INTRODUCTION

The Chinaman scores in the way of detailed work, his mind is concentrated on one sole object — how to extract the greatest pecuniary value out of the soil. With that object he tends each individual plant with a special care. Years of assiduous study have taught him just when to apply the water to tomatoes, just when the beans should be banked up, and all kinds of little devices for securing early crops.

*Argus, 10 March 1914.*

As anthropologist Helen Leach has observed, vegetable gardening, or kitchen gardening as it is also termed, is perhaps the most widespread form of gardening in the world, and has been practised by all but a few traditional hunter gatherer societies. It is an activity as ancient as sowing grains or raising livestock.¹ For Leach, there is a continuum between small-scale horticulture and large-scale agriculture; the distinguishing feature of horticulture is that plants are treated individually.² She argues that the long running debate on the origins of food production and the domestication of plants and animals has been conducted from the perspective of European-style agriculture, neglecting the role played by gardening in the development of food production systems in non-Western cultures.³

The focus of this study is on gardening in its commercial form, generally termed market gardening in Europe, Australia and New Zealand, or truck farming in North America. Market gardening can be seen as a subset of commercial horticulture, which is itself a subset of the broader agricultural industry and encompasses the cultivation of fruit, vegetables and herbs for food and medicinal purposes, as well as flowers, ornamental plants and trees for aesthetic enjoyment. It is distinguished from more specialised branches of horticulture such as orchards and vineyards by the wide variety of crops cultivated, including vegetables, herbs, and

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¹ Helen Leach, *1,000 Years of Gardening in New Zealand*, Auckland, 1984, p. ix.
² Ibid., p.4.
sometimes fruit and flowers. More specifically, this study focuses on the contributions made by Chinese immigrants to market gardening in Australia and New Zealand. The thesis acknowledges that market gardening occupies an awkward space within the agricultural industry – a number of writers have called it ‘the Cinderella industry’. But as Leach notes, growing vegetables continues to be an important source of food for cultures around the world, and is a subject that deserves to be studied seriously. The focus here is on the transnational and cross-cultural transfer and adaptation of market gardening skills, knowledge and technologies as evidenced in the important role that Chinese immigrants played in the market gardening industries in Australia and New Zealand from the 1860s to the 1960s.

This study of Chinese market gardening is informed by, and located within, three bodies of scholarship. The conceptual framework is drawn from work on technology transfer and the diffusion of innovation; the approach is shaped by advocates and examples of multidisciplinarity in the social sciences; and the findings regarding Chinese market gardening in Australia and New Zealand are located within, and contribute to, studies of the Chinese diaspora. This introduction examines these bodies of scholarship, surveys the sources used in the study, and provides an overview of the structure of the thesis.

TECHNOLOGY TRANSFER

This study concerns the transfer of an agricultural technology developed over many centuries in China to two British colonies which share a common heritage of European market gardening. It draws on theoretical approaches to the study of technology transfer and diffusion of innovation, particularly in the field of agriculture. The major strands of the literature on

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technology transfer which inform this work are firstly those studies which take a historical and contextual perspective, such as studies of the eighteenth and nineteenth century transfer of technology from industrialised nations such as England to less industrialised colonies such as America and Australia, which place the process of adoption of an innovation or technology within the context of the political, social and economic characteristics of the host society. Secondly, this thesis is informed by studies specifically addressing the transfer of agricultural technologies from less industrialised to more industrialised countries. Thirdly, it is influenced by recent approaches to technological change which see it as a two-way process, involving ongoing adaptation of innovations to suit local conditions in the host country.

The field of international technology transfer is large and diverse, covering a cross-section of disciplines including sociology, anthropology, history, political economy and business studies. Technology transfer involves the transmission of physical products and processes as well as knowledge and information, and is variously defined according to the discipline involved. The definition adopted in this thesis is the definition introduced by Darwin Stapleton in his seminal work on international technology transfer. Stapleton defines technology transfer as an attempt to take work processes, methods and concepts from one nation or culture and establish them in another. Thus technology transfer involves the emigration of skilled people, or technically skilled people learning new skills elsewhere and bringing them back to their homeland. They may be individuals, groups or cultural minorities.

Integral to ideas about technology transfer is the analytical framework of the diffusion of innovation. This has emerged as an integrated body of concepts which seek to explain the processes of developing an innovation, the characteristics of the innovation and of potential

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adopters, and the decision making processes and channels of communication involved. A major contributor to diffusion of innovation theory is Everett Rogers, who links macro-levels of system change to micro-level units of adoption, and focuses on the operation of individual behaviour, interpersonal relations and social networks in explaining technological change. He argues that diffusion of innovation is about change, uncertainty and risk taking and highlights the importance of interpersonal networks and channels of communication in facilitating the adoption of new ideas.

When discussing theories of technology transfer, two basic dimensions emerge. The first is the process or temporal dimension, which seeks to explain the processes involved in the adoption of an innovation. The second is the contextual or structural dimension, which examines the relationships between an innovation and the society in which it arises, or the society to which it is transferred. Many studies attempt to synthesise both these dimensions, while others emphasise one or other depending upon the discipline of the author.

From the temporal perspective, Stapleton emphasises that technology transfer is not a single, unidirectional event. It often involves a complex process of multiple transfers over time, and continual adaptation and modification to fit into the economy and society of the host country. Later writers such as Edward Beatty reinforce this point, observing that processes of technology transfer are neither unilinear nor deterministic, but vary widely across time, regions and sectors. They represent multiple pathways and interactions, between stages and

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11 Stapleton, *Transfer of Early Industrial Technologies*, p. 27.
between receiving and originating countries.\textsuperscript{12} Thus, following Stapleton, scholars increasingly see technological change as an interrelated series of incremental developments or adaptations, which emerge from a specific historical context. Arnold Pacey, for example, interprets technological change as an ongoing dialectic in which the recipients of new knowledge or techniques interrogate them on the basis of their own experience and knowledge of local conditions, and adapt them to meet their specific needs.\textsuperscript{13}

Stapleton also takes a contextual approach in his study of the transfer of early industrial technologies to America. He identifies the key factors influencing the adaptation of an introduced technology: human resources (knowledge and skills); appropriate natural resources; economic resources (raw materials, labour, capital, markets); appropriate industrial conditions (the presence of supportive industries necessary for the introduced technology); and, social and cultural conditions. In Stapleton’s model the factors influencing the success of technology transfer are, firstly, the social and cultural contexts of the originating and recipient nations and their receptivity to technological innovation. The greater the commonalities between the two cultures, the more successful the transfer is likely to be. The second factor is how well established the technology is in the originating country. The most successful transfers involve technologies which have been proven over extended periods. The third factor is the degree of economic support in the receiving country, including the economic vision of an individual transferor or entrepreneur, and support from governments, bankers or private businesses.\textsuperscript{14}

\begin{itemize}
\item \textsuperscript{13} Arnold Pacey, \textit{Technology in World Civilisation}, Cambridge Massachusetts, 1993, p. viii.
\item \textsuperscript{14} Stapleton, \textit{Transfer of Early Industrial Technologies}, pp. 28–30. See also Warwick Pearson, ‘Water power in a dry continent: the transfer of watermill technology from Britain to Australia in the 19\textsuperscript{th} Century’, PhD Thesis,
Recent conceptual approaches emphasise the contextual aspects of technology transfer. They maintain that technological change is shaped not only by technological antecedents and economic and technological constraints and incentives, but by an interrelated network of technical, economic, social, environmental and political factors that mediate the relationship between imported knowledge and recipient society. Thus technology is seen as an integral part of society and social forces.\(^{15}\)

Turning to the application of theories of technology transfer to history, there are several studies relevant to the study of Chinese market gardening. In his study of nineteenth-century Mexico, Beatty develops a conceptual model for explaining the diverse historical experiences of technology transfer in recipient countries, ranging from the stimulation of domestic economic growth and innovation on the one hand to technological dependence on the other. He considers the two interrelated dimensions of technology transfer. The temporal dimension charts the chronological development of a transferred technology through various stages: decision, acquisition, innovation and diffusion. The contextual dimension considers the network of technical, economic, social, environmental and political factors that mediate the relationship between imported knowledge and the recipient society.\(^{16}\) As Beatty notes, the latter dimension is particularly relevant in cases where the contextual environments of the originating and receiving countries differ markedly.\(^{17}\)

Most studies of technology transfer have focused on transfer from technologically developed to less developed countries in more recent times, or from colonial power to the colonised. In contrast, this study explores the experiences of Chinese migrants as the bearers

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\(^{15}\) Beatty, ‘Approaches to technology transfer’, pp. 170, 183.
of agricultural technology from southern China to two closely related but distinctive social contexts in the southern hemisphere. Chinese in Australia and New Zealand were minority groups in societies where their culture and technology were marginalised. Given the significant differences between the environment from which the bearers of technology originated and the recipient environments, the contextual approach adopted in recent studies of technology transfer provides a useful framework for interpreting Chinese market gardening in Australia and New Zealand. It positions Chinese market gardeners and the agricultural technologies they brought with them within the particular environmental, social and economic contexts they encountered and allows us to explore how the course of market gardening was shaped by such factors as political and legal institutions as well as organisational structures.

The studies of Beatty and Stapleton provide useful models of the application of contextual and historical approaches to technology transfer. Both writers focus on ‘hard’ technology rather than agriculture, for example glass making, cigarette and sewing machine manufacture in Mexico, and railroad and canal building and iron ore smelting in the United States. There is, however, an extensive body of literature on technology transfer in agriculture, in particular critiques of the successes and failures of the ‘green revolution’ of the twentieth century and its geopolitical implications.18 It is not proposed to survey this literature in detail here. However, a major theme in these critiques which is relevant to this study is the shift in emphasis from a one-way transfer of western scientific knowledge and expertise from so-called ‘developed’ nations to developing nations towards greater recognition of indigenous

18 While access to new high yielding, disease resistant varieties of staple cereals and inputs of fertilisers and pesticides increased agricultural production in some areas, the results were unevenly spread and acted to increase inequalities, further impoverishing the lowest income groups. See for example Gordon Conway, One Billion Hungry: Can We Feed the World?, Ithaca, London, 2012; Keith Griffin, The Political Economy of Agrarian Change: An Essay on the Green Revolution, London, 1979; and, Keith Hoggart, Agricultural Change, Environment and Economy: Essays in Honour of W. B. Morgan, London, 1992.
knowledge and technology, and a bottom-up approach, involving local farmers in the design and evaluation of field trials. Influenced by post-colonialism, this shift reflects increasing recognition of farmers as experimenters and innovators, who select appropriate technologies or crop varieties according to their own priorities and make continuous adaptations to changing local conditions. This understanding accords with contemporary approaches to technological and cultural change in the social sciences, which see these processes as dynamic, a series of inventions and reinventions.

There are two studies of technology transfer in agriculture of particular relevance to this study. V. W. Ruttan and Yujiro Hiyami survey models of technology transfer adopted in disciplines ranging from anthropology, sociology and geography to economics, noting their different emphases. Anthropologists and sociologists, for example, tend to focus on sociocultural factors while economists emphasise economic variables. The authors argue that while these models are useful for the purposes for which they were designed, they are not relevant to transfer of technology in agriculture. They emphasise the key role that ecological and environmental factors play in the success of technology transfer in agriculture and the need to incorporate mechanisms of local adaptation.

The second study is Judith Carney’s on the transfer of rice cultivation technology from Africa to the southern United States by African slaves, which takes a cross-cultural and historical approach. Carney analyses the spatial and land management parameters of traditional west African rice cultivation, then charts the introduction of this technology on


20 Ruttan and Hayami, ‘Technology transfer and agricultural development’, p. 121.
plantations run by slave labour in South Carolina.²¹ Her paper contributes to the recent critical reappraisal of the role of slaves in the plantation economy, showing that slaves contributed agronomic expertise as well as skilled labour, in particular their mastery of tidal rice cultivation. She demonstrates a convergence of different knowledge systems, for example of plant species, cultivation strategies and water control, and their recombination into new forms. She concludes: ‘As Africans and Europeans faced each other in new territory under dramatically altered and unequal power relations, the outcome was diffusion, technological innovation and novel forms of labour organisation.’²²

The key insights of these studies that can be usefully applied to the current research are firstly that a given technology or agricultural system is not transferred unchanged, but undergoes adaptation to local conditions – environmental, social, cultural and economic. This understanding is reflected in the chapter structure of this thesis, which is outlined below (pp. 43–4). Secondly, these studies highlight the dynamic nature of technological change and the two-way interactions that occur between different knowledge systems as they converge in the host country. Finally, these studies underscore the need for a multidisciplinary approach to the study of Chinese market gardening, in particular the need to place its development in a cross-cultural and historical context.

**MULTIDISCIPLINARY APPROACHES**

Studies of technology transfer are multidisciplinary, and multidisciplinary approaches are also central to studies of the Chinese diaspora. In addition, the sources available for the

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²² *Ibid*, p. 35.
study of Chinese market gardening in Australia and New Zealand are very diverse, heightening the need for a multidisciplinary approach in this thesis. This study therefore draws particularly on recent multidisciplinary developments in archaeology, material culture studies, human ecology and environmental and cultural history. Recent debates in historical archaeology emphasise the importance of multidisciplinary approaches incorporating historical, archaeological and anthropological evidence as well as oral testimony. These debates address such issues as the relationships between material and documentary evidence; the relative weights that should be assigned to each body of data; and, strategies for combining and interpreting this disparate evidence. As Peter Lape argues in his study of archaeology and history in Southeast Asia, combining various strands of evidence can yield more interpretive power than if they were used individually.

These debates are paralleled in the related field of material culture studies. A central debate concerns the extent to which objects can be interpreted as metaphors or symbols. The art historian Jules David Prown makes a plea for constructive collaboration between what he describes as ‘hard’ material culturalists (who focus on the physical reality of artefacts and their material form) and ‘soft’ material culturalists (who read artefacts as part of the language through which culture is communicated). He concludes that reality probably lies neither solely

in the artefact itself nor in the culturally conditioned mind of the perceiver. Another debate is over the degree to which objects can be used as sources in their own right rather than ‘supplements’ to documentary evidence. These approaches to material culture share an understanding of the complex nature of objects as sources, their multiple uses and functions, and the role of the researcher in discovering and deciphering complex layers of meaning. There is also a shared concern with context, and the complex interactions between people and things. This reflects the influence of anthropology and social history, with their interest in social relationships and the daily lives of ordinary people.

Another debate in historical archaeology concerns the relationships between culture, ethnicity and material culture. The culture-historical framework which dominated archaeological analysis for most of the twentieth century was based on a monolithic view of culture as a bounded, uniform entity which could be directly correlated with particular ethnic groups. Cultural differences between groups and individuals could therefore be measured in terms of similarities and differences between assemblages. The advent of the 'New Archaeology' in the 1960s was influenced by developments in the social sciences and history, reflecting a move toward more multidisciplinary approaches. It introduced a systemic view of culture and a functionalist explanation of social processes. This approach emphasises the adaptive role of cultural norms and sees culture as a differentiated social system mediating

29 For example, David Kingery observes that the uses and functions of artefacts are multiple and intertwined, and much of their meaning subliminal and unconscious. Kingery, ‘Introduction’, p. 1.
30 Tauer Wass, ‘Teaching History’, p. 2; and, Harvey, History and Material Culture, p. 2.
relationships between humans and their environment.\(^{32}\) Again influenced by developments in the social sciences and history, in the 1970s there was renewed interest in concepts of ethnic identity and processes of acculturation and assimilation, interpreting ethnicity as a political and economic tool to advance the group's welfare.\(^{33}\)

More recent conceptualisations of ethnic identity stress its fluidity and contingency.\(^{34}\) Jane Lydon’s study of the Chinese in the Rocks in Sydney, for example, highlights the complexity of cross-cultural encounters, which cannot adequately be explained in terms of ethnicity as allegiance to a bounded group. Lydon argues for more sophisticated approaches towards cross-cultural exchange which consider the dynamic role of material culture in creating, maintaining and transforming culture and explore its strategic and symbolic meanings.\(^{35}\) Similarly, Grace Karskens observes that material objects have special significance for migrants in a new land, linking them to who they were and who they are becoming as they adapt to a new society and environment.\(^{36}\) These approaches have influenced this study in its use of material culture and archaeological evidence in addition to documentary evidence and in the way in which this evidence is placed in the context of dynamic processes of cross-cultural exchange. This evidence enriches our understanding of the lives of individual Chinese market gardeners, including their agricultural practices, the work organisation of their enterprises, their interactions with Europeans and processes of technological change in market gardening. It also sheds light on the more universal experiences of Chinese immigrants and the


\(^{34}\) Lydon, *Many Inventions*, p. 15.


cross-cultural connections, exchanges and transformations which are so much part of the immigration process.

The ‘New Archaeology’ has been criticised more broadly since the 1980s. In his survey of approaches to interpretation in archaeology, Ian Hodder explores the challenges posed to archaeology by a focus on cultural meaning, the actions of individuals and historical context. He argues that material culture is mediated through ideas, beliefs and values; that the individual needs to be part of theories of material culture and social change; and that archaeology's closest ties are with history, in particular the Annales School. Influenced by the methodological debates in history of the past few decades, particularly structuralism, feminist and post-colonial critiques and public history, Hodder emphasises cultural meaning and the simultaneous maintenance and active ‘invention’ of cultural traditions, echoing Lydon. This approach to cultural change is a key influence in this study; it has particular relevance to discussions of conservatism, technological change and innovation in Chinese market gardening.

Particularly in respect to Hodder's Archaeology as Long-term History, published in 1987, Lydon criticises his adoption of the Annales approach in his privileging of the long term and his neglect of the role of the short term, the event and human agency. In Hodder's other work such as Reading the Past, first published in 1986 and updated in 1991, this neglect of human agency is not so evident. While Hodder does retain a bias towards the long term, he argues for a renewed emphasis on the individual in archaeological interpretation, and the

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38 Ibid., pp. 182–3.
integration of both meaning and agency into archaeological theory.\textsuperscript{40}

As Hodder points out, history does not consist only of conceptual structures – ideas, beliefs and values. Environmental and technological constraints as well as social and economic relations also structure change. In Hodder’s words they 'contribute to the historical potential for social transformation, and they provide the resources with which change can be built'.\textsuperscript{41} His inclusion of the significance of environmental constraints is of particular relevance to the aspects of this study concerned with the ways in which Chinese market gardeners adapted their horticultural techniques to the wide range of environments they encountered in Australia and New Zealand; the modifications they made to the landscape; and, the impact of their activities on the environment. Thus this study draws on environmental perspectives in its exploration of the cultural landscapes created by Chinese market gardeners in Australia and New Zealand.

The concept of cultural landscape has been the subject of much scholarly debate in recent years, in particular over the dichotomy that it sets up between 'nature' and 'culture'.\textsuperscript{42} In its broadest sense cultural landscape refers to any system of interaction between human activity and natural habitat, including the land use practices, beliefs and traditions of people living within a landscape.\textsuperscript{43} The definition of cultural landscape adopted in this study is similar to that used by Keir Reeves in relation to Chinese gold mining sites: the physical evidence of the modified environments created as a result of Chinese market gardening activity, together

\textsuperscript{40} Hodder, \textit{Reading the Past}, p. 9.
\textsuperscript{41} \textit{Ibid.}, p. 12.
\textsuperscript{42} See for example Sandra Pannell, \textit{Reconciling Nature and Culture in a Global Context? Lessons from the World Heritage List}, Research Report No 48, Cairns, 2006. Pannell argues that the introduction of the category of cultural landscape introduced by UNESCO in 1992 is still centred on nature and culture as separate and opposed domains, and privileges western world views. In her view there has been little attention paid to the social, environmental and economic effects resulting from this dualism, or to the complexities of the conflicts they create, particularly for indigenous peoples.
with relevant visual, oral and documentary material.\textsuperscript{44}

Understanding of environmental factors is informed by the natural sciences. Human ecology is the branch of the natural sciences most relevant to this study, as it adopts an interdisciplinary approach in its attempts to integrate the social, cultural and natural environments as determinants of human behaviour, considering the 'environment' in its broadest sense. In his study of the interrelationships between environment, development and agriculture, Bernhard Glaeser surveys the various models of the relations between people and the environment that have been developed in human ecology. These range from static models which do not take account of change through time, to dynamic models which incorporate more complex multilevel systems and continuous feedback processes between human behaviour and the natural environment. Glaeser argues that many models are not holistic and do not deal adequately with the role of human beings in society. He advocates a social science oriented approach which takes account of the cultural dimensions of human behaviour, including the socioeconomic, psychological, political and legal factors that influence adaptive decisions.\textsuperscript{45} This is the approach adopted in this thesis.

Philip Kuhn's study of the Chinese diaspora and the community structures that Chinese migrants developed overseas is an example of a multidisciplinary approach which attempts to incorporate an historical dimension into human ecology.\textsuperscript{46} He borrows concepts from history and human ecology. From his perspective, social structure and culture is part of the adaptive

\textsuperscript{44} Keir Reeves, 'Tracking the dragon down under: Chinese cultural connections in gold rush Australia and Aotearoa New Zealand', \textit{Graduate Journal of Asia-Pacific Studies}, Vol. 3, No. 1, 2005, p. 50.
process, and the ecosystem is the total interaction of a population with the environment. Kuhn proposes an historical ecology – a narrative dealing with migrants’ adaptation to changing environments over historic time on a worldwide scale. Although he does not address the methodological implications of his approach from the perspective of the discipline of history, his approach has most in common with the Annales School, in particular the influential work of Fernand Braudel with his identification of temporal structures of historical change and emphasis on the longue durée, the geohistory of the relationship between humans and their environment. Recently historians have criticised Braudel's work on a number of grounds, in particular his tendency towards determinism and lack of consideration of human agency and mentalités, underlying structures of thought and belief. However, the later generation of Annales historians have moved more towards exploring the history of mentalités, and the School has been influential in their emphasis on 'history from below', focusing on the lives, thoughts and actions of ordinary men and women. This study is influenced by both these elements of the Annales approach. It presents Chinese market gardeners as active agents in the history of Australia and New Zealand, while placing the development of market gardening in these countries within the broader contexts of the Chinese diaspora, and longer term processes of social and environmental change.

Kuhn interprets economic, political and social structures as adaptive responses; in historical terms he is closer to Braudel’s moyenne durée or medium term. Kuhn’s approach can be criticised on similar grounds to Braudel’s with its emphasis on institutional forms, its

51 Ibid., p. 127. See also Last, ‘The nature of history’, p. 142.
tendency towards determinism and lack of consideration of underlying subjectivities and cultural meanings. Nevertheless, Kuhn's approach provides a useful conceptual framework for this study, which focuses on the adaptations made by Chinese gardeners in response to the varied physical and social environments they encountered in Australia and New Zealand. The elements of Kuhns' approach which can be most profitably combined with approaches from other disciplines are its accommodation of geographically dispersed populations and ongoing reciprocal exchanges of information, people, culture and resources. Another element is the concept of 'recombinant culture', an adaptive response to the social and environmental conditions of a new country, in which cultural traits are combined and recombined in novel ways.\(^{52}\) This accords with recent conceptualisations of culture as dynamic and manipulable, and cultural exchange as an ongoing two-way process.\(^ {53}\)

Closely related to the field of human ecology is that of environmental history. In the last few decades environmental historians on both sides of the Tasman have regarded Australia and New Zealand as ecological and social laboratories for studying the relations between ecology and history.\(^ {54}\) They have focused on the impact of human activity on the environment, in particular the impact of the introduction of exotic plants and animals and pests on indigenous flora and fauna and the history of extinctions.\(^ {55}\) They have also turned their attention to the moral and social dimensions of European colonisation, exploring the ways in which landscapes have been used and abused, and contrasting indigenous and European

\(^{52}\) Kuhn, 'Toward an historical ecology of Chinese migration', pp. 69, 84–8.
\(^{53}\) As seen in the work of Lydon and Karskens in historical archaeology, discussed earlier in this section, and the work of Stephen Vertovec in the field of transnationalism, discussed in the following section.
\(^{55}\) An important recent example is Tim Flannery, The Future Eaters: An Ecological History of Australasian Lands and People, Sydney, 1994.
attitudes to the land. For example, they have highlighted the ideals, largely unquestioned, inherent in the nineteenth-century British colonial project. These included: the pioneering desire to ‘improve’ or ‘develop’ foreign lands; the industrial and agrarian ideals of progress and the yeoman farmer; the perceived abundance and inexhaustibility of the natural resources of these new lands; and, the economic and political imperatives of exploiting them, to meet the needs of the expanding British Empire. A key theme has been the fundamental mismatch between the expectations of European settlers and the ecological limitations of the new environments they occupied. At the same time, recent scholarship has challenged the simplistic narrative of environmental destruction, human greed and disregard for nature during the colonial period, presenting a more nuanced history. This highlights the minority voices of politicians, scientists, academics and individual landowners expressing their appreciation of the natural environments of Australia and New Zealand and advocating measures for their conservation.

The key elements of these multidisciplinary approaches that are applied to this study are: the use of material culture evidence in addition to traditional documentary sources; the depiction of Chinese market gardeners as active agents in history; and, the placement of the

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57 See for example for Australia, Frawley, ‘Evolving visions’, p. 55; and for New Zealand, Pawson and Brooking, Environmental Histories of New Zealand, pp. 5–7.

58 For example Tim Bonyhady outlines how government authorities in Australia introduced legislation to protect the environment even though they failed to implement it effectively, bowing to pressure from colonists concerned with short-term gain. Tim Bonyhady, The Colonial Earth, Melbourne, 2000, pp. 2–5, 11. See also J. M. Powell, Environmental Management in Australia: Guardians, Improvers and Profit, Melbourne, 1993, pp. 100–101, 113–16. Similarly in New Zealand the State took active measures to conserve natural resources from the 1920s, although this was largely the work of a few individuals whose efforts typically ran counter to the mainstream development ethos. Michael Roche, ‘The state as conservationist, 1920–60: ‘wise use’ of forests, lands and water’, in Pawson and Brooking, Environmental Histories of New Zealand, pp. 183–99. See also Paul Star and Lynne Lochhead, ‘Children of the burnt bush: New Zealanders and the indigenous remnant, 1880–1930’, in Pawson and Brooking, Environmental Histories of New Zealand, pp. 119–35.
development of market gardening in Australia and New Zealand within the broader contexts of
the Chinese diaspora and longer term processes of social and environmental change. In
addition, this study presents processes of technological change and cross-cultural exchange as
dynamic and manipulable, a series of adaptations.

**CHINESE DIASPORA STUDIES**

Drawing on the conceptual framework provided by the literature on technology
transfer and on multidisciplinary approaches in the social sciences, this thesis contributes to,
and is located within, the scholarship on the histories of the overseas Chinese. There are, for
the purposes of this thesis, three strands of relevant literature. The first consists of studies of
the diaspora of Chinese people to Southeast Asia, North America and Australasia from the
mid-nineteenth to mid-twentieth centuries. The second is the historiography of Chinese
migration to Australia and New Zealand. The third strand consists of studies which
specifically address Chinese market gardening in Australia and New Zealand.

**The Chinese diaspora: concepts and approaches**

Any transnational study of the Chinese in Australia and New Zealand in the nineteenth
and twentieth centuries must be placed in the context of the wider diaspora of Chinese to
Southeast Asia, North America and Australasia which occurred from the mid-nineteenth
century. The four-volume anthology edited by Hong Liu, *The Chinese Overseas*, provides a
useful framework for identifying key developments in scholarship on the overseas Chinese.\(^{59}\)
It includes contributions from a variety of disciplines, and ranges from broad global studies to
studies of individual nation states.

In his survey of the extensive historiography of Chinese emigration over the last two

hundred years, Liu identifies three broad themes: the diverse patterns of adaptation in a wide variety of political and geographic settings; the importance of ongoing links with native place; and, the intricate networks connecting overseas Chinese with their home communities. Liu notes that a multidimensional and multidisciplinary perspective is essential for exploring these themes and processes, and can contribute to deeper understanding of the Chinese diaspora and international migration generally, including issues such as identity, ethnicity, multiculturalism and cosmopolitanism. These themes and processes are taken up in this thesis; they can be usefully applied to the study of Chinese market gardening in Australia and New Zealand.

One focus in Liu’s anthology is on Chinese transnationalism, including the multi-stranded networks of social, political and economic relationships linking countries of origin and countries of settlement, the high mobility of Chinese communities, and the flexible strategies they adopt in negotiating their position within their ‘host’ societies. In his contribution Adam McKeown criticises the fragmentation created by nation-based perspectives and ‘locally or culturally bounded depictions of social groups’, arguing that an understanding of Chinese migration needs to incorporate global perspectives on migrant networks, flows and connections.

In adopting transnationalism as a theme, the anthology reflects broader developments in the scholarship on international migration. Recent scholars have interpreted this large-scale movement of people in terms of transnationalism, a phenomenon defined by Stephen Vertovec as cross-border relationships, patterns of exchange, affiliations and social formations spanning

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nation states. Vertovec notes that the recent growth of interest in transnationalism among social scientists parallels increasing interest in globalisation as new forms of mobility, communications and social organisation break down the barriers between social and geographical space. He highlights the adaptiveness and malleability of migrant communities, a valuable resource for dealing with ever-changing local or global situations. In accord with these trends, since the 1980s there has been a move away from national towards more transnational forms of history, which seek to make comparisons between nations and also elucidate the interactions between them. Historians such as John Fitzgerald, Marilyn Lake and Henry Reynolds, and environmental historians Joe Powell, Ian Tyrell, Libby Robin and Tom Griffith exemplify this trend.

Liu’s collection also reflects the shift which has occurred in conceptualising international migration over the last few decades, from a focus on assimilation as a unidirectional, one-sided process, to an appreciation of the complexity and malleability of migrant identity. The papers by Wang Gungwu and Ling Chi Wang, for example, critique assimilationist models and emphasise the multiple identities that Chinese overseas assume. This perspective accords with the approaches of archaeologists and historians working on Chinese sites in Australia, such as Lydon and Karskens, whose work has been discussed above. Another recurring theme is the way key institutions shaped diasporic Chinese communities, notably the family and clan networks which were the foundation of traditional

63 Ibid., p. 5.
Chinese society and the voluntary associations and business and trading networks which provided economic and social support for new immigrants.66

The paper by Zhu Guohong on the historical demography of Chinese migration places immigration to Australia and New Zealand in perspective. During the peak period of Chinese emigration between 1851 and 1875 approximately 55,000 Chinese people migrated to Australia and only 5,000 to New Zealand, compared with 645,000 to Southeast Asia and 200,000 to North America. Overall, between 1801 and 1900 some 2.35 million people emigrated from China.67

Complementing broad global studies are regional and national studies of immigrant Chinese communities. The focus in Liu’s collection is mainly on Southeast Asia and North America, but includes several papers on Australia and New Zealand. These highlight the contrasting historical experiences of Chinese immigrants in Southeast Asia and the colonial states of North America, Australia and New Zealand. Chinese migrants to Southeast Asia from the early seventeenth century included many merchants and traders who enjoyed the patronage of local rulers and faced little competition from indigenous populations. Those who migrated to North America, Australia and New Zealand in the nineteenth century were predominantly peasants and labourers, and they encountered a raft of legislative and administrative restrictions aimed specifically at Asians.68 Institutional racism was a major factor in the evolving identities and occupational patterns of immigrant Chinese, and their relationships

with national and state authorities. It was not until the latter half of the twentieth century that these discriminatory institutions were gradually dismantled and replaced by policies based on multiculturalism and greater tolerance of ethnic diversity.

The key elements of the scholarship on the overseas Chinese which inform this study are firstly the importance of ongoing links with clan and native place and the complex networks maintained between overseas Chinese and their home communities, and secondly their high mobility. This study also highlights the adaptiveness of overseas Chinese communities and the flexible strategies they adopted in negotiating their relationships with their host society. Most comparative studies of the Chinese diaspora have focused on Southeast Asia and to a lesser extent North America. With its transnational perspective, this study contributes to broader understanding of Chinese migration, settlement and cross-cultural exchange in the Pacific region and processes of technology transfer.

The Chinese in Australia and New Zealand

Much has been written about the demographic and social aspects of Chinese immigration to Australia and New Zealand, with a focus on discriminatory European responses to Asian immigrants and the administrative and legislative restrictions imposed upon them. These studies tend to focus on the gold rush period and Chinese mining activities, rather than the range of occupations which Chinese entered after the gold rushes, although Australian and New Zealand Chinese historiography has broadened in recent years.


In the past twenty years, historians in Australia and New Zealand have extended their inquiries beyond the stereotypes of Chinese as sojourners and gold seekers, market gardeners or storekeepers, revealing more complex social and economic relationships, both within the Chinese community and between Chinese and European communities. They have also moved from depicting the Chinese as passive victims of European prejudice and a multitude of legal and administrative restrictions, to depicting them as active agents in the history of Australasia. Some of these studies are discussed below. They provide a context, and also a source of inspiration, for this study.

A number of regional and local histories of Chinese communities in Australia have been produced, revealing the diversity of the experiences of Chinese migrants. They include Cathie May's history of the Chinese in Cairns, Jan Ryan's history of the Chinese in Western Australia, Janis Wilton's history of the Chinese in regional New South Wales and Kathryn Cronin’s study of the Chinese in Melbourne. Diana Giese has recorded the story of the Chinese in Darwin, which had a proportionally larger Chinese population than other cities. Diana Giese has recorded the story of the Chinese in Darwin, which had a proportionally larger Chinese population than other cities. Shirley Fitzgerald's study of the Chinese community in Sydney is another important contribution, charting complex processes of cultural interaction and change. Lydon and Karsken's studies of the Chinese in the Rocks in Sydney focus at a more local level, with a greater wealth of detail. The literature also includes studies of Chinese activities in specific industries such as gold and tin mining, for example Helen Vivian's study of Chinese mining

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sites in Tasmania. C. F. Yong's pioneering study of the Chinese community in Australia between 1901 and 1920 documents the growth of Chinese business, political and social networks, both within Australia and internationally, in response to the White Australia policy.

There have been some comparative studies of Australia and North America, which share common historical experiences of gold rush, large-scale Chinese immigration and European hostility towards Chinese people. They include Andrew Markus' study of the development of restrictive immigration policies in Australia and North America and David Goodman's study of the gold rushes in Australia and California. More recently, John Fitzgerald's *Big White Lie* explicitly places the history of the Chinese in Australia in a transnational context, furthering our understanding of the importance of transnational business, political and social networks in the histories of both Australia and China. Fitzgerald documents the crucial role that Chinese organisations and businesses in Australia played in the modernisation of China in the early-twentieth century. His book reveals the dynamism of Chinese Australians, their openness to Western political ideas and the flexibility of their organisations as they evolved in response to business successes and failures, tumultuous political changes in China and institutional racism in Australia. Another example is Marilyn Lake and Henry Reynolds’ *Drawing the Global Colour Line*, a global history of racial politics between the late-nineteenth and early-twentieth centuries. The authors demonstrate how Australia was part of an international exchange of ideas, people and publications between ‘white men’s countries’ dedicated to maintaining white racial dominance, and played a leading

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79 Lake and Reynolds, *Drawing the Global Colour Line*. 

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role in the development of defensive racial policies.

One of the few comparative studies of the Chinese experience in Australia and New Zealand is a paper by Keir Reeves which highlights the similarity of the cultural landscapes created by gold discoveries in Victoria and Otago. Reeves explores the transmission of social customs among the Chinese on the goldfields of Australasia and Chinese-European interactions. He finds evidence of more interaction, acceptance and cooperation at an individual and community level than broader societal or institutional racism would acknowledge, and a complex web of social relationships, involving both cooperation and hostility. His conclusions are supported by Julia Bradshaw’s study of the Chinese on the West Coast of New Zealand’s South Island. These studies provide an inspiration for this study, which extends this focus to Chinese market gardening in the post-gold rush era, considering market gardens as an important locus of cross-cultural exchange. They also open up the possibility of exploring relationships between Chinese and indigenous people as well as between Chinese and Europeans.

James Ng's three-volume study places the history of the Chinese in New Zealand in the context of the Chinese diaspora across Southeast Asia and the Pacific in the nineteenth century, and focuses in most detail on the gold rush period. However, he also traces the post-gold rush movement of Chinese into other occupations, mainly market gardening, storekeeping and laundering. Charles Sedgwick's social history of the Chinese in New Zealand explores the development of organisational structures within the Chinese community,

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revealing both persistence and change within a complex economic and social milieu. He reveals the Chinese as active agents in their own history, documenting a range of responses including innovation, fragmentation and collective action, depending on particular situations. Nigel Murphy's research on the Chinese in New Zealand has focused on the legislative restrictions enacted against them, in particular a poll tax.

A recent regional study in New Zealand is Bradshaw's history of the Chinese on the West Coast of the South Island, *Golden Prospects*, mentioned above. In this work Bradshaw captures the nuanced interactions between Chinese and Europeans. She stresses the complexities of these engagements, which ranged from business and marriage partnerships at one end of the spectrum to overt racism at the other; more commonly it was an uneasy coexistence. She also highlights how Chinese people negotiated their position with colonial authorities, for example making appeals to mining wardens or the court system to uphold their water rights or seek justice in the wake of racist attacks.

Manying Ip has written extensively about Chinese-New Zealanders. In her contribution to the anthology edited by Hong Liu, she surveys the evolution of the Chinese community in New Zealand in the context of changing immigration policies and the coping strategies they adopted, in particular the key roles played by voluntary associations as well as domestic and transnational business networks. Adopting a human ecological approach similar to that of McKeown, Ip describes the process by which the Chinese who remained after the gold rushes

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entered niche occupations of market gardening and laundering, where they were sheltered from a hostile mainstream society and avoided direct competition with Europeans.

From a historical perspective Ip’s work tends to depict Chinese immigrants to New Zealand, particularly those who arrived during the nineteenth century, as passive victims of institutional racism, with little deeper analysis of the complexities of cross-cultural interactions. For example, in her overview of Chinese immigration to New Zealand she describes early Chinese immigrants as a ‘pitiful stunted “brokenstem” bachelor community for many decades’.87 Her recent publications take a more sociological perspective, and focus on Chinese New Zealanders' relationships with the wider society, including Māori, Pacific Islanders and the wave of Asian migrants who have arrived since 1990. Her study Being Māori-Chinese, based on interviews with seven Māori-Chinese families, spans three generations and sheds light on the social interactions between Chinese market gardeners and their Māori neighbours, particularly during the 1920s and 1930s when both groups were living in rural areas, marginalised from mainstream Pākehā (European) society.88

Together, these studies provide an essential context for understanding and interpreting the experiences of Chinese market gardeners in Australia and New Zealand, in particular for identifying the opportunities and constraints they faced in making a living in new and often hostile physical and social environments. They also highlight the complexities of the social relationships of market gardeners, both within the Chinese community and with the wider European community.

87 Ibid. p. 319.
Chinese market gardening in Australia and New Zealand

This section surveys the literature on Chinese market gardening in Australia and New Zealand and the contribution which the current study makes to it. The geographical coverage in Australia is uneven; the only major studies of Chinese market gardening carried out to date have been in southern and western New South Wales and the Loddon River in Victoria. In New Zealand a major national study of Chinese market gardening has recently been published.

Historians of the gold rushes in Australia have noted the gardening activities of Chinese miners. Zvoncika Stanin and Keir Reeves document Chinese market gardens on the Loddon River, on the Mount Alexander diggings in Victoria, from as early as 1865. Gardening activities supplemented less reliable incomes from mining, and in some cases went on to become larger scale commercial enterprises supplying neighbouring towns. Reeves documents the transition on the Mount Alexander goldfields from mining to a predominantly market gardening economy by the 1880s, and notes that Chinese alluvial mining continued on these diggings much later than on other fields in Victoria, into the 1890s. It is probable this was made possible by the additional income provided by market gardening. In New South Wales Barry McGowan has documented Chinese market gardening associated with the goldfields near Braidwood, Araluen, Jembaicumbene and Mongarlowe in the southeast of the State from the 1870s, as well as market gardens in the Riverina and across western New South

Wales. He notes that dams, water races and irrigation channels supported both mining and market gardening, as a reliable water supply was essential for both enterprises.\(^\text{93}\) Another study of market gardening on the goldfields is the archaeological survey carried out in 1984 by Ian Jack and Katie Holmes on Ah Toy's garden on the Palmer River in far north Queensland.\(^\text{94}\)

Many historians note the significance of the post-gold rush shift from mining into a range of occupations, and the reported dominance of the Chinese in market gardening. McGowan's work in New South Wales extends the focus into the post-gold rush period, and provides a valuable regional survey, documenting the wide spread of Chinese market gardens across the south and west of the State. He reveals market gardening as a prime example of environmental and technological adaptation. His recent publication, *Dust and Dreams: Mining Communities in South-East New South Wales*, uncovers the history of the Chinese and European miners and their families who peopled the scattered mining camps and settlements of the region and prospected for gold, silver, copper and lead.\(^\text{95}\) Another relevant study is Geoffrey Svenson’s thesis on Chinese market gardeners in Milparinka in far north-western New South Wales.\(^\text{96}\)

There have been several smaller scale studies of Chinese market gardening in urban areas, for example in Sydney, Melbourne and Perth.\(^\text{97}\) Awareness of the heritage values of the few surviving market gardens in urban areas has increased in recent years, as shown by the

\(^{93}\) McGowan, 'Chinese market gardens'.


recent debate over the fate of the Chinese market garden in Botany in Sydney, threatened by
the proposed expansion of the adjoining Eastern Suburbs cemetery. A heritage survey of the
Rockdale market garden in Sydney was undertaken by the NSW Department of Infrastructure,
Planning and Natural Resources in 2003. Joanne Monk’s brief history of market gardening in
Victoria is also a useful reference.

In the proceedings of a conference on the Chinese in Australasia held in 2001,
archaeologist Ian Jack remarks that there is a ‘rich heritage and history deriving from the
Chinese pre-eminence in market gardening and irrigation’ and this is in need of ‘urgent
synthesis and fieldwork’. He comments critically on the historians’ blind spot for material
culture. More recently McGowan notes that there has been little detailed research on the
technological and physical dimensions of Chinese agricultural activities.

Recent studies of Chinese market gardening throw light on horticultural techniques,
modifications to the landscape and living standards as well as social and work organisation,
providing a more complex view of an occupation which has too often been stereotyped. Most
early accounts of Chinese market gardening present simplistic images of the Chinese gardener
with his shoulder pole, carrying buckets of water through the garden or hawking baskets of
vegetables in the streets. They provide little detail about Chinese market gardening techniques
or their development over time. By emphasising the role of material culture in reconstructing
past lives, McGowan’s work, for example, opens up rich avenues for further research. Key

98 The gardens were listed on the State Heritage Register in 1999 and by the National Trust of Australia (NSW)
100 Ian Jack, ‘Some less familiar aspects of the Chinese in 19th century Australia’, in Henry Chan, Ann Curthoys
and Nora Chiang (eds), The Overseas Chinese in Australasia: History, Settlement and Interactions, Canberra,
101 McGowan, ‘Chinese market gardens’. 
themes in his study of arid and semi-arid areas in southern and western New South Wales are the physical characteristics and layout of market gardens, cultivation methods and water retrieval, technological adaptation and race relations. He also addresses the concept of Chinese gardeners as pioneers, introduced by Cathie May in her study of the Chinese in North Queensland, and also by Yuanfang Shen in her later book *Dragon Seed in the Antipodes*.102

A key inspiration for this study is Warwick Frost's 2002 paper on Chinese farming activities in Australia between 1850 and 1920, which considers agricultural technology and methods, labour arrangements and interactions with Europeans.103 Like other historians of the Chinese in Australia, Frost challenges the stereotype of Chinese as sojourners rather than settlers. He also challenges the notion that market gardening arrived fully formed from China during the gold rushes and changed little through the rest of the nineteenth century, demonstrating that farming practices evolved over time. He argues that Chinese farming was complex and dynamic, ranging from large-scale commercial agriculture to smaller scale market gardening. In his view the success of the Chinese was due not only to the simple transfer of agricultural skills from China, but to their entrepreneurship and ability to adapt their techniques to the range of environments they encountered in Australia.

As Frost observes, comparisons between the experience of Chinese farmers in Australia and California are valuable, but they are rarely used.104 Apart from a brief mention of Chinese farmers in Tyrell’s *True Gardens of the Gods*, scholars have made little attempt to compare Chinese farming in California and Australia.105 The major study of Chinese farmers

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in California is Sucheng Chan’s *This Bittersweet Soil*. She highlights their organisational skills and technical knowledge, and their adaptiveness and ability to innovate. For example, they developed new markets and obtained capital through mutually beneficial share farming arrangements with European farmers.\(^\text{106}\) In an earlier paper Chan notes that agriculture was one of the main avenues for upward social mobility among Chinese immigrants in nineteenth-century California.\(^\text{107}\)

In New Zealand, historians and archaeologists have also noted the gardening activities of Chinese miners. Neville Ritchie completed a PhD thesis on the excavations and site surveys of Chinese gold mining sites in Central Otago which he oversaw during the construction of the Clutha hydroelectric power scheme in the 1980s.\(^\text{108}\) The excavation program generated a number of publications analysing the sites in more detail, for example the dwellings, avifaunal and faunal remains, and artefacts such as coins, glass containers and bottles and metal containers.\(^\text{109}\) Ritchie records market gardens in Chinese settlements at Cromwell, Lawrence, Arrowtown and Butchers Gully, and also at Round Hill in Southland.\(^\text{110}\) To date only one

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excavation of a Chinese market gardening site has been undertaken in New Zealand, at Carlaw Park in Auckland.\textsuperscript{111}

The recent history of Chinese market gardening in New Zealand, \textit{Sons of the Soil}, by Lily Lee and Ruth Lam, fills a significant gap in the literature.\textsuperscript{112} This well researched publication tells the story of the rise and decline of Chinese market gardening in New Zealand over the last 140 years through the eyes of Chinese market gardening families. Drawing extensively on oral history interviews undertaken around the country, it is rich in personal detail. Nigel Murphy’s history of the Dominion Federation of New Zealand Chinese Commercial Growers, \textit{Success Through Adversity}, is a companion volume to \textit{Sons of the Soil}.\textsuperscript{113} Founded in 1942, the Federation remains the only Chinese organisation in the world catering specifically for commercial growers. Murphy’s study is an important record of the achievements of an organisation dedicated to advocating for the interests of Chinese growers, increasing their knowledge of growing practices and supporting growers and their families. It also records how the Federation built bridges with the European Dominion Council of Commercial Gardeners and fostered cooperation across the ethnic divide.

There are a number of earlier studies of market gardening in the Auckland region, which by the 1970s was the largest area of outdoor vegetable cultivation in New Zealand.\textsuperscript{114} They are written from a geographical and economic rather than historical perspective, and cover the activities of Pākehā, Māori, Chinese and Indian growers. Nevertheless they shed

\textsuperscript{111} Hans Dieter Bader and Janice Adamson, ‘Koong Foong Yuen, The Garden of Prosperity: Final Report on the Archaeological Excavations at Carlaw Park, Auckland’, Auckland, March 2010. During the salvage excavations and site surveys of Chinese gold mining sites in Central Otago undertaken by Neville Ritchie in the 1980s, some test trenches were put through what was believed to have been the Chinese market garden in Arrowtown, but they did not reveal anything. Andrew Piper, personal communication, January 2014.

\textsuperscript{112} Lee and Lam, \textit{Sons of the Soil}.


\textsuperscript{114} Graeme Campbell, \textit{Market Gardening in the Auckland Region}, Auckland, 1981, p. 79.
light on the development of Chinese market gardening in the region, employment of Māori labour, social interactions between the Chinese and other ethnic groups, and the impact of urban expansion. Donald Hunt's thesis examines the market gardening industry in Auckland, comparing and contrasting the agricultural practices of Europeans and non-Europeans, predominantly Chinese and Indians. Long Thing Lee's and Pamela Wai Shing's theses on Chinese market gardening in Auckland also examine farming methods and labour organisation, with brief historical overviews of the expansion of market gardening during the 1940s and 1950s. Graeme Campbell's study provides a broad historical overview of market gardening in the Auckland region, tracing its development from the arrival of Chinese market gardeners in the late-nineteenth century to the expansion of market gardening after World War II. These studies document the shift of market gardening to the rural-urban fringes south of Auckland in the face of suburban and industrial expansion during the 1950s and 1960s. Two other theses provide valuable information on Chinese market gardening in and around Dunedin. They are Geoffrey Stedman’s study of urbanisation on the South Dunedin Flat from 1849 to 1965 and Niti Pawakapan’s study of the Chinese community in Dunedin in the 1920s and 1930s.

Chinese market gardeners played a major role in supplying fresh vegetables and fruit to the wider community for well over fifty years, yet their contribution has often been neglected in the historiography of the Chinese in Australasia. There is a small but growing body of

117 Campbell, Market Gardening.
scholarship addressing Chinese agricultural activities. What is lacking is detailed studies of the technology, methods, labour organisation and social interactions involved in market gardening. In particular there has been limited research into the adaptations Chinese gardeners made to the varied environmental conditions of Australia and New Zealand.

This study aims to address this gap. It brings together existing local and regional studies of Chinese market gardening completed in scattered locations in Australia and New Zealand, from both archaeological and historical perspectives. Drawing on diverse sources, it explores the adaptations which Chinese migrants made to the natural, economic and social environments they encountered in Australasia. Taking Frost’s paper as a starting point, it explores how Chinese market gardening developed over time, and the extent to which Chinese market gardeners adopted advances in European technology. This was a two-way interaction – while Chinese gardeners adapted their skills and technology to novel environments, some Europeans readily acknowledged their superior horticultural skills and were willing to learn from them. By examining the period between 1860 and 1960, this study documents the evolving practices of market gardening and the dynamic cross-cultural exchange that occurred between the Chinese and the wider community, which included both indigenous and non-indigenous peoples.

This study also addresses the economic importance of Chinese market gardening. There are frequent comments in contemporary newspapers that Chinese gardeners supplied the majority of fresh vegetables and fruit to the general community, particularly between the 1880s and 1930s.119 Yet there has been no detailed examination of economic data in order to

119 For example in New Zealand: Wellington (Evening Post, 13 April 1896 p. 2 and 8 August 1901, p. 2); Auckland (Grey River Argus, 27 November 1886, p. 2); and, Hawera (Grey River Argus, 15 November 1916, p. 2). In Australia: Cooktown (Brisbane Courier, 20 October 1903, p. 8); Northern Territory (Northern Territory Times and Gazette, 20 November 1886, p. 2); and, Perth (South Australian Advertiser 5 August
substantiate this, and quantify their contribution. Nor has there been any detailed examination of the social and economic conditions which may have allowed the Chinese to dominate vegetable production.

SOURCES

This study is based primarily on archival research in Australia and New Zealand. Key documentary sources are contemporary newspapers, evidence and reports of government inquiries and other government records. In the nineteenth and early-twentieth centuries royal commissions and parliamentary enquiries were often used to investigate key policy issues, including agriculture, economic development and ‘the Chinese question’. Examples include the New South Wales Royal Commission of Inquiry as to Food Supplies and Prices in 1913 and the New Zealand government's 1929 enquiry into the working conditions of Māori women employed by Chinese market gardeners.¹²⁰ Ongoing digitisation projects in Australia and New Zealand have made searches of early newspapers far less time consuming. Useful secondary sources include local histories of regional towns and suburbs of cities such as Melbourne, Sydney and Auckland, which often record the presence of Chinese market gardeners.

There are excellent collections of primary source material available in New Zealand, including the records of the Otago-Southland Branch of the New Zealand Chinese Association donated to the Hocken Library, and material held by the Alexander Turnbull Library relating to the New Zealand Chinese Association and the Dominion Federation of New Zealand

Chinese Commercial Growers. The diaries of the Reverend Alexander Don, Presbyterian Minister to the Chinese, are a useful resource. His *Roll of Chinese* is a unique record of over 3,500 individual Chinese men living in New Zealand between 1883 and 1913, a period when they were dispersing from the gold mining regions of the South Island and moving into a range of occupations, in particular market gardening.\textsuperscript{121} For over twenty years Don methodically recorded details of clan and personal names, ages, districts of origin, occupations, movements within New Zealand, return visits to China and financial dealings. He updated the roll on his regular tours visiting Chinese communities in the North and South Islands. There is no comparable resource in Australia, where the numbers of Chinese were much larger. However, individual biographical details can be reconstructed through a variety of sources, for example immigration and shipping records compiled by individual colonies prior to Federation and by the Commonwealth government after 1901.

There are a number of limitations to the documentary sources. Most have a Eurocentric bias, making it difficult to recover the perspectives of Chinese people themselves. This study, for example, draws extensively on contemporary newspaper reports and the language and opinions expressed in these sources reflect contemporary prejudices and biases towards Chinese people. Similarly the accounts of European settlers and travellers are coloured by the prejudices of the writers. Market gardening was of little interest to most European observers, perhaps seen as commonplace. Thus depictions of Chinese market gardeners tend to be brief and stereotyped, with little sense of them as individuals, and there is generally little detail on important aspects of market gardening such as agricultural methods and the variety of crops grown. Nevertheless, some contemporary newspaper reports contain useful descriptions of the

agricultural methods and technologies employed by Chinese market gardeners and some quantitative information on the acreages of gardens, numbers of partners and workers, wages, crop yields and economic returns. In general though, the quantitative data available on market gardens is either non-existent or very unevenly spread, making it difficult to assess the economic contribution of Chinese market gardening. \footnote{In contrast Sucheng Chan’s study of Chinese farmers in California between 1860 and 1910 draws heavily on United States Census returns, which include data on crops, holdings, equipment and employees. Chan, \textit{This Bittersweet Soil}.} Finally, there is limited written material left behind by Chinese people themselves, and this is generally in Chinese. I have not accessed this material in its original form. However, I do draw on some Chinese language material, for example the \textit{New Zealand Chinese Growers’ Monthly Journal} and the \textit{Man Sing Times} in New Zealand and the \textit{Tung Wah News} and \textit{Tung Wah Times} in Australia. These publications provide valuable insights into the opinions and daily concerns of the Chinese community.

Oral history is another important source, countering the Eurocentric bias of many documentary sources. With the exception of three interviews conducted by the author, the oral history sources used were from existing collections. Much work has been done in this area in Australia and New Zealand in the last two decades, stimulated by the Chinese community’s growing interest in their own histories. In New Zealand, for example, the Chinese New Zealand Oral History Foundation was established in 2002 following Prime Minister Helen Clark’s official apology to Chinese New Zealanders for the discrimination and injustices imposed on them and their forebears, in particular a poll tax. Oral history projects in New Zealand include the Otaki District Commercial Gardeners’ Society Oral History Project and the Haining Street Oral History Project in Wellington; and, in Australia, the Post-War
Australian Chinese Oral History Project conducted by the National Library of Australia.

_Sons of the Soil_, the recent study of Chinese market gardening in New Zealand, is based on extensive oral history interviews with over one hundred Chinese market gardening families around the country. These interviews provide personal insights into the daily lives of Chinese market gardeners, for example their social relationships, work practices, attitudes towards the land and technological change and their hopes and aspirations.

As discussed above, material culture is another valuable source of evidence, all too often neglected by historians in their emphasis on written documents. In this study I draw on some of the artefacts relating to Chinese market gardening held in museum collections in Australia and New Zealand. As Janis Wilton notes in Australia, Chinese cultural heritage items are scattered through metropolitan and small regional museums, and often have little information as to their provenance. Items relating specifically to Chinese market gardening are even more dispersed and smaller in number. Writers in the field of material culture studies make similar comments regarding the limitations of material culture sources. Janice Tauer Wass and Richard Grassby, for example, highlight the selective nature of museum collections and conclude that historians can gain a fuller picture of the past only by examining a range of artefacts from different sources, in conjunction with written and pictorial records. This is the approach I take in this work. I draw on documentary sources, oral histories and other material culture evidence, to provide a context in time and place for the items of material culture I am

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124 Lee and Lam, _Sons of the Soil_.
126 Tauer Wass, ‘Teaching History with Material Culture’; Grassby, ‘Material Culture and Cultural History’, pp. 597, 602; see also Harvey, _History and Material Culture_, p. 5.
One of the few collections of artefacts relating to Chinese market gardening held in a single institution, with a well documented provenance, is the collection of objects which belonged to the market gardener Georgie Ah Ling housed in the agricultural museum in Donald, Victoria. The artefacts range from agricultural equipment to Chinese language books, Chinese medicine vials and an abacus. This collection is a unique resource which sheds light on the daily life of a Chinese market gardener. The fact that this collection has been preserved in the Donald Agricultural Museum is a testament to the respect in which Ah Ling was held by the Donald community and their initiative in preserving his belongings following his death in 1987.

As discussed earlier, McGowan and Reeves note that incorporating cultural landscapes into historical analysis is an important adjunct to documentary sources. There is little physical evidence of Chinese market gardens in the landscape, for their location is often a distant memory, and many have been obliterated by urban sprawl. The physical evidence of Chinese settlement in Australia and New Zealand is widely scattered and consists mainly of remnant mining landscapes and commercial activity in towns and cities. However, in his study of Chinese market gardens in New South Wales, Barry McGowan shows that significant remains of Chinese agricultural activity exist in Australia. As noted in the literature review above, there have been several archaeological studies of market gardens carried out in Australia and one in New Zealand.

**THIS STUDY**

Drawing on a range of sources and utilising concepts and theories relating to

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127 McGowan, 'Chinese market gardens', not paginated; Reeves, 'Tracking the dragon', p. 51.
technology transfer, this thesis explores the historical development of Chinese market gardening in Australia and New Zealand between 1860 and 1960 from a comparative perspective, considering environmental, economic, technological and social factors. The central hypothesis it investigates is that although Chinese immigrants to Australasia came from similar backgrounds and regions in southern China and the historical development of market gardening followed a similar broad pattern, different environmental and social conditions in Australia and New Zealand gave rise to different patterns of technological adaptation and economic and social interaction. A key aim is to explain how Chinese market gardeners adapted their horticultural techniques and choice of crops to the range of environments they encountered and to the demands of European consumers.

While some Chinese gardeners were employed by Europeans, for example on Australian pastoral stations, this study is primarily concerned with commercial market gardening where they cultivated crops on their own account. The commercial market gardens discussed in this study fall into four broad categories: market gardens associated with gold mining activities, serving both Chinese and non-Chinese customers; market gardens servicing Chinese camps, for example in Hay, Albury and Narrandera in western New South Wales; market gardens on the fringes of country towns; and, market gardens in urban centres. Most surviving Chinese market gardens fall into the third and fourth categories (for example in Sydney, Auckland and Oamaru). For the market gardens in the first two categories I rely on archaeological evidence, where this survives, and documentary sources. Because of the uneven quantitative data available on Chinese market gardening, both spatially and temporally, it is not currently possible to develop a more detailed typology.

The reasons for the broad timeframe of this study are firstly to trace the origins of Chinese market gardening from the gold rushes and secondly to demonstrate the longevity of
Chinese market gardening, which continues to the present day in some areas. However, the primary focus is on the period between the 1880s and the 1930s, when Chinese market gardening was at its peak in Australia and New Zealand.

This study examines examples of market gardens in each of the four categories identified above, and in a range of climatic zones and environments. In Australia they include gardens in tropical Northern Australia, semi-arid western New South Wales and more temperate Tasmania and Victoria. The main focus is on the eastern states of Australia and the Northern Territory because they had the largest populations of Chinese during the period under study, and because the European population, and the Chinese market gardens which served them, were predominantly located in the relatively well watered and fertile south-eastern corner of the continent and in Tasmania. Gardens in a range of environments in New Zealand are discussed, from the colder climates of Central Otago, Oamaru and Dunedin in the South Island, to the warmer climates of Otaki, the Bay of Plenty and Auckland in the North Island.

The chapter structure of this study is based on recent theoretical approaches to technology transfer and takes a contextual approach, positioning Chinese market gardeners and the agricultural technologies they brought with them within the environmental, social and economic contexts they encountered in Australia and New Zealand. It examines the key factors which influenced the transfer of Chinese agricultural technologies to the southern hemisphere. They are: the human resource; the environmental resource; the economic environment; the technological environment; and, the social environment. Changes in market gardening through time are discussed within each of these themes. Taking up Edward Beatty’s challenge in his study of technology transfer in nineteenth century Mexico, this study maps the relevant components of the local environments in Australia and New Zealand, the points of contact and conflict with the imported technology of Chinese market gardening, and the
constraints and opportunities these environments presented to Chinese market gardeners.¹²⁸

Chapter One examines the human resources which Chinese immigrants brought to their adopted countries: their technological skills and experience. It contrasts Chinese horticultural traditions with the European horticultural traditions which British settlers brought with them to the Antipodes, and with the Polynesian gardening traditions which the Māori brought to New Zealand. Chapter Two explores the environmental aspects of market gardening. It first discusses the environment of the southern Chinese province of Guangdong, the origin of the majority of Chinese migrants to Australasia in the mid-nineteenth century. It then examines the diverse environmental and climatic conditions that Chinese market gardeners encountered in Australia and New Zealand, and the adaptations they made to them.

Chapter Three explores the economic dimensions of Chinese market gardening: the occupational structure of Chinese communities in Australia and New Zealand; population movements and processes of urbanisation; and, the critical factors of capital, labour, land, markets and prices as well as marketing strategies. Chapter Four examines the industrial and technological environment within which Chinese market gardeners operated and processes of technological change. It also examines the role of supportive industries and technologies, including suppliers of seeds and fertilisers, agricultural equipment and irrigation systems. A focus of this chapter is on the interplay between tradition, innovation and the diffusion of ideas. Chapter Five discusses the social environment which Chinese market gardeners encountered in Australia and New Zealand, ranging from European attitudes towards Chinese people and their gardening methods at the individual level, to legislative restrictions on immigration at the institutional level. Using the concepts of bonding and bridging social

¹²⁸ Beatty, ‘Approaches to technology transfer’, p. 188.
capital as a framework, it discusses the responses which Chinese market gardeners made to their host society and their diverse social interactions, both within the Chinese community and with the wider society. The final section draws the findings of the previous five chapters into a conclusion.
CHAPTER 1

THE HUMAN RESOURCE

The Chinese are most successful gardeners, or rather farmers, for in their gardens in this colony we really get a specimen of Chinese agriculture. Although we make a distinction between farming and gardening, and conduct them diligently, there is no such distinction made in China, every foot of which is cultivated with as great carefulness as we find displayed here on the land on which they grow vegetables. The Chinese are universally acknowledged to be the best agriculturists in the world.

*Sydney Morning Herald*, 2 March 1865, p. 2.

At the heart of the process of technology transfer is the body of skills, knowledge and experience which individuals or groups bring with them on their journey to a new land, or bring back to their homeland after a sojourn overseas. In the case of the Chinese diaspora across Southeast Asia and the Pacific in the mid-nineteenth century, thousands of people left their homeland to escape civil war, famine and social upheaval, and in response to the economic opportunities offered overseas. In addition to technological skills and experience, these immigrants brought with them a set of beliefs, values and customs which formed the framework for their technologies, and helped them survive and adapt in their adopted countries.

This chapter begins with a brief overview of the immigration to Australia and New Zealand of two groups of people from very different cultural backgrounds – Chinese and British – highlighting their places of origin, socioeconomic backgrounds, skills and experience as well as their hopes and aspirations. The following two sections survey Chinese and British horticultural traditions, comparing and contrasting their key features. The subsequent section discusses the indigenous gardening traditions which European and later Chinese settlers

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encountered in Australia and New Zealand. The final section discusses the continuity of Chinese horticultural traditions in these new lands.

**CHINESE AND BRITISH MIGRATION TO THE ANTIPODES**

Chinese immigrants came to Australia and New Zealand in small numbers from the early days of European settlement.\(^2\) Between 1847 and 1853 some 3,000 Chinese indentured labourers were imported to New South Wales, to fill a major shortage of labour on pastoral properties.\(^3\) However, it was not until the gold rushes of the 1850s and 1860s that large numbers of Chinese men made the long sea journey to Australia and New Zealand in search of wealth. The majority came from the southern province of Guangdong. In particular, they came from a few districts in the Pearl River delta around Canton, the modern city of Guangzhou. In his study of Sydney’s overseas Chinese Michael Williams notes that while Melbourne was dominated by migrants from Seyip (Sze-Yap), comprising the four counties of Taishan (Toisan), Xinhui (Sunwui), Kaiping (Hoi Ping) and Enping, Sydney attracted migrants from a wider range of regions, with a majority from the districts of Zhongshan (Chungshan), Dongguan (Doon Goon) and Zengcheng (Jung Seng or Cheng Sing). Small numbers of emigrants were Hakka, of non-Cantonese ethnicity, who lived in scattered communities in Guangdong.\(^4\) Most of those who arrived in Australia between the 1850s and 1870s travelled to the goldfields of Victoria and New South Wales. They arrived in large numbers from 1854,

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\(^2\) One of the earliest recorded arrivals in Australia was that of Mak Sai Ying (John Shying) in Sydney in 1818 (Michael Williams, *Chinese Settlement in New South Wales*, Sydney, 1999, p. 6). The earliest recorded arrival in New Zealand was Wong Ah Poo Hoc Ting (Appo Hocton), a seaman who jumped ship in 1842 and settled in Nelson (Nigel Murphy, *A Chronology of Events Relating to the History of the Chinese in New Zealand*, Wellington, 2002, p. 2).


and like the miners of many other nationalities who flocked to the goldfields, became part of a
highly mobile population, moving from field to field as new discoveries were made.5

The first Chinese miners arrived on the goldfields of southern New Zealand in 1866,
following many other miners from Australia. They came from the Victorian goldfields at the
invitation of the Otago Provincial Council, sent via leading Chinese merchants in Melbourne.
Gold had been discovered in 1861 in Central Otago, but by 1864 returns were declining, and
there was an exodus of miners to new fields in Marlborough and on the West Coast. Otago
business people were concerned about the impact of this dramatic decrease in population on
the local economy and after much debate decided to recruit Chinese workers from Australia.
As news of the gold rush in New Zealand spread, more men travelled there directly from
China. The majority came from seven counties around Guangzhou: the four counties of Seyip
and the three counties of Panyu (Poon Yu), Nanhai and Shunde (Shuntak), collectively known
as Samyip. The largest numbers came from Panyu and Taishan, smaller numbers from
Zengcheng and Zhongshan.6 There were also a number of Hakka from the Sanon and
Kueishan districts of Guangdong.7 These men had close links with their compatriots on the
Australian goldfields, and many passed through Australia on their way to New Zealand.8

5 Choi, Chinese Migration and Settlement, pp. 11–13; Williams, Chinese Settlement, p. 9.
6 James Ng, Windows on a Chinese Past, Vol. 1, Dunedin, 1993, p. 123; Neville Ritchie, ‘Traces of the past:
archaeological insights into the New Zealand Chinese experience in southern New Zealand’, in Manying Ip
7 James Ng, ‘The sojourner experience: the Cantonese gold seekers in New Zealand’, in Ip (ed.), Unfolding
History, Evolving Identity, p. 7.
8 Keir Reeves’ 2005 study of Chinese cultural connections in gold rush Australia and New Zealand highlights
the fluidity and transfer of ideas throughout Australasia during this period (Keir Reeves, ‘Tracking the dragon
down under: Chinese cultural connections in gold rush Australia and Aotearoa New Zealand’, Graduate
While they spoke different dialects and had varying levels of prosperity, the Chinese who migrated to Australia and New Zealand shared a common farming and peasant background. Most arrived indebted to family or labour agents for their passage, and had little capital. Their skills and labour were therefore all-important, and they made use of their traditional skills in horticulture and water management in gold mining and market gardening. Market gardening and mining, at least of the more easily won alluvial gold which was the focus of early Chinese mining activity, were both enterprises that initially required relatively little capital outlay. They were independent migrants, driven to seek their livelihood overseas by deteriorating economic conditions and political instability at home.

Guangdong province has a long history of emigration overseas going back to the

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twelfth century AD. The opening up of the region to foreign trade in the nineteenth century and the spread of news of the gold rushes in California and later in Australia and New Zealand gave the promise of new economic opportunities overseas. There were also strong push factors. Many scholars have documented the major socioeconomic upheavals in Guangdong during the nineteenth century, caused by social unrest and banditry, foreign political and commercial intrusions, and corrupt and oppressive central and provincial governments. June Mei for example notes the accelerating disintegration of the traditional agrarian economy in Guangdong from the mid-nineteenth century, as peasants were increasingly unable to maintain their farms and irrigation systems and were forced off the land. Some turned to non-agricultural jobs such as hawkers, carriers or boatmen, others were left with little choice but to seek work overseas to support their families. James Ng points out that most Chinese immigrants to New Zealand were not destitute coolies but generally came from rural peasant families who could afford the fare on a ship or had the collateral for loans. But he notes that many were in fact poor and illiterate, quoting Alexander Don’s description of the Chinese who travelled to New Zealand: ‘Nine tenths of them are small farmers, very small and very poor’. As many writers on the overseas Chinese have noted, ties of common dialect or place of origin were all-important to overseas Chinese communities, drawing people together and promoting group solidarity.

The Chinese who came to Australia and New Zealand in the nineteenth century encountered established British colonial societies. These were peopled by predominantly

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12 Alexander Don, Outlook, 4 March 1905, p. 29, quoted in Ng, Windows on a Chinese Past, 1, p. 87.
13 Choi, Chinese Migration and Settlement, pp. 5, 11–13; Williams, Chinese Settlement, p. 11.
British settlers, part of a large-scale diaspora from Europe to the New World which had begun in the seventeenth century and populated Australia, New Zealand, the Americas and southern Africa. The British migrants came from all over the British Isles, from Scotland and Ireland to southern England, and from all classes, from labourers to gentry. James Belich, writing of the peopling of New Zealand in the nineteenth century, describes the fluidity and fragmentation of society in Victorian Britain as people moved from country to city and from the city to the colonies, blending regional and ethnic groups and blurring class lines.

While economic motivations were paramount, they do not fully explain this mass exodus. The human geographer Joe Powell highlights the role of illusion in the settlement process, bound up with the hopes, fears, uncertainties and challenges that are so much part of the human condition. Early European settlers to the Antipodean colonies had aspirations to better themselves and many were attracted by visions of a rural arcadia where there was natural abundance and fertility, where they could become independent small land holders. British and colonial governments, entrepreneurs and immigration agents promoted the vision of the independent yeoman farmer in the colonies, where, in the words of Powell, it became ‘a central symbol in a form of popular and politically useful agrarian idealism’.

Taking a similar perspective, Belich emphasises the powerful influence of these myths and prophecies in the peopling of New Zealand, identifying ‘a convergence between private and public

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16 Powell, Mirrors of the New World, p. 48.
interests in the colonising crusade’. New Zealand shared a similar temperate climate with Britain; colonisers, politicians and publicists waxed lyrical about its natural abundance and the benefits of rural life, and promoted it as a ‘Better Britain’, a climatic paradise.

Despite these agrarian ideals, government endeavours to create a new class of small farmers were a failure in Australia, and to some extent in New Zealand. The story of Australian agriculture so often presented is a saga of men and women on the land, small farmers and selectors battling the power and political influence of wealthy squatters who held vast areas of land on which they raised wool, wheat, mutton and beef for the British market. Large-scale commercial agriculture and pastoralism for export dominated, taking up most of the productive land. Land selection legislation introduced in Victoria and New South Wales in 1860 and 1861, and later in other colonies, left many squatters still in control of their vast holdings and failed to benefit small farmers. The soldier settlement schemes after World War I were also unsuccessful – they were controlled by state governments which failed to apply consistent standards in the selection of settlers, the quality of land allotted or the farming instruction and the support given to returned servicemen.

In New Zealand there was a similar movement in the late-nineteenth century to break up the large sheep runs established in the 1850s and 1860s, to allow small farmers to gain a foothold on the land. This policy gained the Liberal Party great popular support, particularly after advances in refrigeration technology made meat and dairy farming profitable.

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17 Belich, Making Peoples, p. 283.
18 Belich, Making Peoples, pp. 300–1, 305; and, Nigel Murphy, A History of the Horticultural Industry in New Zealand, unpublished ms., 2010, p. 18.
selection of land in New Zealand, acquired by confiscation, purchase and various forms of alienation from Māori owners, was modelled on the small family farms and cottage gardens of southern England. Many settlers, however, became larger scale sheep and dairy farmers, and this trend intensified after the frozen meat trade commenced in 1882. This radically changed the nature of farming, allowing farmers to raise sheep for both meat and wool, and New Zealand’s economy became increasingly based on the export of meat and dairy produce to Britain.

Given the dominance of large scale pastoralism and agriculture for export, market gardening formed a small part of the agricultural sectors in Australia and New Zealand. Most European farmers grew fruit and vegetables as a supplement to mixed farming operations. As Nigel Murphy notes, small-scale, intensive market gardening as a sole source of income was considered a low status occupation, in the same class as agricultural labouring, and this prejudice was carried from Britain to the colonies. This attitude to market gardening facilitated the entry of Chinese immigrants into market gardening, an economic niche where they faced relatively little competition from Europeans.

The Chinese and British immigrants who came to the Antipodes in the period under discussion clearly came from different cultural backgrounds and had different hopes and aspirations. They also brought with them their own distinctive horticultural traditions, developed over centuries of experimentation. These traditions, along with their similarities and differences, are the focus of the following sections.

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22 Helen Leach, *1,000 Years of Gardening in New Zealand*, Wellington, 1984, p. 97.
24 For example, in Auckland by the 1950s, European market gardens were operated in conjunction with viticulture, orcharding or dairying and tended to concentrate on a smaller range of crops (Donald Hunt, ‘Market Gardening in Metropolitan Auckland’, MA Honours Thesis, University of Auckland, 1956, pp. 3, 24).
CHINESE HORTICULTURAL TRADITIONS

One of the major sources on Chinese agriculture is Francesca Bray’s work, part of Joseph Needham’s massive multi-volume study, *Science and Civilisation in China*. Bray relies heavily on the many written texts produced in China over the centuries, drawing on Chinese agricultural treatises going back as far as the second century AD.\(^{26}\) Her work has been criticised by later writers such as Xu and Peel, who point out that she relies too heavily on written sources at the expense of practical application and argue that both these processes were important.\(^{27}\) However, Bray’s work remains a useful reference, and for the purposes of this study, can be used in conjunction with first-hand accounts of Chinese agricultural practices, such as those recorded by the New Zealand missionary Alexander Don and the American agricultural scientist Franklin Hiram King, who both travelled in southern China in the late-nineteenth and early-twentieth centuries and observed farmers at work.

Bray divides Chinese agriculture into two broad systems, based on the two major climatic zones in the country: dry land grain cultivation in the northern plains, with their continental climate, and wet rice cultivation in the subtropical south.\(^{28}\) The focus in this discussion is on the horticultural systems that developed in southern China, in particular Guangdong province, from where the majority of immigrants to Australia and New Zealand originated.

Vegetable cultivation has been an integral part of Chinese agriculture from its beginnings. Archaeological research indicates that while two broad centres of domestication of plants and animals can be identified in China, based on millet and wheat in the north and rice

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\(^{26}\) The earliest work that has survived in its entirety was written by Chia Su Hsieh around 535 AD (Francesca Bray and Joseph Needham, *Science and Civilisation in China Vol. 6, Part 11: Agriculture*, Cambridge, 1984, p. 55).


in the south, there were a number of distinct regional clusters of Neolithic cultures by 5,000 BC, and over the next two millennia they formed spheres of interaction, expanding and merging.\(^{29}\) Another feature of the Neolithic in China is the continuity of hunting, fishing and gathering wild foods throughout the period. There is also strong evidence for gardening, for example from the Ta-p’en-k’eng culture in Taiwan (c. 4,450–4,350 BC).\(^{30}\) From the written sources Bray concludes that the characteristic pattern of Chinese cropping systems was established as early as 5,000 BC, and had surprising continuity through time. Over the centuries the majority of arable land in China continued to be devoted to grain production (millet and wheat in the north, rice in the south), while roots, tubers, legumes and other vegetable crops take up the remainder. For example, in the early 1900s over seventy per cent of the total area under crops in China was planted in grains.\(^{31}\)

Apart from pigs and poultry, animal husbandry played a minor role in the rural economy of the Han heartland of China throughout its history, and little land was used for pasturing livestock. This pattern developed over the centuries in response to continuous population growth and pressure on land, and it is in direct contrast to the European tradition of mixed farming, which combined animal husbandry and grain production, and devoted large areas of land to grazing and pasture.\(^{32}\) However, this depends on how the geographic boundaries of ‘China’ are defined – these changed over the centuries as the Han heartland contracted and expanded. The modern boundaries of China include the autonomous regions of


Inner Mongolia and Tibet and the province of Qinghai, which have vast areas of grassland and long histories of animal husbandry, raising a variety of livestock such as sheep, cattle, horses, yaks, camels and goats.  

The importance of grain and vegetable production in the Chinese economy is reinforced by the fact that the Chinese diet has always been predominantly vegetarian, supplemented by meat and fish. The Chinese word for meal or food is fan, a general term for grains, including rice, millet, wheat and sorghum. This staple component of every meal is enlivened by a wide variety of fresh vegetables, sauces, vinegar, ginger, chilli and other spices. Vegetables are probably the second most important food group, while protein is provided by bean curd, or small quantities of fish or meat. For most of China’s history meat was a luxury for the rich, or reserved for feast days; as the Chinese saying goes, ‘Cereals stay the hunger and vegetables add the savour’.  

Over 1,500 years from the Qin to Yuan dynasties (221 BC to 1368 AD) intensive agricultural systems developed in China which made maximum use of the available land area and supported ever-growing populations. In his survey of the history of technology, Arnold Pacey observes that increases in population were often the stimulus for technological innovation, in particular when more food had to be produced from a fixed area of land. From around 700 AD, if not earlier, new developments in cropping systems, farming implements and irrigation methods occurred in China, Western Asia and Europe, and these changes were directly related to the need to feed increasing numbers of people.

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35 Bray and Needham, Science and Civilisation, 6: 11, p. 540.  
36 Xu and Peel, Agriculture of China, p. 66.  
In the development of intensive agriculture in China greater emphasis was placed on increasing land productivity than on increasing labour productivity. With a large available labour force, the pressure was to develop increasingly labour intensive systems. As populations increased, food needs increased, and a larger labour force was needed to increase yields. This cycle ultimately led to conflict between population pressures and the limits of available arable land, as occurred in Guangdong in the nineteenth century. As production was on a small scale and the area of land individual farmers could cultivate was limited, their only course was to increase the yield from their plots.\textsuperscript{38}

A distinctive feature of Chinese agriculture compared to that of pre-industrial Europe was the predominance of free, small-scale farmers, many of whom owned their own land. For most of the last millennium individual households have remained the basic unit of production in China, a system which has greater flexibility than other forms of farming. Both tenant and land owning farmers make their own decisions about what crops to grow and are free to dispose of their own produce, minimising institutional barriers to innovation in agricultural methods and the adoption of new crops.\textsuperscript{39} Thus increases in efficiency depended more on the skills and experience of the farmer than on the quality and range of equipment.\textsuperscript{40} While most arable land in China was devoted to cereal cultivation, vegetable cultivation played a key role in agricultural innovation. Xu and Peel note that intensive agricultural systems were initially developed in vegetable gardens, and were later introduced into field cropping.\textsuperscript{41}

During the Ming (1368-1644 AD) and the Qing (1644-1911 AD) Dynasties, integrated farming systems developed in the densely populated southern provinces of China such as

\textsuperscript{38} Xu and Peel, \textit{Agriculture of China}, pp. 66, 70–1.
\textsuperscript{39} Evelyn Sakakida Rawski, \textit{Agricultural Change and the Peasant Economy of South China}, Cambridge Massachusetts, 1972, p. 3; and, Xu and Peel, \textit{Agriculture of China}, p. 71.
\textsuperscript{40} Bray and Needham, \textit{Science and Civilisation}, 6:11, p. 604.
\textsuperscript{41} Xu and Peel, \textit{Agriculture of China}, p. 70.
Guangdong. Individual farmers grew rice and vegetables, raised chickens and pigs, planted fruit trees, including mulberry trees to raise silkworms, and farmed fish. Nothing was wasted – the mulberry trees fed the silkworms, the silk worm waste fed the fish and the manure from humans, pigs, and chickens fertilised the fields. Irrigated rice fields were highly productive. Two crops of rice per year were produced, and a wide variety of other crops such as green vegetables, tobacco, peas, rape, sweet potatoes, sugar cane, peanuts and ginger were grown in between. Guangdong province was renowned for its lychees, ginger and oranges which were exported throughout the country.

By the early-twentieth century China was one of the most productive lands in the world. In the Yangtze and Pearl River deltas in the south, intensive agriculture supported population densities as high as twenty people per acre in some rural areas. In 1898 Alexander Don visited Guangdong and travelled to Upper Panyu county where he planned to establish a mission. He visited the home villages of many of the Chinese miners he had met in New Zealand on his annual tours of the isolated gullies of Central Otago. Don commented on the intensive use of every available acre of land for food production, the scarcity of animals and the high population densities:

Here are no wastelands. The rice fields are in stubble, some of them being ploughed for the spring crops. Sweet potatoes and water caltropes are being gathered in, mostly by women and girls. Small plantations of tall sugar cane appear here and there; and many peach orchards ... There are no fences. A strip of turf some six or eight inches wide divides the fields. A strange landscape where all is fields and tombs – where there are no highways or hedges, only byways and banks. Why every inch of ground is laid under

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42 Xu and Peel, *Agriculture of China*, pp. 69–70; Bray and Needham, *Science and Civilisation*, 6:11, pp. 111–2; and, Franklin Hiram King, *Farmers of Forty Centuries*, London, 1949, p. 87. Maize, peanuts, and sweet potato all originated in the Americas; they were introduced to southern China after the middle Ming Dynasty (fourteenth century AD). Another variety of sweet potato was introduced from the Philippines towards the end of the sixteenth century (Xu and Peel, *Agriculture of China*, p. 69).
tribute is evident when the density of population is considered. Within eight miles square are forty villages with fully a quarter of a million inhabitants … Animals are scarce. The struggle for human subsistence is too severe to allow many such.\textsuperscript{45}

The characteristic features of Chinese horticulture as developed and practiced in China over the centuries are discussed below. They provide a baseline for identifying these features in the practices of Chinese market gardeners in Australia and New Zealand, and assessing the extent to which they were modified in response to the new physical, economic and social environments they encountered.

**Field systems and multicropping**

Crop rotation, intercropping (where several crops are planted at the same time alongside each other) and inlaid cropping (where two or more crops with different but overlapping growing periods are grown in the same field) make maximum use of space and solar energy. These systems allow farmers to produce crops continuously, without having to leave land fallow and therefore unproductive. They were in use in China from as early as the Han Dynasty (206 BC–9 AD), when fallowing of land to restore soil fertility was already regarded as a last resort.\textsuperscript{46} The treatise of Chia Hsu Hsieh, published around 535 AD, details the variety of crop rotations used in different parts of the country. In Bray’s view this variation indicates a wider range of field crops than the rotation systems of ancient Rome or medieval Europe that included hemp, cucurbits, coriander and other herbs as well as the usual variety of cereals and legumes. Hsieh paints a picture of sixth century Chinese agriculture at a high level of productivity, higher than anything achieved in Northern Europe before about 1600 AD.\textsuperscript{47}

As protection against drought or flood, Chinese farmers raised the soil of their plots

\textsuperscript{45} Alexander Don, *Under Six Flags*, Dunedin, 1898, pp. 91–9.
into ridges and furrows. Crops were planted on the ridges in long level rows, and the furrows drained off excess water in times of heavy rain, or could be filled with water during droughts, protecting the roots of the growing plants from drying out. Franklin King outlines the advantages of the ridged fields he saw on his travels in southern China in 1909, in making the most efficient use of natural rainfall. The wet soil in the bottom of the furrows promotes the lateral percolation of water and nutrients to the roots of the plants, and the furrows act as long reservoirs to prevent soil erosion. While the ridges and furrows increase the surface area of the plot, any additional loss of soil moisture is balanced by the moisture retained in the furrows.\(^48\)

King also describes how ridges and furrows were changed over in between crops, so that the soil was worked over deeply and thoroughly.\(^49\) Bray notes that when sown in long rows, plants mature rapidly, do not interfere with each other’s growth, and receive maximum sunlight. They are also easily accessible for planting, weeding, hoeing and harvesting.\(^50\)

**Manuring**

In intensive agricultural systems where the land was not left fallow, manuring was essential to maintain soil fertility over centuries of continuous cropping. King declares that the first lesson that the West can learn from the East is how over the centuries the farmers of China, Japan and Korea solved the problem of conserving the resources of the land and maintaining soil fertility. He decries the short sightedness of European societies which let valuable fertiliser go to waste in rivers and oceans.\(^51\) In his account of his travels in Guangdong he describes boat loads of human manure being shipped by canal from Canton.


\(^{49}\) King, *Farmers of Forty Centuries*, pp. 90–1.


\(^{51}\) King, *Farmers of Forty Centuries*, pp. 15, 171.
the fields armies of men waded barefoot in the water in the furrows between the beds, applying manure in diluted form to beds of leeks, using long handled dippers holding a gallon.\textsuperscript{52}

In China livestock played a much lesser role in producing manure, compared to the European farm economy. Chinese farmers never wasted the manure produced by the few pigs, chickens or oxen they kept, even saving the water used to wash the stone floors of pig pens to use on their gardens.\textsuperscript{53} They relied heavily on human manure and urine to supplement animal manure, a practice which repelled some European visitors to China. However, modern chemical analyses of this ancient practice have shown that human and animal manure is rich in essential plant nutrients such as nitrogen, potassium and phosphorous.\textsuperscript{54}

The collection, preparation and application of fertilisers was time consuming and labour intensive, as considerable care was needed in their use. Traditionally human waste was stored in large terracotta urns near houses, or sometimes privies were combined with pig pens so that human and animal manure was efficiently collected in the one location.\textsuperscript{55} The manure was then left to ferment aerobically in large pits for several days to a few weeks before being used. Recent research has shown that the heat generated during the composting process, which reaches 55–60°C, is high enough to kill many of the harmful micro-organisms present in the manure so that the application of human and animal excreta to the fields is in fact less of a health hazard than has often been supposed.\textsuperscript{56} A wide variety of other organic materials were added to manure to make compost: crop residues such as chaff, straw and husks; composted

\begin{footnotes}
\item[52] Ibid., p. 74.
\item[53] Ibid., p. 73.
\end{footnotes}
city rubbish; sediments dredged from ponds and canals; wood ash; and, green manures such as legumes, weeds and aquatic plants. Farmers recognised that the direct application of manure is harmful to plants, so they diluted the fermented manure with water before it was used. Liquid manure was carefully applied to the plants using a long handled dipper; it was also added to irrigation water.

Thorough preparation of soil and enriching it with compost was a hallmark of Chinese horticulture. Frequent hand hoeing aerated the soil and spread organic matter through it, and by reducing the soil to a fine tilth, facilitated the growth of seedlings. King watched a farmer near Kuching carefully hoeing the soil, noting how he closely pulverised it, without injuring any of the multitude of worms his hoe disturbed.

**Individual care of plants**

In any culture, a hallmark of gardening, in contrast to broad-scale farming, is the care and attention paid to individual plants. Unlike farmers who sow seeds and harvest *en masse*, gardeners treat their plants individually throughout their growth cycle and propagate them by a variety of means including from seeds, rhizomes, bulbs and offshoots. In the Chinese context, Xu and Peel term this ‘meticulous cultivation’.

In the Chinese tradition, gardening begins with the careful selection and storage of the seeds or tubers of the best specimens for planting in the following season. A common technique to test the viability of stored seeds was to soak them in water and discard those that

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59 King’s Kuching was possibly modern Xinxing, in Guangdong (King, *Farmers of Forty Centuries*, p. 181).

60 Leach, *1,000 Years of Gardening*, p. 3.

61 Xu and Peel, *Agriculture of China*, p. 66; Leach, *1,000 Years of Gardening*, p. 3.
In her discussion of ancient Polynesian gardening techniques, Leach refers to Barrau’s work, in which he points out that when plants are handled individually, variations between plants can be more easily spotted and those with higher yields or greater resistance to disease or pests can be selected, and gardeners are likely to be more interested in developing new varieties. In comparison, mass sowing and harvesting of cereal seeds encourages uniformity.

Pegermination and transplanting techniques are associated with wet rice cultivation across southeast Asia, but they were applied to a variety of other crops, particularly small-seeded vegetables. Writing in the fourteenth century AD, Wang Chen Nung Shu describes the method of pre-germinating seeds; he also points out the importance of manuring and the rewards to be gained from the labour that goes into market gardening.

When sowing vegetables you must first dry the seed in the sun. The soil cannot be too fertile, so if it is poor manure it well. You cannot hoe too frequently, and you must water the vegetables whenever the weather is dry. The labour is great, but the profits will certainly be tenfold. ... one can also pregerminate the seeds. Any type of seed may be first washed and placed in a calabash, then covered with a damp cloth. After three days the seed will germinate. When it is about the length of a finger it may be planted. First water the soil in a finely tilled bed, then spread the germinated seed evenly and cover with finely sieved soil and manure to prevent it drying out in the sun. With this method the vegetables will all come up at the same time and no weeds grow.

Frequent weeding and hoeing around growing plants aerates the soil and reduces competition for water, sunlight and nutrients. Hand tools such as hoes, mattocks and spades were indispensible for individually caring for plants, as well as opening up new land, tilling small vegetable gardens and digging drainage channels. Many Western travellers to China in

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the nineteenth and early-twentieth centuries saw the preponderance of hand tools and the limited use of draught animals as evidence of the ‘primitive’ nature of oriental agriculture. But as Bray points out, this form of cultivation was adapted to small individual vegetable plots, and ploughs formed the basis of field agriculture in China for many centuries.\footnote{Ibid., p. 197.}

The individual care given to plants extended to the control of insect pests. In 1919 King observed a farmer near Kuching searching his plot of potatoes for signs of insect damage:

> There were no potato beetles and we saw no signs of injury but the gardener was scanning the patch with the eye of a robin. He spied the slightest first drooping of leaves in a stem; went after the difficulty and brought and placed in our hand a cut-worm, a young tuber the size of a marble and a stem cut half off, which he was willing to sacrifice because of our evident interest.\footnote{King, Farmers of Forty Centuries, p. 182.}

**Irrigation**

The volume of Needham’s study of science and civilisation in China covering civil engineering includes a survey of the achievements of Chinese engineers in hydraulics, which equalled and even exceeded those of other ancient civilisations in Egypt, Mesopotamia and Babylonia. A constant theme in Chinese history has been the control of the country’s rivers, which are characterised by marked rises and falls in water levels, bringing regular floods and heavy loads of silt from the high snow fields of the Tibetan plateau. The earliest hydraulic engineering works, constructed in the Zhou Dynasty (1066–256 BC), were dams impounding runoff from hill valleys and dykes controlling the flow of rivers in the lower basins of the Yangtze and Yellow Rivers. Large networks of lateral irrigation canals diverting flows from rivers together with cross-country navigation canals were developed over the succeeding
centuries, and foreign observers were dazzled by their scale and complexity. They included perennial canals, drawing water from rivers throughout the year, and others designed to capture water during seasonal floods. The invention of sluice gates, slipways and locks for irrigation, flood control and raising and lowering water levels to allow the movement of vessels was an integral part of these engineering works. China’s achievements in hydraulic engineering, particularly the use of artificial waterways for transporting heavy goods, were not equalled until the industrial revolution in Europe in the eighteenth century.68

Most major engineering works were constructed in the drier north and east of the country, but in the south intricate systems of canals and waterways supplied the water necessary for wet rice cultivation. On his first visit to Guangdong in 1880 Alexander Don described the great natural fertility of the Pearl River delta and the complex network of irrigation systems that criss-crossed the plains south of Guangzhou:

The hundreds of natural streams of the Canton delta are supplemented by thousands of artificial ones running in every direction and so is formed a perfect network of canals and rivers so close that fully one fifth of the entire surface may be reckoned as occupied by water ... Of course rice is the staple product but there are many other products and we passed though four well-defined belts of vegetation – the first and fourth rice, the second mulberry and the third fan palm. When we come to see the results of the crops in this place it will be seen that there are good grounds for reckoning the Canton delta among the most fruitful spots on earth’s surface.69

Some twenty years later, King described how water was supplied via channels or ditches to small reservoirs in the corners of terraced fields or gardens, where it was stored for


hand watering, and the surplus was led down from terrace to terrace.\textsuperscript{70}

Machinery for raising water from one level to another is essential to any system of irrigated agriculture. The simplest device, known across the ancient world, was the counterbalanced bailing bucket or well sweep, generally known by the Arabic name \textit{shaduf}. Consisting of a long pole with a bucket suspended on one end, and a counterweight such as a stone on the other, it lightened the labour of dipping, carrying and emptying buckets. The \textit{shaduf} was known in China from the fourth century BC.\textsuperscript{71} An elaboration of this device consisted of the addition of a gearing system and the elongation of the bucket spout into a flume (water chute), often made of a dug out palm trunk or bamboo, which automatically emptied into the irrigation channel on the upward motion. It could be operated by human or animal power. Animal power was also used to operate the well windlass, or whim, which utilised the rotary motion provided by a pulley or drum at the mouth of a well. These simple machines were common in the Han Dynasty (206 BC–220 AD).\textsuperscript{72}

Probably the most characteristic Chinese water raising machine was the square pallet chain pump, which probably originated in the first century AD and diffused worldwide after the sixteenth century. It consisted of an endless chain carrying a succession of pallets which drew water along as they passed upwards and discharged into an irrigation canal or field at the top. The chain was turned by human hand or foot, animal power or water power. Human power was probably the earliest as radial treadles could easily be placed on the upper sprocket wheel. Chain pumps were described in Chinese agricultural treatises from the twelfth century AD, and their design changed little over the centuries. Franklin King photographed three men operating a chain pump on his travels in China and Japan in 1909–1910 (Figure 1.2).

\begin{itemize}
  \item \textsuperscript{70} King, \textit{Farmers of Forty Centuries}, p. 6.
  \item \textsuperscript{71} Needham in collaboration with Ling, \textit{Science and Civilisation} 4: II, p. 332.
  \item \textsuperscript{72} \textit{Ibid.}, pp. 334–5.
\end{itemize}
To use animal power, the animal was harnessed to a cogged drive wheel which engaged at right angles with a gear wheel on the sprocket wheel axle. Similar devices were used to dredge canals and water channels. This machine was immortalised in a twelfth century poem which celebrates the labour it saved the hard working farmer:

The man of Sung, who pulled up the sprouts, we despise;
And Chuang Tzu of Meng, who preferred watering with jars.
These are not so good as (that engine which works)
Like a set of birds, each holding the tail of the next in its mouth.
With this we can change water’s flow, and drain a whole lake.
So dance the rice plants happily in the cerulean waves
While the farmer sits on his bamboo mat
Enjoying the cool of the evening ...

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73 Published in King, Farmers of Forty Centuries, Fig. 46, p. 78.
74 Ibid., pp. 339, 362.
75 Ibid., pp. 78–9.
BRITISH HORTICULTURAL TRADITIONS

The Romans are usually credited with introducing domesticated vegetables to the British Isles. When they conquered the islands in 43 AD they brought with them a well-developed gardening tradition, which included a large repertoire of vegetables: numerous varieties of cabbage, kale, lettuce, and salad greens; root vegetables such as parsnip, turnip and radish as well as leeks, onions, garlic and cucumber. However, as Leach points out, the farmers of Britain were themselves already settled agriculturalists. By the early Iron Age (600 BC) they were growing various types of wheat and barley, rye, oats, and the Celtic bean (a type of broad bean). The weeds that inevitably grew among their crops included the forerunners of the turnip and wild herbs such as knotweed and sorrel that were gathered as pot herbs for medicinal and culinary purposes for many centuries. Iron Age farmers also raised sheep, cattle, pigs and goats.

Thus a mixed farming economy based on cultivating cereals and vegetables and raising livestock was established well before Roman times. In contrast to China where livestock production played a relatively minor role, the subsequent story of the development of agriculture in Britain is essentially the story of broad-scale grain and livestock production. Historians of the so-called agricultural ‘revolution’ in England have placed an emphasis on expansion of output and the contribution of agriculture to economic progress. Scholars such as Joan Thirsk have documented some of the less studied aspects of British agriculture, for

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77 Leach, 1,000 Years of Gardening, p. 73.
example the cultivation of vegetables and crops such as woad, hops, rapeseed, grapes, flax, madder and sugar beet. In his study of market gardening around London from the sixteenth century, Malcolm Thick highlights the neglect of market gardening in general histories of agriculture. He points out the paradox that the very factors identified as the essential features of the English agricultural revolution, namely the development of capitalist, market-oriented agriculture by the mid-nineteenth century, were already present in market gardening from the sixteenth century.

The horticultural techniques brought to England by the Romans had many parallels to those developed independently in China. They included transplanting, taking cuttings and offshoots, grafting fruit trees, deep digging, the use of raised beds, manuring, and even raising cucumbers in mica glazed frames to protect them from cold weather. Over the following centuries gardening was carried out in monasteries, royal pleasure gardens and country manors, in conjunction with broad-scale farming.

By the 1670s, English gardeners were beginning to sow seeds in rows or drills, on raised beds with channels in between, a technique used in China for many centuries. In her history of kitchen gardening in England Susan Campbell describes the characteristic garden layout of narrow raised beds, so that gardeners could easily reach from either side to tend their crops. The trenches surrounding each bed doubled as irrigation furrows and paths. Two centuries later, however, the Chinese and English horticultural traditions diverged. Campbell notes that by the nineteenth century there was a shift away from beds and channels to large flat

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83 Campbell, *History of Kitchen Gardening*, pp. 84–7; and, Leach, *1,000 Years of Gardening*, pp. 76–85.
84 Campbell, *History of Kitchen Gardening*, p. 35.
areas sown in rows.\textsuperscript{85}

The English kitchen garden, an integrated system involving raising fruit and vegetables and animal husbandry, had many parallels to the horticulture of southern China. This tradition developed from the sixteenth century, and had its origins in France and the Low Countries. The typical French kitchen garden was a complex including a pond for fish and ducks, a well, two manure heaps (one for fresh, one for old), an orchard and two main garden plots, one for vegetables and pot herbs, the other for ornamentals. There may also have been additional plots for pulses such as peas and beans, cucumbers and melons as well as other economic crops such as hemp or saffron.\textsuperscript{86} This gardening system was the product of influences from abroad, enriched by the introduction of new crops from Europe and the New World, and improved techniques for prolonging the cropping season and making more intensive use of arable land.\textsuperscript{87}

Water was as crucial to the vegetable garden as good soil and shelter. In the damp climate of Britain where rainfall was relatively evenly spread throughout the year, extensive irrigation systems such as those developed by the Arabs, Romans and Chinese were not necessary. Pre-Roman gardeners in Britain drew their water from rivers using a \textit{shaduf} or swing beam or from wells using a rope, bucket and pulley. While the extensive networks of canals and irrigation channels typical of southern China were not duplicated in Britain, Campbell records the strategically placed ponds, dipping pools, wells and water tanks in

\textsuperscript{85} \textit{Ibid.}, pp. 87–8, 117.
\textsuperscript{86} Leach, \textit{1,000 Years of Gardening}, p. 81.
\textsuperscript{87} During the 1500s and 1600s the gooseberry, globe artichoke and asparagus were introduced into England from Europe, and potatoes, capsicums, maize, tomatoes, kidney beans and yams from the New World (Campbell, \textit{History of Kitchen Gardening}, pp. 114–5; and, Leach, \textit{1,000 Years of Gardening}, pp. 78–9, 83, 87).
nineteenth century English kitchen gardens, similar to the reservoirs in Chinese gardens described by King.\footnote{Campbell, \textit{History of Kitchen Gardening}, p. 33.}

A distinctive feature of the English kitchen garden, which sets it apart from the southern Chinese gardening tradition with its open plots, was the use of walled enclosures for the protection of the growing plants from the elements, and security. This was an adaptation to the cooler climate. Depending on their height and orientation the walls retained the heat of the sun if they were south facing or protected plants from cold northerly winds if they were north facing.\footnote{The increase in temperature provided by a sunny south facing wall was significant. Experiments carried out in the late 1800s demonstrated that a peach tree growing against a wall in southern England might enjoy temperatures equivalent to those in the south of France (\textit{ibid.}, pp. 47–9).}

From the Elizabethan period a variety of crops such as melons, cucumber, nasturtium seeds, tomatoes, capsicums, early salad greens, pumpkins and cauliflower were raised in hotbeds. In this technique seeds were planted on a bed of finely mixed, well decayed dung covered with a layer of fine soil. The use of fermenting dung to generate heat was known to many ancient cultures including the Egyptians, Romans, Chinese and Arabs.\footnote{The Arabs brought this technique to Spain in the eighth century AD, but it does not appear to have spread to the rest of Europe for another three centuries (Campbell, \textit{History of Kitchen Gardening}, pp. 119, 123–6; and, Thick, \textit{Neat House Gardens}, pp. 103–4).} To retain the heat a cover was placed over the seedlings until they germinated (the Moors in Spain used cabbage or cauliflower leaves, and French gardeners in later centuries used straw mats). When the seedlings were large enough they were transplanted. This technique greatly extended the growing season of many crops and hastened the growth of seedlings. By the end of the seventeenth century hotbeds were becoming more sophisticated. Cloches in the form of glass jars or glazed tent-like structures, rectangular cases constructed of glazed panes and cold
frames covered with glass or oiled paper were in wide use.\textsuperscript{91} From the 1650s glass was cheap enough to be viable for market gardens.\textsuperscript{92}

Transplanting techniques, similar to those used in China, were well developed by the Elizabethan period and sixteenth century herbals give precise instructions about the number of leaves a plant should have before being transplanted as well as advice on which plants thrive on transplanting and which do not.\textsuperscript{93} The art of saving seed was well understood and commercial nurseries were in existence from the 1590s.\textsuperscript{94} Commercial seed growers offered a much wider variety of seeds, propagated for specific characteristics and with greater consistency in quality through their trade with foreign suppliers.\textsuperscript{95}

In eighteenth-century England intensive horticulture was practised within the walled kitchen gardens on the estates of the wealthy. A few of these gardens still survive, as reminders of this golden age of gardening.\textsuperscript{96} Estate gardens made use of an abundant source of labour to cart and spread manure, hoe, weed, raise and transplant seedlings, prune and water. There was a growing demand for high quality exotic fruit and vegetables, and professional gardeners and nurserymen were in great demand and accorded high status.\textsuperscript{97} The wealthy desired a reliable supply of fresh fruit and vegetables year round and this stimulated experimentation and innovation in gardening techniques, for example by extending the growing season of vegetables through the use of hotbeds and greenhouses and propagating earlier maturing

\textsuperscript{91} In horticulture, a row cover (or cloche) is any material used as a protective covering to shield plants, usually vegetables, from the effects of cold and wind, and also from insect damage (Wikipedia, ‘Row cover’, http://en.wikipedia.org/wiki/Row_cover, accessed 26 March 2011).
\textsuperscript{92} Campbell, \textit{History of Kitchen Gardening}, p. 129; Leach, \textit{1,000 Years of Gardening}, p. 84; and, Thick, \textit{Neat House Gardens}, p. 103.
\textsuperscript{93} Leach, \textit{1,000 Years of Gardening}, pp. 82–3.
\textsuperscript{94} Trade lists included fruit trees, and ornamental trees and shrubs; vegetable seeds do not appear until 1677 (\textit{ibid.}, p. 85).
\textsuperscript{96} \textit{Ibid.}, p. 11.
\textsuperscript{97} Leach, \textit{1,000 Years of Gardening}, p. 89.
varieties. Many new varieties of early potatoes, early peas, gooseberries and other fruit were developed in the eighteenth century.98

Campbell distinguishes between kitchen gardens (which included elements purely for leisure or aesthetics, such as decorative flower borders, arbours, dovecotes and aviaries) and commercial market gardens.99 The emergence of commercial market gardening in England in the 1600s was stimulated by population growth and the failure of grain harvests in the mid-1590s, which hastened the acceptance of more garden vegetables in the diet, particularly among the poor who were most affected by famine and scarcity.100 Thick documents the spread of market gardening around London from the early 1600s, as the rapidly growing population of the city placed huge demands on the surrounding countryside to produce food.101 For over two hundred years from around 1600, the Neat House Gardens, an area of around 100 acres bordering the Thames, in what is today the suburb of Pimlico, supplied Londoners with fresh produce.102 At their peak between 1688 and 1721, the Neat House gardens were renowned for their advanced horticultural techniques. These included careful cultivation, thorough digging and hoeing of the ground, heavy manuring, multiple cropping, crop rotation and methods of producing vegetables out of season using hotbeds and glass.103

London market gardeners were considered exceptional in their intensive use of small plots of land. The variety and rotation of the crops they grew protected them from the problems associated with monoculture. Thick quotes the comments of a contemporary observer Leonard Meager, writing in the 1670s:

98 Ibid., pp. 89–91, 96. See also Thirsk, Alternative Agriculture, p. 36.
99 Campbell, History of Kitchen Gardening, pp. 91–2.
100 Ibid., Neat House Gardens, pp. 17–19.
101 Ibid., pp. 41–58.
102 Ibid., p. 93.
103 Ibid., pp. 47, 63–5.
... you do not sow one sort of crop too often upon one and the same piece of ground, but sow it with changeable Crops, especially Parsnips and Carrots, the which being sown too often without change, will be apt to canker, rot, or be very apt to be worm-eaten, though the ground be maintained very rich. I do not speak this of the Great garden grounds in or near London, where their grounds are in a manner made new and fresh once in two or three years, by dung and soil, and good trenching; so that their ground is as it were new and fresh for one and the same kind of crops every year.\(^{104}\)

In 1577 the English horticulturalist Thomas Hill recommended planting faster growing salad greens such as radishes, purslane and rocket in beds at the same time as slower maturing onions and leeks. He also advised transplanting seedlings to well spaced holes in prepared beds, as part of the process of thinning out a thickly sown crop.\(^{105}\) By the late-nineteenth century simultaneous cropping was widely adopted where space was at a premium. Common crop combinations were radishes, lettuces or endives sown on the banks in between the trenches dug for celery; broad beans and early potatoes; tall and dwarf peas; and, rhubarb and sea kale.\(^{106}\)

In the sixteenth and seventeenth centuries Huguenots, Protestant refugees from France, Holland and Belgium, fled in their thousands to England to escape Catholic oppression. Many were skilled gardeners and they had a major influence on British gardening. They set up commercial market gardens all over southern England and particularly around the expanding city of London.\(^{107}\) Among the methods they brought with them were grafting, dwarfing and espaliering – training fruit trees and vines against a supporting wall.\(^{108}\) The art of grafting was developed in many ancient civilisations, including Mesopotamia, Greece, Rome and China as

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\(^{107}\) Stapleton notes the important role which Huguenot and Flemish immigrants played in the industrial revolution in Britain, and the copying of various continental technologies in the eighteenth century (Stapleton, *Transfer of Early Industrial Technologies*, p. 1).  
early as 2,000 BC. This technique enables the gardener to create trees with desired characteristics such as drought or frost tolerance, early or late fruiting, or bearing fruit of specific size, shape and flavour.

The Huguenots also brought the technique of ‘forcing’ or stimulating the growth of seedlings using hotbeds, which was well known in seventeenth century France and also in China. The adoption of hotbeds and glass frames, enabling crops to be produced without regard to season, was the major innovation of intensive market gardening. Gardeners could supply a succession of roots, herbs, vegetables and fruit throughout the year. The increasing demands for novelty from rich customers stimulated innovation and ingenuity, as gardeners could reap great profits from supplying exotic produce such as asparagus, artichokes, cherries and apricots, and fruit such as raspberries and strawberries, out of season. At the same time gardeners saw the opportunity for reducing the prices of common vegetables and increasing the demand for them from the working classes, who consumed relatively little fresh fruit and vegetables, traditionally eating them in stewed form as potage.

As their name implies, market gardens in Britain were commercial operations, oriented towards production for a market rather than subsistence, and they made use of capitalist forms of enterprise such as rented land and large outlays on hired labour, and as time went on, investment in glass houses and soil additives. Access to markets was the main determinant of location, and responsiveness to the changing demands of consumers drove innovation and maximised profits. By adding manure and new soil, draining and irrigating, gardeners could

transform their soils to meet the needs of production.\textsuperscript{114}

At first glance it appears that the Chinese and British horticultural traditions developed under very different circumstances and had distinctive histories. The discussion above, however, shows that there are parallels in the basic horticultural techniques they employed. They shared many common elements, in particular the attention given to individual plants, deep cultivation of the soil, techniques of raising seedlings in hotbeds, transplanting, multicropping and crop rotation, and the extensive use of manure. Thus, when Chinese horticultural traditions were transported to Australia and New Zealand, many of the methods employed by Chinese market gardeners were familiar to Europeans. It is probable that this familiarity promoted European acceptance and recognition of Chinese horticultural skills.\textsuperscript{115} There is a further parallel in the traditional Chinese and British abhorrence of ‘wasteland’, glossed in Chinese as \textit{huang}.\textsuperscript{116} This point is discussed further in Chapter Five.

While the British and Chinese horticultural traditions shared basic techniques, their application in Australia and New Zealand took place under different circumstances and followed different trajectories. As a result of the tensions between the yeoman ideal and the reality of the dominance of large-scale pastoralism, commercial market gardening was relegated to a minor element of the agricultural economies of Australia and New Zealand. Although Chinese market gardeners never supplanted Europeans in market gardening, they played a significant role in the industry over many decades and in some areas of New Zealand such as Oamaru and the Auckland urban area, they cultivated larger acreages overall than

\textsuperscript{115}This issue is explored further in later chapters. See Chapter 3, p. 189 and Chapter 5, pp. 318–26.
\textsuperscript{116}James Beattie, pers. comm., July 2014.
European gardeners. Chinese market gardeners also encountered indigenous horticultural traditions in Australia and New Zealand.

INDIGENOUS HORTICULTURAL TRADITIONS

British and Chinese horticultural traditions encountered distinctive indigenous subsistence traditions in Australia and New Zealand, and interacted with these traditions in distinctive ways. In Australia, the indigenous Aboriginal people remained hunters and gatherers while the vast majority of the rest of the world became cultivators. They had no tradition of true horticulture, although they replanted the tops of edible yams and other tubers after harvesting and deliberately scattered the seeds of edible fruit trees in refuse heaps near camp sites. They have been characterised as the original affluent society, successfully adapted to survival in the world’s driest inhabited continent. It is probable that these unique environmental challenges made any investment in agriculture uneconomic. Indigenous Australian subsistence traditions had relatively little impact on imported British and Chinese horticultural systems, although, as discussed in the following chapter, some indigenous plant species were incorporated into British and Chinese horticulture.

In New Zealand, British and Chinese horticulturalists encountered an established Māori horticultural tradition, which originated in tropical Polynesia. Māori people had a long tradition of gardening, based on the tropical crops they brought with them from the Pacific islands. Polynesian gardeners specialised in tropical root crops such as yam (*Dioscoria batatas*), taro (*Colocasia esculenta*), sweet potato (*Ipomoea batatas*), ginger (*Zingiber*).

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117 Figures collected in 1925, 1945 and 1964 in the Auckland urban area show that in all these years, the total acreage cultivated by Chinese market gardeners was larger than that cultivated by Europeans (Mohommod Taher, ‘Asians in New Zealand: A Geographical Review and Interpretation’, PhD Thesis, University of Auckland, 1965, Table 3.5, p. 184).

officinale) and Polynesian arrowroot (Tacca leontopetaloides) as well as tree crops such as bananas (Musa sp.), breadfruit (Artocarpus altilis), coconut (Cocos nucifera), ti tree (Cordyline spp.) and paper mulberry (Broussonetia papyrifera). However, the Māori people who settled New Zealand some nine hundred years ago had to adapt their agricultural techniques to a much larger and cooler landmass than the tropical islands they left behind. A number of cultigens in the basic Polynesian repertoire, including breadfruit and banana, did not survive. But six key crops were successfully grown in New Zealand: sweet potato (kumara), yam, taro, ti tree, paper mulberry and the bottle gourd (Lagenaria siceraria).

Māori gardeners quickly adopted European crops such as maize, potatoes, cabbages, turnips and leeks, introduced by early explorers, whalers and sealers and later by missionaries. These new crops provided them with a variety of new vegetable foods, particularly in the warmer North Island, and they grew them not only for their own consumption but also for trade with Europeans. By 1840 entrepreneurial Māori had established a thriving trade in garden produce, growing beetroot, radish, artichokes, cucumbers, celery and endive to supply early European settlers and visiting ships. They also grew maize, potatoes, watermelons and peaches for their own consumption and for Europeans. By 1850 Māori tribes in the Thames and Waikato districts supplied the rapidly growing town of Auckland with most of its vegetables. Later they also supplied the goldfields of New South Wales and Victoria with potatoes and wheat. The scale of their enterprise can be

120 Leach, *1,000 Years of Gardening*, pp. 53–6.
121 Ibid., p. 101.
judged by the fact that in 1853 alone the Hauraki tribes sent at least 1,300 canoe loads of fresh vegetables, estimated to be worth over £8,000, to Auckland.  

The production of these huge amounts of food, in addition to the quantities required for the competitive feasts held between neighbouring tribes, was carried out using traditional labour intensive cultivation techniques. This commercial boom was short lived. Without the application of manure the fertility of the soil declined and yields dropped so that by the early 1860s large-scale Māori gardening virtually ceased. The New Zealand Wars of the 1860s displaced Māori from their traditional lands and European settlers spread out over the countryside, establishing home gardens and orchards. European gardeners established commercial market gardens close to population centres, to be followed by Chinese market gardeners later in the nineteenth century. As this thesis will demonstrate, the social and economic relationships that Chinese market gardeners developed with indigenous people were significant factors in the successful transfer of their horticultural technologies, particularly in New Zealand.

**CHINESE HORTICULTURE IN THE ANTIPODES**

Overlaying earlier indigenous and British horticultural traditions, the traditional Chinese horticultural techniques transferred to Australia and New Zealand were remarkably enduring. The cultivation of plants in rows on raised beds with long furrows in between was a feature of Chinese market gardens in Australia and New Zealand noted by contemporary European observers, for example in Sydney in 1867 and Brisbane in 1882. Ridges and furrows are distinctive archaeological features that survive to the present day as indicators of

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Chinese market gardening activity in more remote rural areas, for example on Mona and Manar Stations near Braidwood in south-western New South Wales. They can also be seen in early aerial photographs of urban areas, taken before Chinese market gardens were swallowed up by housing. Aerial photographs taken in the 1940s of Ithaca and Enoggera creeks in the Brisbane suburbs of Ashgrove and Enoggera, show characteristic crop marks on either side of their banks, vestiges of the Chinese market gardens which once flourished there. Chinese market gardeners settled in this area and in the neighbouring suburbs of Bardon and Kelvin Grove from the 1880s and cultivated vegetables until the 1950s.

Chinese manuring methods aroused both approval and opprobrium in European observers. In 1867 Sydney horticulturalist John Gelding visited a Chinese market garden at Rushcutters Bay where he observed liquid manure stored in a long array of Chinese jars. As early as 1862, Chinese market gardeners were active around the Victorian gold mining towns of Castlemaine, Ballarat and Sandhurst. While his report was couched in the language typical of the day and depicted Chinese market gardening as an ‘exotic’ practice, an observant journalist recorded some useful details of the way in which Chinese gardeners in Victoria handled liquid manure:

> It is in market-gardening, apart from digging, that they have chiefly made themselves useful in the colony... He [the Chinese gardener] is great in the use of liquid manure, and round his garden gate at all times long rows of peculiar round long-necked pipkins are to be seen - miniatures of those oil jars in which the forty thieves who tormented Ali Baba were so summarily disposed of by quick-witted Morgiana. These pipkins the Chinese gardener circulates throughout his neighbourhood when empty, and recovers when full, and, with the help of the river water, to thoroughly disseminate this manure about the

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128 Desley Drevins, ‘Chinese market gardens and market gardeners on Enoggera Creek and Ithaca Creek’, presentation given to Ashgrove Historical Society, 1 September 2007, pp. 1–4.
129 Gelding, 'John Chinaman and his garden', p. 192.
roots of his plants, he performs marvels in the art of kitchen gardening.\(^{130}\)

Some archaeological evidence of Chinese manuring methods has survived on the goldfields of Central Otago. A ‘short drop’ privy associated with Ah Lum’s store in Arrowtown was still extant in the early 1980s.\(^{131}\) Ah Lum’s story is discussed in more detail in the following chapter; he was both a market gardener and a storekeeper. It is thus quite probable that he collected the waste from the privy for use on his garden.

Individual care of plants was another hallmark of Chinese gardening in Australia and New Zealand, and was noted in oral histories and newspaper reports. George Lee Kim, who grew up on his grandfather’s market garden in Bendigo in the 1920s and 1930s, describes his grandfather’s painstaking methods:

Always on the go when you look at it, rows and rows of vegetables, there was always something to do, as they got bigger and he distributed them into different beds, like cabbages and caulis ... Once you had planted them you had to nurse them, weed them, hoe them, keep them going with applications of very strong horse manure, the produce them days was very strong and good.\(^{132}\)

Esma Smith, the daughter of a Chinese market gardener, grew up in Forbes New South Wales in the 1940s. She recalled that her father did not use pesticides, but walked up and down the rows of vegetables painstakingly collecting beetles in a small funnel shaped wooden container. He would then pour hot water through it.\(^{133}\) In 1888 a New Zealand agricultural expert Mr T. Kirk reported on the devastating effects on food crops of the cabbage moth *Plutella cruciferarum*, which was first introduced from England into the Wellington district around 1880 and rapidly spread, devastating European and Chinese market gardens. He

\(^{130}\) *Argus*, 27 August 1862, p. 5.

\(^{131}\) Andrew Piper, pers. comm., April 2011.


\(^{133}\) Esma Smith interviewed by Rob Willis, 4 September 2009, Forbes, NSW. National Library of Australia, *Voices of the Bush* oral history project, ORAL TRC 6125/11.
described how Chinese gardeners were able to bring the pest under control through their ‘untiring industry’ and the application of lime dust, which to be effective must be frequently and lightly applied. He attributed their success to the care with which they treated individual plants, hand picking insect pests from them:

They spare neither time nor pains. They work from daylight to dark, their gardens are scrupulously clean and neat, no accumulations to harbour vermin; they carefully watch their crops, and apply 'hand picking' to an extent that would cause an Englishman to lose patience.\(^\text{134}\)

Careful preparation of the soil prior to planting and regular hoeing and weeding was another key feature of Chinese market gardening in Australia and New Zealand. One of the earliest and most detailed descriptions of Chinese market gardening methods, as they were transplanted to Australia, was published in the *Melbourne Age* in 1865. The report describes Chinese market gardening in the Castlemaine district on the Victorian goldfields, and outlines the methods of preparing the soil and the typical layout of Chinese gardens, which facilitated easy access to the growing plants:

The gardens are models of neatness ... They are thoroughly clean of weeds ... The ground is prepared by being trenched to a depth of from two and a half to three feet. The garden is divided by a number of narrow walks into long beds or plots which are of such a width that the gardener, sitting, or rather crouching by the side of it, as the Chinese do, can easily stretch half way across the plot, so that he can weed it without having to step on the plot. His beds are raised to a height of about eight inches above the level of the walks. It has to be observed that the soil is always beautifully pulverised, and it may be presumed that it would be sufficient to drive a Chinese gardener frantic if any one were to tread and leave a footprint on his plots.\(^\text{135}\)

China’s long history of water control stood Chinese immigrants to Australia and New Zealand in good stead, in their occupations of mining and market gardening. The Californian

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\(^{134}\) *Hawke’s Bay Herald*, 13 November 1888, p. 3

\(^{135}\) *Sydney Morning Herald*, 2 March 1865, p. 2, reprinted from the *Melbourne Age*, 24 February 1865.

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pump, named from its use on the Californian goldfields, was derived directly from the traditional Chinese chain pump. It was a continuous belt, usually made of canvas, with buckets attached, and was commonly used on the goldfields of Australia and New Zealand. In 1877 a newspaper reporter described Chinese miners operating a Californian pump in Central Otago. When viewed from a distance they appeared to be dancing:

Passing along Gabriels Gully I observed about twenty-five Chinamen at work, in parties of three and four. They were engaged in dancing operations. What this means we fail to understand excepting they were pumping water out of their claims by foot – that is, driving California pumps with a wheel a la treadmill, a system very common with Chinese.

Figure 1.3: Aerial photograph of Chinese market garden site, Whittlesea, Victoria, January 2007.

137 Dunstan Times, 7 December 1877, p. 2.
138 Photograph courtesy of City of Whittlesea.
The traditional layout of gardens with water reservoirs and a network of irrigation trenches endured in Australia and New Zealand, and their remains can still be seen as archaeological features in some places (for example, on the site of Ah Toy’s garden on the Palmer River in far north Queensland, discussed in the following chapter (pp. 101–3)). Likewise in Whittlesea in Victoria, after the gold rushes Chinese market gardeners settled along the Plenty River and Bruce’s Creek from the 1870s. The remains of their irrigation systems are still visible today in some locations and in an aerial photograph of a Chinese market garden site in Whittlesea, taken in 2007, the water reservoirs and parallel rows of irrigation channels through the gardens are clearly visible (Figure 1.3).

CONCLUSION

This chapter has explored how two immigrant gardening traditions with very different origins and histories were transported to Australia and New Zealand, where they came into contact with each other and with indigenous subsistence traditions. Chinese immigrants maintained their traditional Chinese gardening practices in these new environments. In contrast, the intensive horticultural traditions which were imported from Britain were overshadowed by broad-scale agriculture for export. Most British migrants who took up agriculture had aspirations to become yeoman farmers. Broad-scale agriculture and pastoralism came to dominate the economies of Australia and New Zealand, with market gardening relegated to a relatively minor role.

While there was considerable continuity in traditional Chinese agricultural technologies and practices in Australia and New Zealand, this study will go on to show that Chinese market gardeners adopted European technological developments which were appropriate to the scale and work organisation of their enterprises. It will explore how Chinese gardening traditions interacted with European and earlier indigenous gardening traditions in
Australia and New Zealand, and were blended and modified. The following chapter discusses the diverse environments which the Chinese immigrants who took up market gardening in Australia and New Zealand encountered, and the adaptations which they made to their horticultural techniques and choice of crops.
CHAPTER 2

THE NATURAL ENVIRONMENT

The one man, apparently, who can laugh at drought in Queensland is the despised Chinaman.

*The Queenslander*, 16 August 1902, p. 360S.

Fields, gardens and other cultivated landscapes represent the continual interaction between human beings and natural processes. In the words of Kathryn Gleason, they are never-finished projects – part of a cycle of hourly, daily, seasonal and annual changes, which govern the rhythm of human activity.¹ In her study of Chinese agriculture, Francesca Bray observes that agriculture is the prime technological system which mediates between the natural environment and human society, and the history of agriculture is the result of a continual interplay between the forces of nature and those of state and society. Environmental conditions influence the form of agricultural technology adopted, and therefore the economic and political relations of the wider society. At the same time social and political constraints influence the patterns of development of agricultural systems.² Researchers in the field of technology transfer, such as V. W. Ruttan and Yujiro Hiyami, similarly emphasise the important role that environmental factors play in the success of technology transfer in agriculture and the need to incorporate mechanisms of local adaptation.³

The Chinese immigrants who took up market gardening in Australia and New Zealand encountered diverse environments, very different from their homeland in subtropical southern China. They modified their horticultural techniques and choice of crops accordingly. This

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chapter explores the environmental factors which influenced the course of Chinese market gardening in Australia and New Zealand. It begins with a brief introduction to the natural environments of southern China, Australia and New Zealand. It then traces the development of Chinese market gardening in the more temperate areas of Australia and New Zealand, where most of the population and therefore most market gardens were located. This section focuses on the environmental factors determining the location of market gardens, in particular availability of water, soil fertility, aspect and slope as well as the adaptations gardeners made in the selection of crops they grew. The final section explores how Chinese gardeners in Australia and New Zealand adapted their horticultural techniques and choice of crops to some of the more extreme environments in which they settled, ranging from the tropics of northern Australia and semi-arid western New South Wales to the cool temperate climates of Central Otago and Tasmania.

HOME SOIL: THE NATURAL ENVIRONMENT OF SOUTHERN CHINA

Bray divides the vast land area of China into two contrasting natural environments: the continental zone of the northern plains and the subtropical zone south of the Yangtze River. Guohua Xu and L. J. Peel outline a more detailed picture of China’s environment, dividing it into three natural geographic regions: the Eastern Monsoon region, the Xinjiang-Inner Mongolia arid region and the Qinghai-Tibetan Plateau or alpine region. The Eastern Monsoon region, the Han heartland of China, can be subdivided into four subregions on the basis of temperature differences due to latitude: temperate humid/semi-humid northeast China; warm temperate humid/semi-humid north China; subtropical humid central and south China; and, tropical humid south China.4

The province of Guangdong spans the tropical and subtropical zones. Bounded in the

north by the Nan Ling mountain range, Guangdong has mean annual temperatures between 12°C and 30°C and high rainfall ranging between 1,500–2,000 mm per annum, mostly occurring between summer and autumn (mid-April to mid-October). Winter and spring can be dry. Most of the region is frost-free, so crops can be cultivated year round. Much of the province is hilly or mountainous, limiting the amount of arable land. Agriculture is mainly confined to the flat, irrigable river valleys, including the broad Canton delta, while the long coastline provides a wealth of marine resources. The region has been the nation’s main point of contact with foreign powers, in particular through the trading enclaves of Guangzhou, Macao and Hong Kong. The south coast of China has also been the gateway for millions of departing Chinese emigrants.

As discussed in Chapter One, the fertile coastal plains of Guangdong, which produce two crops of rice a year, have supported high population densities over many centuries. In addition to the staple crops of rice and barley, many other crops were produced in rotation, including sweet potato, peanuts, tobacco, ginger, arrowroot, water chestnut, taro, melons and green vegetables. In the rich Pearl River delta area, criss-crossed by canals, clusters of small villages were surrounded by fields, ponds for raising fish and for water buffalos to wallow, orchards containing a great variety of fruit trees (pomelo, orange, banana, plum, lychee, mulberry, carambola, peach, guava and pear) and stands of bamboo and other timber trees.

Despite Guangdong’s rich environment, there were often times of drought and flood, bringing famine and disease. For example, after he returned from his fifth visit to the villages of Upper Panyu County north of Guangzhou in 1902–1903, the New Zealand missionary George Hunter McNeur reported that in many places the first crop of rice had been lost after a severe drought, and a second season of drought was expected. He vividly describes the people

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treading their water wheels, trying to raise water to save their crops:

Every well sweep is swinging up and down, up and down, all day ... Many have had to give up, and have left their fields to bake in the sun, and now the ground is covered with great thirsty cracks, while the paddy is tinged with yellow.7

Chinese immigrants’ accounts of their homeland are rare. In about 1900 a Chinese miner, Yut Kui Kong, was living near Alexandra in Central Otago, eking out a living searching for gold. Aged fifty-nine, he had been in New Zealand for thirty-two years. He told Alexander Don that both his parents were dead when he left his home in Guangdong as a young man; if they had been alive they would not have let him come. He recalled that the family field was over 10 mu (approximately 2 acres), but part of it was hilly. If there was a dry season or major floods, there was no harvest, and the family had to either beg or starve. While the loss of one rice crop meant months of hunger, the loss of two crops in succession inevitably resulted in many deaths from starvation. Diseases such as cholera, smallpox, typhoid and malaria were never far away.8

The Chinese immigrants who travelled from their home villages to the Antipodes left behind them a rich subtropical environment which was bountiful, but could also be cruel, with periods of drought and floods. In Australia and New Zealand they encountered new environments and faced new challenges. Just as they had done in their homeland, they had to cope with the unpredictable forces of nature.

NEW SOILS: THE NATURAL ENVIRONMENTS OF AUSTRALIA AND NEW ZEALAND

As environmental historians Libby Robin and Tom Griffiths point out, the geological histories of Australia and New Zealand diverged markedly from the time of the breakup of the

7 George Hunter McNeur, letter, Outlook, 28 February 1903, p. 15.
8 Ng, Windows on a Chinese Past, Vol. 1, p. 33.
ancient Gondwanaland supercontinent. Today they have strikingly different geologies and ecologies. In Robin’s and Griffiths’ words, Australia is ‘a wide, brown land, flat and worn’, while New Zealand is a cluster of ‘green and black, high and steaming islands’. 9

Australia is an ancient, geologically stable continent with poor soils, low relief and slow flowing rivers. About seventy per cent of the land area is arid or semi-arid; around fifty per cent receives less than 300 mm of rain per annum. 10 The continent has a variety of distinct regional climates with transition zones often extending over a considerable distance. These range from a tropical monsoonal climate in the north, with high summer rainfall and mild, dry winters, to the temperate climates of southern New South Wales, Victoria, Tasmania and southwest Western Australia. Central Australia has an arid desert climate, with annual rainfall averaging only 200 to 250 mm, frequently in the form of heavy thunderstorms. North of the Tropic of Capricorn the terrain varies from desert with vast stretches of sand dunes and clay pans, to grassland and dense tropical rainforest.

The most notable feature of Australia’s climate, and a major limiting factor for agriculture and settlement, is its extremely variable rainfall, with frequent droughts lasting several seasons. This is influenced by the Southern Oscillation and the accompanying El Niño/La Niña effect, driven largely from the tropical Pacific Ocean and its overlying atmosphere. The rainfall pattern is strongly seasonal, dominated by the subtropical high pressure belt which moves north and south with the seasons. When the high pressure weather systems move north during winter, southern Australia comes under the influence of westerly winds and rain-bearing cold fronts. 11 In his history of Australia, Stuart Macintyre notes that

climatologists have detected the El Niño effect in records going back to the early-nineteenth century and suggests that it has probably shaped the Australian environment for a lot longer.\(^\text{12}\)

Water has thus been a crucial determinant of subsistence throughout the human history of Australia.\(^\text{13}\) Archaeological evidence indicates that long before the arrival of Europeans, Aboriginal populations tended to be concentrated in better watered areas where food resources were most abundant – coastal areas and inland lakes and rivers. In the well watered eastern zone an average of 2.5 square kilometres was needed to support one person, while in the central desert as much as 260 square kilometres per person was required.\(^\text{14}\) European settlement followed a similar pattern, as many Australian historians and human geographers have observed. J. M. Powell and Kevin Frawley, for example, document the expansion of pastoralism in the 1820s and 1830s across a ‘fertile crescent’ in the southeast corner of the continent stretching more than 2,000 km from Brisbane to Melbourne and Adelaide. By 1850, two-thirds of the white population still lived in this more fertile zone, within 200 kilometres of the coast, and this proportion continues to hold today. Most of Australia's primary production occurs in the temperate south-east and relies on winter rainfall.\(^\text{15}\) Figures 2.1 and 2.2 show the close correlation between the spread of settlement and the major rainfall zones.


Figure 2.1: Map of Australia showing zones of average annual rainfall. Powell, *An Historical Geography of Modern Australia*, 1988, p.12.

Figure 2.2: Simplified sequence of European settlement in Australia. Powell, *An Historical Geography of Modern Australia*, 1988, p. 58.
Powell and Frawley describe the settling of Australia as a process of trial and error, testing the limits of the physical environment. They highlight the environmental challenges faced by European settlers – the attempts of pastoralists to expand their holdings into the arid and semi-arid grasslands of mulga and saltbush, which often ended in retreat, and the attempts to establish settlements in the tropical north which were often defeated by extremes of heat, humidity and torrential rains.¹⁶

In contrast to Australia, New Zealand is a young, geologically active land with high mountains, fjords, glaciers, geysers and rushing rivers. Most importantly for agriculture, flat land is limited and soils in the areas that exist are enriched by nutrients scoured from the rugged surrounding terrain.¹⁷ A relatively small, narrow land mass in the South Pacific, surrounded by oceans, New Zealand has a temperate maritime climate. Mean annual temperatures range from 10°C in the south to 16°C in the north. Frosts can occur anywhere (although rarely in Auckland and Northland). New Zealand’s climate is dominated by three main factors: the surrounding oceans; the prevailing westerly winds; and, the mountain ranges which trend north – south and form a barrier to the westerlies. Most of the country is near the sea, giving mild temperatures, moderate rainfall and high sunshine hours.

However, New Zealand’s climate is highly variable over short distances and encompasses a great diversity of regional microclimates; it has been classified into as many as eighteen climatic zones. In broad terms the top half of the North Island has a warm temperate climate with warm summers, mild winters and an annual rainfall of 1,000 to 1,500 mm, with a winter maximum. The coastal areas of the central and southern North Island (such as the Bay of Plenty and Hawke’s Bay) also fall into this climatic zone. The central plateau of the North

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Island and the Southern Alps of the South Island have cold temperatures and high rainfall, and local conditions vary greatly according to altitude, distance from the sea and exposure. For much of the southern region, winter is the driest season. The South Island has distinct climatic zones due to the orographic effect of the Southern Alps. The West Coast has very high rainfall, with as much as 10,000 mm per annum falling on the divide of the Southern Alps and 6,000 mm at Milford Sound on the coast. To the east of the Alps annual rainfall is much lower – 500 to 800mm on the Canterbury Plains and 300 to 500 mm in Central Otago.18

An elevated region relatively distant from the coast, Central Otago has a more continental climate than any other area of the country. The region has some of New Zealand’s highest and lowest temperatures as well as lowest rainfall. In Alexandra, for example, the average maximum temperature in July, the coldest month, is only 8°C, one of the lowest in New Zealand, and the maximum temperature in January, the hottest month, can reach over 37°C.19

Since European settlement the dense forests which once covered large parts of New Zealand have been mostly clearfelled, transforming the landscape in the drive to create pasture to produce wool, meat and dairy products for export. To this end, a major focus of agricultural research efforts from the late-nineteenth century has been the development of varieties of grass seed suitable for New Zealand conditions.20 Environmental historians have also documented the destruction of the wetlands which once abounded in lowland New Zealand, in the same drive to convert seeming ‘wastelands’ into productive use and in response to ever...
increasing demands for flat land. Chinese market gardeners, who selected sites for their gardens close to watercourses, also played a part in draining low-lying land and changing the hydrological features of the surrounding catchment areas.

The cool temperate climate of New Zealand would have presented a stark contrast to subtropical southern China. Central Otago, the region to which the first Chinese immigrants came in search of gold, had a particularly extreme climate, with hot dry summers and cold winters. Similarly in Australia, Chinese immigrants encountered diverse environments, ranging from tropical to arid and semi arid. The following sections explore how Chinese market gardeners in Australia and New Zealand adapted their crops and horticultural techniques to these novel environments.

CHINESE GARDENS IN NEW LANDS

This section explores how Chinese market gardeners selected sites for their gardens and modified their horticultural techniques and selection of crops in the more temperate areas of Australia and New Zealand. Historically, market gardens in Australia followed the spread of European settlement and consequently were predominantly located in the relatively well watered and fertile south-eastern corner of the continent and in Tasmania. Townships grew up close to watercourses, often at key locations such as river crossings or the confluence of rivers, and the market gardens serving them were often located beside these watercourses. In New Zealand, market gardens also followed the spread of European settlement and major centres of market gardening developed in areas with favourable local climates, flat land and fertile soils,

Since European settlement there has been an eighty-five per cent decline in wetlands in New Zealand, one of the most dramatic in the world (Geoff Park, ‘Swamps which might doubtless be easily drained: swamp drainage and its impact on the indigenous’, in Pawson and Brooking (eds), Environmental Histories of New Zealand, pp. 151–8; and, Pawson and Brooking, Environmental Histories of New Zealand, p. 10).

Examples include the Chinese market gardens on the Mulwaree River at Goulburn, the Lachlan River at Hillston and the Castlereagh River at Gilgandra in New South Wales, and on the Loddon River near Vaughan in Victoria (Barry McGowan, ‘Chinese market gardens in southern and western New South Wales’, Australian Humanities Review, Issue 36, July 2005, not paginated).
such as Oamaru in the South Island and Otaki, Hawke’s Bay and the Bay of Plenty in the North Island. Thus the siting of market gardens generally on the fringes of towns and cities was at least partly, if not significantly, influenced by environmental factors.

Writing in the *Agricultural Gazette of New South Wales* in 1916, A. J. Finn provided advice on the selection of suitable sites for market gardens. He highlighted environmental factors such as soil quality, water supply and aspect, noting that river flats which have friable alluvial soils are the best locations, preferably with a north-easterly aspect. Discussing climate, he outlined the advantages and disadvantages of warmer locations nearer the coast, such as north-eastern New South Wales where growing seasons are longer but crops are more prone to disease and insect pests compared to the cooler upland districts where growing seasons are shorter but disease and insect pests are less prevalent.\(^{23}\) Finn also discussed other locational factors such as proximity to markets, transport facilities and supplies of manure as well as economic factors such as land prices and capital. All these issues affected the course of Chinese market gardening in Australia and New Zealand and they are discussed in later chapters.

Paralleling Finn’s criteria, Chinese gardeners considered important environmental factors in selecting the location of their gardens: the availability of water, soil fertility, aspect and slope, and shelter from prevailing winds.\(^{24}\) Thus their market gardens were generally located near water courses, freshwater lakes or swamps, on relatively flat areas of fertile alluvial soil. These factors have been highlighted in recent studies of market gardening in


\(^{24}\) In this they followed the traditional environmental principles used in the siting of villages and fields in their homeland in southern China, taking into account access to water, drainage, directional orientation, terrain and land and water transport routes. See Ronald Knapp, ed, *Chinese Landscapes: The Village as Place*, Honolulu, 1992. p. 6.
Sydney, Perth, Melbourne, rural Victoria, and rural New South Wales. As a report in the Melbourne newspaper the *Age* noted in 1865, the primary consideration in the location of market gardens was an adequate supply of water:

> The Chinese display much skill and intelligence in the choice of their garden ground, both as regards the character of the soil, and the nature of the situation. The first consideration with them is the supply of water, and they choose a site … on the bank of a creek, in which they may obtain water in the driest seasons. Failing this, they must have wells dug in their gardens, from which they can get a constant supply of pure water.

Water was an essential commodity for both alluvial gold mining and market gardening. In his study of Chinese market gardens in southern and western New South Wales, McGowan notes the close links between market gardening and mining. The dams and water races constructed for sluicing alluvial gravels and separating the precious grains of gold were also used by market gardeners to channel irrigation water to their gardens. For example at Majors Creek near Braidwood in southern New South Wales a Chinese market garden was located some distance away from the main creek, which was devoted entirely to mining. A tail race reticulated water from the dam constructed for mining purposes, diverting it down a gully to run along the upper length of the garden. Similar examples can be seen in western New South Wales. At Gilgunnia McGowan recorded a water race which once conveyed water from an old gold battery dam to a Chinese market garden. At Mount Drysdale Station water was reticulated via a pipe from a mining dam to a holding tank sunk in the middle of a Chinese

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market garden. Water was also vital for Chinese miners and gardeners in the relatively arid Central Otago region in New Zealand. They drew water from the same dams and water races, and competed with Europeans for access to this critical resource.

In Australia, Chinese market gardeners demonstrated the value of irrigation and intensive cultivation in areas where few Europeans attempted to grow vegetables and provided the evidence for proponents of major irrigation schemes to make the ‘desert bloom’. Advocates of closer settlement argued that it was feasible, and desirable, for European farmers to adopt the labour intensive methods of the Chinese and equal their successes. In 1899 John West, a proponent of irrigation along the Murray River, bemoaned the fact that: ‘the average farmer … is in the unfortunate position … with the belief … [that] irrigation will do no good in the hands of any other than a Chinaman’. In his lavishly illustrated *Australia Unlimited*, published in 1918, the journalist Edwin Brady writes enthusiastically of the untapped potential of Australia for agricultural development and records the successes of Chinese farmers in Nowra, New South Wales, and in Cairns, Atherton, Hughenden and Texas in Queensland, citing their high yields as evidence Europeans could achieve the same results.

Even critics of the proselytisers for irrigation and patriotic nation builders, such as the geographer Thomas Griffith Taylor, acknowledged the inventiveness and technological skills of the Chinese. Taylor had no fears of an ‘Asian invasion’ and his views on race aroused as much controversy as his views on irrigation. It is difficult to separate irrigation and settlement

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31 Taylor argued that Australia could support only a limited population because of its limited resources and that efforts should be directed towards developing the better watered areas of the southeast of the continent instead of the tropics and arid areas (J. M. Powell, ‘Thomas Griffith-Taylor’, *Australian Dictionary of Biography*, 1990, http://adb.anu.edu.au/biography/taylor-thomas-griffith-8765, accessed 30 April 2012).
policy from the complexities of the social climate, with its intersection of class, gender and race. Europeans recognised the horticultural skills of Chinese market gardeners and their achievements in producing crops in arid areas, but their willingness to adopt Chinese methods was constrained by a complex set of attitudes and beliefs.

In New Zealand, with its temperate climate and generally reliable rainfall, there was less emphasis on large-scale irrigation schemes. Irrigation was a priority only in the drier regions of the South Island, where a number of major government-funded irrigation projects were undertaken in Central Otago in the 1920s and on the Canterbury Plains in the 1930s and 1940s.\textsuperscript{32} From a search of contemporary New Zealand newspapers, it appears that less attention was paid to the irrigation techniques of Chinese market gardeners and they had less direct influence on agricultural policy making. A few newspapers noted the successes of Australian irrigation schemes and also the successes of Chinese market gardeners. In 1920, for example, the \textit{Northern Advocate} in Whangarei described the major irrigation scheme constructed in the Murrumbidgee Irrigation Area in New South Wales as a useful model for the irrigation schemes proposed in Central Otago and noted that Chinese market gardeners on the Yanco Experimental Farms claimed to produce tomatoes which gave a gross return of £400 per acre.\textsuperscript{33}

Soils and aspect were also important factors in the locations of market gardens. In New Zealand, Chinese and European market gardeners established gardens in sheltered coastal areas with fertile alluvial or volcanic soils, for example in Auckland, Otaki, the Hutt Valley and the Bay of Plenty. Otaki became an important centre of market gardening in the early

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\textsuperscript{(32) Smaller scale irrigation schemes for agriculture were developed in Central Otago and Canterbury in the late-nineteenth century with private and government involvement, for example those capturing the waters of the braided, snow-fed rivers crossing the Canterbury Plains to the sea (Benjamin Evans, \textit{A History of Agriculture, Production and Marketing in New Zealand}, Palmerston North, 1969, p. 13; and, Martin Ward and Shona Russell, \textit{Water Sharing Schemes: Insights from Canterbury and Otago}, Report for Foundation for Research, Science and Technology, Wellington, 2010, p. 4.)}
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\textsuperscript{(33) \textit{Northern Advocate}, Whangarei, 4 May 1920, p. 3.}
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1900s. As Wellington expanded, land values rose and market gardeners in the city and the Hutt Valley were forced to move on.\textsuperscript{34} In November 1909 the \textit{Bay of Plenty Times} reported that there were about 150 Chinese in Otaki, most working on market gardens, and 200 were expected by Christmas.\textsuperscript{35} The location was ideal – a relatively sheltered alluvial plain with deep, fertile soils running several miles inland and a mild sunny climate. The river provided a reliable water supply and easy access inland.\textsuperscript{36}

In Auckland, Chinese and Europeans established market gardens on the fertile volcanic soils derived from the forty-nine volcanoes in the Auckland isthmus. Now dormant, these small volcanic cones dominate the Auckland landscape. The gardens were typically located on gentle north or east facing slopes with good drainage and receiving maximum solar energy.\textsuperscript{37}

In the late-nineteenth and early-twentieth centuries market gardens were located in the inner city and in the suburbs of Avondale, Mangere, Takapuna, Mount Wellington and Panmure.\textsuperscript{38} In Mangere Chinese gardeners followed in the footsteps of indigenous gardeners. With rich volcanic soils, a mild subtropical climate and sheltered location on the Manukau harbour, Mangere was a prime gardening location where Māori had cultivated crops of taro and kumara for centuries before the arrival of Europeans.\textsuperscript{39} The volcanic stones ejected in successive eruptions were used to demarcate garden plots and warm the soils, extending the growing

\textbf{References}

\textsuperscript{34} Chinese market gardeners were particularly affected by increases in land values and land rents, as the majority were lessees rather than land owners.

\textsuperscript{35} \textit{Bay of Plenty Times}, 24 November 1909, p. 2.


\textsuperscript{39} New Zealand’s temperate climate imposed restrictions on where the tropical and subtropical crops introduced by Polynesian settlers could be grown. The archaeological evidence for Māori gardening is most extensive in the northern half of the North Island, especially in coastal areas where the severity and frequency of frosts is limited (Louise Furey, \textit{Māori Gardening: An Archaeological Perspective}, Wellington, 2006, p. 21).
season.\textsuperscript{40}

In the South Island, Nelson in the north and Oamaru on the central east coast were important horticultural centres from early European settlement and remain so today, due to their favourable climates. Oamaru in particular has a unique microclimate, with well drained, fertile, dark brown clay loam soils, moderate temperatures in winter and spring and a northerly aspect, providing protection from frosts and cold southerlies.\textsuperscript{41} The ideal growing conditions allowed gardeners to produce early crops of potatoes, Brussells sprouts and carrots as well as winter lettuce, which realised premium prices. According to the \textit{Dunstan Times} the first Chinese settlers established a market garden in Oamaru in 1870.\textsuperscript{42} From the 1950s to the 1990s Chinese market gardeners gained national prominence for the quality of their produce, particularly their renowned Brussells sprouts.\textsuperscript{43}

Market gardening was always a risky business. Chinese market gardeners were subject to the vagaries of the weather, such as heavy rains causing floods, droughts, high winds and frosts. In cooler areas of Australia, such as Tasmania, and much of New Zealand south of Auckland, frosts were a constant danger to garden crops and orchards. Early or late frosts could destroy crops, robbing gardeners of the profits they might gain from supplying seasonal produce to the markets ahead of, or later than, other growers. Even in coastal areas such as Otaki in New Zealand, with a generally mild climate, sudden frosts could occur late in the year. In 1908 a sudden frost in late October did great damage to flourishing crops of potatoes, tomatoes, beans and other green vegetables. The \textit{Evening Post} in Wellington reported:

\begin{quotation}
\textit{The 100 hectare Otuataua Stonefields reserve is one of only two surviving remnants of these once extensive...}\textsuperscript{40}
\end{quotation}

\begin{quotation}
\textsuperscript{40} The 100 hectare Otuataua Stonefields reserve is one of only two surviving remnants of these once extensive gardens. Department of Conservation, ‘Historic Otuataua Stonefields’, http://www.doc.govt.nz/conservation/historic/by-region/auckland/central-and-south-auckland/otuataua-stonefields/, accessed 11 February 2013.
\textsuperscript{42} \textit{Dunstan Times}, 23 September 1870.
\textsuperscript{43} Lee and Lam, \textit{Sons of the Soil}, pp. 65–6, 74–5.
\end{quotation}
'Chinese market gardeners will be very heavy losers, acres of potato crops being blackened'. In Auckland there was less risk of frost, but it was still a gamble growing frost-sensitive crops such as lettuces and cucumber in winter. Adapting ancient Chinese horticultural techniques, Chinese market gardeners used growing frames covered with paper, hessian or other material to protect delicate seedlings from frost. Percy Yuen, whose father Jack Luen established a market garden in the Auckland suburb of Mangere in 1950 after his garden in Gisborne was flooded, recalled his father’s methods of protecting early cucumbers:

   Early cucumber planting was done by compost … the seeds were sown and covered with a 30 centimetre by 30 centimetre wooden frame and then covered with glass. If a frost was imminent then the nightly chore would be to cover the glass with a sheet of paper, such as a page from the phone directory. Though time consuming, it was a way to have short green cucumbers first on the market floor.

In Hastings in the 1960s, market gardener and orchardist Alan Wing used smudge pots throughout his orchard in Spring to protect the fruit blossoms from frost damage. From the 1970s, Chinese and European growers took advantage of advances in plant breeding and hybridisation and could choose from a wide range of crop varieties selected for frost and disease tolerance.

In another adaptation to their new environments, Chinese gardeners began growing European crops suited to temperate climates. In New Zealand, they also added indigenous cultigens to their repertoire, blending indigenous and Chinese gardening traditions. In areas with suitable climates, for example Auckland, the Bay of Plenty and Taranaki, they grew

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44 Evening Post, 28 October 1908, p. 6.
45 Lee and Lam, Sons of the Soil, p. 432.
46 Alan Wing, ‘My Growing Years’, video, c. 1993. Smudge pots (metal containers in which fuel is burnt to produce heat) were used by many orchardists, most of whom were European, throughout New Zealand into the 1970s. Andrew Piper, pers. comm., January 2014.
47 Lee and Lam, Sons of the Soil, p. 74.
kumara, the same species as the sweet potato grown in southern China. In Auckland, they grew kumara from their first arrival in the late 1860s, for example in the inner city in the 1870s, in Panmure in the 1920s and 1930s and Mangere in the 1950s. This was a sound business decision as kumara had been successfully acclimatised to New Zealand conditions by generations of Māori cultivators and had a ready market among Māori and Europeans. Unlike green vegetables, which had to be sold immediately after harvesting, kumara could be stored and sold when out of season for higher prices. Joe and Fay Gock, for example, have grown kumara in Mangere for over fifty years. In 1952 their neighbour Hiko Raniera Wilson gave them some spare kumara plants. Her generosity began a long lasting friendship and the Gocks grew kumara as their main crop until 2005.

Chinese market gardeners also grew puha (Sonchus kirkii or New Zealand sow thistle), generally for their own consumption rather than for sale. This green vegetable, a staple of the Māori diet, often grew wild in market gardens among the other vegetables, for example in Auckland and in the gardens of Norman Wong, who established a market garden in Matawhero near Gisborne in the 1950s. Figure 2.3 is a photograph of three Chinese market gardeners in their garden in the Auckland suburb of Western Springs, taken in the early 1900s. Puha can be seen growing in the foreground.

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48 Ibid., pp. 213, 283–4, 294, 297.
50 Maori gardeners made a number of adaptations to traditional Polynesian horticultural practices in order to grow kumara in New Zealand’s temperate climate, including the introduction of a winter storage phase and other techniques such as soil lightening, mulching, and constructing raised planting beds or mounds and wind breaks (Helen Leach, 1,000 Years of Gardening in New Zealand, Auckland, 1984, pp. 58, 61, 72).
53 Lee and Lam, Sons of the Soil, pp. 289–90.
FROM MONSOON TO DESERT

Wherever they settled, from tropical northern Australia to the cooler climates of southern New Zealand and Tasmania, Chinese market gardeners grew vegetables for their own consumption and for sale to Europeans. This section explores how they adapted their horticultural techniques and choice of crops to some of the more extreme environments they encountered. It discusses examples of Chinese market gardens in tropical northern Australia,

55 Sir George Grey Special Collections, Auckland Libraries, 80-BIN 185.
arid and semi-arid western New South Wales and the cool temperate climates of Central Otago and Tasmania.

**The Australian tropics: Queensland and the Northern Territory**

One of the few Chinese market garden sites in Australia to be investigated by archaeologists is the site known as Ah Toy’s garden on the Palmer River goldfields in North Queensland. Combined with documentary and oral history evidence, the site provides much information about the daily lives of Chinese gardeners in a remote tropical environment. The climate of the isolated Cape York region is one of extremes – during the summer wet season the rivers and creeks are transformed into raging torrents, making travel difficult, while in the winter dry season they dwindle to a trickle. The terrain of the Palmer River basin is rugged, bisected by steep ridges, and the soil is poor, supporting only sparse vegetation.

This site is also an excellent example of Chinese market gardening on the goldfields. An Gee and Ah Ung, the original Chinese leaseholders, combined mining with market gardening. They were among the thousands of Chinese who flocked to the Palmer River after gold was discovered there in 1872. By 1877 the Chinese far outnumbered the Europeans on the Palmer River goldfields; there were about 18,000 compared to 1,500 Europeans. In such a remote area where communications were difficult and natural food supplies were limited, fresh fruit and vegetables were vital commodities. Ian Jack and Katie Holmes note that in 1883 there were 68 market gardeners on the Palmer, all Chinese. Their numbers declined as

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56 Ian Jack and Katie Holmes surveyed and excavated a small section of the site in 1984. The site was occupied by a series of Chinese leaseholders between 1883 and 1934. Ah Toy, after whom the site is named, was the last of the three leaseholders; he held the lease from 1900 until 1934 (Ian Jack and Katie Holmes, ‘Ah Toy’s garden: a Chinese market garden on the Palmer River goldfield, North Queensland’, *Australian Journal of Historical Archaeology*, Vol. 2, 1984, pp. 51–2).
the fortunes of the goldfields declined, to 57 in 1885 and 36 in 1887.\textsuperscript{59} By 1900, when Ah Toy took over the lease of the garden, officially only 393 Chinese remained on the Palmer River, and only 13 gardens. For more than thirty years Ah Toy supplied vegetables to local miners, the population of Maytown and a Chinese storekeeper in Cooktown. He also grew pannikin grass to supply horse fodder to the packer who regularly passed the garden on his route between Maytown and Laura.\textsuperscript{60}

Ah Toy’s gardens were located on either side of an unnamed creek running into Lone Star Creek. They were irrigated by water channelled from a stoutly built log dam across the creek, fed by a natural spring. The dam collapsed in the late 1970s, but sections of the water race carrying the water to the gardens remained in 1984. The race took the form of an earth dug ditch, with hollow logs supported on a wooden trough carrying the water across side gullies. At several places additional sluices leading south into the creek were constructed to give greater control over the water flow. On the north side of the creek was an irrigated vegetable garden, with the substantial remains of a complex system of parallel irrigation channels running south-east from the race. The garden on the south bank of the creek was planted mainly in fruit trees (custard apples, oranges and mandarins) together with taro, yams (also known as Chinese yam) and rough leaf pineapples.\textsuperscript{61}

The evidence uncovered at this remote site illustrates the necessity for adaptation and improvisation common to both Chinese and Europeans living in the Australian outback. The design of the irrigation system shows ingenuity in coping with the climatic extremes of this region and the great variations in water volume between the wet season and the dry. A detailed description of Ah Toy’s irrigation system is found in Percy Willmett’s reminiscences of his

\textsuperscript{59} Ibid., p. 52.  
\textsuperscript{60} Ibid.  
\textsuperscript{61} Ibid., pp. 55–6.
journey to the Palmer goldfields as a school boy, published in 1932.

The descent down a narrow track into the valley drops approximately 600 to 700 feet in about half a mile. On the way down we could see Tommy Ah Toy’s house and gardens which we reached some few minutes later. ... Tommy Ah Toy has a nice garden in the valley: grows pumpkins, corn, oranges, mandarins etc, and perhaps the most interesting feature here is the Chinaman's irrigation scheme. From a spring a quarter of a mile up the valley he runs a drain around the side of the hill and finally crosses a creek some 15 feet deep by running the spring water across it in a hollow log, finally to irrigate the whole farm.62

As Ah Toy’s garden illustrates, Chinese gardeners in tropical Queensland grew crops suited to the climate. Here they could grow the tropical crops familiar to them from southern China, such as yam, taro, sweet potato and ginger. It is thought that the Chinese introduced yam, taro and sweet potato to far north Queensland during the gold rushes.63 However, the histories of the origins and dispersal of these crops are complex and it is likely that there were multiple introductions. Chinese were probably only one of a number of different groups to introduce domesticated varieties to Australia over the last two hundred years, including Europeans and South Sea Islanders. Visiting groups of fishermen from Papua New Guinea, Indonesia, Malaysia and China visiting the north coast of Australia could also have introduced these crops well before European settlement.64 To further complicate the picture, there are wild species of sweet potato (commonly called bush potato) and taro native to Australia, which were cultivated by Aboriginal people long before the arrival of Europeans.65 Unlike taro, the yam is a cultivar with no known wild progenitor and it is hypothesised that it was originally

63 Grant Vinning, Select Markets for Sweet Potato, Taro and Yam, Report for Rural Industries Research and Development Corporation, Kingston ACT, May 2003, pp. 7, 37.
introduced to Australia from Papua New Guinea and island South East Asia sometime during the last 11,000 years.\textsuperscript{66}

Sweet potatoes could be a lucrative crop. In the Mackay district Chinese market gardeners were the main producers of sweet potatoes for the sugar cane plantations, which they supplied on contract at a fixed price year round. Sweet potatoes were the staple diet of the kanaka labourers who had been ‘imported’ from the South Sea Islands, guaranteeing a constant demand.\textsuperscript{67} According to an 1885 report in the \textit{Queenslander}, the market price in the early 1880s ranged from £3.10s to £5 per ton, making it a profitable enterprise. Using their skills in intensive horticulture Chinese gardeners obtained two crops of sweet potatoes each year, realising an annual yield of around 14 tons per acre. However, by the mid-1880s the numbers of South Sea Island workers were beginning to decline. Sweet potato prices fell and larger acreages were devoted to growing European potatoes. Even at the 1885 prices of around £2 or £2.10s per ton for sweet potatoes, it was estimated that gardeners could realise a yearly gross return of about £30 per acre.\textsuperscript{68}

Yams and taro were less commercially viable crops and were generally grown by Chinese gardeners for their own consumption. In 1878 Sir Samuel Wilson read a paper on the Chinese yam to the Council of the Zoological and Acclimatisation Society in Melbourne. He noted the great depth to which the roots grew, making it labour intensive and costly to harvest, and concluded that it was most appropriate for small-scale gardening where the soil was thoroughly trenched and well manured.\textsuperscript{69} It was thus ideally suited to Chinese horticultural

\textsuperscript{67} Indentured labourers ‘blackbirded’ from the islands of Melanesia (predominantly the islands now included in Vanuatu, the Solomons, New Caledonia and Papua New Guinea) formed the major workforce in the Queensland sugar industry from the 1860s (Henry Reynolds, \textit{North of Capricorn: The Untold Story of Australia’s North}, Crows Nest, 2003, pp. 38–41).
\textsuperscript{68} \textit{Queenslander}, 7 February 1885, p. 231.
\textsuperscript{69} \textit{Bacchus Marsh Express}, 30 November 1878, p. 3.
techniques. In 1932 a Townsville newspaper reported that the cultivation of yams in the north was practically confined to the Chinese, and the product was mostly for their own consumption.\textsuperscript{70} According to a newspaper report on the Melbourne Centennial Exhibition in 1888, taro was grown only occasionally in Queensland, and more as a decorative plant than for its commercial value.\textsuperscript{71}

In addition to selecting appropriate crops for the tropical environment, in planning their gardens Chinese gardeners balanced the need for young seedlings to be sheltered from the full heat of the sun with the need for growing plants to receive maximum sunlight. Together with manuring and frequent watering, this ensured the rapid growth of crops, quick turnaround and maximum economic return. A report in the \textit{Queenslander} in 1878 described the methods of Chinese gardeners.

In making their seed beds, great judgment is employed. The open ground is chosen in preference to shady places near fences. The ground is turned over several times, and no matter how rich it may be manure seems to be dug in each time; and after every digging the bed is soaked full of water. … At this time of the year, while the sun’s heat is so powerful, forked stakes or pieces of hardwood are driven at the sides of the seed beds; battens or saplings are put on to the stakes, and dried twigs are laid over the battens, thus forming a bush house protection, with its invigorating shade over the seed bed.\textsuperscript{72}

Even in southern Australia, intense heat was a feature of the climate, particularly in summer. Similar methods were applied elsewhere in the country, for example in Geelong in Victoria and Milparinka in western New South Wales (as discussed below (pp. 111–14)). In Geelong, Chinese gardeners erected temporary paling roofs over their garden beds to protect young plants from the summer sun during their early growth.\textsuperscript{73}

\textsuperscript{70} Townsville \textit{Daily Bulletin}, 6 September 1932, p. 7. The taro variety favoured by Chinese, and most commonly cultivated in Australia today, is a soft cooking type known as bun-long (Queensland Department of Agriculture, Fisheries and Forestry, ‘About taro’).
\textsuperscript{71} \textit{Argus}, 25 September 1888, p. 43.
\textsuperscript{72} \textit{Queenslander}, 19 January 1878, p. 27.
\textsuperscript{73} \textit{Argus}, 8 December 1886, p. 15.
While Chinese farmers and market gardeners played a key role in land clearing and ‘developing’ the Australian tropics, they were complicit with Europeans in the environmental impacts they wrought on the landscape. This was particularly true where Chinese farmers engaged in large-scale cultivation of subsistence crops, for example bananas and sugar cane in Queensland. Powell observes that the groups of Chinese who cleared tropical rainforest to cultivate bananas in north Queensland practised a form of shifting cultivation, deliberately exhausting the soil before moving on to a new block of virgin land.\(^{74}\) It was easier to abandon a plantation after five or six years rather than devote time and labour to removing old plants, restoring soil fertility and dealing with insect pests such as fruit fly. Powell also cites the environmental damage caused by the Hop Wah syndicate’s pioneering sugar growing venture. He contends that planting and overcropping on steeper slopes would have accelerated soil erosion and runoff, contributing to the silting up of watercourses, damaging stream banks and altering hydrological characteristics.\(^{75}\)

In his history of Australia’s multi-racial north, Henry Reynolds highlights the mobility and versatility of Chinese immigrants as they sought economic opportunities in different towns and districts across the region, working at a wide range of occupations, including market gardening, large-scale farming, mining and storekeeping.\(^{76}\) In the Northern Territory, market gardening was the most common form of Chinese economic activity in the late-nineteenth century apart from mining and Chinese people greatly outnumbered Europeans. The South Australian census in 1901 recorded that among the approximately 3,000 Chinese in the Territory there were nearly 1,700 miners, 400 market gardeners, 160 cooks and 120

\(^{76}\) Reynolds, *North of Capricorn*, p. 78.
shopkeepers and their assistants. The European population numbered only 864.\textsuperscript{77}

In the monsoonal Top End, the Chinese encountered a climate similar in many respects to that of their homeland. A rare account by a Chinese immigrant to the Northern Territory, Shi Kwong Ho, describes how a Chinese gardener chose a site for his garden and the variety of crops he grew.

He saw a river there and appreciated its view. He trampled on the bank of the river and found an area down the stream suitable for gardening. He was fully determined to stay in this yet-to-be-developed Eden. He did his best to use the water, the soil and everything he could find locally. Not long afterwards the banana trees, paw paw trees, cedars and other fruit trees were grown up into the air. His beans, melons and other vegetables were spread out along the riverside and up to the mountain’s base.\textsuperscript{78}

As they did in Queensland, Chinese market gardeners in the Northern Territory grew a diverse range of tropical crops, many familiar to them from southern China. Their produce included Chinese beans, yams, taro, sweet potatoes, sugar cane, peanuts, ginger, bananas, mangoes, papayas and pineapples. They also successfully grew the temperate crops familiar to Europeans, such as cabbages, cucumbers, turnips, tomatoes, carrots and beetroot. The Northern Territory market garden in Figure 2.4 illustrates the variety of crops that were cultivated. In 1878 the editor of the \textit{South Australian Register} observed that without the Chinese there would be scarcely any vegetables to feed the residents of the Northern Territory. He reported that sweet potatoes were cultivated more than any other esculent and further described the great variety of crops which thrived in the tropical north:

\begin{quote}
Chinese beans, pumpkins, cucumbers, melons and the like thrive very well, while at the Chinese garden in Palmerston where they have command of water for irrigation the English cabbage, lettuce, radishes, onions, carrots are produced with very little trouble … the pineapple, plantain, pawpaw and custard apple are now becoming tolerably
\end{quote}

\textsuperscript{77} Ibid., p. 111; C. Y. Choi, \textit{Chinese Migration and Settlement in Australia}, Sydney, 1975, p. 35.
plentiful in both town and country and at Palmerston the jackfruit, mango, tamarind, orange, lime, coconut and sugarcane are progressing favourably.79

![Figure 2.4: Chinese-Australian in his market garden in the Northern Territory, c. 1930.](image)

The prizes regularly won by Chinese gardeners in the Agricultural and Horticultural and Industrial Association (AH&I) shows in Darwin indicate the variety of produce they grew. The report of the AH&I Show in 1903 noted the variety of crops suitable for a tropical climate grown by Chinese gardeners, such as taro, yam, sweet potato, mango, soursop, coconuts and sugar cane.81 At the AH&I show in 1906 Chinese gardeners won prizes for the following produce: Gee Sing, English cabbages and bananas; Wah Sing, cucumbers, turnips, yams and

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79 *South Australian Register*, 26 January 1878, p. 4S.
81 *Northern Territory Times and Gazette*, 14 August 1903, p. 2.
paddy rice; Ah Sam, carrots and tomatoes; Mow Sing, sweet potatoes and sugar cane; Yee Sing Yin, peanuts, watermelon and pumpkin; and, Pang Quee, mangoes.  

Chinese farmers also grew larger scale crops of maize and rice. In a report on the agricultural industry in the Northern Territory in 1897, the staunch Territorian F. R. Finniss argued that the neglect of cultivating the soil in the Northern Territory was the chief cause of the Territory’s lack of economic development. He attributed this neglect to the inability or unwillingness of Europeans to work in tropical climates and their lack of knowledge of tropical agriculture. He contrasted the dismal failures of many European planters with the success of Chinese gardeners and acknowledged that they had been keeping the European community supplied with fresh fruit and vegetables for many years. He also noted the larger scale ventures of some Chinese farmers growing rice and maize.

Some are successfully cultivating rice at Millner’s Lagoon, and a year or two ago a rice farm near Union Town was most successful, producing a ton of grain per acre, I have been told, of No. 1 rice, which brought a better price up country than the imported article.  

The extremes of the tropical climate in the Northern Territory affected both mining and gardening. Alluvial mining was mainly limited to the wet season and the early weeks of the dry when water was plentiful. During the wet market gardeners had to cope with large volumes of water surging through their irrigation channels, often causing flooding. In the dry they harnessed scarce water resources using a variety of irrigation techniques. Severe crop losses often occurred during the floods of the wet season. In February 1879, towards the end of the wet, a correspondent to the Northern Territory Times and Gazette, writing from Yam Creek, described how floods had swept all crops clean away in country districts and bemoaned

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82 Northern Territory Times and Gazette, 3 August 1906, p. 2.
83 Northern Territory Times and Gazette, 17 September 1897, p. 2.
84 Reynolds, North of Capricorn, p. 110.
the loss of the expected harvest of sweet potatoes. Describing the climate of the Territory as ‘four months of heaven, four months of purgatory and four months of hell’, he expressed sympathy for the Chinese gardeners in the district and warned that people would soon be short of food. 85

The semi-arid and arid zones: western New South Wales and South Australia

In the late-nineteenth century, Chinese immigrants followed the expanding pastoral frontier in the Riverina and western New South Wales. They were also drawn by the mineral boom in copper, gold, silver and lead which lasted around forty years. Chinese men engaged in mining and market gardening on the fringes of country towns. Several thousand were employed as contract workers on pastoral stations, clearing vast tracts of land and working as gardeners, fencers and shearsers. Although the numbers of independent Chinese market gardeners were small compared to those engaged in land clearing, they were an essential part of rural life, supplying fruit and vegetables to their own community, pastoral stations and isolated mining settlements. 86

The expansion of European settlement into western New South Wales followed the Darling River. By 1859 paddle steamers were operating as far north as the port of Wilcannia. Even after most other land in New South Wales had been taken up by European settlers, the far west of the State remained remote and unattractive to pastoralists. 87 Distances to markets were great, transport costs were high, and the harsh environment made the region marginal for agriculture or pastoralism. The terrain is largely desert, with less than 200mm of rain a year. Rainfall is extremely variable, and when it does occur it is often in the form of heavy storms, which can cause localised flooding. Temperatures range from over 40°C in summer to minus 85

85 Northern Territory Times and Gazette, 22 February 1879, p. 2.
6°C in winter.\textsuperscript{88}

A few Chinese market gardeners managed to make a living in this remote and inhospitable region, their fortunes tied to those of the settlements they served. By 1882 a group of about eight Chinese had established two market gardens near the small settlement of Milparinka, in the far north-west corner of New South Wales. The first site, known as Chinaman’s Garden Well, was located on Evelyn Creek about two-and-a-half kilometres upstream from Milparinka. It was regularly used as a camp by Aboriginal people and passing travellers, including Afghan cameleers. The second garden was three kilometres away at Chinaman’s Well, on a tributary of Evelyn Creek. However, in his study of this marginal community, Geoffrey Svenson notes that the archaeological evidence for gardening activity at this site is not as strong.\textsuperscript{89}

Milparinka was established in 1880 as a service town to the nearby Mount Browne goldfield. It existed on the very frontier of European settlement until World War I, and then went into rapid decline. Today it is a ghost town. The Chinese were central to the life of Milparinka, despite general opposition to their presence as gold diggers. In 1882 the Mining Warden reported that the health of inhabitants was ‘in some degree ... attributable to the good supply of vegetables raised by the Chinese gardeners, of whom there are eight employed on two gardens’.\textsuperscript{90} The following year he commented that the gardeners had been very successful in supplying vegetables at reasonable prices and that they expected to have peaches, pears and grapes for sale within a year.\textsuperscript{91}

Throughout its history Milparinka was plagued by chronic water shortages and competition over this vital resource generated friction between the European and Chinese

\textsuperscript{88} Ibid., p. 7.
\textsuperscript{89} Ibid., pp. 135, 138.
\textsuperscript{91} Report to Department of Mines, 1883, quoted in Svenson, ‘Marginal people’, p. 40.
communities. Svenson records how the small group of gardeners gained a monopoly over the supply of scarce garden produce and also over a significant proportion of the water resources of Milparinka.\textsuperscript{92} In March 1896 the local newspaper published an editorial deploring the state of the water supply:

The settlement which might, and would be with a proper water supply, an oasis in the desert, is still a barren waste. There are no cottage gardens to educate and purify the minds of the young and act as a solace to the old. The vegetable and fruit supply, which might be so abundant, is in the hands of a few Chinese, who charge 1/- for a small bunch of vegetables, and from 9d to 1/6 per pound for grapes, and in like proportion for melons and tomatoes and such like when they are to be had.\textsuperscript{93}

Two months later the paper complained: ‘we are at the mercy of a one-horse Chinaman's Garden for a meagre supply of a few miserable vegetables and at famine prices too’.\textsuperscript{94}

It appears that Chinese gardeners in this remote region turned the challenges of life in an arid desert environment to their advantage, obtaining good prices for the scarce and highly sought after fruit and vegetables they grew. Drawing on their traditional horticultural and water management skills, they grew grapes, potatoes, apples, peaches, pears, melons, tomatoes, cabbage, carrots and turnips. They sold their produce through the only store in Milparinka and direct to the residents of the town. To fertilise their garden they scoured the town for pig and fowl manure.\textsuperscript{95}

In this arid region where there were no permanent watercourses, residents relied on wells for their water supply. At Chinaman’s Garden Well the gardeners raised water using a windlass and mining buckets, and hand watered their crops. Svenson found a high degree of consistency in the surface artefacts he recorded on the site. They included a windlass barrel,

\textsuperscript{92} Svenson, ‘Marginal people’, p. 72.
\textsuperscript{93} \textit{Sturt Recorder}, 8 March 1896, p. 2.
\textsuperscript{94} \textit{Sturt Recorder}, 29 May 1896, p. 2.
\textsuperscript{95} Svenson, \textit{Marginal People}, p. 131.
tar ladle, part of the handle of a watering can and horse tackle, indicating that the gardeners used horses, perhaps to drive the windlass.  

Overall the assemblage was similar to those recorded by Neville Ritchie on Chinese sites in Central Otago. It included medicine bottles and vials, bottle glass and opium smoking equipment as well as Chinese earthenware and porcelain tableware.

Svenson draws parallels between the gardening techniques employed by the Chinese in Milparinka and the traditional methods observed by Franklin King in his travels in China and Japan in the early-twentieth century. King reports the intensive use of fields with cucumbers and other vine crops being grown above other vegetables, and suggests that apart from economies in the use of land, vine crops served to shelter more susceptible crops from the extremes of weather. Svenson argues that such a system would have a clear application at Milparinka, where the Chinese gardeners probably grew melon vines and tomato plants to shelter other crops from excessive exposure to the sun and the extremes of heat in summer and subzero overnight temperatures in winter.

Contemporary newspaper reports observe that there were a number of storage tanks at the Chinese gardens at Milparinka and Svenson suggests that that these had a similar function to the glazed terracotta urns described by King in southern China which were used to store liquid manure. They could also have functioned as holding tanks for irrigation water. A notable feature of the garden at Chinaman’s Garden Well was a cellar excavated into the ground, probably used to store grapes and other garden produce and protect them from the

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96 Ibid., p. 93.
98 Svenson, Marginal People, pp. 93, 100, 106, 99
99 Franklin Hiram King, Farmers of Forty Centuries, London, 1949, p. 36.
100 Svenson, Marginal People, pp. 87, 131.
101 Ibid., p. 84. See also King, Farmers of Forty Centuries, pp. 70, 199, 257–8.
extreme desert temperatures. In Chihli Province (modern Hebei Province) in northern China, King notes the use of ‘dry earth cellars which can be maintained at very uniform temperature, the separate fruits being wrapped in paper’. This enabled farmers to preserve perishable fruit such as grapes and pears and keep them on the market almost year round.\textsuperscript{102}

The soils of Milparinka are sandy and highly alkaline. Svenson speculates that the Chinese at Milparinka may have originated from the arid lands of northern China. His hypothesis is based on King’s reference to the use of alkaline soils for growing grapes in northern China, the archaeological evidence of the cellar and a number of coins originating from Chihli and Kansu Provinces in northern China.\textsuperscript{103} However, Svenson acknowledges this is highly speculative and elsewhere he notes that in his study of Chinese archaeological sites in southern New Zealand Ritchie found that over sixty-six per cent of the coins recovered were from northern China, even though the great majority of miners originated from the well watered areas of southern China.\textsuperscript{104}

The last Chinese in Milparinka died during World War I after successfully maintaining a market niche for almost thirty-five years. The demise of the Chinese gardeners compounded the demise of Milparinka itself. According to Svenson, the collapse of the isolated town was due to a number of factors, including the economic recession of the 1890s, the accompanying bank failures and the mass departure of the young men who represented the business future of the town to the war.\textsuperscript{105}

Elsewhere in the arid west of the State many other Chinese market gardeners succeeded in making a living. In his study of the Chinese in southern and western New South

\begin{thebibliography}{9}
\bibitem{103} Svenson, \textit{Marginal People}, pp. 95, 139.
\bibitem{104} Neville Ritchie, 'Archaeology and history of the Chinese in southern New Zealand: A study of acculturation, adaptation, and change', PhD, University of Otago, Dunedin, 1986, p. 532.
\bibitem{105} Svenson, \textit{Marginal People}, p. 143.
\end{thebibliography}
Wales Barry McGowan highlights the inventiveness and adaptability of Chinese market gardeners in harnessing scarce water resources and modifying and adapting the technology and implements they had available to them. At Nymagee Station, for example, a wing dam and water race were constructed to divert water to a market garden from a water soakage and overflow. The remains of internal water channels and storage reservoirs were still evident on the garden site in 2005. At two market garden sites in Cobar storm water flows were captured from several directions via railway culverts and eroded gullies on the roadsides. During storms water was channelled via sluice gates into large dams on the gardens and then pumped into storage tanks placed at strategic points around the gardens.106 These techniques parallel those observed by King in southern China.107

McGowan describes the Chinese Camp at Hillston on the banks of the Lachlan River, where thirty to forty Chinese lived in the 1880s. Adjoining the camp was a garden known as Chong Lee's. Local resident Tom Parr, who worked in the gardens during his school holidays for 5 shillings a week, recalled that the Chinese raised water from the river using small buckets holding about 2 litres fastened to an endless chain driven by a horse going round and round continuously. This description is very similar to King’s 1911 account of agriculture in China, except a horse was used instead of a human powered treadmill.108 The gardeners in Hillston flood irrigated some of their vegetables and trees by opening and closing off the irrigation channels as required, but most of the water ran into holding ponds of about 1,350 litres capacity. From there the plants were watered individually using two large watering cans carried on a shoulder yoke.109 The Chinese gardens at Bourke were irrigated in a similar way,

108 Ibid., p. 78.
the water being raised from the Darling River and channelled to open 200 gallon (about 920 litre) holding tanks.\textsuperscript{110}

Growing fresh vegetables in the arid centre of Australia was an equal challenge. From the 1890s Ned Chong ran a market garden at Hookey’s waterhole about four miles outside Oodnadatta, initially in partnership with a countryman Cherry Ah Chee. Chong cultivated a wide variety of fruit and vegetables and relied on irrigation in the arid conditions. A visitor to Chong’s garden in 1913, known only by the initials E.S.A., was amazed by its fertility and the variety of crops that flourished, including green peas, tomatoes, lettuce, French beans, celery, beetroot, cabbages and watermelons. But his account highlights Chong’s precarious existence:

\begin{quote}
We were met at the entrance to the garden by Ned Chong, the owner ... His philosophy was plainly visible in the wonderful Edenic garden which unfolded itself like a marvellous carpet before my astonished eyes. We were conducted through a maze of vegetable beds to view the remarkable water system. This consisted of a revolving wheel, a huge wooden affair, driven by a horse, connected with a windlass, whereby vast quantities of water were obtained from the stream nearby. Huge trenches completed the irrigation scheme. We had come at a low-ebb time, when very little water was available, and when Ned Chong was in deep anxiety concerning whether he could keep the garden going much longer. This seemed cruel luck, considering the almost overpowering odds which he had fought in that wilderness of stone and sand.\textsuperscript{111}

It is not surprising that Chong branched out into other enterprises to supplement his income from market gardening. He expanded his market gardens to include a piggery and later established a butcher’s shop and bakery. In the 1940s he ran a store and boarding house in Alice Springs for several years. Ned Chong died in Oodnadatta in 1949, at the age of around one hundred.\textsuperscript{112}
\end{quote}

\textsuperscript{110} \textit{Ibid.}
\textsuperscript{111} \textit{Register}, Adelaide, 18 November 1913, p. 9.
The cool temperate zone: New Zealand and Tasmania

The goldfields of Otago and Southland are the southernmost goldfields in the world. The Chinese miners who travelled there in the nineteenth century had to adapt to a climate very different to their homeland. In 1897 Alexander Don spoke with a Chinese miner from Upper Panyu County in Guangdong, who was fossicking at Waipori in Central Otago. The miner compared the barrenness of the steep Otago ridges with the ‘fatness’ of his native district, where three crops were annually taken off the same ground. Discussing the insights that archaeological evidence can provide into the lives of the Chinese in southern New Zealand, Ritchie highlights their adaptability and resourcefulness. They built shelters from whatever local materials were available in the remote, rugged gorges of Central Otago, by walling up rock overhangs or building huts of river cobbles, rock rubble, adobe or mud bricks. They also used flattened kerosene tins, rice sacks and whatever other materials they could scavenge, as recorded at Lawrence. In the far south at Round Hill which has a more temperate coastal climate and where timber is plentiful, they built timber huts with shingle roofs. Chinese miners also quickly adopted the practical European miners’ work clothes and boots to combat the cold.

In a similar way the miners who took up market gardening adapted their horticultural practices and choice of crops to the hot summers and cold winters of Central Otago. They were unable to grow crops year round; in winter rain, snow and sleet meant that they had to cease regular gardening activity. Many Chinese miners made a small garden to supply themselves and then perhaps seized the opportunity to supply their Chinese and European

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113 Alexander Don, Annual Inland Tour 1896–1897, Dunedin, 1897, p. 480; see also Christian Outlook, 3 July 1897, p. 268.
115 Lee and Lam, Sons of the Soil, p. 21.
neighbours. James Ng has documented gardens in many of the scattered mining camps in Central Otago and Southland, including Wetherstones, Macetown, Conroy’s Gully, Butchers Gully, Bald Hill Flat and Round Hill. There were also gardens in townships such as Waitahuna, Tapanui, Lawrence, Roxburgh, Cromwell, Queenstown and Riverton. Large market gardens were recorded at Beaumont, Clyde, Ophir, Matakanaui, Arrowtown and Palmerston.\textsuperscript{116}

In the rugged terrain of Central Otago some of the Chinese gardens were established on terraces cut into the hillside or formed by widening naturally occurring river terraces.\textsuperscript{117} A photograph of the Chinese camp in Arrowtown (Figure 2.5) shows gardens on flat land above the Arrow River. The method of terracing slopes for agriculture is common throughout the world, particularly in densely populated areas such as Asia. Visiting Happy Valley on Hong Kong Island in 1911, King marvelled at the efficiency with which Chinese horticulturalists surface fitted their gardens to the landscape, achieving the maximum ground area for cultivation.\textsuperscript{118} Terraced gardens constructed by immigrant Chinese communities have been recorded elsewhere in the world, notably in the remote Salmon River mountains of Idaho. Perhaps the most extensive Chinese terraced gardens outside Asia, these commercial scale gardens were constructed by Chinese miners who were attracted to Idaho by the gold rushes in 1869 and were cultivated until the 1920s.\textsuperscript{119} There are many parallels between the Chinese history of this region and Central Otago.

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\textsuperscript{116} Ng, \textit{Windows on a Chinese Past}, Vol. 1, p. 321. \\
\textsuperscript{117} Neville Ritchie, pers. comm., February 2011. \\
\textsuperscript{118} King, \textit{Farmers of Forty Centuries}, pp. 67–8. \\
\end{flushright}
The commercial crops grown by Chinese gardeners in Central Otago were those which were suited to the climate and found a ready market among Europeans, including potatoes, corn, cabbage, peas, turnips, gooseberries, strawberries and green vegetables. They also grew familiar Chinese vegetables such as Chinese cabbage, turnip, radish and bean sprouts for their own use. They would have brought the seeds with them from China or purchased them from enterprising Chinese merchants in New Zealand. According to Ng, Chinese cabbage was the most common Chinese vegetable grown. It is a hardy plant which grows readily throughout New Zealand and acquires its best flavour in the colder south. On his regular ‘inland tours’ through Central Otago Alexander Don often stayed and ate with Chinese miners. On his 1905–1906 tour he climbed over a 1,000 foot high range to Bannockburn where three

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120 Photograph courtesy Lakes District Museum, EL1870.
122 When Phil George ate with the Chinese at Kyeburn, the menu included Chinese cabbage, Chinese radish, Chinese parsley, garlic and celery (Ng, *Windows on a Chinese Past*, Vol. 1, Fn. 151b, p. 341).
men had opened a claim in the river bed of the great gorge, where they faced ‘a grim battle with rock and torrent and frost’.\textsuperscript{124} He reported: ‘At 8.15pm we all riced together with an abundance of delicious white cabbage grown of seed from Canton’.\textsuperscript{125} In 1901 he sat down to a meal of rice, bacon, peas, eggs and ‘Shantung cabbage’ at Mareburn.\textsuperscript{126} Earlier, in 1883, Don wrote that \textit{wong nga paak}, a variety of Chinese cabbage, was being grown at Round Hill and that 3 pounds of bean sprouts or \textit{nga tsoi} could be bought there for a shilling.\textsuperscript{127}

Chinese gardeners in southern New Zealand continued the horticultural traditions of their homeland, raising pigs and planting fruit trees as well as growing vegetables. They adapted their choice of crops to the New Zealand climate, for example in Otago they grew the stone fruit ideally suited to the cool climate such as peaches, plums and apricots as well as apples and pears.\textsuperscript{128} Fruit could be a lucrative supplement to vegetable growing, and some Chinese market gardeners became successful orchardists. One was Lye Bow who, like thousands of his countrymen, originally came to Central Otago in search of gold. However, he quickly saw the demand for fresh food to feed the thousands of miners who flocked to the goldfields. He began a market garden in Butchers Gully and branched out into what became a very successful orchard business. By the 1890s he was regularly receiving prizes at horticultural shows for his magnificent apples, pears and plums.\textsuperscript{129} In May 1896 the \textit{Otago Witness} described Lye Bow as 'a straight out enthusiast for fruit culture, ever ready with praise and energy to assist the development of the industry'.\textsuperscript{130} The editor noted how he had

\begin{flushright}
\textsuperscript{125} \textit{Outlook}, 14 April 1906, p. 13.
\textsuperscript{127} Ng, \textit{Windows on a Chinese Past}, Vol. 1, Fn. 151a, p. 341.
\textsuperscript{128} Fruit growing was a long established tradition in China and fruit trees had rich aesthetic and symbolic associations as well as economic value (Craig Clunas, \textit{Fruitful Sites: Garden Culture in Ming Dynasty China}, London, 1996).
\textsuperscript{129} \textit{Otago Witness}, 1 March 1894, p. 4; and, 4 March 1897, p. 26; 24 February 1898, p. 26.
\textsuperscript{130} \textit{Otago Witness}, 28 May 1896, p. 25.
\end{flushright}
succeeded in keeping the codling moth pest away from his orchard for the previous few years, probably drawing on traditional Chinese horticultural knowledge. It had destroyed other orchards in the neighbourhood, but caused relatively little damage in Lye Bow’s orchard.

In April 1894 the *Otago Witness* reported that Lye Bow had 1,200 apple trees, 500 other fruit trees and had produced 10 tons of apples for local consumption that season.131 By 1903 it was reported that on his 14 acre orchard he had 1,000 apple trees, 2,000 apricot, 200 peach, 200 greengage plum, and several hundred pear trees. Despite unfavourable weather the previous year, he expected to net £3,000 that season, a substantial sum.132 Lye Bow grew vegetables between the rows of trees in his orchard, utilising every foot of soil.133 However, other Chinese market gardeners who combined vegetable growing and orcharding were less successful, particularly where they planted vegetables too closely between their fruit trees and cultivated the soil too deeply. A report on the fruit industry in Central Otago in 1903 noted that the orchard of Ah Wie near Earnscleugh Station showed evidence of a drain on soil fertility and relatively light crops of fruit, due to too close planting of vegetables between the trees.134

Water was a critical resource for miners as well as gardeners in the relatively arid Central Otago region. In his study of gold mining in the Alexandra district, John McCraw documents the battles over water rights that were fought out in the warden’s courts and the struggles of local authorities and residents to obtain adequate town water supplies when legislation gave priority to water supplies for mining.135 Like his countrymen on the Australian goldfields, Lye Bow made use of mining infrastructure such as dams, races and flumes to convey water to his gardens. He drew water from the same dam in Butchers Gully used by his

131 *Otago Witness*, 12 April 1894, p. 34.
132 *Otago Witness*, 11 November 1903, p. 27.
133 Lee and Lam, *Sons of the Soil*, p. 31.
134 *Otago Witness*, 11 November 1903, p. 27.
countrymen who were searching for alluvial gold in the bed of Butchers Creek. McCraw records the long drawn out legal battles which Lye Bow and his countrymen fought in the warden’s court during the 1890s to maintain their water rights against the European mining companies which were operating large steam and water operated dredges upstream of their own operations. At the same time the Alexandra Borough Council was attempting to construct an adequate town water supply to serve the township’s growing population and approached Lye Bow to relinquish some of his water rights. In 1907, exasperated by the harassment he had received from European mining companies, Lye Bow finally sold part of his water rights to the Council.

Like all people on the land in Central Otago, Chinese gardeners had to cope with unpredictable weather and fluctuating prices for their produce. In October 1898 the Matakanui correspondent of the Dunstan Times reported that one of the few remaining large-scale Chinese market gardens in Central Otago, run by Charlie Lock Chong at Matakanui, had been destroyed by an unseasonal snow storm.

The prevailing weather last week was rain, hail, snow and frost, accompanied by thunder and lightning. The storm did great damage to the gardens. Our local gardener, Ah Lock, told me that the crop of strawberries and plums in his garden will be a complete failure. This is a pity .... Last year his garden was a favourite resort of the townsfolk and visitors from a distance when his strawberries were ripe. His loss will be considerable, especially with the strawberries, as the demand for the fruit was always greater than the supply.

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Ibid., pp. 227–9.

Ibid., p. 229. The physical remains of Lye Bow’s garden and orchard have been listed on the register of the New Zealand Historic Places Trust as a Historic Area. They include the remains of the orchard and surrounding stone wall, the probable site of Lye Bow’s house, and an adjacent area of gold workings which include a section of the Alexandra Borough water race (NZHPT, Register No. 7547, New Zealand Historic Places Trust, ‘Lye Bows Historic Area’ http://www.historic.org.nz/theregister/RegisterSearch/RegisterResults.aspx?RID=7547, accessed 14 June 2011).

Dunstan Times, 14 October 1898, quoted in Ng, Windows on a Chinese Past, Vol. 1, p. 321. Ah Lock continued his gardening enterprise; he sold his garden to another Chinese, Chan Tseung Pooi circa 1900. The Matakanui garden was still in existence in 1911, when Don reported that there were five men working there (Outlook, 1 August 1911, p. 14).
High winds were a danger to horticulturalists in many locations in New Zealand, requiring the use of fences or hedges to shelter crops. In 1874 the Tuapeka Times in Otago reported that a party of Chinese had started a garden by the Wetherstones town boundary, notable for the fact that they used thistle stalks to line the wires of their fences as protection from the wind. In Outram, near Dunedin, Chinese market gardeners surrounded their plots with manuka brush fences. Ted Broad often visited the gardens of Sam Young and Co (established by Young Man Heung and three partners) in Outram with his parents as he was growing up in the 1930s and early 1940s. He recalled: ‘all the fences around the property were all manuka brush, laced close together to protect the vegies from the wind’. Fences were probably an adaptation to the more extreme climate of southern New Zealand, for in southern China market gardeners traditionally left their fields open to the elements with no enclosing walls or fences. One possible explanation for this is that allowing winds to blow freely through growing crops discouraged insect pests. In his study of market gardening in the Auckland region, Donald Hunt points out that hedgerows or shelter belts were of little use. Many gardeners would rather have the prevailing cold winds from the south and west than the warm humid winds from the north and east which facilitate the spread of blight and insect pests.

Strong dry winds, usually from the north-west or south-west, are a feature of the Canterbury climate, particularly in spring and summer when they can create drought conditions. The Chinese market gardeners who settled in the Christchurch district from the 1870s favoured the warm, sheltered north-facing valleys in the Port Hills and the sheltered

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139 Tuapeka Times, 26 September 1874.
140 Lee and Lam, Sons of the Soil, p. 45.
141 Helen Leach, pers. comm., 4 February 2011.
bays of the Banks Peninsula such as Akaroa.\textsuperscript{143} Similarly in Wellington, located on the Cook Strait, high winds were a regular occurrence. In June 1892 cold southerly gales destroyed vegetation across the city, particularly affecting Chinese market gardens. The \textit{Taranaki Herald} reported: ‘The Chinese gardeners report that during the whole winter so far vegetables above ground have been destroyed and that nothing is left but root crops’.\textsuperscript{144} To minimise this risk, market gardeners chose sheltered locations where their crops were protected from the strong winds of the Cook Strait, for example in Island Bay, Seatoun on Worser Bay and Miramar on Evans Bay. When the large Chinese market garden in Island Bay, which had been cultivated probably from the late 1880s, was subdivided into residential sections and advertised for sale in 1905, the advertisement noted the advantages of its location.

\begin{quote}
In the early days of the Bay, when the Chinaman commenced gardening operations there, practically the whole district was at their disposal, but with their national shrewdness, they decided on this block of land … The reasons are obvious. It is sheltered from prevailing winds. It basks in the rays of ‘bright Phoebus’ from the moment of his morning entry until his evening exit.\textsuperscript{145}
\end{quote}

There are parallels between the entrepreneurial market gardener and orchardist Lye Bow in Central Otago and James Chung Gon in Tasmania. Born in Shandung Province in about 1854, Chung Gon’s narrative states that he arrived in Australia at the age of eighteen with only a shilling in his pocket and speaking no English.\textsuperscript{146} He received a hostile reception from European larrikins but managed to make his way to kinsmen who gave him European clothes and money to travel to the Bendigo goldfields. Disliking the rough life of the Victorian diggings he travelled to Tasmania with Chinese friends where he worked in a variety of jobs, as a tin miner, market gardener and wood cutter. He finally settled in Launceston where he

\begin{footnotes}
\item[143] Lee and Lam, \textit{Sons of the Soil}, pp. 89, 91.
\item[144] \textit{Taranaki Herald}, 9 June 1892, p. 2.
\item[145] \textit{Evening Post}, 20 November 1905, p. 8.
\end{footnotes}
began a small market garden near the junction of the Tamar and North Esk Rivers. Business prospered and Chung Gon leased 10 acres in South Launceston, where Coronation Reserve is today. He employed ten of his countrymen and had three hand carts supplying fresh produce to shops, hotels and the Launceston General Hospital.\textsuperscript{147}

Chung Gon ran market gardens in Launceston for over fifty years. He went on to become a successful businessman, investing in tin mines in north-eastern Tasmania, running a 200 acre orchard near Lilydale which was one of the first commercial orchards in northern Tasmania and opening fruit and vegetable stores for his children.\textsuperscript{148} He read constantly to keep abreast of innovations in horticulture; he is said to have pioneered the commercial use of irrigation in Northern Tasmania and to have adapted agricultural machinery.\textsuperscript{149} After World War II, in partnership with Messrs Springer and Pinner, he began a new business venture manufacturing agricultural pipes and flower pots from locally sourced clay. He was still working in his garden and weeding beds of onions well into his nineties.\textsuperscript{150}

By the 1950s Chung Gon found that market gardening was no longer economically viable, due to increased costs of labour and artificial fertilisers as well as the difficulty of obtaining adequate supplies of stable manure. Land values within the Launceston city boundaries were rising and he finally made the decision to sell his 18 acres of land for residential development. In 1953 the oldest market gardens in Launceston were subdivided into one hundred housing allotments.\textsuperscript{151} Throughout the years Chung Gon supplied the people of Launceston with produce he maintained traditional Chinese agricultural methods: rotating

\textsuperscript{147} \textit{Mercury}, Hobart, 21 September 1942, p. 3.
\textsuperscript{148} The Chung Gon family greengrocer business is still in operation in Launceston in 2014 (Andrew Piper, pers. comm., January 2014).
\textsuperscript{150} \textit{Mercury}, Hobart, 28 March 1949, p. 7.
\textsuperscript{151} \textit{Mercury}, Hobart, 28 July 1953, p. 12.
root crops such as carrots and parsnips with green crops such as lettuce, cabbages and peas to maintain soil fertility; planting by the moon so that seedlings would mature earlier; thoroughly preparing the soil before planting; and, enriching it with hundreds of cart loads of stable manure a month.\textsuperscript{152} But he was also willing to adopt new technology and European gardening techniques. He grew tomatoes in hot houses and in the 1950s he experimented with various types of artificial manures to replace the cart-loads of stable manure he once used.\textsuperscript{153}

Chun Gon showed great flexibility in adapting his horticultural methods to the cool climate of Tasmania. In addition to the traditional range of vegetables familiar to Europeans such as onions, potatoes, carrots, parsnips, lettuces and peas, he also grew Chinese cabbage and marketed it as a winter alternative to summer lettuce. In his orchards he grew cherries, plums, apples and pears which thrive in a cool climate.

CONCLUSION

As Lesley Head, Pat Muir and Eva Hampel observe, gardens can be seen as places of environmental engagement, where immigrant peoples and plants have continued traditions from their homelands and accommodated to new biophysical and social environments.\textsuperscript{154} By the late-nineteenth century Chinese market gardeners were widely dispersed across rural areas of Australia and New Zealand and could be found in the most remote settlements and the most marginal areas for agriculture. Drawing on their traditional skills in horticulture and water management, they successfully tilled the soil in environments ranging from the rugged ranges of Central Otago to the tropics and the deserts of Australia. They grew novel crops not grown in China and also introduced Chinese crops to Australia and New Zealand.

Chinese market gardeners created productive gardens in inhospitable terrain which

\textsuperscript{152} \textit{Mercury}, Hobart, 28 August 1942, p. 3 and 28 July 1953, p. 12.
\textsuperscript{153} \textit{Mercury}, Hobart, 28 July 1953, p. 12.
Europeans did not attempt to cultivate, for example in Milparinka where they turned the impediments of life in an arid environment to their advantage, obtaining good prices for the scarce and highly sought after fresh fruit and vegetables they grew. Similarly in the Northern Territory they capitalised on Europeans’ lack of confidence in the prospects for agriculture in a tropical environment. In addition to supplying the fruit and vegetables familiar to Europeans, Chinese market gardeners introduced new crop varieties to Australia and New Zealand, and incorporated indigenous plants into their repertoire, for example kumara and puha in New Zealand.

Chinese farmers and market gardeners played a key role in land clearing, ‘developing’ the land and making it productive. They were therefore complicit with Europeans in the environmental impacts they wrought on the landscape. The environmental impact of Chinese market gardening and its sustainability has not been researched in any detail. There are questions to be answered about the role of Chinese gardeners in draining wetlands, the extent to which the intensive agricultural practices they brought with them depleted soil fertility and the extent to which traditional manuring and irrigation practices countered this effect. Despite these potential negative effects on the environment, Europeans came to rely on Chinese gardeners for their supplies of fresh fruit and vegetables, particularly in remote areas far from major population centres. The occupational shift from gold mining to market gardening and the economic niche which Chinese market gardeners were successfully able to occupy over many decades are examined in more detail in the following chapter.
CHAPTER 3

THE ECONOMIC ENVIRONMENT

In no respect are the wisdom, foresight, and accurate calculation of the Chinese gardener more wonderfully displayed than in his arrangement of his crops, so that he has always got some description ready for sale, and yet never has a glut, or is compelled to sell immature vegetables, or allow them to become overgrown.

*Sydney Morning Herald*, 2 March 1865, p. 2.

Historians of technology transfer emphasise the importance of economic factors as crucial components of the successful adaptation of a given technology to a new environment. As Edward Beatty points out, economic factors are part of an interrelated network of technical, economic, social, environmental and political influences that mediate the relationship between imported knowledge and the recipient society. Darwin Stapleton observes that the economic vision and motivation of transferors is as important as their technical skill and he highlights the importance of social support such as patronage by governments, merchants and bankers to carry the technology through the risk stage. In the case of Chinese immigrants to Australia and New Zealand, their prime motivation was economic – to earn money to support their families in China and, if possible, to save enough to return to China or bring their wives and children out to join them. In common with other migrant communities they faced significant social and economic barriers in earning a living and relied heavily on social and economic support networks within their own community rather than the institutions of the host society.

Recent research into immigrant entrepreneurship and small business provides a useful analytical framework for interpreting the economic dimensions of Chinese market gardening.

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3 Stapleton, *Transfer of Early Industrial Technologies*, p. 29.
In his study of Chinese entrepreneurship in Australia Jock Collins draws on international studies of ‘ethnic’ entrepreneurs such as the study by Roger Waldinger and colleagues.\(^4\) In Waldinger’s model the business success of a particular migrant group is determined by how the specific characteristics of that group – their pre-migration experiences, history of migration and settlement, and post-migration experiences – interact with each other and with the socio-economic environment or opportunity structure of the host country.\(^5\) Collins’ work has been criticised by Michael Williams, who points out that his nation-based perspective fails to take account of the importance of ongoing links with family and native place in China, focuses narrowly on the period before and after World War II, and concentrates on economic motivations and institutional racism in the host society as the main determinants of the lives of Chinese immigrants.\(^6\) These criticisms are valid. When examining the course of Chinese market gardening in Australia and New Zealand it is necessary to use an extended timeframe and consider the diverse influences on the lives of Chinese market gardeners, including the importance of ongoing ties with China. However, Collins’ characterisation of family farmers as ‘small business people on the land’ is a useful concept for the purposes of this chapter.\(^7\)

Using this concept as a starting point, this chapter examines the economic factors which influenced the course of Chinese market gardening in Australia and New Zealand: the economic opportunities and resources which helped Chinese immigrants succeed in this line of small business as well as the economic barriers which limited the successful transfer of

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traditional Chinese market gardening technologies to the host countries. The chapter begins with a brief consideration of the economic environments of Australia and New Zealand which Chinese immigrants encountered between the 1850s and the 1940s. The second and third sections outline the post-migration experiences of Chinese immigrants and the historical development of market gardening, beginning with the economic niche which Chinese market gardeners established on the goldfields then tracing the movement of Chinese market gardeners to towns and cities after the gold rushes and their place in the urban economy. The fourth section examines the economic resources and opportunities that market gardeners drew upon to meet the challenges posed by a complex and changing set of social and economic circumstances, including restrictive immigration policies, population growth, urbanisation, changes in land use and changes in retailing.

AUSTRALIA AND NEW ZEALAND: SETTLER SOCIETIES IN THE SOUTHERN HEMISPHERE

Australia and New Zealand are among the group of countries (including the United States and Canada) variously referred to by economic historians as the Anglo cluster, settler societies or regions of recent settlement. These countries have a number of common characteristics: they share an Anglo-Saxon cultural heritage and the English language; they are products of British colonialism which spread across the world in the eighteenth and nineteenth centuries; and, they are all developed ‘Western’ economies. Historically they were resource rich and labour poor, relying on large-scale immigration, capital inflow from Europe and the export of a narrow range of primary products (foods and raw materials) for their economic

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J. W. McCarty points out that the commercial cities of these countries became increasingly linked to the world market and the levelling effects of the expanding global economy in the nineteenth century. As this chapter will show, the rapidly growing cities of Australia and New Zealand in the late-nineteenth century provided an ideal economic niche for Chinese market gardeners supplying fresh food to urban populations.

Among settler societies Australia and New Zealand share many commonalities. They were occupied by Europeans later than the other nations, during the early stages of the industrial revolution in Britain; pastoral industries emerged as the core of their economies; and, their economic development was strongly influenced by their distance from European markets. Their rapid economic growth during the second half of the nineteenth century was founded on the wool industry and fuelled by the discovery of gold and a favourable demographic structure created by large-scale immigration. The development of refrigerated shipping in the 1890s transformed the agricultural industry in both countries and resulted in a boom in the export trade in meat and dairy produce.

These common characteristics are reflected in similar patterns of economic growth. For example, David Greasley and Les Oxley find a close correspondence between real wages in Australia and New Zealand between 1873 and 1913 indicating that the trans-Tasman labour

11 Geoffrey Blainey’s classic study The Tyranny of Distance: How Distance Shaped Australia’s History, Sydney, 2001, highlights the crucial influence that Australia’s isolation from Europe had in shaping the nation’s history.
12 Schedvin, ‘Staples and regions’, p. 536. Economic historians agree that the globalising forces of trade and migration, together with local productivity performance, played key roles in wages movements but they are divided on their assessment of magnitude and the relationships between migration and real wages (David Greasley et al., ‘Real wages in Australia and Canada, 1870–1913: globalisation and productivity’, Australian Economic History Review, Vol. 40, Issue 2, July 2000, pp. 185–6).
market was well integrated during this period and wage movements in both countries were
shaped by common forces.\footnote{14} Many economists have noted the extremely high levels of growth
and high standards of living achieved in Australia and New Zealand between 1850 and 1913,
apt from an economic downturn in the 1890s.\footnote{15} While estimates vary depending on the
economic models and indicators employed (in particular how indices of prices, cost of living
and expenditure relative to wages are arrived at and inter-country comparisons are taken into
account) there is general agreement that Australia and New Zealand were more prosperous
than Britain and the United States in the second half of the nineteenth century.\footnote{16} According to
C.B. Schedvin, per capita incomes in Australia were higher than in the United States from as
early as 1830, and in New Zealand from at least 1870, until well into the twentieth century.
Incomes fell below the United States after 1902 in New Zealand and after 1912 in Australia.\footnote{17}
Economic growth in Australia and New Zealand slowed in the early-twentieth century, when
both countries were in the early phases of industrialisation.\footnote{18}

Given the dominance of pastoralism and broad-scale agriculture, market gardening was
always a minor part of the agricultural economies of Australia and New Zealand. This still
holds true today.\footnote{19} Table 3.1 shows the acreages of land devoted to market gardens in New
South Wales and Victoria from 1860 to 1930 and in Queensland from 1910 to 1930. The
proportion of market gardens as a percentage of the total acreage under cultivation was never
above 4.5 per cent for the years recorded, even when orchards were included (in the years

\footnote{14} Greasley and Oxley, ‘Globalization and real wages’, p. 35.
\footnote{15} Schedvin, ‘Staples and regions’, p. 536.
\footnote{16} Ibid., p. 534; Mark Thomas, ‘A substantial Australian superiority? Anglo-Australian comparisons of
consumption and income in the late nineteenth century’, \textit{Australian Economic History Review}, Vol. 35, No. 2,
1995, pp. 10–38; and, Greasley and Oxley, ‘Refrigeration and distribution’, pp. 23–44.
\footnote{17} Schedvin, ‘Staples and regions’, p. 541.
\footnote{18} Discussing the possible explanations for these growth patterns, Schedvin argues that Australia and New
Zealand were caught in a ‘staple trap’, where attempts to diversify the agricultural economy in the early
twentieth century were hampered by the continuing influence of dominant staples (Schedvin, ‘Staples and
regions’, pp. 553, 557).
\footnote{19} Francis Parker, ‘Making periurban farmers on the fringe matter’, \textit{Proceedings of State of Australian Cities
before 1900). However, despite its small size, the horticultural industry, and the market gardening industry within it, has historically played a significant role in providing fresh vegetables and fruit to local markets. It should be noted that the small acreages devoted to market gardening do not reflect the high yields that could be produced from them.\textsuperscript{20} In the 1840s, before Chinese immigrants arrived in Australia in large numbers, European gardeners could make handsome profits from vegetables. In 1841 it was reported that one man near Melbourne made £500 in a year from just 3 acres.\textsuperscript{21}

Perhaps a more valid indicator of the relative importance of market gardening is the numbers employed in the industry. In Australia in 1911 for example, market gardeners made up only 0.05 per cent of the total agricultural workforce. The comparable figure in 1921 was 0.03 per cent.\textsuperscript{22} Numbers were similarly small in New Zealand. Market gardeners made up 0.05 per cent of the total agricultural workforce in 1906 and 0.03 per cent in 1926.\textsuperscript{23} Another factor is the money economy versus the real economy, in other words the invisible production of market gardens not recorded in official statistics. It is probable that much of the production of market gardeners was not recorded in official statistics and also that the numbers working in the industry were under-enumerated due to the high mobility of the workforce. This would have been particularly true of Chinese market gardeners.\textsuperscript{24}

\textsuperscript{20} For example the average value of production per acre for market gardens in New South Wales increased steadily from £26.3s in 1902–1904 to £56 in 1920–1921 (New South Wales Legislative Council, Report on the Agricultural Industry in New South Wales, Sydney, 1923, p. 17). This can be compared to the average value of the total Australian wheat crop in 1906–7 of £1.12s.9d per acre (George Handley Knibbs, Official Yearbook of the Commonwealth of Australia, No. 1, 1908, Melbourne, 1908, p. 306). In 1913–14 this figure was £2.0s.5d per acre (Knibbs, Official Year Book of the Commonwealth of Australia, No. 8, 1915, Melbourne, 1915, p. 317).

\textsuperscript{21} Richard Broome, Coburg: Between Two Creeks, Coburg, 2001, p. 49.


\textsuperscript{24} There are economists working on the problem of modelling the hidden or shadow economy. Aggregated shadow economy data is available for Australia and New Zealand from 1990 to 2012 (Professor Friedrich
TABLE 3.1  
ACREAGES OF MARKET GARDENS AS A PERCENTAGE OF ALL LAND UNDER CROP: NSW, VICTORIA AND QUEENSLAND, 1860–1930

<table>
<thead>
<tr>
<th>Season</th>
<th>NSW</th>
<th>VIC</th>
<th>QLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1860 -1</td>
<td>3.5% [8,707*]</td>
<td>1.7% [7,298*]</td>
<td>-</td>
</tr>
<tr>
<td>1870 -1</td>
<td>4.5% [17,168*]</td>
<td>1.6% [14,856*]</td>
<td>-</td>
</tr>
<tr>
<td>1880 -1</td>
<td>2.9% [18,130*]</td>
<td>1.1% [22,288*]</td>
<td>-</td>
</tr>
<tr>
<td>1890 -1</td>
<td>2.8% [24,276*]</td>
<td>1.2% [33,654*]</td>
<td>-</td>
</tr>
<tr>
<td>1900 -1</td>
<td>0.32% [8,000]</td>
<td>1.5% [57,496*]</td>
<td>-</td>
</tr>
<tr>
<td>1910 -1</td>
<td>0.28% [9,813]</td>
<td>0.27% [10,778]</td>
<td>0.34% [2,317]</td>
</tr>
<tr>
<td>1920 -1</td>
<td>0.22% [9,888]</td>
<td>0.27% [12,201]</td>
<td>0.25% [2,018]</td>
</tr>
<tr>
<td>1930 -1</td>
<td>0.1% [7,448]</td>
<td>0.3% [20,197]</td>
<td>0.07% [903]</td>
</tr>
</tbody>
</table>

*Figure includes orchards and gardens.

Schneider, pers. comm.). However, the issue of the unrecorded contribution of migrant groups such as the Chinese to the economies of Australia and New Zealand in the late nineteenth and early twentieth centuries is an area for further research.

TABLE 3.2
MARKET GARDENERS IN NSW AND VICTORIA, 1891 and 1901

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL CHINESE POPULATION</th>
<th>NUMBER OF CHINESE MARKET GARDENERS</th>
<th>CHINESE MARKET GARDENERS AS PERCENTAGE OF CHINESE WORKFORCE</th>
<th>CHINESE MARKET GARDENERS AS PERCENTAGE OF ALL MARKET GARDENERS</th>
<th>EUROPEAN MARKET GARDENERS AS PERCENTAGE OF EUROPEAN WORKFORCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NSW</td>
<td>VIC</td>
<td>NSW</td>
<td>VIC</td>
<td>NSW</td>
</tr>
<tr>
<td>1891</td>
<td>14,156</td>
<td>9,377</td>
<td>3,841</td>
<td>2,095</td>
<td>27.0</td>
</tr>
<tr>
<td>1901</td>
<td>11,263</td>
<td>7,749</td>
<td>3,563</td>
<td>2,051</td>
<td>31.6</td>
</tr>
</tbody>
</table>

*Note: No figure is available for European market gardeners in Victoria in 1891.

The horticultural industry has been characterised by a high representation of migrant groups from diverse non-English speaking backgrounds, particularly in Australia. This is a heritage extending back to the Chinese immigrants who played such a key role in the market gardening industry from the late-nineteenth century. Although New Zealand’s immigration intake since the mid-nineteenth century has been less diverse, the market gardening industry has also had a significant representation of non-English speakers, notably from China and India. Despite their declining numbers from the late-nineteenth century, Chinese immigrants played a significant role in the industry. In Australia in 1901, Chinese market gardeners comprised 67.5 per cent of all market gardeners in New South Wales and 43.5 per cent of all

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26 Sources: Based on data compiled by Yong from Censuses of NSW, 1891, p. 719 and 1901, p. 344; and, Censuses of Victoria, 1891, p.91 and 1901, pp. 574–79 (C.F. Yong, The New Gold Mountain, Richmond S.A., 1977, p. 262, Table 2).

27 Ibid.

market gardeners in Victoria (see Table 3.2). In New Zealand, Chinese market gardeners comprised between 38.3 per cent and 52.9 per cent of all market gardeners between 1896 and 1926, reaching a peak of 52.9 per cent in 1926 (see Table 3.3).

**TABLE 3.3**
MARKET GARDENERS IN NEW ZEALAND, 1871–1936<sup>29</sup>

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL CHINESE POPULATION</th>
<th>NUMBER OF CHINESE MARKET GARDENERS</th>
<th>CHINESE MARKET GARDENERS AS PERCENTAGE OF CHINESE WORKFORCE</th>
<th>CHINESE MARKET GARDENERS AS PERCENTAGE OF ALL MARKET GARDENERS</th>
<th>EUROPEAN MARKET GARDENERS AS PERCENTAGE OF EUROPEAN WORKFORCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871</td>
<td>2,641</td>
<td>49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1874</td>
<td>4,816</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1878</td>
<td>4,433</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1881</td>
<td>5,004</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1886</td>
<td>4,542</td>
<td>647</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1891</td>
<td>4,444</td>
<td>609</td>
<td>13.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1896</td>
<td>3,711</td>
<td>657</td>
<td>17.7</td>
<td>46.9</td>
<td></td>
</tr>
<tr>
<td>1901</td>
<td>2,857</td>
<td>685</td>
<td>24.0</td>
<td>49.8</td>
<td>0.41</td>
</tr>
<tr>
<td>1906</td>
<td>2,570</td>
<td>791</td>
<td>30.8</td>
<td>38.3</td>
<td>0.50</td>
</tr>
<tr>
<td>1921</td>
<td>3,266</td>
<td>1,252</td>
<td>38.3</td>
<td>46.1</td>
<td>0.49</td>
</tr>
<tr>
<td>1926</td>
<td>3,374</td>
<td>1,144</td>
<td>33.9</td>
<td>52.9</td>
<td></td>
</tr>
<tr>
<td>1936</td>
<td>2,943</td>
<td>914</td>
<td>31.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The transition of Chinese immigrants from gold mining to market gardening had a very similar history in Australia and New Zealand, influenced by the close economic, cultural and social ties between the two countries. The following section explores the origins of Chinese market gardens on the goldfields.

**GARDENING ON THE GOLDFIELDS**

Chinese market gardening had its origins in the gold rushes. Although they initially came in search of gold many Chinese men saw there was a more reliable income to be earned supplying vegetables to the thousands of gold seekers who flocked to the diggings and created temporary camps and fledgling townships. Some took up market gardening as a means of supplementing the income they earned from mining while others went on to become successful full-time market gardeners.

The discovery of gold in Victoria and New South Wales in 1851, and later in Queensland and Western Australia, radically transformed the economic fortunes of the Australian colonies and contributed to their political, social and cultural development. In Victoria for example, the gold rushes sparked the spectacular growth of Melbourne and regional cities such as Ballarat and Bendigo, and the State’s population grew from 77,000 to 541,000 in a single decade, from 1851 to 1861. However, as Charles Fahey points out, the heady days of alluvial prospecting when men could make their fortunes from the readily accessible river gravels were short lived and after only a few years large amounts of capital and machinery were required to recover gold from leads buried deep underground. By the

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1860s many miners were wage earners employed by mining companies.\textsuperscript{32} Similarly in New Zealand the gold rushes which began in 1861 were already experiencing a slump by 1865. The estimated 18,800 European miners in Otago in early 1864 fell to around 6,000 by the end of 1865, as they either returned to Australia or followed the rush to newly discovered fields on the West Coast.\textsuperscript{33}

It is difficult to estimate the precise earnings of individual miners, as they were understandably reluctant to advertise the extent of their finds, but it is clear from contemporary accounts that mining was a risky enterprise. In 1851 the \textit{Sydney Morning Herald} reported on conditions at the Ophir diggings in New South Wales: ‘Some are doing very well ... and great numbers scarcely earning their rations. The gold digger’s fortune cannot be more suitably expressed than by terming it a lottery.’\textsuperscript{34}

The gold rushes created a high demand for fresh food and often a more reliable income could be made from supplying other miners with vegetables than from mining.\textsuperscript{35} A recent study of census and economic data from the Californian goldfields has shown that, consistent with the historical literature, miners generally made negative or small positive gains while non-miners were much better off economically than if they had pursued similar occupations in their place of origin. This was true of both American-born and foreign-born miners. Thus merchants and other service providers reaped most of the profits from mining.\textsuperscript{36}

The reduced earnings from mining after the heady early days of the gold rushes would have encouraged Chinese miners to diversify into other activities that generated a more

\textsuperscript{34} \textit{Sydney Morning Herald}, 6 June 1851, p. 2.
\textsuperscript{35} Food prices in non-mining areas also rose sharply, as farmers and rural workers deserted their farms for the diggings (Michael Symons, \textit{One Continuous Picnic: A Gastronomic History of Australia}, Melbourne, p. 67).
reliable income. The high prices of most goods and services on the goldfields and the high demand for fresh food made market gardening an attractive option. In March 1852 the Lieutenant Governor of Victoria, Charles Latrobe, reported: ‘Meat (mutton) has always been procurable at a reasonable price, but every other article is purchased at an advance of from 50 to 100 per cent upon ordinary prices.’ In 1852–1853 an intrepid young British woman, Ellen Clacy, visited the Victorian goldfields. In the popular account of her adventures she observed:

It is not only the diggers however, who make money at the Gold Fields. Carters, carpenters, storemen, wheelwrights, butchers, shoemakers, &c. usually in the long run make a fortune quicker than the diggers themselves, and certainly with less hard work or risk of life. They can always get £1 to £2 a day without rations whereas they may dig for weeks and get nothing.38

Chinese immigrants were quick to identify this niche market on the goldfields. Recalling the early days of the gold rush at Gabriels Gully in New Zealand, a correspondent to the Evening Post in 1899 wrote that in the early 1860s they had the Chinese to thank for supplying vegetables.39 On the West Coast there was a rapid influx of hungry miners from 1864 into a region with no established farms or market gardens. Chinese gardeners quickly recognised the opportunity to fill the need for fresh vegetables.40 In 1877 the West Coast Times reported:

In the market garden business the Chinese as usual take up the field ... were it not for their efforts the place would at present be supplied with garden stuff only in an intermittent and dear fashion.41

Given the uncertainty of returns from mining, the scarcity of fresh vegetables and the generally high cost of food on the diggings it is not surprising that miners in both Australia

39 Evening Post, Wellington, 23 December 1899, p. 3.
40 Julia Bradshaw, Golden Prospects: Chinese on the West Coast of New Zealand, Greymouth, 2009, p. 70.
41 West Coast Times, 9 February 1877.
and New Zealand grew some vegetables to feed themselves. In September 1854 the Melbourne Argus reported: ‘Gold fields diggers are abandoning the nomadic life, erecting more substantial dwellings and paying more attention to horticulture, which will lead to a more abundant supply of vegetables’. Changes to mining regulations encouraged miners to establish a more settled existence. After 1857 the issue of a miner’s right allowed the holder to establish a small residence and garden near their claim and by the early 1860s changes in mining technology were freeing up river flats for gardening. These developments gave miners greater security of tenure and more land on which to grow vegetables for their own consumption and also for sale to others. In 1863 the journalist A. J. Patterson wrote of the changes that had occurred on the Victorian goldfields:

On almost every field quartz raising and crushing on a large scale have superseded the primitive systems of six or eight years ago ... licences to occupy land for residence and cultivation have been freely issued by the Government ... water supply has been provided to some extent, railways and roads have been opened up; the remotest districts are easily accessible … to the purveyor of stores and the market gardener.

The focus of this discussion is on commercial market gardening, rather than growing vegetables for personal consumption. It is probable that Chinese miners initially grew vegetables to supplement their income from mining and were involved in small-scale commercial activities, mainly supplying their own community. Some moved into full-time market gardening once it became clear there was a sufficient market in the wider community. As Waldinger et al. point out, the initial market for immigrant businesses often arises within the migrant community itself, as their needs and cultural preferences are best known and best

42 There is considerable evidence for this on the Central Otago goldfields, documented in Alexander Don’s reports of his annual inland tours (see for example, The New Zealand Presbyterian, 1 May 1889, pp. 204–5, and Chinese Mission Work in New Zealand: Annual Inland Tour 1900–1901, Dunedin, 1901, pp. 21, 29).
43 Argus, Melbourne, 8 September 1854, p. 5.
served by members of their own group. Food is one of the major products involved. This commercial activity may then serve as a platform for expansion of the business into the open market. Thus ready access to customers beyond the Chinese community was an important factor in the growth of Chinese market gardening on the goldfields.

Writers such as Warwick Frost and Anne Curthoys have suggested that there is little evidence of Chinese market gardening on the Victorian and New South Wales goldfields in the 1850s and that market gardening only became important after the end of the gold rushes in the mid to late-1860s. Certainly in the mid-1850s there is little evidence of Chinese market gardening in Victoria. In 1857 a Select Committee on Chinese Immigration reported:

The Chinese hitherto have in no one instance applied themselves to the cultivation of the land, nor indeed to any of the industrial pursuits of the colony, save that of digging for gold; their object being to acquire a sufficiency of means whereby to return to their own country.

However, there is evidence for Chinese market gardening on the goldfields by the late 1850s, somewhat earlier than Frost and Curthoys contend. In his report on the Victorian goldfields in 1862, A. J. Patterson notes the variety of occupations the Chinese had taken up in addition to mining. His comments suggest that by this time Chinese were growing both Chinese vegetables for their own community and European vegetables for the wider market:

... it is in market-gardening, apart from digging, that they have chiefly made themselves useful in the colony. Near Castlemaine, Sandhurst and Ballarat, they follow this art with great perseverance, and for a length of time they had almost the supply of these markets in their own hands. They cultivate Chinese cabbage, and the usual vegetables familiar to

46 Waldinger et al., Ethnic Entrepreneurs, pp. 21–2.
49 In 1859 the Bendigo Advertiser reported that Chinese cabbage was being grown for sale in the Chinese camp at Spring Gully, near Bendigo. Bendigo Advertiser, 26 March 1859, p. 2.
Europeans, and they dig and water, and manure with indomitable perseverance.\textsuperscript{50}

By the mid-1860s it appears that Chinese market gardeners were well established in business on the Victorian goldfields and did not have many European competitors. In 1865 Patterson reported:

The class of Chinamen most useful to their European neighbours, next to miners, who are adding to the wealth of the country, are the gardeners. There are few townships in the colony the inhabitants of which are not mainly dependent on the Chinese for the constant and regular supply of fresh vegetables of the very finest quality. Such, at least, may be said to be the case on the gold-fields. Any idea of competing with the Chinese among our gold-fields townships, in the production and sale of vegetables, appears to be pretty generally abandoned.\textsuperscript{51}

In 1866 the \textit{Argus} reported on the perceived ability and perseverance of Chinese gardeners on the goldfields. Although this may be only hearsay, the report noted that their earnings exceeded those of their compatriots who searched for gold.

There is a garden kept by five Chinamen near Mr. Patterson's slaughter yard ... The ground is about three acres in extent, and the five Chinamen earn each man about £1 per week. This, to Europeans, may appear small, but it is an amount in excess of the average earned by their digging brethren, and more by about 200 per cent, than these men could earn in their own country. If they choose they can save money.\textsuperscript{52}

In a report on the Chinese in Victoria in 1869, the Reverend Young, who ministered to the Chinese community for many years, records 813 market gardeners on the goldfields; the largest numbers were in Beechworth and Bendigo.\textsuperscript{53} One Chinese market gardener in Victoria who amassed enough savings from growing vegetables to enable him to return to China was Gin Long, who was well known in Beechworth and the surrounding district. In 1867 the

\begin{footnotes}
\item[50] Patterson, \textit{Gold Fields of Victoria}, p. 138.
\item[51] \textit{Sydney Morning Herald}, 2 March 1865, p. 2, from the \textit{Melbourne Age}, 24 February, 1865.
\item[52] \textit{Argus}, 14 July 1866, p. 640.
\item[53] W. Young, \textit{Report on the Condition of the Chinese Population of Victoria}, Victorian Parliamentary Papers, Melbourne, 1869, pp. 5–14. There were also numbers of Chinese engaged in pastoral and agricultural pursuits such as shearing and harvesting, as shown in Table 4.6.
\end{footnotes}
*Ovens and Murray Advertiser* reported that he was returning to China for about two years, and commented:

During his residence here Gin Long amassed no inconsiderable amount of the precious metal, which had attracted him to the colony, not by gold mining but by digging the ground for the growth of vegetables. At several of the Agricultural and Horticultural Societies Exhibitions he was awarded prizes for his skill in vegetable raising and the superiority of the productions he vended, combined with his civility and probity, made him a general favourite with a very numerous class of customers.⁵⁴

In New Zealand documentary evidence indicates that Chinese immigrants took up gardening from an early stage. Not all the Chinese who arrived from the Victorian diggings travelled directly to the Otago goldfields; some remained in Dunedin and leased land for market gardens. In August 1867, the *Otago Witness*, reporting the arrival of 236 Chinese from Melbourne on the steamers *Rangitoto* and *Otago*, stated:

... gradually they are being drafted off to different parts of the gold fields where those who preceded them have settled, and one or two drays daily are being despatched with their goods and chattels. Not a few of their number seemed disposed to settle about the city, and in different places they have leased portions of ground and are already at work, trenching, delving and otherwise preparing their sections for the cultivation of garden produce.⁵⁵

The evidence from the New Zealand goldfields supports the model of immigrant business development proposed by Waldinger *et al.* Like their countrymen on the Australian goldfields, Chinese miners in Central Otago initially grew vegetables for their own consumption in small plots adjacent to their huts, as shown in the archaeological evidence. One of the best preserved of the Chinese sites recorded by Neville Ritchie was the camp at Cromwell, which consisted of around thirty huts surrounded by small garden plots, with pig

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⁵⁴ *Bruce Herald*, 11 September 1867, p. 3, Intercolonial News Report from *Ovens and Murray Advertiser*.
pens, hen coops and fruit trees. A small stone lined spring provided water year round. Thus the miners recreated in the far south of New Zealand a form of subsistence similar in many ways to that which they had left behind in southern China. They were small self-sufficient farms, where the raising of pigs and chickens provided both food and valuable manure for the vegetable plots.

Ritchie identifies two further categories of Chinese gardens in Southern New Zealand which are indicative of the development of commercial market gardening. Firstly, large garden areas were established adjacent to Chinese settlements, either communally owned or owned by one relatively affluent person such as a storekeeper, such as in Arrowtown, Cromwell and Lawrence. These settlements served as centres for the small groups of miners scattered through the gullies in the surrounding districts, with gardens, general stores, grog shops, gaming rooms and brothels. Secondly, large market gardens operated on a full-time commercial basis were established in many towns by the 1880s.

The documentary evidence supports the archaeological evidence that Chinese miners in Central Otago first established small vegetable gardens to feed themselves and their countrymen, and then branched out to supply the wider community. Drawing chiefly on the diaries of Alexander Don, James Ng and Ritchie suggest that this may have occurred at Wetherstones, Macetown, Conroy’s Gully and Bald Hill Flat in Central Otago and Round Hill in Southland. They document large market gardens established by the 1870s in Beaumont, Butchers Gully, Clyde, Ophir, Matakanui, Arrowtown and Palmerston. Chinese gardeners and vegetable hawkers were located wherever good business opportunities existed, including in

larger towns away from the goldfields such as Milton, Gore, Oamaru, Invercargill and Dunedin.58

Chinese market gardeners selected crops which found a ready market among Europeans and which were suited to the New Zealand climate. Some European observers noted with interest that the Chinese had introduced new vegetables from their native land, including the Chinese cabbage, Chinese turnip, bean sprouts, Chinese celery, garlic, parsley and a variety of radish, but that there was little demand for them from European consumers, so they were generally grown only for Chinese consumption.59 In 1865 the Otago Witness reported:

The Chinese are the first market gardeners on the goldfields and they have already introduced several new vegetables previously not seen amongst us – one of them a species of beet known as ‘the Chinese cabbage’.60

It appears that the initial favourable reception of the Chinese on the New Zealand goldfields was due in part to their enterprise in supplying much needed fresh produce to the mining community at reasonable prices, and the fact that they were able to identify an economic niche where they did not compete directly with Europeans. In May 1869 the Dunstan Times wrote of the ‘immense value’ of Chinese gold seekers. They had nowhere unduly competed with Europeans on the labour market, they ‘filled in gaps’ by taking over abandoned ground and kept up the value of mining property, they reduced the cost of vegetables with their gardens and ‘generally acquitted themselves as respected members of

58 Ng, Windows on a Chinese Past, Vol. 1, p. 321; and, Ritchie, ‘Archaeology and history of the Chinese’, p. 641. In 1874 for example, the Tuapeka Times reported that six or eight Chinese had established a market garden in Lawrence, reportedly working the ground very finely and lavishly working in horse manure (Tuapeka Times, 21 October 1874, p. 2). In the same year the newspaper reported that a party of Chinese had started a garden by the town boundary in Wetherstones (Tuapeka Times, 26 September 1874, p. 2).
59 Ng, Windows on a Chinese Past, Vol. 1, p. 323.
60 Otago Witness, 30 September 1865, pp. 13–14.
society’. The work of Chinese market gardeners in manuring and tilling also improved the quality of the soil for later European land users, a theme which recurs in later Chinese settlement in the North Island. In 1877 the *Tuapeka Times* commented on the survey of quarter acre sections in the township of Roxburgh:

> The soil is of extra good quality, having been occupied by a Chinese gardener for the last three or four years and the finest vegetables of all descriptions have been produced.

After the gold rushes Chinese market gardeners followed the movement of the general population to towns and cities, where they established themselves in suitable locations as suppliers of fresh produce. The following section traces this movement, and the shift of Chinese immigrants into a range of occupations other than mining from the 1870s. Market gardening was one of the major occupations taken up.

**AFTER THE GOLD WAS GONE**

As Keir Reeves points out, the concept of Chinese as sojourners is problematic as it is based on a simplistic model of a single journey to the goldfields and return to China after the gold rushes. Many Chinese remained in their adopted countries, moving into other occupations and forming enduring communities. Reeves’ study of McLaren’s Flat on the Mount Alexander diggings in Victoria traces the transition of Chinese activity from mining to other occupations, predominantly market gardening. He shows that many Chinese miners stayed on, either by choice or circumstance, developing strong networks with the Chinese community in Melbourne and other regional centres and becoming integrated into the

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61 *Dunstan Times*, 14 May 1869.
62 *Tuapeka Times*, 26 May 1877, p. 3.
European community. Thus market gardening provided an economic foundation for the transition of Chinese immigrants from sojourners to settlers. C. Y. Choi makes a similar argument in his study of Chinese settlement in Australia, together with more recent researchers in immigrant entrepreneurship in Australia such as Jock Collins and Bruce Missingham.

### TABLE 3.4

**RURAL AND URBAN CHINESE POPULATIONS, NSW, VICTORIA AND QUEENSLAND, 1861 -1901, COMPARED TO GENERAL POPULATION**

<table>
<thead>
<tr>
<th></th>
<th>1861</th>
<th>1871</th>
<th>1881</th>
<th>1891</th>
<th>1901</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney</td>
<td>189</td>
<td>336</td>
<td>1,321</td>
<td>3,465</td>
<td>3,474</td>
</tr>
<tr>
<td>Melbourne</td>
<td>581</td>
<td>614</td>
<td>1,094</td>
<td>2,585</td>
<td>2,431</td>
</tr>
<tr>
<td>% of VIC</td>
<td>2.34 [23]</td>
<td>3.44 [26]</td>
<td>9.15 [31]</td>
<td>30.45 [41]</td>
<td>38.30 [40]</td>
</tr>
<tr>
<td>Brisbane</td>
<td>14</td>
<td>47</td>
<td>115</td>
<td>258</td>
<td>408</td>
</tr>
</tbody>
</table>

Note: The percentage figures refer to the numbers of Chinese in each capital city as a percentage of the Chinese population in the colony. Figures in square brackets refer to the percentage of the general population residing in the capital city of each colony.

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66 Sources: Commonwealth Censuses and Yearbooks. Adapted from Choi, *Chinese Migration and Settlement in Australia*, Sydney, 1975, Table 2.3, p. 28; and, J.W. McCarty and C.B. Schedvin (eds), *Australian CapitalCities*, Sydney, 1978, Table 2.3, p. 22.
Historians of the Chinese in Australia such as Choi, McGowan and Michael Williams have all noted the significance of the post-gold rush shift into other occupations. The general Australian population became increasingly urbanised in the latter part of the nineteenth century and this process of urbanisation was almost as rapid among the Chinese community, as they sought employment opportunities in the cities. Table 3.4 shows the percentages of the Chinese populations of New South Wales, Victoria and Queensland living in capital cities between 1861 and 1901. The increase in the urban Chinese population is particularly marked between 1881 and 1901 in all three colonies. By 1901 the percentages of the Chinese populations of Victoria and New South Wales living in the capital cities of each State were approaching the figures for the general population (figures in square brackets). The urbanisation of the Chinese community continued after Federation. While the overall Chinese population decreased, the proportion of Chinese residing in metropolitan areas increased from 32 per cent in 1911 to 41.4 per cent in 1933. By 1947 58.9 per cent of Chinese lived in cities, a larger proportion than the general population (50.72 per cent).

The cities provided employment opportunities for Chinese people and also the security and community support provided by benevolent associations and social clubs. Market gardening was an economically and socially viable occupation for urban Chinese, as the demand for fresh food increased dramatically with the growth of urban populations. At the same time, there remained sizeable Chinese populations dispersed across rural areas, in small groups on the fringes of country towns, or in larger groups of one hundred or more in some

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69 Choi, *Chinese Migration and Settlement*, p. 33.
regional centres. Market gardening was one of the major occupations of Chinese people in rural areas, in addition to storekeeping and work on pastoral stations.

Similarly in New Zealand the pattern of Chinese settlement mirrored that of the European population. The gold rushes stimulated a rapid growth of population in the South Island. Dunedin was the country’s leading commercial centre during the 1860s and a major centre for the Chinese community. But by the early 1870s the mining industry was already in decline. From the late-1870s there was a marked shift of the New Zealand population from the South Island to the North Island, and by the late-nineteenth century Dunedin was eclipsed by the growing cities in the North Island. As Table 3.5 shows, by 1916 almost sixty per cent of the population was in the North Island. Former Chinese miners followed these population movements, seeking business opportunities and markets in the burgeoning towns of the North Island. Many service towns grew up to cater for the booming dairy industry following the advent of refrigerated shipping in the 1880s, and this rural expansion continued into the first decades of the twentieth century.

As occurred in Australia the Chinese community in New Zealand became increasingly urbanised in the late-nineteenth and early-twentieth centuries, to a greater extent than the general population. In 1921 sixty-nine per cent of the Chinese population lived in urban

71 By 1889 there were an estimated 290 Chinese living in Dunedin and suburbs, of whom 110 were gardeners (Niti Pawakapan, ‘The Chinese in Dunedin between the 1920s and the 1930s’, MA Thesis, University of Otago, Dunedin, 1987, p. 37).
72 The population movement to the North Island was promoted by the move of the capital from Auckland to Wellington in 1876 and the establishment of a central government, replacing the former provincial system (Charles Sedgwick, ‘The politics of survival: a social history of the Chinese in New Zealand’, PhD Thesis, University of Canterbury, Christchurch, 1982, pp. 6, 73).
75 *Ibid.*, p. 74. In 1901 there were only 752 Chinese in the North Island out of a total Chinese population of 2,857. By 1936 the total Chinese population in New Zealand was 2,580, and 2,058 were resident in the North Island (Ng, *Windows on a Chinese Past*, Vol. 3, p. 160).
centres, compared to fifty-six per cent of the general population. By 1926 almost seventy-one per cent of the Chinese population lived in urban centres and they were concentrated in the two main centres in the North Island, Wellington (thirty-four per cent) and Auckland (thirty-two per cent). Alexander Don’s Roll of Chinese documents the movement of Chinese from the South to the North Island and the occupational shift from mining to market gardening. The Appendix is an analysis of the data contained in the roll relating to market gardeners, for the years 1900 to 1912. The figures represent only a sample of Chinese market gardeners in New Zealand for this period (approximately seventy-five per cent), but the data clearly shows the emergence of centres of Chinese market gardening in the North Island, notably in Palmerston North, Wanganui, Otaki, Fielding, Gisborne and Auckland. It is likely that the numbers for Wellington are under-represented, as Don did not visit the city as often as other centres. However, there was a major movement of both Chinese and European market gardeners from the Hutt Valley near Wellington to the Otaki/Te Horo district during this period. In 1909 it was reported that up to 300 tons of vegetables a month were being transported by rail from Otaki to Wellington, mainly by Chinese gardeners. In the South Island, Dunedin remained a major centre of Chinese market gardening with smaller clusters in Christchurch, Greymouth, Invercargill, Oamaru and Nelson.

78 The sample numbers 597 out of a total of 791 Chinese market gardeners in New Zealand in 1906, or 75.47 percent.
79 Wanganui Herald, 19 January 1909, p. 4.
TABLE 3.5
NEW ZEALAND: RELATIVE POPULATIONS NORTH AND SOUTH ISLAND,
1864–1916\(^{80}\)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>% POPULATION NORTH ISLAND</th>
<th>% POPULATION SOUTH ISLAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>1864</td>
<td>37.91</td>
<td>62.09</td>
</tr>
<tr>
<td>1867</td>
<td>36.55</td>
<td>63.45</td>
</tr>
<tr>
<td>1871</td>
<td>37.78</td>
<td>62.22</td>
</tr>
<tr>
<td>1891</td>
<td>44.92</td>
<td>55.08</td>
</tr>
<tr>
<td>1906</td>
<td>53.65</td>
<td>46.35</td>
</tr>
<tr>
<td>1916</td>
<td>59.22</td>
<td>40.78</td>
</tr>
</tbody>
</table>

The occupational shift that accompanied the rural-urban shift of Chinese communities in Australia and New Zealand involved a range of occupations, predominantly storekeeping, laundries and market gardening. In Australia, cabinet making was another occupation attractive to the Chinese. Nevertheless market gardening remained a major occupation in both rural and urban areas of Australia. Table 3.6 shows the main occupations of Chinese in Victoria, New South Wales and Queensland in 1891 and 1901. Market gardening was the major source of livelihood for Chinese people in all three states, representing about one third of the total Chinese workforce. The percentage of the Chinese workforce who were market gardeners increased between 1891 and 1901 in both New South Wales and Victoria. Chinese dominated the occupation of market gardening during this period, particularly in New South Wales. As Table 3.2 shows, they represented over seventy per cent of all market gardeners in New South Wales in 1881 and over sixty-seven per cent in 1891. In Melbourne in 1905, forty-

four per cent of the 4,600 market gardeners in the city were Chinese.\textsuperscript{81} The importance of market gardening as a source of livelihood for the Chinese community was maintained in 1911 when, according to Commonwealth census figures, market gardeners represented just over 29 per cent of the total Chinese population in Australia.\textsuperscript{82} The 1921 Commonwealth Census provides no information on numbers of Chinese market gardeners but Yong suggests that they would have represented at least twenty per cent of the total Chinese population in Australia.\textsuperscript{83}

A similar pattern can be seen in the occupational structure of the much smaller Chinese community in New Zealand. Table 3.7 records the relative importance of the four major Chinese occupations from 1871 to 1936. It shows that the rise of market gardening as the major Chinese occupation in New Zealand occurred later than in Australia, during the first two decades of the twentieth century, reaching almost forty-four per cent of the Chinese workforce by 1921. The statistics show a marked decrease in mining as an occupation between 1901 and 1921, and a corresponding shift into other occupations, predominantly market gardening and to a lesser extent store keeping. The 1936 census recorded 914 Chinese market gardeners, one third of the total Chinese workforce.\textsuperscript{84}

It is significant that the dominance of Chinese in market gardening was maintained despite the decline of the Chinese populations in Australia and New Zealand in the late-nineteenth and early-twentieth centuries, as a direct result of restrictive immigration policies in both countries. There are a number of explanations for this phenomenon. Sociological studies of migrant groups in Australia highlight the tendency of immigrants to congregate in ‘niche’ occupations where they complement rather than compete with members of the host society. In his study of Chinese entrepreneurs in Australia Collins surveys the history of Chinese

\textsuperscript{82} Yong, \textit{New Gold Mountain}, Table 3, p. 262.
\textsuperscript{83} \textit{Ibid.}, p. 36.
\textsuperscript{84} Ng Bickleen Fong, \textit{The Chinese in New Zealand}, Hong Kong, 1959, p. 84.
immigration and argues that the institutional racism directed towards Chinese immigrants in the form of restrictive immigration policies and discriminatory employment practices, supported by the trade union movement, denied them access to many avenues of work. While some former miners found employment as contract labourers on pastoral properties, many turned to self-employment as market gardeners or store owners.  

In this analysis the attraction of self-employment in small business is as much to provide shelter from racist hostility in the workplace as to provide a greater income. Indeed, Collins argues that the move into small business, particularly market gardening, storekeeping and furniture making, was critical to the economic survival of individual families and the Chinese community as a whole. Yong similarly emphasises the barriers which prevented Chinese immigrants from establishing large businesses such as banks or department stores in Australia: restrictive immigration laws, racist attitudes and an unpredictable business environment. He argues that although Chinese merchants had the capital and experience to start new businesses in Australia they preferred to invest in the familiar and less hostile environment of their homeland.

In common with studies of Chinese entrepreneurship in Australia, Charles Sedgwick argues in his study of the Chinese in New Zealand that the stable businesses which Chinese immigrants established after the gold rushes formed the basis for the emergence and survival of the community. The market gardens, fruit and vegetable stores and laundries they operated provided a relatively stable income from a predictable clientele, and the possibility of a more settled lifestyle with more regular savings and return visits to China as well as flexible

86 Ibid., p. 117.
87 Yong, New Gold Mountain, pp. 53–4.
business partnerships.\textsuperscript{88} Certainly market gardening involved establishing a longer term relationship with the land compared to mining as crops had to be tended daily, all year round, in order to provide a constant return.

Like many other migrant groups around the world Chinese immigrants in Australia and New Zealand tend to cluster in the small business sector which has low barriers to entry and a high labour to capital ratio. As Waldinger \textit{et al.} argue, barriers to upward mobility are a powerful incentive to enter small business.\textsuperscript{89} In her study of the Chinese in Australia Christine Inglis highlights some of these barriers, in particular the difficulties new arrivals have in finding employment when they lack fluency in English or their skills are either not recognised or not usable in their new environment.\textsuperscript{90}

There were further reasons why market gardening became the major small business enterprise Chinese immigrants entered after the gold rushes. Firstly, Europeans recognised and valued the horticultural skills of Chinese immigrants, although their successes were more often attributed to their frugality and ‘plodding industry’ than their technological expertise.\textsuperscript{91} Secondly, market gardening represented a very small part of the agricultural sector and was regarded as a labour intensive, low status occupation which most Europeans were not keen to enter.\textsuperscript{92}

\begin{flushright}
89 Waldinger \textit{et al.}, \textit{Ethnic Entrepreneurs}, p. 32.  
91 A comment in a Queensland newspaper in 1901 regarding the return of Chinese market gardeners to Charters Towers was typical of this attitude: ‘White gardeners did not have same patient application as Chinese in cultivating the soil in dry weather and as vegetables were a necessity, the Chinese had to return’ \textit{(Brisbane Courier}, 25 October 1901, p. 2).  
92 For example when asked why Europeans did not take up vegetable growing even though the soil was fertile, a farmer in Fielding, in the Manawatu district of New Zealand, replied: ‘Farmers are too lazy, also the times are too good for them to devote their energies to what they consider misplaced energy’ \textit{(Fielding Star}, 15 January 1908, p. 2).
\end{flushright}
TABLE 3.6
MAJOR OCCUPATIONS OF CHINESE MALES IN NSW, VICTORIA AND QUEENSLAND, 1891 AND 1901 (PERCENTAGE OF ALL CHINESE BREADWINNERS)\textsuperscript{93}

<table>
<thead>
<tr>
<th>OCCUPATIONS</th>
<th>1891 NSW</th>
<th>1891 VIC</th>
<th>1891 QLD</th>
<th>1901 NSW</th>
<th>1901 VIC</th>
<th>1901 QLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miners</td>
<td>14.83</td>
<td>27.48</td>
<td>10.45</td>
<td>10.22</td>
<td>21.17</td>
<td>7.76</td>
</tr>
<tr>
<td>Market gardeners</td>
<td>29.26</td>
<td>26.51</td>
<td>30.53</td>
<td>35.76</td>
<td>33.02</td>
<td>28.29</td>
</tr>
<tr>
<td>Pastoral workers</td>
<td>4.74</td>
<td>1.21</td>
<td>1.76</td>
<td>4.71</td>
<td>.44</td>
<td>.62</td>
</tr>
<tr>
<td>Other agriculture</td>
<td>13.84</td>
<td>6.68</td>
<td>17.98</td>
<td>3.54</td>
<td>8.41</td>
<td>21.95</td>
</tr>
<tr>
<td>General labourers</td>
<td>5.48</td>
<td>7.35</td>
<td>6.93</td>
<td>5.88</td>
<td>1.45</td>
<td>2.95</td>
</tr>
<tr>
<td>Domestic servants</td>
<td>6.03</td>
<td>4.85</td>
<td>8.25</td>
<td>5.95</td>
<td>1.63</td>
<td>8.75</td>
</tr>
<tr>
<td>Hotel/boarding house workers</td>
<td>2.13</td>
<td>.85</td>
<td>3.06</td>
<td>2.94</td>
<td>1.97</td>
<td>3.65</td>
</tr>
<tr>
<td>Merchants</td>
<td>.43</td>
<td>.38</td>
<td>.28</td>
<td>.72</td>
<td>.90</td>
<td>.34</td>
</tr>
<tr>
<td>Greengrocers</td>
<td>2.42</td>
<td>1.17</td>
<td>2.39</td>
<td>6.52</td>
<td>4.12</td>
<td>3.46</td>
</tr>
<tr>
<td>Storekeepers</td>
<td>2.77</td>
<td>6.20</td>
<td>6.04</td>
<td>2.91</td>
<td>4.74</td>
<td>7.03</td>
</tr>
<tr>
<td>Hawkers</td>
<td>3.07</td>
<td>3.64</td>
<td>1.49</td>
<td>3.65</td>
<td>2.55</td>
<td>3.04</td>
</tr>
<tr>
<td>Clerks</td>
<td>1.64</td>
<td>.92</td>
<td>.35</td>
<td>2.27</td>
<td>.82</td>
<td>.45</td>
</tr>
<tr>
<td>Cabinet makers</td>
<td>2.64</td>
<td>3.10</td>
<td>.36</td>
<td>6.64</td>
<td>10.12</td>
<td>.68</td>
</tr>
<tr>
<td>Laundry</td>
<td>.02</td>
<td>.93</td>
<td>.19</td>
<td>.68</td>
<td>4.41</td>
<td>-</td>
</tr>
<tr>
<td>Total no of breadwiners</td>
<td>13,127</td>
<td>7,937</td>
<td>8,399</td>
<td>9,968</td>
<td>6,123</td>
<td>8,468</td>
</tr>
</tbody>
</table>

\textsuperscript{93} Based on data compiled by Choi from 1981 and 1901 Censuses of NSW, Victoria and Queensland (Choi, Chinese Migration and Settlement in Australia, Sydney, 1975, Table 2.4, pp. 30–1).
TABLE 3.7
MAJOR CHINESE OCCUPATIONS AS A PERCENTAGE OF THE CHINESE WORKFORCE IN NEW ZEALAND, 1871–1936

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MINING</th>
<th>MARKET GARDENING</th>
<th>STORE KEEPING</th>
<th>LAUNDRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1871</td>
<td>84.7</td>
<td>1.2</td>
<td>2.4</td>
<td>-</td>
</tr>
<tr>
<td>1874</td>
<td>84.0</td>
<td>2.1</td>
<td>1.8</td>
<td>-</td>
</tr>
<tr>
<td>1878</td>
<td>76.7</td>
<td>6.3</td>
<td>2.4</td>
<td>-</td>
</tr>
<tr>
<td>1881</td>
<td>77.1</td>
<td>8.0</td>
<td>2.3</td>
<td>-</td>
</tr>
<tr>
<td>1886</td>
<td>69.0</td>
<td>14.2</td>
<td>3.1</td>
<td>-</td>
</tr>
<tr>
<td>1891</td>
<td>68.0</td>
<td>13.7</td>
<td>3.1</td>
<td>.09</td>
</tr>
<tr>
<td>1896</td>
<td>58.5</td>
<td>17.7</td>
<td>5.8</td>
<td>.83</td>
</tr>
<tr>
<td>1901</td>
<td>46.0</td>
<td>24.0</td>
<td>7.3</td>
<td>3.0</td>
</tr>
<tr>
<td>1921</td>
<td>1.8</td>
<td>43.9</td>
<td>22.9</td>
<td>11.4</td>
</tr>
<tr>
<td>1926</td>
<td>0.8</td>
<td>33.9</td>
<td>22.4</td>
<td>10.6</td>
</tr>
<tr>
<td>1936</td>
<td>0.8</td>
<td>42.5</td>
<td>25.6</td>
<td>7.3</td>
</tr>
</tbody>
</table>

As Collins observes, the literature on immigrant entrepreneurship emphasises the importance of niche markets within immigrant communities as the seedbed for business enterprises in the wider economy. Hawkers and small Chinese fruit and vegetable stalls became an integral part of fruit and vegetable distribution, acting as the link between producers and the public.\(^{95}\) Chinese wholesale fruit and vegetable distribution firms were established in Sydney and Melbourne between 1910 and 1920, and attained a virtual monopoly of the business at that time.\(^{96}\) Yong contrasts the situation in Australia with that in America, arguing that Chinese market gardening never became a significant occupation in America because labourers had a wide range of other employment opportunities including

\(^{94}\) Based on Sedgwick, ‘Politics of Survival’, Appendix VIII.
\(^{95}\) Collins, ‘Chinese Entrepreneurs’, p. 117.
\(^{96}\) Choi, *Chinese Migration and Settlement*, p. 53.
road and railway building, forest clearing, fruit growing and picking, fishing, cooking and laundry work.\(^{97}\) However, Chinese people also entered a relatively wide range of occupations in Australia, as Table 3.6 shows. There are more complex economic and social reasons for the dominance of Chinese in market gardening in Australia and New Zealand.

Although market gardening remained the major occupation in the Australian-Chinese community, Choi documents the growing importance of cabinet making, laundry and wholesale fruit and vegetable marketing businesses in Sydney and Melbourne by the early-twentieth century.\(^{98}\) However, in contrast to market gardening where they faced relatively little competition from Europeans, Chinese in the furniture making industry faced strong competition and there was much agitation against them in New South Wales and Victoria.\(^{99}\) During the debate in the Victorian Parliament in 1885 on the Factories, Workroom and Shops Bill, which contained measures to counter the dominance of the Chinese in the furniture trade, Mr Winter was one of the few members who spoke in support of the Chinese. He said: ‘there would have often been a disastrous vegetable famine here and in other parts of Australia if it had not been for the Chinese. They should not be handicapped in any way.’\(^{100}\) Discriminatory legislation was introduced in Victoria, New South Wales and later Western Australia to curtail Chinese business operations other than market gardening.\(^{101}\) As a result Chinese furniture making enterprises (and also laundries) declined rapidly, while market gardens declined more slowly.\(^{102}\)

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97 Yong, *New Gold Mountain*, p. 36.
98 Choi, *Chinese Migration and Settlement*, p. 32.
99 Ibid., p. 53.
100 *Argus*, Melbourne, 10 December 1885, p. 4.
There is evidence of concerns about Chinese market gardeners competing with Europeans, particularly during periods of economic downturn and high unemployment. However, these anti-Chinese sentiments were often tempered by the argument that any measures taken against them would impact on the supply of fresh produce and that most consumers would continue to buy Chinese-grown vegetables. Measures taken specifically against Chinese market gardeners were not widely taken up and did not extend to restrictive legislation. In New Zealand in July 1890, for example, a meeting of the Trades Council resolved to ask all unions to refrain from dealing with Chinese under any circumstances and to encourage small farmers to form an association for the supply of vegetables. It does not appear that these initiatives were widely taken up.\textsuperscript{103}

In 1895–1896 the Anti-Chinese League in Wellington proposed to establish a European market garden in competition with Chinese which would provide work for the unemployed. In July 1896 a delegation from the League met with the Minister for Lands to request a grant of land and a European land owner, Frank Moore, also offered land rent-free for two years. However it does not appear that this venture proceeded.\textsuperscript{104} There were movements to boycott Chinese grown vegetables spearheaded by the Market Gardeners and Fruiterers Association in Christchurch in 1895 as well as anti-Chinese demonstrations and meetings in Christchurch in 1912, but these were not widespread.\textsuperscript{105} There were also localised and short-lived anti-Chinese movements in other centres of Chinese market gardening, for example in Ohakune in 1907 and Otaki in 1909.\textsuperscript{106} In Auckland in 1926, a meeting of the New Zealand Natives Association reconvened, largely in response to concerns about the dominance of Chinese and Indian

\textsuperscript{103} Wanganui Herald, 28 July 1890, p. 2.
\textsuperscript{104} Evening Post, 8 August 1895, p. 4; 22 August 1895, p. 4; 13 May 1896, p. 2; 14 May 1896, p. 4; and, 11 July 1896, p. 5.
\textsuperscript{105} Star, Christchurch, 16 May 1895, p. 2; and, Ashburton Guardian, 26 February 1912, p. 2.
\textsuperscript{106} Observer, Auckland, 28 December 1907, p. 15; and, Otago Witness, 13 January 1909, p. 53.
market gardeners in Pukekohe and Bombay.\footnote{Evening Post, 25 January 1926, p. 4.}

In Australia in August 1887, a meeting of European market gardeners in the Cheltenham district of Victoria resolved not to supply Chinese hawkers with vegetables but it was reported that this initiative had been only partially carried out.\footnote{Argus, Melbourne, 25 August 1887, p. 5.} In the same month an anti-Chinese meeting held in Brisbane resolved to boycott Chinese-grown vegetables, but a journalist reporting the meeting commented that if they were put into effect the town of some 30,000 would overnight be deprived of vegetables.\footnote{Brisbane Courier, 19 August 1887, p. 10.}

The decline of Chinese market gardening in New South Wales and Victoria appears to have begun after 1910 and became steeper in the 1930s. Yong attributes this to three factors. Firstly, the rapid decrease in the Chinese population following the \textit{Immigration Restriction Act 1901} and in particular after 1911, necessarily contributed to the decline in numbers of market gardeners. Secondly, southern European migrants began to enter market gardening in the 1920s and 1930s, in areas such as Werribee near Melbourne and Blacktown, Fairfield, Cabramatta, Ryde and Nepean near Sydney. Finally, as cities expanded, many European land owners resumed the land they leased to Chinese market gardeners in order to subdivide for residential and industrial uses.\footnote{Yong, \textit{New Gold Mountain}, p. 38.} This occurred in Brighton in Melbourne and in Rose Bay, Kingsford and Rockdale in Sydney.\footnote{Weston Bate, \textit{A History of Brighton}, Melbourne, 1983, p. 390; and, James Jervis, \textit{The History of Woollahra, a Record of Events from 1788 to 1960 and a Centenary of Local Government}, Sydney 1965, pp. 68–9.} In the early-twentieth century local government authorities also resumed market gardening land for public recreation reserves and sporting facilities such as golf courses and bowling clubs, for example in the Sydney suburbs of Willoughby and Manly, and in South Perth.\footnote{Ian Rannard, \textit{The Forgotten Gardens: The Story of the Last Market Gardens in Willoughby and Northbridge, NSW}, Douglas Park, 2005, pp. 7, 46; Terry Metherill, ‘Faster: Manly in the 1920s’, unpublished ms., City of}
Parker also note how European migrants settled in cities and rural areas in Australia during this period and took up market gardening, particularly Greeks, Czechoslovakians, Yugoslavians, Maltese and Italians.113

In New Zealand Chinese dominated the market gardening industry for longer than in Australia, reaching a peak in the 1960s.114 In 1957 it was estimated that Chinese market gardeners supplied over seventy-five per cent of the domestic production of green leafy vegetables.115 This was probably due to the regeneration of the Chinese community that occurred with the arrival of wives and children as war refugees between 1939 and 1947, and the fact that New Zealand did not experience a large influx of post-war migrants from Europe like Australia. This is confirmed by Lily Lee and Ruth Lam’s study of Chinese market gardening in New Zealand. Their research indicates peak periods for Chinese market gardening in Otaki, Hawke’s Bay and Mangere in the 1960s and 1970s, Gisborne in the 1950s and 1960s and Ohakune between the 1930s and 1970s.116 In the South Island the major peaks were in Dunedin between the 1950s and 1970s and in Oamaru in the 1960s.117

THE ECONOMICS OF MARKET GARDENING

As noted above, studies of immigrant entrepreneurship have shown the tendency of migrants to cluster in small businesses with low capital but high labour input. Market gardening required relatively little capital to establish, but the traditional intensive agricultural techniques used by Chinese gardeners meant that the year-round work of preparing the soil,
planting, watering, hoeing, manuring, harvesting and preparing produce for sale was extremely labour intensive. Anti-Chinese attitudes and legal restrictions on Chinese immigrants owning land, their limited capital and high mobility meant that most market gardens were leased.\footnote{Restrictions on Chinese people owning land in Australia and New Zealand are discussed in more detail below, in the section headed ‘Land’.

118} 

Utilising their social and business networks which were based on common ties of kinship and allegiance to village and district in China, Chinese market gardeners developed distinctive forms of labour organisation and sales and marketing strategies which enabled them to earn a livelihood and weather complex and changing economic and social conditions. The key economic factors influencing the course of Chinese market gardening in Australia and New Zealand are now examined. They are: access to capital; a reliable supply of labour; land; an accessible market for produce; and, the application of sales and marketing strategies.

**Capital**

Compensating for their limited individual capital Chinese market gardeners generally worked in partnerships, several men sharing the lease of a market garden and sharing the capital and operating costs as well as the income. One example was Ben Hing’s 6 acre market garden in Kogarah, Sydney, on which he employed eight men, all as partners. Giving evidence to the Royal Commission into food supplies and prices in 1913, he explained how the profits were divided equally between the partners. Any partner not working on the garden contributed the equivalent of a weekly wage (around £1.10s) each week, which was added to the total revenue before it was divided.\footnote{New South Wales Legislative Assembly, *Royal Commission of Inquiry as to Food Supplies and Prices 1913*, Sectional Report on the Supply of Fruit and Vegetables, Sydney, 1914, Sydney, 1914, p. 1.}

As most Chinese market gardens were leased, the major capital inputs were land rents and council rates, seeds, gardening implements and fertiliser. In the days before motor
vehicles, there might also be the cost of a horse and cart and the ongoing costs of feeding and housing the horse. There were the additional costs of transporting produce to market. To make most efficient use of their carts many market gardeners in cities such as Sydney and Melbourne carried back loads of manure and straw to their gardens after their early morning trip to deliver their produce to the central markets.\textsuperscript{120} Giving evidence to the Royal Commission into food supplies and prices in 1913, the European gardener Henry Tasker estimated the annual costs per acre of seed, manure, bone dust and cartage (of produce, manure and horse feed) to be approximately £13.5s per acre per year.\textsuperscript{121}

The size of partnerships varied, depending on the size of the holding and the number of men who were willing to work together. They often came from the same clan, village or district in China. In New Zealand the records of Alexander Don in the early-twentieth century show clusters of gardens operated by groups of men from the same district (see Appendix). They were often related, by kinship or marriage. Similarly, in Australia, there were strong clan associations on many market gardens. For example, families living in villages in the Go Yui (Gao Yau) district in Guangdong consistently sent their sons to work on market gardens in Alexandria in Sydney. A clan association, the Yui Ming Fook Tong, was established to protect the interests of market gardeners in Sydney. The association still exists today.\textsuperscript{122}

These flexible business arrangements enabled individual Chinese men to draw on the economic and social resources provided by networks of kinship and friendship, and share risks. They also accommodated the high mobility of the overseas Chinese community, as they could easily be terminated and investments liquidated. When one partner moved elsewhere or

\textsuperscript{121} New South Wales Legislative Assembly, \textit{Royal Commission of Inquiry as to Food Supplies}, pp. 69–70.
\textsuperscript{122} Shirley Fitzgerald, \textit{Gold Tape and Red Scissors: The Story of Sydney’s Chinese}, Sydney, 1996, pp. 97, 162; and, Williams, ‘Chinese Settlement’, p. 44.
returned to China (often for several years) his place was taken by another.\textsuperscript{123} In their studies of
the Chinese community in New Zealand, Sedgwick and Pawakapan describe how employees
on market gardens, particularly younger men or recent arrivals, had to wait their turn for a
partnership, until they had accumulated enough capital and found someone retiring or
returning to China. Partners and labourers also took the opportunity to strike out on their own.
Sedgwick highlights the ideal of self-employment in the Chinese community, which conferred
stability and status.\textsuperscript{124} In his study of Chinese market gardeners in the Sydney suburb of
Willoughby, Ian Rannard also highlights their self-reliance and their preference for running
their own businesses.\textsuperscript{125} Chinese market gardeners working in Sydney today still prefer self-
employment.\textsuperscript{126}

Waldinger \textit{et al.} note the importance of informal credit raising mechanisms in migrant
business formation and the reliance of entrepreneurs on local community networks for capital
and also for information on business opportunities, local laws and regulations, reliable
suppliers and labour recruitment.\textsuperscript{127} Studies of migrant small farmers in Australia similarly
highlight the importance of chain migration as well as social and kinship networks in their
economic success.\textsuperscript{128} In his study of the Chinese community in New Zealand, Sedgwick notes
that typically a gardener started with a small piece of land and saved for years, reinvesting in
the business. As it was largely unmechanised and labour intensive the business only expanded
slowly. He notes that this was not a simple result of Chinese conservatism; it was common to

\textsuperscript{123} Williams records that in his interview with Billy Gay, Gay stated that he knew many gardeners who would
‘go back for 12 months whenever they had saved £100’ (interview with Billy Gay, 19 March 1998 (Tape 2, A
115), quoted in Williams, ‘Chinese Settlement’, p. 44).
\textsuperscript{125} Rannard, \textit{Forgotten Gardens}, p. 78.
\textsuperscript{126} Author interviews with Gordon Ha, Sydney, 27 July 2011 and Wayn Chew, Sydney, 3 August 2011,
recordings held by author.
\textsuperscript{127} Waldinger \textit{et al.}, \textit{Ethnic Entrepreneurs}, p. 36.
\textsuperscript{128} See Bruce Missingham, Jacqui Dibden and Chris Cocklin, ‘A multicultural countryside? Ethnic communities
chemicals’.
the horticultural industry in general.\textsuperscript{129}

Chinese market gardeners typically invested most of their capital into their income producing garden. A list of the debts and assets of a Chinese market gardener in Wellington, New Zealand in the early 1900s, who rented 19 acres of land in the suburb of Mirramar at £4 per acre a year, gives a snapshot of his economic situation. Like many market gardeners, Ming Hong’s assets lay chiefly in the crops he had in the ground. These were valued at just over £353. Against this he had debts of £107, including £80 for two horses and two carts and the balance for horse feed.\textsuperscript{130}

Thus market gardeners invested relatively little capital in their own accommodation. Stedman, for example, writing about the Chinese market gardens in Dunedin in the early-twentieth century, contrasts the neatly laid out and carefully tended vegetable plots with the ramshackle huts occupied by the gardeners.\textsuperscript{131} While many European observers commented on the poor living conditions of Chinese market gardeners, they were making a rational economic decision as to where they should allocate their scarce financial resources. Early European settlers to the colonies were given similar advice. Prescriptive manuals, such as \textit{How to Settle in Victoria}, published in 1855, advised intending migrants to only erect a temporary house and give priority to fencing the land and making it productive as soon as possible. In 1852 Frances Lancelott, a government mineralogist, recommended that establishing a garden and fencing it should take precedence over erecting a substantial dwelling.\textsuperscript{132}

\begin{footnotesize}
\begin{enumerate}
  \item Sedgwick, ‘Politics of survival’, p. 318. The issue of innovation and technological change in market gardening will be explored in the following chapter.
  \item His only assets were three pigs valued at £10, garden implements £15, and the vegetables in the ground: 40,000 cabbages £45; 45,000 spring cabbages £200; half an acre of turnips £17.10s; carrots £5; parsnips £2; leeks £16; celery £10; beetroot £2.5s, spring onions £5; swede turnips £1; garlic (18cwt) £15; cabbage plants £5; lettuce £2; cauliflowers £16; rhubarb roots (1,500) £12.10. (\textit{Evening Post}, 26 June 1906, p. 6).
\end{enumerate}
\end{footnotesize}
There were additional disincentives to Chinese market gardeners to make improvements to their accommodation, which set them apart from Europeans, particularly in the nineteenth century. The majority only rented their land and were single men. Their priority was to earn money to support wives and families in China, and they often made return trips to their homeland. Discussing the Chinese in Victoria, Oddie observes that many returned to China permanently after a relatively short period of residence in Australia and were prepared to tolerate considerable hardship and isolation for their short stay.  

It is difficult to assess the returns individual Chinese made from market gardening, as this data was either not collected in official statistics or aggregated. For example, in Australia before 1901 the statistics on acreages and value of production of market gardens in New South
Wales and Victoria were aggregated with orchards and no data is available from Queensland. The economic data is thus widely scattered. The income of market gardeners was also highly variable depending on the season and market prices, which depended on supply and demand. However, some data is available from government inquiries such as the *Royal Commission of Inquiry as to Food Supplies and Prices* in New South Wales in 1913. In his evidence to this inquiry the market gardener Ben Hing stated:

> Income from gardens varies. When there is a good crop you make more money. I could not tell you how much per week per man. At times you do not make over 30s a week. With a good season you might make £6 a week. 135

It is possible to make some broad comparisons between earnings from market gardening and earnings in other occupations. According to some of Pawakapan’s informants in New Zealand, in the 1920s market garden workers in Dunedin preferred the higher incomes that could be earned from market gardening to the lower incomes they could earn in other occupations, even though gardening involved longer hours and hard physical labour. During the 1920s market gardening in and around Dunedin was expanding and workers could earn £4 a week plus keep, compared to the average wage of an assistant in a fruit and vegetable shop of £2.10s to £3 a week. It was said that a frugal labourer could save enough after three or four years to lease his own small garden. 136 Data provided by Sedgwick, from a small sample of eighty-four men who were applying to the government to bring wives from China in 1954, suggest that in New Zealand in the 1950s the incomes of Chinese market gardeners were towards the higher end of the income range of Chinese in a variety of occupations. Their incomes ranged from £516–524 per annum compared to £364–624 for fruit shop owners.

135 New South Wales Legislative Assembly, *Royal Commission of Inquiry as to Food Supplies*, p. 2.
£208–520 for shop assistants and £364 for laundrymen.\(^{137}\)

In her history of gardening in New Zealand Bee Dawson states that given good soil and favourable weather Chinese market gardeners could make a modest living, although she does not provide any economic data to support this general statement.\(^{138}\) The limited economic data indicates that not all Chinese market gardeners were poor, barely eking out a living from their small plots of land. While prices, and therefore returns, fluctuated many were able to make a reasonable living with incomes equivalent to the earnings of European general labourers. This is supported by the evidence given to the Royal Commission into alleged gambling and vice held in New South Wales in 1892. In its final report the Committee commented that despite his frugality and long hours of labour:

> It is perhaps as well to guard against the idea that a working Chinaman lives on the verge of starvation. Like most people he appreciates a full meal; and if European luxuries are conspicuous by their absence, he nevertheless has his periods of sober feasting.”\(^{139}\)

Just over ten years later, witnesses to the Royal Commission of Inquiry as to Food Supplies and Prices in 1913 made similar comments. Henry Tasker commented: ‘They live sparely but they have their luxuries when they are doing well’.\(^{140}\)

For many Chinese market gardeners, gardening acted as a springboard for entry into other small businesses such as retail fruit and vegetable stores. Some went on to become highly successful entrepreneurs. One was the Auckland market gardener Ah Chee (Chan Dah Chee). When he first arrived in New Zealand in the 1870s he worked as an itinerant hawker. In 1882 he leased a 7.25 acre market garden in the inner city suburb of Parnell, which he

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\(^{140}\) New South Wales Legislative Assembly, Royal Commission of Inquiry as to Food Supplies, pp. 69, 96.
operated until 1920 (see Figure 3.2). In the 1890s he established a market garden in Epsom with three partners, Ah Chong, Ming Ling and Ah Hing. He purchased another 35 acres in Avondale in 1905, and 13 acres in Patumahoe in 1925. His success in market gardening enabled Ah Chee to move into a range of business enterprises including fruit and vegetable retailing, banana and ginger plantations in Fiji, importing Chinese groceries and merchandise as well as exporting dried wood ear fungus and cured rabbit skins to China.141

In 2008 an archaeological excavation of the site of the first market garden established by Ah Chee in Parnell in 1882, where he lived with his family, was carried out in 2008. This was the first archaeological investigation of a Chinese market garden site in New Zealand. The artefacts recovered support the recollections of his descendants that Ah Chee and his family had a comfortable, if not lavish, lifestyle. In addition to the Chinese ceramics commonly found in overseas Chinese archaeological sites (celadon rice bowls, porcelain serving bowls and spoons and rice wine jars), the assemblage included fine European teaware – two matching bone china cups and saucers and a side plate with a gilt banded design, and a Rockingham style teapot. This interpretation is further supported by evidence of a gas supply and a water closet in Ah Chee’s house, both luxury conveniences.142 However, there is not necessarily a direct relationship between high cost artefacts and the social status of the occupants of a site, as the work of Grace Karskens and Jane Lydon in the Rocks in Sydney demonstrates.143

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142 Ibid., pp. 163–4, 221–3.
Chinese market gardeners also prospered in regional population centres. In Australia, around 1900, the businessman William James Nomchong, who had been in partnership in a bank in Braidwood with Quong Tart, established a successful market garden in Goulburn on 14 acres bordering the Mulwaree River and recruited numerous workers from China. His son Lionel Nomchong recalls:

My father ... he made a lot of money from the market garden side of it, he had other people working for him, and he had managers in his market garden, he was doing things in Sydney to get him money and so on, buying property and selling it, and he did the same in Goulburn on his visits to and fro ... But the start of him making big money was from market gardening.  

Bendigo, which owed its prosperity to the gold rushes, supported several large market

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144 From George Treacy Stevens 1886 birdseye view of Auckland, New Zealand Map 374, Sir George Grey Special Collections, Auckland Libraries.
gardens, which endured up to World War II and supplied a large surrounding area with fresh produce, as far afield as Ballarat. George Lee Kim, whose grandfather Billy Lee King came to Australia in the 1870s as a gold miner and then established a market garden in Bendigo, recalls that there were four or five market gardens around the city in the 1920s and 1930s, some as large as 20 or 30 acres, employing many people. All were making money, there was good land available, and they were producing first class produce.  

In New Zealand, market gardeners prospered in regional centres such as Wanganui, Hamilton, Gisborne and Oamaru. Ngan Fore (Ngan Seung Fore) became a successful entrepreneur in Wanganui by 1920. He operated several market gardens around the city, supplying Wanganui and Wellington, and employed up to sixty men. His main garden, covering over 40 acres, was at Aromoho. He could always be counted on to provide lodging and a job to his newly arrived countrymen, although he paid poor wages (10s a week and keep). In 1917 he built a fine home in Wanganui at Aromoho, complete with a flagpole flying the Chinese flag. In all these cases market gardening was central to the success of Chinese businessmen and provided them with a platform for expanding into other businesses.

Balanced against this are accounts of Chinese market gardeners barely making a living. George Lee Kim describes how hard his grandfather laboured when he first established his market garden in Bendigo, breaking up the heavy clay soil into a fine tilth suitable for growing vegetables, and carrying heavy watering cans holding 6 gallons (over 22 litres) on either end of a shoulder pole. Kim recalls that his grandfather sold his produce to householders in Bendigo and often his customers would say ‘tick it up John’ (put it on credit). ‘It used to go on and on, I don't think he ever got paid’. His father helped his grandfather in the business: ‘He

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147 Ng, Windows on a Chinese Past, Vol. 3, pp. 76, 303–4; and, Lee and Lam, Sons of the Soil, pp. 207–8. Ngan Fore’s daughter Mary recalls that he paid some of his workers more than £2 per week (Lee and Lam, Sons of the Soil, p. 208).
used to make enough per day to buy commodities to bring home for us, a little meat, salt, sugar, tea; just enough so we could keep our heads above water. I would ask for more than what I had, it wasn't quite enough.'

**Labour**

Chinese market gardeners developed distinctive patterns of business management and labour relations which set them apart from Europeans. As traditional Chinese gardening techniques were so labour intensive, the operation of market gardens in Australia and New Zealand depended on a reliable supply of labour from China through kin and clan networks. Many writers on the overseas Chinese in Australia and New Zealand note the process of chain migration as sons, nephews or cousins followed the first family member to migrate and the fundamental importance of kinship, clan and district ties to their social and economic survival in a new land. Williams, for example, emphasises the strong identification of people from the Pearl River delta region by district, village and dialect; it was on this basis that they organised their migration and local businesses and societies in their adopted country. There were also close social, economic and political connections between the Chinese communities in Australia and New Zealand. Sedgwick notes that many Chinese travelling to New Zealand stopped in Sydney _en route_ and stayed with contacts there from the same village or district.

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150 Ng, _Windows on a Chinese Past_, Vol. 1, p. 89; Sedgwick, ‘Politics of Survival’, pp. 64, 445; Yong, _New Gold Mountain_, p. 54; Choi, _Chinese Migration and Settlement_, pp. 11–13; Lydon, _Many Inventions_, p. 66; and, Williams, _Chinese Settlement_, p. 11.
151 Williams, _Chinese Settlement_, p. 11.
152 Reeves, ‘Tracking the dragon down under’, pp. 49–66.
153 Sedgwick, _Politics of Survival_, p. 319. Of the 6,580 Chinese who entered New Zealand between 1874 and 1896, 64.38 per cent came from Australia. During the same period, 67.51 per cent of the Chinese who
The pattern of flexible business partnerships characteristic of Chinese market gardens was established from an early stage of Chinese migration to Australia; such as on the Victorian goldfields. In 1865 the *Melbourne Age* reported on the work organisation of Chinese market gardens in the Castlemaine district, commenting on the division of labour within gardens and also on the apparent cooperation between market gardens to avoid competition:

> There are a great many of those vegetable gardens in various parts of the Castlemaine district, being so distributed that it would seem as if it had been arranged that enough of vegetables should be reared by Chinese in each locality, to supply the whole of each neighbourhood. The number of Chinamen employed in each is generally about from four to six, and all appear to have an equal interest in the business. Each has allotted to him the particular duties which he is to perform. One hawks the vegetables and collects manure, another is employed chiefly in weeding, a third in watering, and a fourth in digging, preparing the plots, and sowing the seeds. These arrangements once made are rigidly adhered to, and are universally carried out in the most amicable spirit.\(^{154}\)

The work cultures of Europeans and Chinese were very different. From the late nineteenth century, European work culture was based on the principle of a fair hourly wage and an eight hour day while the Chinese was based on profit sharing which rewarded long hours of work.\(^{155}\) For example, the evidence given to the *Royal Commission of Inquiry as to Food Supplies and Prices* in 1913 noted the distinctive work patterns of the Chinese. One witness, Henry Tasker, commented that Chinese market gardeners on the share system worked harder and for much longer hours than Europeans employed on wages.\(^{156}\)


\(^{154}\) *Sydney Morning Herald*, 2 March 1865, p. 2, from the *Melbourne Age*, 24 February, 1865.


\(^{156}\) New South Wales Legislative Assembly, *Royal Commission of Inquiry as to Food Supplies*, p. 69.
garden sites in Australia and New Zealand are testimony to the hard manual labour involved in creating and maintaining market gardens and preparing vegetables for sale to consumers. During the 2008 excavation of the market garden established by the Chinese entrepreneur Ah Chee in Auckland, a variety of agricultural implements were recovered including spades, shovels, hoes, rakes, pitchforks, a slasher, files for sharpening blades and the remains of the metal rim and handle of a wooden bucket. A large number of brown bulbous shaped rice spirit bottles, Ng Ka Py, were also excavated. According to the wife of one of Ah Chee’s descendants, market gardeners who suffered from rheumatism, the result of long hours of physical labour in all weathers, drank rice spirits to ease their aches and pains.\textsuperscript{157} However, there is ample archaeological evidence that the Chinese miners who came to New Zealand during the gold rushes drank copious quantities of rice spirits and other liquor as a social activity.\textsuperscript{158}

Workers on market gardens had a frugal lifestyle and generally lived communally. In her archaeological study on the Loddon River in Victoria, Stanin contrasts the simple one-room dwellings of Chinese gardeners such as Yong Kit, used for communal sleeping and cooking, with those of European settlers where the presence of families and the accumulation of possessions lead to expansion and division of spaces.\textsuperscript{159} In Sydney in the late-nineteenth century, Chinese gardeners in Randwick lived in simple corrugated iron huts divided into two parts, one for communal sleeping and one for storing carts, agricultural tools and liquid manure.\textsuperscript{160} Lionel Nomchong, whose grandfather established a large market garden in Goulburn around 1910 employing many workers, recalls their living conditions:

\textsuperscript{157} Bader and Adamson, ‘Koong Foong Yuen’, pp. 166, 221.
\textsuperscript{158} Andrew Piper, pers. comm., December 2011.
\textsuperscript{159} Stanin, ‘From Li Chun to Yong Kit’, pp. 27–8.
They had accommodation, dormitory rooms in the big sheds, … you would go down and there would be a hallway with rooms going off each side. There was a big dining room with chairs all around it and at the end of the dining room, further down was a big kitchen and there was a chopping block there made from the trunk of a tree and then near that was a great big open fire with big bars across it and chains hanging down from inside and there was always a great big kettle of water boiling all the time.161

In a community made up predominantly of single men, these communal living and working arrangements fostered a sense of companionship, reinforced by communal food preparation, eating and drinking, and fostered the preservation of Chinese customs and beliefs.162 The sharing of food and accommodation costs also made economic sense.

The evidence suggests that there was clear segmentation within the occupation of Chinese market gardening and upward occupational mobility resulting in some successful market gardeners going on to become merchants and entrepreneurs. As Jane Lydon observes in her study of the Chinese in the Rocks in Sydney, the Chinese community was not as cohesive as the word suggests; it embodied class divisions related to wealth and status within the Confucian social order.163 In some cases one or more men with sufficient capital would take on a lease and employ their countrymen, creating a distinction between owners or partners and general labourers. Workers on market gardens who accumulated sufficient savings could go on to become partners. The evidence to the 1892 Royal Commission on alleged Chinese gambling and immorality indicates that some Chinese merchants in Sydney took over market gardens, such as in La Perouse, and brought out Chinese workers on contract. Pow Chee, for example, an interpreter and school teacher, described how the doctor On Lee engaged thirty Chinese workers to work on his gardens for a term of five years, paying them £1 a week plus food and lodging. He deducted the amount of the poll tax from their

162 See for example Lydon, Many Inventions, p. 173.
163 Lydon, Many Inventions, p. 73.
wages over the course of their contract.\textsuperscript{164}

Labour relations on Chinese market gardens were managed according to traditional kin and clan loyalties and were patriarchal. The data in Alexander Don’s \textit{Roll of Chinese} collated in the Appendix clearly shows that partners in and workers on individual market gardens in New Zealand tended to come from the same district in China and were also clustered in particular cities. For example market gardens in Palmerston North and Wanganui were operated by men from Poon Yu county and market gardens in Fielding by men from Jung Sing. Immigration records show that numerous Chinese workers at Ah Chee’s gardens in Parnell, many of whom were his kinsmen, were beholden to him for housing and employment.\textsuperscript{165} Similar conditions existed on other large market gardens in New Zealand and Australia, such as those operated by Ngan Fore in Wanganui and William Nomchong in Goulburn.\textsuperscript{166}

Despite their paternalistic living and working environments, at times workers on market gardens banded together to assert their rights. In Auckland in 1913, William Ah Chee, son of Ah Chee, pointed out that Chinese employers had their labour troubles just like Europeans. When workers felt they should be getting higher wages they appointed deputations to their employers and if their demands were not met they went out on strike; they had done so two or three times in the last year. However, according to the newspaper report Chee stated ‘they usually managed to settle their troubles before they went very far, as the result of conferences between the parties concerned’.\textsuperscript{167} He said that he could show from his wages book that some workers in his gardens were getting as much as £3 and £4 per week, including

\textsuperscript{164} New South Wales Legislative Assembly, \textit{Report of the Royal Commission into Chinese Gambling}, p. 160. By comparison the average wage in New South Wales in 1892 was £1.12s a week, without food and lodging. See also Yong, \textit{New Gold Mountain}, p. 36.


\textsuperscript{167} \textit{Evening Post}, 21 May 1913, p. 3.
their keep. The higher paid workers would probably have been managers. It would have been in William Ah Chee’s interests to point out the generous wages he paid his workers. It is likely that the majority were paid considerably less and were also in a position of indebtedness to him which would have limited their bargaining power. As they worked under a partnership structure, Chinese market gardeners operated largely outside the systems of state arbitration governing wages and working conditions which were introduced in Australia and New Zealand from the late nineteenth century. Aimed at reducing class conflict, these systems were indicative of the rise of the welfare state and increasing government intervention in the labour market.\footnote{168}

The flexible organisation of Chinese market gardening enterprises in Australia and New Zealand helped them to adapt to changing social and economic climates and labour market conditions. The major factor influencing the labour supply on Chinese market gardens, and thus labour costs, was the operation of restrictive immigration policies in Australia and New Zealand from the late-nineteenth century, resulting in sharply declining Chinese populations. In his evidence to the 1892 Royal Commission, the market gardener Quin Young commented on increases in wages brought about by the declining Chinese population: ‘When I first started business I paid wages of 14s. week. I have to pay more now, because we cannot get men to work, there are not so many Chinese now.’\footnote{169} As Williams points out, the immigration restrictions introduced by New South Wales in 1888 and the Commonwealth in 1901 increased the wages of Chinese gardeners and cabinet makers due to their improved bargaining position.\footnote{170} Giving evidence to the \textit{Royal Commission of Inquiry as to Food}


\footnote{169} New South Wales Legislative Assembly, \textit{Royal Commission into Chinese Gambling}, p. 418.

\footnote{170} Williams, \textit{Chinese Settlement}, p. 38.
Supplies and Prices in 1913, Henry Tasker stated that wages for both Chinese and European market garden workers had increased from £1.6s to £1.8s a week in 1900–1910 to £2 to £2.5s a week in 1913. The Chinese witness, Ben Hing, alluded to the continuing problem of labour shortages and the resultant pressure on wages:

I am making less out of the garden than ten years ago, everything is dear, very few Chinese are coming in now, Chinese workers are scarce ... You have to keep him and find him in everything. It is very hard to get men to work in the gardens.

In Australia concessions to immigration restrictions eased the labour supply problem to some extent. Exemptions were granted for assistants to, or substitutes for, market gardeners to enter Australia under the Immigration Restriction Act, enabling market gardens to continue into the 1940s. Chinese market gardeners faced less direct competition from Europeans than their compatriots in the furniture making and laundry industries, as Europeans were less inclined to take on the heavy manual labour and long hours involved in market gardening and governments recognised that they were providing a valuable service to the community.

Immigration restrictions were relaxed to admit men engaged in less competitive occupations such as merchants, market gardeners and later chefs. However, these arrivals did not keep pace with the retirement of ageing Chinese market gardeners and market gardens in urban areas were increasingly overtaken by industrial and residential development. After World War II few Chinese market gardens survived in Sydney and Melbourne. Younger market gardeners and new arrivals from China moved into the expanding restaurant industry, while other newly

171 Ibid., p. 69.
172 Ibid., p. 1.
174 In New South Wales in 1921, for example, the Minster for Labour took not action after some European market gardeners, concerned that they could not compete with the Chinese in the industry, urged him to apply the eight hour day system to Chinese market gardeners (Yong, New Gold Mountain, p. 37).
arrived migrants from Europe and later South-East Asia took up market gardening. They also employed indigenous people in rural New South Wales and Queensland. (These working relationships are discussed further in Chapter Five.)

In New Zealand Chinese market gardeners employed Māori workers, the majority of them women. Although immigration restrictions were eased following the Sino-Japanese war in the late 1930s, allowing Chinese wives and children to enter New Zealand, market gardening expanded significantly during and after World War II and additional labour was needed to supplement the assistance provided by family members. In 1951 Chinese market gardeners requested the government to allow Chinese labourers to be admitted temporarily to ease the labour shortage, but their request was refused.

In contrast to European market gardeners, Chinese gardeners in New Zealand continued to rely on family labour into the 1970s. One of the reasons given was that hiring labour was not economically viable, as growing vegetables required care and skill. Chinese market gardeners felt that hired labourers did not generally take great care in their work and

175 Choi, Chinese Migration and Settlement, p. 53, and, Williams, Chinese Settlement, p. 44.
177 Ah Yook and Carole Gass, interviewed by Joe Eisenberg, August 1999, Golden Threads Papers, Armidale; and, Henry Reynolds, North of Capricorn, The Untold Story of Australia’s North, Crows Nest, NSW 2003, p. 76.
179 Lee and Lam, Sons of the Soil, p. 152; and, Ng, Windows on a Chinese Past, Vol. 3, pp. 183–4, 186.
would need constant supervision. This shows an interesting continuity in the care and individual attention which Chinese market gardeners have traditionally given to their crops. The reliance on family labour is still evident on some of the few remaining Chinese market gardens operating in Sydney, such as the 5.5 acre garden in Botany farmed by Gordon Ha. Having taken over from his father Wally Ha who came to Australia in 1952 to work on his uncle’s garden in La Perouse, Gordon Ha operates the farm with his brother and cousin and maintains a small business specialising in Asian vegetables and herbs.

Land

In common with other settler nations with large agricultural sectors, land was the major source of wealth in Australia and New Zealand. As Powell observes, land was also a prime source of political influence. Processes of acquiring title to land and the direction and pace of the spread of settlement were tightly controlled by governments and politicians through legislation, with varying degrees of success. Geoffrey Bolton emphasises the economic motivation for Britain’s settlement of New South Wales and the important role which private land companies played in the economic development of both Australia and New Zealand in the early-nineteenth century, seeking to profit from the large-scale development of pastoral properties.

However, Chinese immigrants were not part of the European agrarian ideal. Until well into the twentieth century they were restricted from owning land by a complex web of institutional racism and were generally relegated to working as rural labourers on European

183 Gordon Ha interviewed by Joanna Boileau, Botany, 27 July 2011.
185 Powell, Mirrors of the New World, pp. 71–5.
pastoral properties or as leaseholders cultivating small plots of land owned by Europeans. In New Zealand the only period when Chinese were not legally able to buy land was during World War II, between 1942 and 1945. However, until this time the great majority of Chinese market gardeners leased land. Most were single men, very mobile and lacked the capital to invest in land. In addition, many European land owners may have been reluctant to sell their land to Chinese, although they would consider leasing it for short periods. More Chinese market gardeners began to purchase land after World War II. By this time many had accumulated sufficient capital for a deposit, having supplied vegetables for the armed forces during the war years, and more financial assistance was available from produce marketing firms and the State Advances Corporation (the forerunner of Housing New Zealand Corporation). Many growers had also been able to bring their wives and children from China, encouraging them to settle down on their own land. Surveying Chinese market gardeners in Auckland in the 1970s, Lee found that growers aspired to owning their own land and prized it as an objective in itself. Farming leasehold land was seen as a stepping stone to buying land once they had enough capital.

Similar factors in Australia restricted the ability of Chinese market gardeners to purchase land. Chinese people were unable to own land unless they were naturalised Australian citizens and only some 5,000 were naturalised under the laws of the Australian colonies prior to 1901. After Federation legislative restrictions varied from state to state. In some states, legal discrimination against Chinese and other ‘aliens’ extended to the right to

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187 Lee and Lam, *Sons of the Soil*, pp. 17, 529.
190 The pre-Federation Chinese population in Australia fluctuated, between 38,258 in 1861 and 29,627 in 1901 (Choi, *Chinese Migration and Settlement*, p. 22). Under the *Naturalization Act 1903* persons deemed naturalised in the colonies prior to the passing of the Act were deemed naturalised under Commonwealth law. However, few people were granted naturalisation between 1904 and 1956 (Paul Jones, *Chinese-Australian Journeys: Records on Travel, Migration and Settlement, 1860–1975*, Canberra, 2005, p. 119).
lease or own property. In 1912, Queensland enacted legislation allowing aliens to acquire leases of less than 5 acres for up to twenty-one years; those leasing over 5 acres were required to pass a dictation test in a prescribed language. In New South Wales legislation enacted in 1913 and 1916 prevented aliens from acquiring certain land holdings direct from the Crown. In South Australia after 1914, Asians were not permitted to acquire leases of Crown land in irrigation areas.\(^{191}\) However, according to Marie de Lepervanche, these acts, at least in Queensland, were rarely enforced.\(^{192}\)

Unable to own land unless they were Australian citizens, most Chinese farmers in north Queensland obtained five-year 'clearing leases' from European land owners who lacked the capital or the desire to undertake the hard labour of clearing their properties.\(^{193}\) In 1919 Mr Ashford, the New South Wales Minister for Lands, responding to the complaints of European banana growers in northern New South Wales, stated he had received advice from the Crown Solicitor that Chinese persons may purchase 'ordinary lands' but could not buy or lease land from the Crown under certain tenures.\(^{194}\)

Sizes of market gardens were highly variable according to their location and the number of partners involved in an enterprise. In New Zealand few figures are available for the sizes of gardens on the goldfields, but Ng suggests they were initially only small in size, becoming larger as the populations of the gold mining settlements grew.\(^{195}\) By the early 1900s, when the numbers of Chinese involved in market gardening exceeded those in mining,
extensive gardens employing large groups of men were established in North Island population
centres such as Otaki and Wanganui.196 Chinese market gardens in Otaki ranged from 10 to 30
acres, and there was a 41 acre garden outside Wanganui operated by Ngan Fore.197 By 1930
there was a 50 acre garden outside Fielding, probably operated by a partnership of six men
including Wong Mong Jook, trading under the name Yee Lee and Co.198

Market gardens in inner city areas tended to be smaller than those on the outskirts. In
Dunedin in the early-twentieth century, most Chinese market gardens were between 3 and 8
acres.199 In Auckland, early Chinese market gardens between the 1870s and 1890s ranged
from 3 to 7 acres in inner city areas such as Ponsonby, Parnell and Arch Hill to larger gardens
of 41, 22 and 26 acres in Mangere, Avondale and Epsom.200 By the 1930s there were large
gardens of 127, 95, 70 and 50 acres in Panmure (the average was around 30 acres) and 70 and
64 acres in Mangere.201

The acreages of market gardens in Australia were also highly variable. The data
available for the Victorian goldfields indicates that the sizes of market gardens in the 1860s
ranged from 1 to 6 acres, with larger gardens on the outskirts of larger towns such as Bendigo.
The quantitative data are insufficient for detailed analysis, but suggest a similar pattern to New
Zealand – the sizes of Chinese market gardens established in inner city areas by the late-
nineteenth century tended to be smaller than those on the outskirts of cities or country towns.
In Sydney in 1900, there were eighty-five Chinese market gardens, averaging 3.9 acres in

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198 Wong Mong Jook, born in Gwa Leng village in 1891, arrived in New Zealand in 1907. His first employment
was in Chan Dah Chee’s market garden in Auckland. In 1917 he joined a cousin and four others in a market
garden and fruit and vegetable store business in Fielding (Gwa Leng New Zealand Family History Group,
195).
In the Melbourne suburb of Brighton, a major market gardening area supplying the city, they averaged 9.7 acres in around 1900. In Brisbane in 1889, market gardens ranged from 1 to 10 acres. By comparison, in Queensland between 1902 and 1928, there were large gardens of 30 acres in Warwick and 40 acres in Samford (both west of Brisbane) and gardens of 20 to 30 acres outside Bendigo in Victoria in the 1920s.

As most Chinese market gardeners leased land, their wealth lay in the improvements they made to it and the crops they produced. But it was often European land owners who benefitted from the labour of Chinese market gardeners, who transformed uncleared, ‘unproductive’ land into fertile acres suitable for agriculture or pasture. In New Zealand, the Chinese market gardeners who arrived in the Ohakune district in the central North Island from the early 1900s took up leases on land that had been logged for the booming timber milling industry and grew vegetables in the fertile volcanic soil among the stumps and logs. With limited tools and the aid of a horse, if they could afford one, they cleared the bush and removed the stumps after the land had been burnt off. As they cleared they gradually increased the area under vegetable crops.

European landowners usually leased their land rent-free to Chinese gardeners for two to five years, on the condition that they returned the land in pasture, which could then be stocked with sheep and cattle. The gardeners then moved on to another block of uncleared land and repeated the process. The Chinese played a major role in developing the market garden industry in Ohakune, which remains an important market garden centre particularly for

**Notes**

202 New South Wales Legislative Assembly, *Royal Commission of Inquiry as to Food Supplies*, p. xxxv.
203 *Brisbane Courier*, 30 September 1889, p. 7.
root crops such as carrots and parsnips. Unlike most European farmers, who regarded market gardening as a supplement to mixed farming and used haphazard methods, the Chinese derived their sole income from what they produced and applied the traditional intensive cultivation techniques of their homeland. Similarly, the Chinese gardeners who leased land from Europeans in Dunedin in the early-twentieth century improved the fertility and productivity of the land and increased its value. Their leases were generally only word of mouth agreements and could be terminated at any time.

An item published in the Sydney Chinese language newspaper the Tung Wah News in July 1899 providing advice to Chinese market gardeners gives an insight into the terms of their leases and security of tenure. Gardeners were advised that any lease they signed should include the size of the land, who paid the rates, the amount of rent and should not make the tenant responsible for repairs. It also suggested that the added value Chinese gardeners gave to uncultivated land could be used as a bargaining tool to negotiate a period rent-free.

Productive land used for vegetable growing could be worth ten times as much as unimproved land. Giving evidence to the New South Wales Royal Commission of Inquiry as to Food Supplies and Prices in 1913, Thomas Elliot, a market gardener in Bowral, observed that improved and drained land ideal for growing cabbages was worth £50 an acre compared to unimproved land which was only worth £4 or £5 an acre. In New Zealand in the early-twentieth century, uncleared land on the outskirts of the growing towns of the North Island could be leased for 7 shillings an acre in the first year, increasing to £1 to £2 in the second

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207 Lee and Lam, Sons of the Soil, pp. 219–21; and, Murphy, ‘History of the Horticultural Industry’, pp. 3, 11.
208 George, Ohakune, pp. 218, 222.
211 New South Wales Legislative Assembly, Royal Commission of Inquiry as to Food Supplies, p. 72.
year and perhaps £4 or £5 in the third year as it was progressively improved. In the 1920s a Dunedin market gardener returning to China for an extended visit could sell his share in the lease of an established 5 acre garden that had been worked for a number of years to a countryman for £200 to £300, or £40 to £60 an acre. Thus, Chinese market gardeners could also benefit from the increased capital value of market garden land which they had developed through their own labour.

Land values of market gardens were also determined by their location in relation to markets and population centres and their relative value for competing land uses. In 1875 Johann Heinrich Von Thunen developed a general theory of urban growth and a rationale for the location of market gardens on the fringes of urban centres, arguing that the arrangement of land uses around a city is based on the notion of economic rent and competition for land. As urban land uses realise higher rents, rural land uses are progressively displaced by residential, commercial and industrial uses. Improved communications and refrigerated storage and transport have extended the area from which cities can draw supplies of fruit and vegetables, leading some geographers to question the relevance of von Thunen’s model. However, as Derek Smith argues, it is still relevant in Australia where centres of consumption are widely dispersed.

Market gardening enterprises had to adapt to changes in land use over time, particularly in cities. Faced with rising land values and corresponding increases in rents and rates as urban populations grew and suburbs expanded into former rural or semi-rural areas

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many had to move their operations to areas on the urban fringes where land values were lower or take up another occupation altogether. By the early-twentieth century market gardens which had been established in the inner suburbs of cities in Australia and New Zealand from the 1870s and 1880s were beginning to be encroached upon by residential and industrial development. In the era before urban planning there were tensions between the competing demands of industrial and residential uses, and a social geography of class and ethnicity emerged as working class and ‘ethnic’ enclaves developed.217 Growing cities also needed space for waste disposal, water supplies and road and rail transport networks. In Melbourne market gardens began to disappear from suburbs such as Hawthorn after World War I. In 1919 the last remaining bastion of Chinese market gardening in Hawthorn, the 40 acre Urquart estate, which had been cultivated since the 1880s, was sold and subdivided for housing.218 In the Sydney suburbs of Botany, Alexandria and Willoughby Chinese market gardening was declining by the 1920s as former agricultural land was subdivided for housing estates.219 In 1928 the *Tung Wah Times* reported that the number of Chinese gardens in Sydney’s inner suburbs was decreasing due to rising land rents.220

In New Zealand, as the suburbs of Dunedin expanded Chinese market gardeners moved from South Dunedin, Sawyers Bay, Forbury and Caversham, close to the city centre, to outer areas such as the Kaikorai Valley and the Taieri Plain. As land became more valuable for housing and industry than food production, European landlords first increased rents, then as suburban sprawl gathered pace, terminated leases and subdivided their land for building lots.

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220 *Tung Wah Times*, 21 April 1928, p. 7-b.
Most Chinese moved their gardening operations to areas further away from the city where land was cheaper and they could afford larger plots. A retired market gardener interviewed by Pawakapan described how his father began with a small garden in Forbury in 1920, then moved to the Kaikorai valley. After he took over from his father he moved to North Taieri, Outram, then finally to Momona. Each time he expanded the size of his holding as he saved enough money to lease more land.

In Auckland, market gardeners in Mangere and suburbs closer to the city centre such as Avondale and Mount Wellington moved to areas on the outskirts of the city such as Pukekohe, Bombay and Kumeu as inner city land values rose (refer to Figure 5). Chinese market gardeners had an alternative to moving their operations. They could intensify them, perhaps on a smaller holding, by increasing inputs of capital and labour to compete with alternative urban land uses. In New Zealand, some Chinese market gardeners in the Auckland suburb of Mangere (including the Luen brothers Percy, Harry and George; Jack Chong, Sam Lee, David Yee, Poy Lee and Sherman Lowe) intensified their operations from the 1960s. They established glasshouses on small holdings of 1 to 2 acres where today Chinese growers still produce tomatoes with cucumbers as a rotation crop. They achieve higher yields per acre and reduce labour costs as they use automated irrigation and heating equipment. In some cases developers who had purchased land but not yet commenced building allowed market gardeners to continue to cultivate it. Glasshouse growing also gained popularity among gardeners in the suburbs of Avondale, Otahuhu and Onehunga in the post-war period, as it

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221 Stedman, ‘The South Dunedin Flat’, p. 137. Despite the forces of suburbanisation and industrialisation, an enclave of Chinese market gardeners remained in the Macandrew Road area of south Dunedin until the late 1930s, when the land was resumed for the building of a government school (p. 206).
promised higher returns per acre and was suited to small holdings.\textsuperscript{224}

**Markets and prices**

In contrast to the high population densities of southern China in the nineteenth century the populations of Australia and New Zealand were small and scattered over large distances, particularly in remote areas of Australia. As vegetables were perishable, market gardens needed to be located close to markets so that produce could be harvested and sold as quickly as possible, ideally the same day. Locating close to markets also saved freight costs and time lost working on market gardens.\textsuperscript{225} As the general populations of Australia and New Zealand became increasingly urbanised in the late-nineteenth century Chinese market gardeners established market gardens in urban areas to serve these growing markets.

Apart from a period during World War II when the Australian and New Zealand governments introduced controls over the prices and supply of vegetables, as part of a program of centralising control of their economies, vegetables were sold under a free market.\textsuperscript{226} Prices fluctuated widely depending on whether there was a glut or shortage in supply. In 1904, for example, a report in the *Agricultural Gazette of New South Wales* noted that prices for vegetables could rise or fall as much as three hundred per cent due to sudden gluts and shortages.\textsuperscript{227} Thus one of the major challenges for European and Chinese market gardeners alike was to manage gluts and shortages in specific crops and fluctuating prices, and to try to ensure an even supply of produce year round.


\textsuperscript{225} This was still the case in the 1970s. In surveying Chinese market gardeners in Auckland Lee found that a major factor in the location of their gardens was proximity to the expanding market of Auckland and lower transport costs (Lee, ‘Chinese market gardening’, pp. 9, 12).


\textsuperscript{227} W. H. Clarke, ‘The fruit and vegetable industries’, *Agricultural Gazette of NSW*, December 2 1904, p. 1204.
Chinese market gardeners used their traditional horticultural skills, such as the use of hot beds and transplanting, to speed the growth of young seedlings and extend their growing season. Their aim was to produce a crop, and thus a monetary return, as quickly as possible.\(^{228}\) They also typically cultivated a wide variety of crops with different growing seasons, whereas European market gardeners tended to concentrate on larger scale cultivation of one or two crops, for example in New Zealand, potatoes and onions.\(^{229}\) This helped ensure an even supply of produce year round. In 1921 a newspaper in Wellington, New Zealand reported that the Chinese market gardeners in Otaki organised their crops to guard against a glut in the market.\(^{230}\) In Australia, keen-eyed European observers often commented on the orderliness of Chinese market gardens and the variety of crops at different stages of growth. In 1865 the Melbourne Age commented:

> In no respect are the wisdom, foresight, and accurate calculation of the Chinese gardener more wonderfully displayed than in his arrangement of his crops, so that he has always got some description ready for sale, and yet never has a glut, or is compelled to sell immature vegetables, or allow them to become overgrown. He sows and reaps something every day all the year round, with him it is always seed time and harvest. In the garden are to be seen vegetables in all stages of development, and as soon as one plant is taken from the ground new seed is put in its place. The soil is never allowed to remain a day idle, but it is too liberally treated ever to get exhausted.\(^{231}\)

However, Chinese market gardeners were not always successful in managing gluts and shortages in specific crops, particularly in regional centres with smaller markets. Ernest Sue Fong recalls the Chinese market gardens in Inverell, New South Wales in the 1930s, where there were two large gardens, one employing twenty-eight men, the other twenty men.

\(^{228}\) This dissuaded many early Chinese market gardeners from planting orchards; the trees took too long to grow to maturity and produce a return. See comment in *Sydney Morning Herald*, 2 March 1865, p. 2.


\(^{230}\) *Evening Post*, 3 November 1921, p. 9.

\(^{231}\) *Sydney Morning Herald*, 2 March 1865, p. 2, from the *Melbourne Age*, 24 February 1865.
There was Sam Sing and Hop Sing ... I used to go down and take a lot of fertiliser down to them ... The trouble was when they got a good crop, everybody else got a good crop and they’d get a glut and they’d get no money out of it. ... It just got tougher and tougher and they dwindled away.\textsuperscript{232}

Even in Otaki, close to the large Wellington market, Chinese market gardeners were sometimes hit by a glut of cabbages, beans or other seasonal vegetables, flooding the market. In 1909 a Wellington newspaper reported:

The Chinese have found that with present prices for their produce it does not pay to send them from Otaki to Wellington. Numbers of them are ploughing the rotting vegetables into the ground.\textsuperscript{233}

Through intensive cultivation, frequent watering and manuring Chinese market gardeners were able to produce more to the acre. This helped them to keep their prices relatively low and still make a profit. Europeans often commented on the astonishing amounts Chinese gardeners could produce from a small area of land. Writing in the 1930s Depression, Alex Bennet advised his readers on how to make a living from an acre and suggested they take a walk around a Chinese garden as an example of how to get the utmost out of a small plot of land. He advised that 1 acre carefully cultivated was more likely to be a money spinner than 5 acres barely scratched over, saying that the aim was to get the highest possible return from a given area in the shortest possible time. Drawing on European kitchen gardening traditions and also referring to traditional Chinese agricultural methods, he promoted intensive hand cultivation, interplanting, thorough manuring and watering, keeping the garden free of weeds as well as giving the growing plants individual attention. His motto was ‘an acre means no idle hours’.\textsuperscript{234}

The economic returns from market gardening varied greatly according to market

\textsuperscript{232} Wilton, \textit{Golden Threads}, p. 27.
\textsuperscript{233} \textit{Evening Post}, 25 March 1909, p. 8.
\textsuperscript{234} Alex Bennett, \textit{A Living From an Acre: How to Defeat the Depression}, Sydney, 1932, pp. 17–19, 74–5.
conditions, the vagaries of the weather, the location of the garden and the number of men working it. In his history of Brighton, Bate observes that market prices vitally affected gardeners. He notes that the shift to vegetable production in the area after 1854 coincided with the gold rushes and can be explained by rising demand and rising prices. The prices of potatoes rose from £7 per ton in 1849 to £23 per ton in 1854 and carrots from 1.5 pence to 1 shilling in the same period. He argues that even though vegetables were an unstable commodity they were no worse a business proposition than other commodities, citing evidence for similar or greater fluctuations in the prices of wheat, bread and dairy produce between 1849 and 1854.235 The Chinese market gardeners who settled in Brighton in the 1870s and 1880s faced relatively little opposition from European market gardeners until the Depression when they showed how well they were insulated against low prices. Bate comments that they could even make a profit out of incidental crops like parsley, garlic and minor salad vegetables which European gardeners found uneconomic.236 C.M. Yuan points out that Chinese could not access social services during the 1930s Depression and many lived in poverty, but within their community, market gardeners remained relatively prosperous, providing consumers with fresh produce.237 Some gardeners even gave work to unemployed Europeans, for example in Mangere in Auckland where they employed them to clear rocks and create stone walls around the gardens and gave them bread and a bowl of soup for lunch.238

Other indirect evidence suggests that Chinese market gardeners had relatively good incomes, even during the economic downturn in the 1890s. In 1901 a New Zealand newspaper report described the assets of a Chinese market gardener near Carterton, who was making good money supplying the Wellington market. According to the prices quoted, his current crop

235 Bate, History of Brighton, p. 168.
236 Southern Cross, 22 September 1900, p. 2, quoted in Bate, History of Brighton, p. 357.
of cauliflowers had a maximum market value of approximately £1,666. ‘He has this season 14 acres of very fine cauliflowers, which he retails at 4d each for the best and largest. There are 100,000 of them and the whole crop is marketable’. Of course the actual prices realised for specific crops depended on the market at the time.

In an address to the Birkenhead and Northcote Fruitgrowers Association in Auckland in 1899, Allan Wilson noted the surprisingly large returns Chinese market gardeners gained from some lines of vegetables, for example a good crop of lettuce could yield £300 per acre and cabbages £50 to £100 an acre. However, he warned that the highest prices were rarely obtained, and much depended on catching the market at the best time. Often prices fell so low it did not pay to market the produce, and it was well to watch the market closely and endeavour to always have a variety of crops ready for sale at a reasonable price. An indication of the keen interest which Chinese market gardeners in Sydney had in the market prices for their produce is the regular publication of vegetable prices in the Chinese language Tung Wah News.241

During droughts the irrigation skills of Chinese market gardeners often enabled them to produce vegetables where Europeans’ crops either failed or they did not attempt to grow them. For example, in Botany in Sydney, an area of sand dunes and swamps with plentiful water, Chinese gardeners could reap the benefits of high prices in times when other areas were stricken by drought and vegetables were scarce. One historian commented ‘when others pray for rain, these market gardeners pray no less fervently for a continuation of dry weather’.242

In Queensland the Brisbane Courier reported on the visit of an officer of the Department of Agriculture to the Chinese market gardens around Brisbane in May 1902, citing

239 Wanganui Herald, 16 April 1901, p. 2.
241 For example, see Tung Wah News, 13 July 1898, p. 4; 31 August 1898, p. 4; and, 17 September 1898, p. 4.
them as an example of the efficacy of irrigation. The report observed that the Chinese had little concern about the current drought, commenting ‘in fact, the longer the dry weather continues the better for the Chinese gardeners, as their products bring a higher price’. It estimated the annual value of vegetables produced by the gardeners to be between £150 and £200 per acre.\textsuperscript{243} Three months later the newspaper reported on the successes of Sam Wah, a gardener in Warwick. He irrigated his 30 acre farm using a four horsepower steam pump and reaped substantial profits from his investment in advances in irrigation technology.

He gets two crops of cabbages a year from eight acres, and by planting 6,500 plants to the acre he receives 50,000 head from each crop, or 100,000 head of cabbages a year from eight acres. From five to six acres of onions he obtains 60 tons; eight acres of potatoes yield him 40 tons; while from a two-acre crop of sugar-melons alone his income is £100, selling them at the rate of 6d. to 1s. each. With vegetables in general, he speaks of equal success. At the present time he is sending vegetables to Brisbane, Ipswich, Toowoomba, Charleville, Stanthorpe, Killarney, and other places, but in the warmer weather his exportations are much heavier, when for five months he sends away 3 tons of vegetables of all kinds daily, and keeps Warwick customers going as well.\textsuperscript{244}

Over twenty years later the newspaper reported in a similar vein on the successes of Chinese gardeners in Samford, west of Brisbane, who obtained good prices for their produce during the drought of 1927, thanks to their extensive irrigation system.\textsuperscript{245}

The evidence for the cost and availability of vegetables and fruit in the late-nineteenth and early-twentieth centuries in Australia is contradictory. Some contemporary sources point to their cheapness and ready availability, while others paint a picture of scarcity and high cost. This probably indicates unreliable supply with alternating gluts and shortages, and uneven distribution. As Andrea Gaynor points out in her study of gardening in Australian cities the availability of cheap vegetables from Chinese market gardeners would have made growing

\begin{thebibliography}{9}
\bibitem{243} Brisbane Courier, 3 May 1902, p. 15.
\bibitem{244} Brisbane Courier, 6 August 1902, p. 2.
\bibitem{245} Brisbane Courier, 4 February 1928, p. 13.
\end{thebibliography}
their own in their backyards less attractive to urban residents. Some suburbs were well served by Chinese market gardeners, while others were not. Enid Ross, who grew up in Newcastle in the early 1900s, recalled:

We didn't make gardens in those days because the fruit and vegetables were so cheap it wasn't worthwhile. We did have fruit trees in the yard ... and that was all we had growing. Parsley perhaps, and mint is something that's needed for the addition to food, but tomatoes were only four pence a dozen and the Chinaman with his baskets would come ... and he would have quite a variety of vegetables, cabbage - eight pence, perhaps cheaper sometimes, cauliflower and the like, and celery, all freshly picked out of his garden and a soup bunch made up ... Well, it wouldn't be worth making a garden for that.

In his study of the Chinese in Dunedin, Pawakapan argues that although Chinese gardeners were self-employed, they were exploited by the demands of consumers for cheap vegetables. But there is evidence of Chinese market gardeners and vegetable hawkers exercising their economic power, even though they were hedged in by the prejudices of the wider community and a maze of discriminatory legislation. The fears and prejudices of consumers influenced their purchasing choices. In 1881 there was a smallpox scare in New South Wales, and Chinese market gardeners and vegetable hawkers were the scapegoats – householders refused to buy their produce for fear of contamination and they had to bear the taunts as well as the sticks and stones of larrikins. In Newcastle the Chinese community responded by banding together and refusing to sell vegetables direct to householders for one month. They sold their produce to European greengrocers instead, forcing householders to pay double the price for their vegetables. The *Sydney Morning Herald* noted that the householders of Newcastle were keen to welcome back the Chinese hawkers, commenting 'the pocket is a

247 Enid Ross interviewed by Warwick Eather, 18 and 22 February 1987, New South Wales Bicentennial Oral History Collection, Mitchell Library, MLMSS 5163/Box 02, transcript p. 20.
248 Pawakapan, ‘Chinese in Dunedin’ p. 98.
very sensitive object when touched.\footnote{249}

There are other examples of Chinese market gardeners taking collective action. In 1890 Chinese market gardeners in Mackay reacted promptly to the introduction of a local bylaw imposing a special tax on vegetable hawkers in the municipality. They cut off supplies of fresh vegetables and refused to do business, returning the townspeople to a monotonous diet of tea, damper and mutton or beef. The bylaw was soon repealed.\footnote{250} In New Zealand in September 1907, Chinese market gardeners in Wanganui met and decided to increase the prices of their vegetables by fifty per cent. It was later reported that Chinese market gardeners in Dunedin wanted to follow their example but ‘could not trust each other to hold to the terms of the proposed bond’. \footnote{251} In 1908 a Wellington reporter commented on the relatively uniform prices charged by Chinese fruit and vegetable retailers, as evidence of ‘a subtle understanding’ among them’. \footnote{252} These comments reflect the prevailing prejudices against Chinese people.

**Marketing strategies**

Utilising their social and business networks within the Chinese community, market gardeners had access to a range of avenues for distributing and marketing their produce. These flexible marketing strategies enabled them to adapt to changes in the retail sector. A characteristic feature of the Chinese immigrant economy was the integration of the various occupations involved in food supply: market gardening; hawking produce door-to-door; fruit and vegetable stores; and, wholesale fruit and vegetable marketing.\footnote{253} As Sedgwick notes, in New Zealand in the late-nineteenth and early-twentieth centuries the Chinese community was linked occupationally, with growers, hawkers and retailers all handling the same commodities

and controlling distribution. Those who grew crops and retailed them were generally younger, while older men hawked vegetables on foot or by horse and dray if they were still keen to earn a living.\textsuperscript{254} Similarly, in Australia, many merchants acquired their capital by working in market gardens or as vegetable dealers at the markets before becoming partners in a store.\textsuperscript{255} This integration minimised the length of the supply chain and meant that Chinese market gardeners were able to provide superior quality and freshness as well as reliable supplies. After World War II when the tastes of Australians and New Zealanders became more cosmopolitan, the increasing popularity of Chinese restaurants created a further outlet for Chinese market gardens and slowed their decline.\textsuperscript{256}

It is difficult to establish what proportion of Chinese market gardens had direct connections to Chinese retail outlets. In her study of Chinese market gardening in Perth between 1900 and 1920, Anne Atkinson finds only limited evidence for direct connections between Chinese greengrocers and market gardens; most sales were through hawking or wholesale produce markets.\textsuperscript{257} However, there are examples of combined market garden and retail enterprises in Queensland and New South Wales, such as the garden and store operated by Willie Mar and his son (also named Willie Mar) in Winton from 1927 to 2000. The Sydney based firm Tong Sing and Co. operated two market gardens on the Gwydir River outside Moree from the 1890s to the 1950s.\textsuperscript{258} Opening a greengrocery store was a natural avenue of business expansion for successful market gardening enterprises, particularly where market gardeners were able to bring wives and children from China to help in the business. The

\begin{flushleft}
\textsuperscript{254} Sedgwick, ‘Politics of Survival’, p. 320.  \\
\textsuperscript{255} Williams, \textit{Chinese Settlement}, p. 26.  \\
\textsuperscript{256} Yuan, ‘Chinese in White Australia’, p. 306.  \\
\textsuperscript{257} Anne Atkinson, ‘Chinese market gardening in the Perth metropolitan region, 1900–1920’, \textit{Western Geographer}, Vol. 8, 1984, p. 47. See also Yong, \textit{New Gold Mountain}, p. 36.  \\
\end{flushleft}
experience of Chung Kwong is typical of many Chinese immigrants to New Zealand. In the 1920s he ran a garden and fruit shop with the assistance of his wife in the North Island town of Otaki. After returning to China for three years so the children could receive a Chinese education, the family returned to New Zealand in 1932 and moved to Wairoa where they again ran a fruit shop and market garden.\(^{259}\) In the 1930s Hop Lee Brothers operated a 50 acre market garden outside the town of Fielding and a store in the town centre, Yee Lee and Co. They had six partners and six employees and delivered produce in two trucks.\(^{260}\) Lee and Lam record many other successful businesses combining market gardens and fruit and vegetable stores, particularly in smaller provincial towns. They include S.C. Lee and Bing (from 1902) and Wong Sik Hum (from 1913) in Wanganui; Wong Cho Nam in Masterton in the 1930s and 1940s; and, King Brothers in Ashburton from 1947.\(^{261}\)

Chinese hawkers working on their own account sold the produce of both European and Chinese market gardeners door-to-door. In 1887 a regional Victorian newspaper reported that European market gardeners in Melbourne were jealous of the Chinese hawkers who supplied suburban householders with such regularity, as well as the Chinese market gardeners who sold their own produce directly to customers.\(^{262}\) Chinese gardeners who sold their own produce directly to householders rather than through city markets obtained better returns. Where there were sufficient numbers in a market gardening partnership work roles were divided between the partners. Generally it was men with English language skills who became salesmen and dealt with European customers.\(^{263}\) Describing Chinese market gardening operations on the Victorian goldfields in the early 1860s, a Bendigo newspaper commented:

\(^{260}\) Gwa Leng New Zealand Family History Group, *Gwa Leng Wongs*, p. 35; and, Lee and Lam, *Sons of the Soil*, pp. 195–6.
\(^{261}\) Lee and Lam, *Sons of the Soil*, pp. 100, 139, 205–6.
\(^{262}\) Alexandra and Yea Standard, Gobur, Thornton and Acheron Express, 16 September 1887, p. 50.
\(^{263}\) Williams, *Chinese Settlement*, p. 44.
Another great point in their general success – from a financial point of view – is that they generally have a number of salesmen, who carry their produce to market in baskets, thus saving the cost of horse keep’.  

In later years, Chinese market gardeners in urban areas continued to sell their own wares to suburban residents, for example in Dunedin in the early 1900s. In country towns they also typically sold their produce door-to-door directly to householders. The Golden Threads Project in New South Wales records local residents’ memories of Chinese market gardeners selling their produce from horses and carts, handcarts or baskets carried on a shoulder pole in many country towns, including Eugowra, Deniliquin, Dubbo, Gilgandra, Inverell, Parkes and Wagga. Direct marketing enabled market gardeners to keep their prices low and still realise a profit, while consumers benefitted by having a regular supply of fresh vegetables brought to their door. As a rural Victorian newspaper commented in 1887:

For years residents in the suburbs of Melbourne have depended for their supply of vegetables on the Chinese hawkers, who wait on their customers with unerring regularity. The suburban resident has no need to seek for the article. There are regular days of the week on which every variety of the choicest vegetable is brought to his door by the industrious Chinaman.

In Wellington in the early 1900s, Chinese greengrocers closed their stores while they did their rounds of the neighbourhoods with their baskets of produce. In Auckland in the 1890s, a Scots market gardener in Avondale, after studying the methods of the Chinese, began selling his produce door-to-door. He successfully competed with Chinese market gardeners; by

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264 Southland Times, 10 July 1863, from Bendigo Independent, 23 June 1863.
267 Alexandra and Yea Standard, Gobur, Thornton and Acheron Express, 16 September 1887, p. 50.
268 Evening Post, 7 May 1908, p. 3.
1891 he owned a 35 acre market garden and employed twenty-five men and boys.\footnote{Tuapeka Times, 18 November 1891, p. 6. It should be noted that door-to-door sales were not the sole preserve of the Chinese, European hawkers of fruit and vegetables also operated in the era before central produce markets were established (Oline Richards, 'Chinese market gardening: A Western Australian postscript', \textit{Australian Garden History}, Vol. 13, No. 1, 2002, p. 20).}

With the establishment of central markets in cities such as Sydney, Melbourne, Perth, Wellington and Auckland by the early-twentieth century, the auction system of selling produce gained popularity.\footnote{Yong, \textit{New Gold Mountain}, p. 37. Public markets were built in Auckland in 1906 and Wellington in 1910 (Murphy, \textit{History of the Horticultural Industry}, p. 17). In Australia public markets were established in Sydney in Campbell Street (Belmore Markets, 1869), then the Haymarket (New Belmore Markets, 1890s, Municipal Markets 1909–1914) and in North Melbourne (Victoria Markets, 1878) (Melbourne Wholesale Fruit, Vegetable & Flower Market, ‘History’, http://www.melbournemarkets.com.au/about_history.asp, accessed 12 September 2011; and, City of Sydney Council, ‘History of Sydney City Council’, http://www.cityofsydney.nsw.gov.au/_data/assets/pdf_file/0003/65550/hs_chos_history_of_council_1001.pdf, accessed 12 September 2011). In Perth produce markets were established in 1899 and in 1906 between Roe and James streets (Atkinson, ‘Chinese market gardening’ p. 480).} However, it is difficult to determine how many Chinese market gardeners sold their produce directly to consumers and how many sold via the auction system due to the lack of quantitative data. Probably many continued to use both methods. With the auction system came middlemen, both Chinese and European. In Sydney and Melbourne for example, Chinese men who had English language skills worked as vegetable dealers at the city markets and gardeners with limited English would sell their entire loads to them.\footnote{Williams, \textit{Chinese Settlement}, pp. 44, 17.} The report of the 1913 Royal Commission on food supplies and prices recommended restricting the operations of so-called forestallers, agents who bought quantities of produce direct from growers at low prices and held them back in order to sell at higher prices to late buyers.\footnote{New South Wales Legislative Assembly, \textit{Royal Commission as to Food Supplies}, pp. xliii, 70.} Thus by the late-nineteenth century market gardeners had a number of avenues for selling their produce. Smaller enterprises sold direct to customers through hawking and door-to-door sales, by auction at city produce markets or to Chinese or European greengrocers. In Dunedin in the 1920s and 1930s, for example, gardeners took their crops to the produce markets on Tuesdays.
and Thursdays and delivered the remainder directly to retailers.\(^{273}\)

Larger enterprises operated by Chinese merchants produced a sufficient volume to enable them to supply organisations such as clubs, hotels, shipping companies and hospitals under contract. For example, in Sydney in the 1890s the market gardener Quin Young had contracts to supply the Grosvenor, Australia, Royal and Metropolitan hotels and clubs such as the Reform Club, the Union Club and the Australian Club. In his evidence to the Royal Commission into alleged Chinese gambling, he stated: ‘I send vegetables from the garden direct to these places every morning. I know a lot of other countrymen in the same kind of business but not as large as mine’.\(^{274}\) Young employed hawkers to sell direct to customers, owned two horses and carts and also sold produce though his shop in Castlereagh Street.\(^{275}\) In 1913 the entrepreneur Ben Hing was a major partner in a large garden in Kogarah worked by eight men. He paid his partners wholesale market prices then sold the produce, mainly by order, to hotels, shipping companies and Sydney Hospital. He also sold produce though his shop in central Sydney.\(^{276}\) In Dunedin, historian James Ng suggests that the volume of vegetables produced by the large number of Chinese market gardeners in the 1880s and 1890s would have been well in excess of the needs of the Dunedin population, indicating that they also supplied the ships that visited the port for repairs and reprovisioning.\(^{277}\)

Market gardening enterprises were flexible enough to adapt to changes in retailing, particularly in cities. Increased regulation by local governments of matters such as public health and traffic flow in the early-twentieth century brought about a shift away from hawking and door-to-door sales towards retail stores and the auction system. In Sydney for example, the number of suburban fruit shops increased significantly between 1900 and 1930 as a result.

\(^{273}\) Lee and Lam, *Sons of the Soil*, p. 43.


\(^{275}\) Ibid.

\(^{276}\) New South Wales Legislative Assembly, *Royal Commission of Inquiry as to Food Supplies*, p. 1.

\(^{277}\) James Ng, pers. comm., November 2011. See also Lee and Lam, *Sons of the Soil*, p. 41.
of regulations limiting the operation of street traders and barrows. However, there is evidence that Chinese market gardeners, their carts laden with produce, still plied their trade in the suburbs of Melbourne as late as the 1940s. In 1946 the Argus reported that there was a good chance of home deliveries resuming despite problems of fuel shortages after the war. It observed that Chinese market gardeners’ carts still regularly visited the suburbs.

An alternative marketing option for Chinese growers was selling directly to the public from roadside stalls adjacent to their gardens. This became an economically viable option from the 1950s and 1960s, with increases in private car ownership and improvements in the road system. In New Zealand for example, growers such as George Yee in Taradale, Hawke’s Bay; Ho Sue Shee in Mangere, Auckland, and Jim Shack Tai in Bombay, south of Auckland, all ran roadside vegetable shops in conjunction with their gardens from the late 1950s and early 1960s. There has been a revival in the popularity of sales from the farm gate in the last twenty years, with the demise of the auction system.

The auction system was the major method of produce marketing in New Zealand from the 1950s to the late 1980s, when large supermarket chains began to dominate, buying produce in large quantities on contract. The auction system was generally supported by Chinese growers as they believed it was a fair way of selling their produce, placed growers on a more equal footing and rewarded their efforts. Most growers felt that prices were more realistic through the auction system, despite the fact that they had to deal with fluctuations according to supply and demand. Looking back over his years of experience in the industry, Jeffery Turner of Turners & Growers, one of the oldest established New Zealand wholesale produce firms,

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278 Walker and Roberts, Scarcity to Surfeit, p. 137.
279 Argus, 21 February 1946, p. 10.
280 Lee and Lam, Sons of the Soil, pp. 263, 397, 451.
281 See for example William Young interviewed by Lily Lee, 16 November 2006, quoted in Lee and Lam, Sons of the Soil, p. 193; Allan Fong interviewed by Ruth Lam, 24 September 2007, quoted in Lee and Lam, Sons of the Soil, p. 501.
puts it succinctly:

The auction system has many advantages – it allows the law of supply and demand to have full play and it rewards the goods of the best quality, condition and presentation with the highest prices. It encourages the growers to aim for the best.\textsuperscript{282}

Turner also commented on the responsible role of the auctioneer, balancing the needs of growers and retail buyers:

Auctioning was a lot of fun but it was also tricky because you knew you had a very responsible position, you were selling the livelihood of those growers. Hard months and hard days of battling the weather to get their crops in and it was all over in a few seconds …\textsuperscript{283}

CONCLUSION

Taking as its starting point the concept of Chinese market gardeners as small business people on the land, this chapter has explored the economic resources and opportunities which Chinese immigrants to Australia and New Zealand were able to draw upon to successfully transfer traditional Chinese agricultural practices to new lands. They faced many challenges in Australia and New Zealand, in particular barriers of language and culture, racist attitudes, restrictive immigration policies, discriminatory employment practices and an unpredictable business environment. These barriers limited their occupational and social mobility and encouraged them to enter niche occupations such as market gardening, with low capital but high labour inputs. Chinese market gardeners also faced economic constraints that were characteristic of the market gardening industry generally: the small size of the industry compared to other agricultural pursuits; the need to be located close to markets; rising land prices and changing land uses in cities; wide seasonal fluctuations in supply and demand and therefore in prices; and, changes in retailing.


Chinese market gardeners developed distinctive models of business organisation and labour relations as well as sales and marketing strategies which were based on common ties of kinship and allegiance to village and district in China. These included flexible business partnerships, often paternalistic labour relations, a work culture emphasising the rewards of long hours of labour and flexible marketing strategies integrating the various occupations involved in food supply. The social and business networks within the Chinese community played a central role, providing: sources of capital and labour; information on local business opportunities, laws and regulations; and, avenues for distribution and marketing.

The flexible business partnerships adopted by Chinese market gardening enterprises enabled them to adapt to a complex and changing set of social and economic circumstances, including labour shortages due to the significant decline in Chinese immigration as a result of restrictive immigration policies, population growth, urbanisation and changes in retailing.\(^{284}\) Despite these constraints Chinese market gardeners were able to utilise their traditional skills in intensive horticulture and irrigation to maximise their returns from small acreages and manage gluts and shortages. The limited economic data available in the sources surveyed in this chapter indicate that many market gardeners made an adequate living and some went on to become successful merchants and entrepreneurs. Thus market gardening was an important springboard for upward mobility and expansion into other businesses.

The documentary and oral history evidence presented demonstrates that Chinese market gardeners remained important suppliers of fresh food in towns and cities across Australia well into the twentieth century, and for even longer in New Zealand. There were a

\(^{284}\) For example, the *Royal Commission of Inquiry as to Food Supplies and Prices 1913* in New South Wales found that the supply of fresh vegetables was not keeping pace with demand due to the rapid increase in the urban population, the expansion of suburban building areas absorbing land formerly devoted to market gardens and labour shortages due to the almost complete cessation of Chinese migration. The report also highlighted poor road and rail transport facilities, with delays and rough handling causing significant losses to growers and reduction in supplies (New South Wales Legislative Assembly, *Royal Commission of Inquiry as to Food Supplies*, pp. xxx, xxxvii).
number of reasons for their predominance in market gardening. Chinese gardeners followed general population movements and markets, and were adept at identifying niche markets, particularly in the growing cities. Europeans recognised the horticultural skills of Chinese immigrants, which were valued in the Australian and New Zealand economies. In addition market gardening was regarded as a labour intensive, low status occupation which most Europeans were not keen to enter, reducing direct competition between Europeans and Chinese in the industry.

This chapter also counters the stereotype of Chinese immigrants as sojourners. If market gardeners were to conduct a successful commercial enterprise they needed to make a longer term commitment to living in their adopted country and establish links to the land. Market gardening was therefore a crucial economic foundation for the transition of Chinese immigrants from sojourners to settlers. Australia and New Zealand were leading the world in per capita incomes for most of the period from 1860 to 1914. The rapid urbanisation of the populations of Australia and New Zealand and the high standards of living they enjoyed underpinned the growth of market gardening.

Developments in technology, transport, communications and industry, which flowed from population growth and urban expansion, also supported the growth of market gardening. The industries specifically associated with early market gardening included tanneries, boiling down works, piggeries and dairies. These factors are explored in greater depth in the following chapter.
CHAPTER 4
TECHNOLOGY AND INDUSTRY

For the future the rewards are going to be there for the people who are going to be innovative, they are going to be there for the people that can produce the right product for the customers.

The capacity for learning, problem solving and innovation is a fundamental human trait. Theorists in archaeology such as Lewis Binford, James Deetz, Steven Mithen, Ian Hodder and Jane Lydon see humans throughout history and prehistory as active individuals, adapting to changes in their social and physical environments and constantly modifying them.¹ Europeans settled Australia and New Zealand in the late-eighteenth and early-nineteenth centuries, during the height of the industrial revolution in Britain. In these isolated colonies they modified imported European technologies or improvised local technologies with European origins in order to cope with local conditions. Writers in the field of technology transfer have emphasised the unique set of conditions which existed in Australia and New Zealand in the nineteenth century, in particular the small and scattered populations in both countries and their reliance on the export of primary produce to Britain as well as the vast size and aridity of the Australian continent.²

Theories of technology transfer include supportive industries as key factors in the successful transfer of technology, along with the economic resources which have been

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discussed in the previous chapter. These supportive industries were crucial in supplying the production inputs required for market gardening, including manure, fertilisers and pesticides, seeds and mechanical equipment such as pumps, irrigation plant and cultivating tools. Technological developments in transport facilities, in particular the expansion of railways and tramways, were also crucial in expanding the market reach of market gardeners.

This chapter explores the interplay between the continuity of the traditional agricultural practices and technologies which Chinese immigrants brought to Australia and New Zealand, and their adaptation of these technologies to new social and environmental conditions. The chapter begins with a discussion of technology transfer in agriculture in Australia and New Zealand and the part that Chinese immigrants played in this process. The second section discusses conservatism, innovation and the diffusion of ideas and some of the economic and social factors involved in technological change. The final section discusses change and innovation in market gardening, illustrating the many ways in which Chinese market gardeners adapted their agricultural technology to new environments and adopted European technological advances which were appropriate to their intensive cultivation methods. It also discusses the associated industries which supported technological change in Chinese market gardening: transport, fertiliser, pesticide, motor vehicle and agricultural equipment industries as well as nurseries and seed producers.

MARKET GARDENING AND TECHNOLOGY TRANSFER

There were complex interactions between the social, economic and technological changes that occurred in agriculture and industry in Britain from the early-eighteenth century and laid the foundations for the industrial revolution. There are ongoing debates among


4 Recent scholars interpret the technological changes that occurred in agriculture in Britain from the late
scholars on the nature of these relationships, such as the extent to which the size of the agricultural workforce declined, releasing labour to industry, and the precise chronology and speed of agricultural change, depending upon what economic indices are used.\textsuperscript{5} Some historians such as Robert Allen and Norman McCarol emphasise the importance of structural changes in agriculture rather than changes in the overall size of the workforce.\textsuperscript{6} However, there is general consensus that changes in agriculture laid the basis of the industrial revolution long before any significant increase in industrial output. The economic data, based on a variety of indices, shows that there was a steady increase in agricultural productivity between 1700 and 1850 which supported the growing population and facilitated the expansion of industry and commerce.\textsuperscript{7}

This increase in productivity was the result of a number of interrelated factors, in particular enclosures of common land and the rise of large estates which were more efficient to manage; greater security given to tenant farmers; advances in plant and animal breeding, resulting in improvements in the quality of crops and livestock; and, the application of fertilisers and machinery.\textsuperscript{8} In turn, industrial and technological advances promoted mechanisation in agriculture saving both time and labour and increasing productivity.

In Von Tunzelmann’s terms there were both process and product innovations in


\textsuperscript{6} These factors included the decline of the family farm, the employment of more adult males and an increase in seasonal and day labour, with resulting underemployment and unemployment in rural areas (Allen, ‘Agriculture during the industrial revolution’, pp. 105–6; McCarol,\textit{ British History 1815–1906}, p. 222).

\textsuperscript{7} The indices used include volume of farm output, the sum of farm wages, profits and rents; and, a measure of food supply versus demand (Allen, ‘Agriculture during the industrial revolution’, pp. 101, 110; and, O’Brien, ‘Modern conceptions of the industrial revolution’, p. 22).

\textsuperscript{8} Allen, ‘Agriculture during the industrial revolution’, pp. 111–13; and, McCarol,\textit{ British History 1815–1906}, p. 82.
agriculture – in other words new methods of doing things and new activities or outputs. New ‘gadgets’ to make the work of ploughing, planting, weeding, fertilising and harvesting easier were developed, along with new breeds of livestock and new crop varieties as well as new inputs of commercially produced fertilisers. All these developments had a direct impact on the progress of European settlement in Australia and New Zealand from the late-eighteenth century, as they were transferred and adapted to suit local conditions.

The scenario most relevant to the situation of Chinese immigrants in Australia and New Zealand is one of creative settlers in a hostile environment, similar to that adopted by the economic historian Colin White. In White’s scenario for Australia, new settlers pioneered a range of innovations in fields as diverse as food canning, refrigeration, wind power and irrigation. These were not so-called macro-inventions but a multitude of micro-inventions that transformed big ideas into practical innovations. In Darwin Stapleton’s terms, they were subinventions, as transferred technologies were continually adapted and modified to fit the economy and society of the host country through the use of available local raw materials, technical alterations or through the acquisition of new skills and knowledge. Scholars of the industrial revolution in Britain such as Von Tunzelmann also emphasise the importance of micro-inventions in the technological advances that occurred in agriculture and industry from the mid-eighteenth century.

White highlights the flow of people, ideas and skills throughout the British Empire in the nineteenth century and the diverse multinational input into technological developments in

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colonial Australia, including from France, Germany, Italy, America, Canada, South Africa and India. He also points out that the most dynamic industries, technologically and economically, were in the primary sector: agriculture, pastoralism and mining. Initially most innovations arose from the experimentation of individuals closest to the particular problem and from practical experience and technical ingenuity rather than scientific understanding and research.\textsuperscript{13} As Joe Powell observes in Australia, and Stapleton in America, this was a process of trial and error as immigrants adapted their farming practices and crops to foreign environments.\textsuperscript{14} Similarly, historians such as Jan Todd and Ann Moyal note the important role played by individual innovators and researchers in nineteenth-century Australia and the tardiness of governments in funding experimentation and applied research.\textsuperscript{15}

Chinese immigrants were among these innovators. However, their contribution to agriculture in Australia and New Zealand has been largely overlooked, with the exception of the work of a few scholars such as Barry McGowan, Warwick Frost and Jock Collins in Australia and Lily Lee, Ruth Lam, Manying Ip and Nigel Murphy in New Zealand.\textsuperscript{16} As Frost observes, most specialised histories of Australian agriculture do not mention the Chinese and most historians of the Chinese in Australia focus on social and political aspects, making only brief reference to their skills in agriculture, their methods and work organisation.\textsuperscript{17} There is a similar gap in the literature on the history of agriculture in New Zealand, due largely to an

\begin{thebibliography}{99}
\bibitem{13} Ibid., pp. 157–8.
\bibitem{14} Powell, \textit{Mirrors of the New World}, p. 78; and, Stapleton, \textit{Transfer of Early Industrial Technologies}, pp. 4–5.
\bibitem{17} Frost, 'Migrants and technological transfer', p. 113.
\end{thebibliography}
emphasis on broad-scale farming at the expense of small-scale horticulture. Lily Lee and Ruth Lam’s recent study of Chinese market gardening in New Zealand does much to fill this gap.

As outlined in Chapter One, China has a long history of agricultural innovation. Evelyn Rawski, Gang Deng and Francesca Bray all argue that agriculture was the ‘root’ of Chinese society. As Chinese rulers derived their revenues directly from a largely agrarian populace, agriculture was a priority both ideologically and economically. Thus agriculture was open to change, and economic interest was the force which drove the Chinese to study and preserve agricultural technology and transfer it to future generations. Deng and Bray highlight the role of nongshu (agricultural manuals) in the diffusion of agricultural change in pre-modern China. Among the peasantry, who had lower levels of literacy, farming knowledge was passed on by word of mouth and by example from generation to generation. Bray also points out that the success of government initiated agricultural reforms was due in large part to the willingness of the rural population to experiment and improve on their own initiative, alive to the benefits of new technology.

Thus, the Chinese immigrants who made the long sea journey from Guangdong Province to Australia and New Zealand had behind them a long tradition of innovation and change in agriculture, combined with practical experience of farming. The general literature

19 Lee and Lam, Sons of the Soil.
21 Deng, Development Versus Stagnation, pp. 139–40; and, Bray and Needham, Science and Civilisation, 6: II, p. 598.
on Chinese migration to Australia provides little detail on the characteristics of Chinese farming, tending to depict it as a set of traditional practices that was transferred to Australia fully formed during the gold rushes. However, Frost shows that Chinese agricultural practices evolved over time and that Chinese immigrants who took up farming and market gardening in Australia continued to adapt and innovate in their new environments. 23 He proposes a broad sequence for the development of Chinese farming in Australia, characterising the period 1850–1880 as one of adjustment, in which Chinese immigrants mainly worked as farm labourers under European supervision or in small-scale market gardening which wrought little technological change. In Frost’s schema the period 1880 to 1900 was the golden period of Chinese agriculture, when they dominated intensive agriculture and became specialists in this field, particularly market gardening. The period 1900–1920 was a period of decline, when the scale and range of Chinese agriculture shrank significantly. 24 This is true in the case of more specialised Chinese horticulture, for example growing maize, bananas and rice in Queensland and tobacco in New South Wales and Victoria.

However, Frost’s schema (which he acknowledges may be an oversimplification) is challenged by a more detailed study of the development of Chinese market gardening. As the evidence presented in this chapter will show, Chinese market gardening underwent technological change and adaptation from the time the first Chinese immigrants began to grow crops on the goldfields. It continued to thrive in major cities and towns across Australia until the late 1930s, and in New Zealand into the 1970s. Influenced by technological developments in the wider society, significant changes in Chinese market gardening occurred between the 1920s and 1950s.

Just as European immigrants attempted to transplant established European agricultural

24 Ibid., pp. 116–22.
practices to new and sometimes hostile environments, Chinese immigrants transferred traditional Chinese agricultural methods that had been developed over centuries in their homeland. Both groups adapted their methods to the new environments they encountered and met with varying degrees of success. European farming methods, based primarily on growing cereal crops and raising sheep and cattle, met with economic success but at the cost of significant damage to the environment in both countries.\textsuperscript{25} At the same time these industries triggered many significant innovations and adaptations of imported technology, for example in Australia the stripper harvester invented by Ridley in 1843 and the stump jump plough in 1876.\textsuperscript{26}

As discussed in Chapter One, many features of traditional Chinese horticulture were remarkably enduring in Australia and New Zealand. However, Chinese market gardeners adapted their agricultural technology to new environments and adopted specific European technological advances which were appropriate to their intensive cultivation methods. The following section explores the complex mix of conservatism and innovation which characterised Chinese market gardening in Australia and New Zealand, and some of the mechanisms by which ideas and innovations diffused within the Chinese community and between the wider community and the Chinese community.

**CONSERVATISM, INNOVATION AND THE DIFFUSION OF IDEAS**

Nineteenth-century attitudes towards Chinese immigrants were contradictory. Europeans characterised them as conservative, clinging to ‘primitive’ methods and ideally suited to manual labour, involving hours of patient toil. At the same time they acknowledged, to varying degrees, the ingenuity and entrepreneurial skills of Chinese people as well as their


\textsuperscript{26} Moyal, *Bright and Savage Land*, pp. 170–1.
long tradition of technological advances. An article published in New Zealand in 1871 is typical of these attitudes:

It appears to us that the previous habits and training of many of the Chinese would render them exceedingly useful as agricultural labourers. They have been accustomed to work with the simple but ingenious appliances of their country, the slight plough or harrow, drawn by the water ox or domesticated buffalo, the fanning mill (which first gave to modern Europe its idea of the implement), the irrigation pump; the process of charcoal making; the manufacture of paper … while in manufactures and productions of many kinds, they greatly excel. They have been exclusively accustomed to hand labour and in whatever requires patient toiling-on, they are ‘to the manner born’ [sic].

Several decades later, in 1916, a newspaper correspondent made similar comments about Chinese gardeners in Otaki:

But, with all their patience and all their hard work, the Chinese are primitive in their methods. If they were less primitive there would be less drudgery. However, there it is, and they … persistently and stubbornly refuse to adopt European methods … But, that same Celestial knows how to attend to his business. He always obtains results.

Many later writers have also depicted Chinese market gardeners as conservative and resistant to change. For example, writing about Chinese market gardeners in South Dunedin in the early-twentieth century, Geoffrey Stedman observes:

Methods of cultivation and marketing were organised on the traditional pattern of the old peasant China and were little influenced by the new environment. … no mechanical implements were used in cultivation, necessitating constant and back breaking application to the soil.

The evidence presented in this chapter, however, provides many examples of Chinese market gardeners adopting European technological developments and where necessary,

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27 Otago Witness, Dunedin, 26 August 1871, p. 2. Fanning mill: a machine designed to separate weeds, such as rye grasses, wheat grasses, and wild oats, from seeds and to sort the seeds of grain, legume, and other vegetable crops by specific weight. Phormium tenax: New Zealand flax.
adapting them to meet their own needs. These were both process and product innovations, ranging from irrigation pumps and agricultural implements to fertilisers and improved seed varieties. To explain the processes by which technological change was adopted within the community of Chinese market gardeners, the discussion in this chapter applies the analytical framework of the diffusion of innovation. In this approach we can see Chinese market gardeners as active agents of technological change, interrogating new knowledge and technologies on the basis of their own experience and knowledge of local conditions and reinventing them to meet their specific needs.

The examples discussed in the following section reveal individual differences within both the European and Chinese communities in the degree to which market gardeners were willing to adopt new ideas and experiment. Some market gardeners could be conservative and resistant to change.30 However, Lee and Lam’s study of Chinese market gardening in New Zealand reveals a number of Chinese market gardeners who were particularly innovative and creative, keeping up with the latest technological developments in New Zealand and overseas and leading by example.31 Everett Rogers highlights the important role played by change agents in the diffusion of innovation, in particular opinion leaders in the community.32 Similarly, scholars writing about the so called ‘Green Revolution’ and technological change in agriculture emphasise the creativity of individual farmers and their ability to experiment, adapt and innovate as well as act as role models in the local community.33

30 See for example Weston Bate’s discussion of European and Chinese market gardeners in Brighton, Victoria in the early 1900s (Weston Bate, A History of Brighton, Melbourne, 1983, pp. 363–4).
31 For example Alan Wing of Hawke’s Bay and Joe and Fay Gock of Mangere (Lee and Lam, Sons of the Soil, pp. 255, 258–9, 411–18).
There are complex social and economic factors influencing the take up of technology beyond individual differences in willingness to take risks and experiment. As Gordon Clark argues, explanations of differences in the speed of adoption of innovation in terms of individual behavioural characteristics are overly simplistic. Those categorised as conservative or ‘late adopters’ may be unable to afford the capital investment involved, may have other priorities for their capital or the innovation itself may be marginally suited on technical grounds.\(^3^4\) In his study of the Chinese in Dunedin between 1910 and 1920, Niti Pawakapan observes that the Chinese were particularly conservative in financial matters. They would work for years to save enough for the fare to return to China to visit family or to bring relatives to New Zealand, and would defer the purchase of a truck or tractor.\(^3^5\) Thus, characteristic of transnational communities, a priority of overseas Chinese was maintaining ties with their kin and home village in China and supporting them financially.\(^3^6\)

The owners of larger, more successful market gardening operations were more likely to have the capital to invest in advances in technology, tractors and motor vehicles. An example of a small one or two-man business which made little investment in new technology is that of Georgie Ah Ling, in Donald, Victoria. Despite his conservatism, Ah Ling did make some changes over the years. Although he was relatively isolated from other Chinese people after his partner died, his social contact with the local European community encouraged him to adopt some new technology.\(^3^7\) He replaced his covered wagon with a flat bed lorry, which was still horse-drawn, and used a petrol engine to pump water from the reservoir. Although he


\(^3^6\) This harks back to the traditions of imperial China. Just as families selected and supported their brightest and best to become government officials, the extended families of migrants to Australia and New Zealand collected and paid the fares of their most enterprising sons to go overseas to make their fortunes. Andrew Piper, pers. comm., July 2012.

\(^3^7\) Donald History and Natural History Group, *Georgie Ah Ling: Donald’s Friend*, Donald, 2008, pp. 11, 14.
dreamed of returning to China a prosperous man one day, Ah Ling remained in Australia, faithfully sending most of his modest earnings home to support his wife and children.\textsuperscript{38}

There were also clear economic reasons for delaying investing in technology. As discussed in Chapter Three, the fact that most market gardens were leased before World War II discouraged gardeners from making large capital investments in their businesses. In addition the small scale of many early market gardening operations, with small acreages and intensive cropping, was not amenable to mechanisation. In his study of market gardening in the Auckland region in the 1950s, Donald Hunt contrasts the farming methods of European and Chinese growers. European market gardeners, who had larger acreages than Chinese (up to 20 acres) and grew a smaller range of crops, generally used a half-horse power tractor, plough, disc scarifier, moulding machine, topdresser and farm trailer.\textsuperscript{39} In contrast the Chinese, who had smaller acreages, particularly in suburbs closer to the city centre such as Mangere, and grew a wide variety of crops with narrow spaces between rows, used only small hand-operated rotary hoes on their intensive plots.\textsuperscript{40} Thus, the intensive agricultural methods which had their origins in nineteenth-century China made it difficult for Chinese gardeners to use horse-drawn implements or tractors.

Another factor in technological change was labour supply. In the nineteenth century there was a generally reliable supply of labour on Chinese market gardens, which did not encourage mechanisation. As discussed in Chapter Three, there were increasing labour

\textsuperscript{38} Ibid., pp. 11, 19, 27.

\textsuperscript{39} A disc scarifier is a machine with spikes or prongs used for loosening soil and weeds prior to planting. A moulding machine is a heavier device used to break up and turn over large lumps of soil, at a greater depth (Oxford Dictionaries http://oxforddictionaries.com/definition/scarifier?; and, Global Farm Machinery Network, http://agmachine.ning.com/photo/molding-machine?, accessed 10 May 2012).

\textsuperscript{40} Donald Hunt, ‘Market gardening in metropolitan Auckland’, MA Thesis, University of New Zealand, Auckland, 1956, p. 19. This difference was maintained over the next two decades, although average acreages increased. In her 1977 study Ling found that the average size of Chinese market gardens in the Auckland region was 10 ha (24 acres), compared to 14 ha (34.5 acres) for the gardens of other ethnicities (Lee Thong Ling, ‘Chinese market gardening in the Auckland region’, MA Thesis, University of Auckland, 1974, p. 25).
shortages in the early-twentieth century after immigration restrictions were introduced in Australia and New Zealand. There were also generational changes. By the 1950s the Australian or New Zealand-born children of Chinese market gardeners were attending university and entering professional occupations. As the use of family labour became less important, mechanisation increased.41

Later generations of Chinese immigrants had different aspirations to their parents and grandparents. Harry Chong Choy came to Sydney in 1949, following in the footsteps of his father and grandfather. His father was a partner in a market garden in Rockdale with five other Chinese, and Choy joined his father there. But Harry Choy’s ambition was to go into business, not to till the land. He recalled:

I was ambitious and worked hard. I came to see two things as essential to making a good life in Australia: speaking English and driving a car. Three years after I arrived, I bought a car. I paid 250 pounds for a Ford. Seeing the car, all my friends said: ‘You are really over-extended!’ I spent almost all my money saved from three years of hard work. It was the price of half a house at that time. There were only four other fellow countrymen of Gaoyao/Gouyiu origin who owned a car. Even my father was against me buying the car, asking me: ‘Why do you buy a car?’ I told him: ‘You would not be able to enjoy independence or own a business without owning a car.’42

The members of the younger generation who did follow their parents or other relatives into market gardening learned the business from them. In New Zealand for example, the large Wong Sing partnership in Gisborne was an important training ground for younger kinsmen who arrived from China in the 1940s, and was recognised as the centre for Toi Shan-Sun Wui clan activities. The partnership later developed into several separate family-run gardens.43 The

43 Lee and Lam, Sons of the Soil, p. 281.
younger generation in turn played a key role in technological change, often encouraging their elders to adopt the latest developments. This was particularly the case in New Zealand, where significant Chinese involvement in market gardening continued longer than in Australia. Sue Chong, whose father Jack had a market garden in Taranaki with her grandfather Harry, remembers the arguments between them over mechanisation in the 1930s. Her father was all for buying the latest model tractor but her grandfather could not see the point of it.\(^{44}\) Bill Wong learned the market gardening business from his father Wong Bing in Hastings after he left school in 1956. When he took over ten years later he told his father he had new ideas and wanted to try new things. He recalls:

> Dad was a little bit old fashioned and didn’t like to change much. I thought that if I take over, I’d like to look to the future. If you don’t, you don’t get ahead.\(^{45}\)

Another avenue for the diffusion of innovation in agriculture within the Chinese community was via the ongoing links that Chinese settlers in Australia and New Zealand maintained with their homeland. Agriculture in China was also modernising and there was a fertile exchange of ideas between China and overseas Chinese in Australia and New Zealand from the late-nineteenth century via the return visits of many Chinese immigrants to China and visits of Chinese government officials, intellectuals and writers as well as Chinese language media, as John Fitzgerald has documented in his recent work.\(^{46}\) One example in New Zealand was the visit of the Chinese consul Yung Liang Huang to the west coast of the South Island in 1910. He updated the local Chinese community on the modernisation of their homeland and advised them not to be too conservative and to adopt English ways and methods.


\(^{46}\) Two prominent intellectuals were Liang Quichao, a fierce critic of Imperial China, who spent at least six months in Australia in 1900 giving lectures and writing essays, and the journalist Tang Caixhi, who came to Sydney in 1901 as editor of the *Tung Wah News* (John Fitzgerald, *Big White Lie: Chinese Australians in White Australia*, Sydney, 2007, pp. 11, 116–17).
of work when in an English country.\textsuperscript{47}

European technological developments and ideas diffused from the European community through a variety of avenues. Exchanges between European and Chinese market gardeners and the establishment of cooperative organisations such as the Otaki District Commercial Gardeners Association in New Zealand, established in 1942, played an important role in technology transfer. They disseminated information about the latest seed varieties, fertilisers and pesticides and technology such as rotary hoes, tractors and irrigation systems.\textsuperscript{48}

It was in the interests of vegetable processing firms, such as Watties in New Zealand, to encourage growers to produce crops suited to their production needs and new varieties to meet changing consumer preferences. Produce marketing firms in New Zealand promoted technological change and innovation in market gardening, providing Chinese growers with capital to invest in additional land or equipment to make their operations more efficient and advice on new crop varieties.

The auction system rewarded growers who experimented and produced improved crop varieties with higher prices. For example, Produce Markets and Turners and Growers in New Zealand offered loans to Chinese market gardeners to purchase tractors and machinery and mortgages to purchase land.\textsuperscript{49} Repayments were deducted from the sales of the produce they supplied. In the 1950s there was strong competition between the auction companies for product supply and therefore a great desire to assist growers. Dick Young established a market garden in Waimauku north of Auckland in 1960 when he was only eighteen years old. He recalls the assistance he received from Turners and Growers when he was starting out. Willing to take a business risk, they gave him a loan to purchase seed, sprays and fertiliser to grow

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\textsuperscript{47} Grey River Argus, 21 December 1910, p. 2.  \\
\textsuperscript{48} Murphy, Success Through Adversity, p. 16.  \\
\textsuperscript{49} Lee and Lam, Sons of the Soil, pp. 337, 370, 378.
\end{flushleft}
lettuces. As his business grew Young obtained further loans to purchase machinery such as tractors.\textsuperscript{50}

Media advertising also played a role in technological change, disseminating information about the latest developments in agricultural equipment. In Australia in the early 1900s, the engineering firm Tangyes advertised ‘force pumps’ and steam pumps in the Chinese language \textit{Tung Wah Times}.\textsuperscript{51} There are many factors involved in the decisions of advertisers to maintain a presence in a given publication, including the economic climate, the response from readers and the advertising opportunities offered by rival publications, but the firm’s advertisements in a Chinese language newspaper are an indication that they saw a potential market for their products among Chinese market gardeners and that gardeners were open to adopting new technologies. In the early years of Chinese language newspapers in the 1890s, advertisers were almost exclusively Western businesses.\textsuperscript{52} The \textit{Tung Wah Times} also published articles about new types of pumps for gardens and new ways to use them, a further indication of readers’ interest in technological developments.\textsuperscript{53} Articles appeared on the importance of technology in agriculture in 1900, on an exhibition of manufacturing technology in Perth in 1910 and on agricultural research in New South Wales in 1926.\textsuperscript{54}

The following section examines in more detail change and innovation in the development of Chinese market gardening in Australia and New Zealand. It demonstrates that

\textsuperscript{50} Ibid., pp. 432–3.
\textsuperscript{51} \textit{Tung Wah Times}, 30 November 1907, p. 7 c. Tangyes Ltd was a British engineering firm, founded in Birmingham by Richard Tangye and his two brothers in 1856. It operated until 1957. The firm specialised in manufacturing machine tools, including hydraulic lifting jacks, hydraulic and centrifugal pumps and a wide range of other power machines. Tangyes Ltd exported their products worldwide, including to Australia and other British colonies (Grace’s Guide: British Industrial History, http://www.gracesguide.co.uk/Richard_Tangye, accessed 11 May 2012).
\textsuperscript{53} \textit{Tung Wah Times}, 28 March 1900, p. 3 b.
\textsuperscript{54} \textit{Tung Wah Times}, 3 January 1900, p. 2, b-c; 15 January 1910, p. 7 a; and, 22 May 1926, p. 7 b-d.
while gardeners maintained many features of traditional Chinese intensive agricultural practices, they readily adopted European technological advances which were appropriate to the scale and work organisation of their enterprises and where necessary, adapted them to meet their own needs.

TECHNOLOGICAL CHANGE IN MARKET GARDENING

There was both continuity and change in traditional Chinese agricultural practices once they were transplanted to Australia and New Zealand. The major contribution of Chinese immigrants to agricultural technology in Australia and New Zealand lay in the intensive cultivation and irrigation methods they used to produce vegetable crops. There was considerable continuity in the layout of gardens and the labour intensive methods involved in preparing the soil, manuring, weeding and the attention given to individual plants. However, as shown in Chapter Two, there was also ongoing adaptation of Chinese agricultural practices, such as in the cultivation of European crops to meet the demands of European consumers. Gardeners integrated advances in European technology into their farming systems where these were appropriate to the scale and work organisation of their enterprises. These innovations were a series of micro-inventions, both in processes and products. They included innovations in: gardening implements; motor vehicles and tractors; transport; water storage and irrigation equipment; fertilisers; pest control methods; growing methods; and, new seed and crop varieties. There were also changes in the built structures on gardens to accommodate these technological changes.

Gardening implements

The basic implements of the nineteenth-century market gardener were hand tools: spade, hoe, fork, rake and watering can. These simple tools were the product of experience handed down over generations and were remarkably stable in design, enduring well into the
twentieth century. They changed little over the decades, with the exception of the watering can which was superseded in the 1930s and 1940s by sprinkler systems. This lack of technological change was a product of the small-scale land holdings and labour intensive cultivation methods which characterised market gardening. As Bing Wong, whose grandfather was a market gardener in Auckland, recalls: ‘in New Zealand they usually just had simple tools, a shovel, a hoe and a basket, they use labour, they hoe and dig and they grow the crops’.\(^55\) A striking contemporary example of how little some aspects of market gardening have changed is the garden of Gordon Ha in Botany, one of the longest surviving Chinese market gardens in Sydney. Today Ha and his cousin cultivate Asian herbs and Chinese vegetables such as bok choy and cho sum for a niche market instead of the European vegetables their parents grew. They use rotary hoes and a tractor to cultivate their 5.5 acre plot. However, as Figure 4.1 shows, they still use traditional labour intensive methods, harvesting their crops by hand.\(^56\)

![Figure 4.1](image)

*Figure 4.1* Gordon Ha and his cousin working on their market garden in Botany, Sydney, 2011.\(^57\)

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\(^56\) Gordon Ha interviewed by Joanna Boileau, Sydney, 27 July 2010. Contemporary Chinese market gardeners in New Zealand also comment on the labour intensive nature of market gardening, despite high levels of mechanisation in cultivating and seeding (Allan Fong interviewed by Ruth Lam, 27 September 2007, quoted in Lee and Lam p. 493).

\(^57\) Photograph: Joanna Boileau.
In 1937 the Melbourne *Argus* newspaper published a story about two aged Chinese market gardeners returning to their homeland.\(^{58}\) Although the story presents a stereotyped image of Chinese, it illustrates the longevity of traditional hand implements and the attachment market gardeners had to their faithful tools, well worn and repaired over the years. Charlie Jung and Ah Chuey, who for decades had been market gardeners in Victoria, managed to save enough money to return to China. Boarding their ship, the two men were followed up the gangway by two red-capped porters carrying a strange assortment of luggage:

Clothing and curios and presents were packed in huge wicker baskets slung on a wooden yoke. And bringing up the rear came the strangest articles of all—a number of ancient garden hoes, their original handles long since replaced by twisted saplings, and two huge and battered watering-cans of an antiquated pattern. Charlie Jung explained the reason for these strange pieces of luggage. They had used them in the gardens for more than 30 years, and had proved them trusty and reliable implements. When the two old men decided to return to Canton they offered the hoes and watering-cans for sale. There were no bidders, and rather than leave them in Australia they decided to carry them back to Canton with them. ‘We may do gardening in Canton’, said Charlie Jung. ‘Then we have to buy no new tools.’\(^{59}\)

Another illustration of the longevity of market gardening implements comes from a description of the establishment of a 4.5 acre market garden by four Chinese men on the banks of the Barwon River at Geelong in 1870, written by a correspondent to a New Zealand newspaper. During the first three months all were engaged in plotting out and levelling the ground, raising the soil into parallel ridges, divided by a narrow irrigation trench 10 inches (25.5 cm) wide. The work was entirely done ‘with fork-shaped hoes, and heavy long-headed common hoes’.\(^{60}\) Half a century later similar heavy three-pronged hoes were still in use on market gardens in Bendigo. George Lee Kim, describing his grandfather working on his

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\(^{58}\) *Argus*, Melbourne, 14 October 1937, p. 1.

\(^{59}\) *Ibid.*

\(^{60}\) *Bruce Herald*, 24 August 1870, p. 7.
market garden in Bendigo in the 1920s, states that he used a digging fork like a hoe with three prongs, a long handle and a heavy metal head. It had to be heavy, to break up the ground and was used as a hammer to pound the lumps of dirt into small particles. Kim recalls:

It was clayey soil … They used to have to dig the land with hoe and digging fork, they had to dig it out, break it up, to get down to the fine tilth that seedlings could survive in. That was very hard work, they were into middle age. I used to help them sometimes; I wasn’t strong enough to lift this hoe, you had to be fairly strong to break this ground open and crush it up.61

Figure 4.2: Chinese hoe and rake, collection of Hay Goal Museum, Hay.62

Chinese market gardeners adapted their agricultural tools, saving time and labour and increasing the efficiency of their operations. As discussed in Chapter One, the careful preparation of soil before planting, breaking it up into a fine tilth, is a hallmark of traditional Chinese agricultural practices. The implements used to achieve this were adapted in their new environments. In the early-twentieth century in New Zealand, for example, Chinese and European market gardeners in Otaki used a horse-drawn clod crusher, a heavy beam which

 levelled the soil and crushed the clods into a fine tilth. The hoes they used to weed between the rows of growing plants and aerate the soil became more sophisticated over time, making the heavy physical work of gardening easier. They replaced hand hoes with commercially manufactured hand-operated single or double wheel hoes such as the ‘Planet Junior’. Later small mechanised rotary hoes were used and on larger acreages multi-row cultivators. Similarly in Australia, the range of gardening implements used varied according to the size of the garden. In southern and western New South Wales, for example, horse-drawn harrows and ploughs were used in larger gardens.

Individual gardeners adapted agricultural implements from the materials they had available, particularly in remote areas of Australia. One example is the four-tined garden rake recovered from the site of Ah Toy’s garden on the Palmer River goldfields in far north Queensland, illustrated in Figure 4.3. The rake was ingeniously made by modifying a broken ten-tined sluicing rake originally used in mining operations to rake alluvial gravel. Three of the outer tines of the rake had broken off. Three tines on the opposite end were later sawn off to balance the tool, so it became a useful garden rake. This tool illustrates bush ‘making do’ and adaptive reuse, improvisation common to both Chinese and Europeans living in the Australian outback where iron tools were not discarded lightly. It also illustrates the transition between mining and market gardening as a major source of subsistence for Chinese immigrants and the hard manual labour involved in both occupations.

64 *Ibid.*, p. 26. The Planet Junior line of small farming tools was produced by the Philadelphia manufacturer S. L. Allen and Company from 1870. By 1890 the firm had carved a significant niche in American agricultural manufacturing. It began by specialising in lightweight hand-pushed implements then expanded into a range of implements pulled by one horse, and in the early 1900s, by small gasoline powered tractors Allen and Company’s farming implements were exported to New Zealand by the early 1890s and field demonstrations were held around the country in 1894 (*Taranaki Herald*, 5 October 1894, p. 2; and, *Wanganui Herald*, 5 October 1894, p. 2).
Chinese market gardeners in regional New South Wales adapted and improvised their agricultural implements. Surveying the site of the market garden in Goulburn operated by the Nomchong family until the 1950s, McGowan recorded a large clod crusher, the roller of which was studded with iron pegs from the nearby railway line.\textsuperscript{67} On the site of a Chinese market garden on Bedooba Station, north of Gilgunnia in western New South Wales, numerous improvised agricultural implements were found, including a single blade plough and seeder.\textsuperscript{68} The collection of the Museum of the Riverina includes agricultural implements improvised by Chinese market gardeners, such as a plough and small harrows or seeders (Figure 4.4). The wheels of these attachments were often recycled from children’s tricycles or prams.\textsuperscript{69}

\textit{Figure 4.3:} Gardening rake adapted from a sluicing rake, recovered during a survey of the site of Ah Toy’s Garden, far north Queensland. Drawing reproduced courtesy of Ian Jack.


\textsuperscript{68} Barry McGowan, ‘Chinese market gardens in Southern and Western NSW’, \textit{Australian Humanities Review}, Issue 36, 2005, not paginated.

\textsuperscript{69} McGowan, \textit{Tracking the Dragon}, p. 22.
There are many other cases of Chinese market gardeners improvising agricultural implements using whatever materials they had available, to make the tasks of harvesting and preparing produce for market easier. In New Zealand, Lee Bak Yew, who started his own market garden at Kakanui in Oamaru in 1952, after working for another gardener, Yee Tang Kwee, was keen to make his operations more efficient. He and his partners changed from watering by hand to using hoses and experimented with making machines to harvest Brussels sprouts, which were very labour intensive to pick. In the 1960s they made a machine to strip the sprouts from the stalks using bits of scrap metal. Lee Bak Yew’s son Peter Lee recalls their trial and error approach:

This all happened when my father and Ken Yee used a bit of scrap metal from here and there and a little wee Bunsen burner to heat this and bend that to make this machine.

Washing root vegetables by hand was a very labour intensive task and many sons and

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71 Lee and Lam, Sons of the Soil, p. 72.
72 Peter Lee interviewed by Lily Lee, 12 March 2008, Oamaru, quoted in Lee and Lam, Sons of the Soil, p. 75.
daughters of New Zealand market gardening families have memories of working late into the night preparing their produce for market. They washed carrots, parsnips and potatoes, top and tailed onions, then loaded them into hessian sacks and sewed them up.73 Richard Foon, for example, remembers his father George washing carrots by hand with a broom in a bathtub in Gisborne, in the 1960s.74 Some inventive market gardeners found ways to alleviate this task. In the 1950s Jack Chong, a market gardener in Manaia in Taranaki, designed a carrot washer which he built with the aid of a local engineering firm. His daughter Sue recalls:

It was the first of its kind and consisted of a long barrel, made of wooden slats, rotated by a petrol-powered motor. It was located close to the river … water was pumped up from the river and sprayed onto the rotating carrots from sprinklers fixed above the revolving washer. Covered in soil, the carrots were fed in from the top and fell into a box at the bottom all wet but nice and clean.75

Chinese market gardeners also used great ingenuity in adapting commercially manufactured labour saving devices such as wheel hoes to make them more efficient. Peter Lee, the son of Lee Bak Yew, who ran a market garden in Kakanui near Oamaru from 1952, recalls how his cousins looked for ways to reduce the labour involved in planting and spreading fertiliser. They made a mechanical planter using pieces of tin and bicycle wheels, and modified machines for sowing seeds and spreading fertiliser. He also describes how his father adapted the Planet Junior wheel hoe, usually hand operated, for use with a tractor:

We used to sow seeds by pushing a Planet Junior row after row. So he [my father] sent me to Christchurch to go to this company to see if I can find this model of a Planet Junior. So I went and I had to buy four of them and he made a rack and hung the handles of the machines on the rack and towed it behind the tractor rather than having to push them over one row at a time.76

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73 Lee and Lam, Sons of the Soil, pp. 216, 263, 290, 293.
74 Ibid., p. 293.
76 Lee and Lam, Sons of the Soil, p. 72.
Motor vehicles and tractors

The development of the internal combustion engine in the nineteenth century revolutionised road and later rail transport. From the 1930s market gardeners in Australia and New Zealand began to purchase motor vehicles to transport their produce, and later tractors to cultivate the soil. It is difficult to quantify the rate at which market gardeners generally mechanised their operations, and in particular, the degree to which Chinese market gardeners adopted these developments relative to other market gardeners. There is evidence that some Chinese market gardeners were slow to take up the use of motor vehicles and tractors. In her recollections of her family’s market garden in the Sydney suburb of Granville, Marjorie Long Dodd recalls that her father bought a truck in the 1930s, a 1929 Chevrolet, but did not learn to drive. For many years his neighbour would drive the truck to take his vegetables to the city markets each week.77 Owen Bennett, who grew up in Ryde, another Sydney suburb, in the 1930s, recalls that Charlie, the Chinese market gardener along Darwin Street, never had his own truck, but relied on a European carrier to collect his produce and take it to the markets: ‘A fellow used to come in an old Chev truck to pick up produce from the Chinese market gardens, Charlie never had any transport’.78

However, in some areas where machinery was clearly labour saving, gardeners were quick to adopt it. In Ohakune in New Zealand, for example, the laborious methods of removing stumps by hand were quickly abandoned with the appearance of the first bulldozer in the district in 1937. Local farmers, both European and Chinese, were initially sceptical of the ability of the machine to remove some of the heavier roots and stumps, but their doubts were dispelled when the Ministry of Works demonstrated it in action. Kong Shem came to

78 Owen Bennett interviewed by Lesley Goldberg, 3 November 1998, City of Ryde Library Services, transcript pp. 7–8.
Ohakune from Auckland in around 1935. He remembers the arrival of the first bulldozer in the district and how it could clear an acre of land in a day. The first machines were located at the Ministry of Works depot and were available for hire. Mechanisation opened up new prospects for market gardening in Ohakune, enabling larger acreages to be brought into cultivation and vegetables to be produced in sufficient quantities to meet the needs of a large proportion of the North Island population. This also illustrates the role of government agencies in the diffusion of innovation and the benefits of potential adopters being able to see new technology in operation in the field.

Other market gardeners bought motor vehicles and learned to drive as early as the 1920s. Quong Sing, who ran a large market garden in the Auckland suburb of Mt Roskill in the 1920s and 1930s and employed over seventy men, had several trucks. Neighbour Tom Grinter was often called over on cold winter mornings to help start them up. Ng Jin Quong, who arrived in New Zealand in 1919 at the age of sixteen, was in demand by 1925, by which time he could speak enough English to go on hawking rounds selling produce and could also drive a truck. He was invited to be a partner in King Brothers market gardens in Oamaru and Sue Lee gardens in Timaru. He chose to go to Timaru where he worked for Sue Lee for over thirty years. Other men became skilled mechanics and specialised in servicing the vehicles of their compatriots, such as Jim Young and Mung Chew Young in Hawke’s Bay in the 1940s.

The main reason Chinese market gardeners did not buy motor vehicles in the 1920s and 1930s was probably their prohibitive cost rather than simple conservatism. It is likely that Chinese market gardeners, and many European gardeners as well, only bought motor vehicles and tractors when they could afford them. Pawakapan interviewed the son of a Chinese market

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80 Merrilyn George, Ohakune: Opening to a New World, Ohakune, 1990, p. 222–3.
82 Lee and Lam, Sons of the Soil, p. 109.
83 Ibid., pp. 256, 261.
gardener in Dunedin who began growing crops before World War I and died in the 1950s. His father did all the work on the garden by hand, and even after his wife arrived in the 1920s and the children grew up and were old enough to assist in the garden it was still hard manual labour. He did not save enough to buy a tractor until the 1940s; before that he hired the neighbour’s Clydesdale horse to plough his land.  

Even with the advent of tractors, the intensive cultivation techniques used on small holdings and the typical layout of long raised beds with narrow ditches between them meant that they had limited application. Another retired Chinese market gardener in Dunedin interviewed by Pawakapan recalled that before World War II he still did most of the work in the garden by hand, even though he bought his own truck in the late 1920s and a tractor in the 1930s. Tractors were mainly used for preparing the ground before planting and after World War II, when more sophisticated attachments became available, for weeding, seeding and spreading fertiliser. Thus it made more economic sense to hire equipment or use contractors when necessary rather than make a major capital outlay on equipment that was not used regularly.

Some enterprising market gardeners such as Harry Gow and his son Jim in Otaki invested in tractors and did contract work for other growers. Jim Gow recalls that the family came to Otaki in 1942 and bought a 3 acre market garden. His father bought one of the first tractors imported to New Zealand from America, and Jim used it to do contract work for local growers. During World War II there was an unprecedented move towards farm mechanisation, particularly after the United States entered the Pacific war in 1942 and New Zealand became a major supplier of vegetables to the armed forces. Market gardening was

84  Pawakapan, ‘Chinese in Dunedin’, p. 83.
85  Ibid., pp. 88–9.
86  Thorpe et al., ‘Otaki’s market gardens’, p. 19.
now an essential industry, and despite being officially classified as aliens, Chinese gardeners were at the forefront of efforts to increase production. Large quantities of tractors, sprayers, pumps and vegetable planters were imported from the United States under a lend lease agreement.\textsuperscript{87} One market gardener who obtained an import licence during the war to import tractors was G.Y. Toy, who supplied a dehydration factory in Pukekohe. Toy was one of the largest growers in Hamilton from the 1940s; he had 180 acres in the Rukuhuia area which he and his family cultivated until the 1980s.\textsuperscript{88}

Despite these wartime developments, in the early 1950s there was still relatively little mechanisation on market gardens in New Zealand. Steven Young, who grew up on a market garden in Levin in the 1950s, recalls that both his family and their neighbour had a horse. Ploughing and disk ing (to break down the turned over soil) was commonly done by contractors. Planting, weeding, harvesting, then trimming and packing the vegetables for market was all done by hand. The horses hauled the loaded cases on a sled to the roadside, to be picked up by transport companies who would take them to the city markets in Wellington. Young’s father did not buy his own tractor and attachments until the late 1950s. This reduced hand weeding to a certain extent, but not entirely.\textsuperscript{89} In Gisborne, Dong Wong, the son of market gardener Norman Wong, recalls that even though they had a tractor and rotary hoe for ploughing in the 1950s, ‘everything grown was harvested manually, from top and tailing onions to digging acres of potatoes by fork in the hot Gisborne sun’.\textsuperscript{90}

From the early 1960s farm mechanisation intensified as city market gardeners moved their operations to the urban fringes and average acreages increased. It became economic to

\textsuperscript{87} Bee Dawson, \textit{A History of Gardening in New Zealand}, Auckland, 2010, pp. 245–6.
\textsuperscript{88} Lee and Lam, \textit{Sons of the Soil}, p. 306.
\textsuperscript{89} It was an Allis Chalmers model with a rear mounted engine and cultivation equipment in the front (Stephen Young, ‘“To be happy for the rest of your life”: Chinese market gardeners in New Zealand’, Address in honour of ‘A Barbarous Measure: The Poll Tax and Chinese New Zealanders’, National Library of New Zealand, 2 October 2003).
\textsuperscript{90} Lee and Lam, \textit{Sons of the Soil}, p. 290.
own a truck to transport vegetables to market with the increased distance involved, and market gardeners purchased tractors and did their own ploughing and disking rather than contracting it out. Rotary hoes and specialised equipment to plant, fertilise, weed, spray and harvest crops were widely available.\footnote{Young, ‘To be happy for the rest of your life’.} The photograph of the Ding family market garden in Outram (Figure 4.5) illustrates the increasing use of tractors and trucks by the 1960s.

![Figure 4.5: A tractor and truck loaded with crates of produce at the Ding family market garden in Outram, west of Dunedin, c. 1961.](image)

**Motor vehicle and agricultural equipment manufacturers**

To introduce market gardeners to the latest agricultural tools, some agricultural equipment manufacturers employed Chinese salespeople and advertised in Chinese language media. They also arranged field demonstrations of their products, an excellent way for market

gardeners to evaluate their performance under local conditions. Allen and Company, the American manufacturers of the Planet Junior range of farming implements, exported their products to New Zealand from the early 1890s and held field demonstrations around the country in 1894. In 1898 their sales representative, a Mr Sandford, arranged an exhibition of Planet Junior products at Ming Quong’s market gardens in Royal Oak, Auckland (Figure 4.6).

![Advertisement for field demonstration of Planet Junior farm implements, Auckland Star, 1898.](image)

**Figure 4.6:** Advertisement for field demonstration of Planet Junior farm implements, *Auckland Star*, 1898.

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94 *Auckland Star*, 26 October 1898, p. 6.
95 *Auckland Star*, 26 October 1898, p. 6.
As Chinese market gardeners began to purchase motor vehicles in the 1920s and 1930s, and later tractors and other agricultural equipment, these industries began to look to the Chinese market. In New Zealand, the International Harvester Company employed Chinese staff. Mun Chew Young, from Hawke’s Bay, served an apprenticeship with International Harvester in Palmerston North in the 1940s. A member of the Chinese community in Dunedin interviewed by Pawakapan describes how he had an interest in engineering and gained a qualification as a skilled mechanic. From 1936 to 1953 he was employed by International Harvester selling tractors and trucks, especially to Chinese market gardeners, even though he spoke little Chinese. He travelled throughout the country and was one of the first to introduce trucks and tractors to the Chinese community. He also taught some of them to drive.

In those days I knew a lot of Chinese, especially the market gardeners. Many of them had tractors or trucks in the forties and fifties. ... Because I knew little Chinese, Mr I. had written me a letter of introduction in Chinese in case I visited my customers. It was very useful and I still keep it in my file.

Advertisements in the *New Zealand Chinese Growers’ Monthly Journal* in the 1950s provide some evidence for a growing market for farm equipment among Chinese market gardeners. The journal began publication in August 1949 and at that time had a circulation of around 2,000. From its first issue the editors actively sought advertising, stating ‘any firm which has any business connection with the Chinese people, particularly the Chinese farming community, will be benefitted by advertising in this Journal’. Between 1949 and 1954, regular advertisements appeared for tractors and specialised attachments (for example the

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97 Pawapakan, ‘Chinese in Dunedin’, pp. 90–1. For privacy reasons, Pawapakan did not use the full names of his informants.

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advertisement for the British Ransoms Crawler tractor illustrated in Figure 4.7). There were also advertisements for pumps and irrigation systems such as the Buckner Giant Overhead Sprinkler System, placed by Brown Brothers Engineering.

Figure 4.7: Bilingual advertisement for Ransomes Crawler garden tractor, *New Zealand Chinese Growers’ Monthly Journal*, 1950.

In Australia, advertisements placed by car dealers, automobile maintenance companies and motor oils began to appear in the *Tung Wah Times* in the late 1920s. They included Reo Motors Ltd; Manly Fords; The Sydney Automobile Maintenance Association; Neptune Products Ltd, producers of motor spirits and lubricants; and, the Australian Roma Oil

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99 They included advertisements for the Newman British Lightweight tractor with four speed gearbox, the Bristol 20 tractor and the Fordson Major tractor manufactured by International Harvester. Tractor attachments included the Howard rotary hoe and the Clifford rotary cultivator.

100 For example, *New Zealand Chinese Growers’ Monthly Journal*, 1 November 1949, p. 3; 1 January 1950, pp. 3, 4; 1 May 1950, pp. 2, 5, 6; and, 1 July 1951, pp. 3, 11. Their motto was ‘profit flows when water flows’.

Company (see Figures 4.8 and 4.9). There were also advertisements for driving schools; for example, an advertisement for Fowlers Motor College appeared in June 1929.

Figure 4.8: Chinese language advertisement for Manly Ford, *Tung Wah Times*, 1926.

Figure 4.9: Chinese language advertisement for Automobile Maintenance Association, *Tung Wah Times*, 1929.

Transport

During the nineteenth century roads, railways, ships and riverboats physically connected the isolated centres of population in Britain’s colonies in the Antipodes and linked primary producers with their markets. Before the great railway building projects undertaken

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102 *Tung Wah Times*, 11 February 1928, p. 5 d; 30 March 1929, p. 6 a; 21 May 1932, p. 8d; and, 10 November 1928, p. 6 a.
103 *Tung Wah Times*, 29 June 1929, p. 8 b.
104 *Tung Wah Times*, 27 February 1926, p. 6.
105 *Tung Wah Times*, 30 March 1929, p. 6.
by colonial governments from the 1880s, roads were poor and shipping was the major form of transport for freight and passengers. The first railways built in Australia did not only originate from the capital cities, but fanned out from major coastal ports to connect with the mining, pastoral and agricultural districts of the interior.\textsuperscript{106} From these ports produce was exported directly to Britain, or to capital cites for domestic consumption. Similarly in New Zealand, national financing and construction of railways from the 1870s began as separate short lines radiating from the major centres (all coastal ports) and remained fragmented for many decades.\textsuperscript{107}

As a result of improvements in road, rail and sea travel, transport costs declined through the nineteenth century.\textsuperscript{108} Developments in transport and communications also served to advance the colonial project, entrenching European settlement and ownership of lands appropriated from the indigenous inhabitants of Australia and New Zealand, and ushering in the industrial-capitalist age in these outposts of Empire.\textsuperscript{109} Colonial governments encouraged population growth in rural areas through railway building and the sale of crown land to selectors on credit as well as closer settlement and irrigation schemes. Urban populations were also growing rapidly by the late-nineteenth century which encouraged the growth of urban transport networks. These in turn promoted suburban expansion and decentralisation of jobs and housing. For example, the suburban building boom in Melbourne in the 1880s was

\textsuperscript{106} For example, in the 1880s there were seven separate rail systems in Queensland, and eight in South Australia (Graeme Dawson, J.W. McCarty and Ailsa McCleary (eds), Australians, A Historical Library: Australians 1888, Broadway NSW, 1987, pp. 94–6).

\textsuperscript{107} The main trunk line in the South Island linking Invercargill, Dunedin and Christchurch was completed in 1879, reflecting the early dominance of Otago and Canterbury Provinces. The North Island main trunk line connecting Auckland and Wellington was not completed until 1908 (G.T. Bloomfield, New Zealand: A Handbook of Historical Statistics, Boston, 1984, p. 227; and, Neill Atkinson, Trainland: How Railways Made New Zealand, Auckland, 2007, pp. 32, 56).

\textsuperscript{108} In Australia, for example, the cost of transporting fodder by rail or river steamer decreased from an average of 2s per ton per mile in the summer of 1830 to 6d per ton per mile in the summer of 1880 (D. B. Williams (ed.), Agriculture in the Australian Economy, Sydney, 1967, pp. 167–8).

\textsuperscript{109} Scott Cook, Colonial Encounters in the Age of High Imperialism, New Brunswick, 1996, pp. 65–6; and, Atkinson, Trainland, p. 22.
triggered by a major program of railway construction into outer urban areas which were still lightly populated. The electrification of suburban rail lines in Sydney and Melbourne after World War I increased carrying capacity and the speed of travel, further promoting suburban expansion. The influence of the railway is clearly evident in the growth pattern of the late-nineteenth century and early-twentieth century suburbs of cities such as Sydney and Melbourne, which were clustered along railway and tram routes and around stations.\footnote{Lionel Frost and Tony Dingle, \textit{Sustaining Suburbia: A Historical Perspective on Australia’s Urban Growth}, Economics and Commerce Discussion papers, Discussion Paper no 23.93, November 1993, pp. 6–7.}

Chinese market gardeners benefitted directly from these developments as they could supply a wider market and deliver their produce to consumers in a much shorter time, maintaining freshness and quality and getting the best returns. Prior to the introduction of rail, market gardens had to be situated close to towns and cities. The distance was limited by how far a man carrying baskets of vegetables on foot, or using a horse and cart, could travel within a day. In the early-twentieth century the expanding network of train and tram lines in Sydney and Melbourne, and tram lines in Auckland and Wellington, promoted suburban expansion and opened up new markets for urban market gardeners.\footnote{Lee and Lam, \textit{Sons of the Soil}, p. 119.}

As Nigel Murphy notes, the gradual expansion of market gardens throughout New Zealand followed in time and location the construction and opening of rail lines. For example, the completion of the railway from Wellington to Otaki in 1886 gave Otaki market gardeners access to the Wellington market. Once the main trunk line between Wellington and Auckland was opened in 1908 they supplied the larger towns \textit{en route} and also the dining cars on trains.\footnote{Wai Shing, ‘Locational and structural changes of market gardening’, p. 11; Thorpe \textit{et al.}, ‘Otaki’s market gardens’, p. 15; and, Alex McLellan, ‘Market gardening in Otaki’, \textit{Otaki Historical Society Historical Journal}, Issue 5, 1982, p. 61.} The completion of the main trunk line promoted the growth of new towns and settlements and the opening up of new market gardening areas to serve them, for example the
Ohakune and Raetihi districts in the central North Island. The region became a major centre for the cultivation of root vegetables, especially carrots, which became the iconic symbol of Ohakune.\textsuperscript{113}

The expansion of rail networks in Australia in the late-nineteenth century also supported the growth of market gardens in rural areas. In Wellington, New South Wales, Sing Lee recalls that before the 1950s, when regional canneries were established, all market garden produce was sent by rail to the city markets. There were about three freight trains a day to Sydney, loaded with pumpkins, onions, potatoes and beans.\textsuperscript{114} Around Sydney, market gardens spread where there was ready access to markets, close to townships served by rail such as Parramatta and Liverpool to the west and Moss Vale and Berrima in the Southern Highlands. Further west, market gardening centres developed near country towns with good transport connections to Sydney such as Kelso, Wellington and Bathurst.\textsuperscript{115}

Market gardening in the Cohuna district in central Victoria began on a large scale in 1915 when an area of 450 acres was subdivided into market garden allotments ranging from 5 to 10 acres. European residents formed a Cooperative Gardeners Association and brought in experienced Chinese gardeners to cultivate the land. The local market gardening industry expanded after 1919 when the railway opened, giving growers direct access to the Melbourne market.\textsuperscript{116} In western Queensland and the gulf region during the 1880s, Chinese market gardeners established gardens to serve the settlements which grew up along established stock routes and the railway line from Townsville to Hughenden. Both Hughenden, the rail terminus, 

\textsuperscript{113} Nigel Murphy, \textit{History of the Horticultural Industry}, unpublished ms., 2010, pp. 11, 15–16. See also Lee and Lam, \textit{Sons of the Soil}, pp. 119, 229.
\textsuperscript{114} Golden Threads: The Chinese in Regional New South Wales Database, 1999, record S74, Notes, p. 5.
\textsuperscript{115} Terry Kass, \textit{A Thematic History of the Central West}, Sydney, 2003, p. 18.
and Cloncurry, further west, supported syndicates of gardeners.\textsuperscript{117}

Rail transport was not suitable for delicate, highly perishable produce such as salad vegetables and herbs – these continued to be produced close to the point of sale and transported by road. Giving evidence to the \textit{Royal Commission of Inquiry as to Food Supplies and Prices} in Sydney in 1913, many growers complained of problems with rail transport, citing rough handling and numerous delays resulting in wastage and financial losses.\textsuperscript{118} They also commented on the high costs of rail freight and of road cartage to and from railway stations. William Mortimer, a market gardener in Moss Vale, stated that vegetable growing in his district sometimes did not pay at all. He had to pay cartage of 12 shillings per ton to the railway station at Moss Vale, then rail freight of 10s.7d. per ton to Sydney and finally cartage to the markets of 4 shillings per ton.\textsuperscript{119} Another witness, Henry Tasker, commented that the speed and efficiency of rail transport should be improved so that market gardeners in outlying districts could send their produce to the city markets overnight and consumers could buy their vegetables fresh from the garden early the next morning.\textsuperscript{120} Several decades later, growers in Otaki in New Zealand in the 1940s and 1950s complained of similar problems with rail transport, including poor stacking of cases, poor shunting, delays and pilfering.\textsuperscript{121}

The advent of motorised trucks in Australia and New Zealand from the 1920s challenged rail transport. In Otaki for example, Pop Edwards began a small transport business in 1923 with one lorry transporting butter from the Otaki dairy factory to Wellington. In 1929 he extended the service to vegetable growers, two days a week, to meet the Monday and

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\textsuperscript{118} New South Wales Legislative Assembly, \textit{Royal Commission of Inquiry as to Food Supplies and Prices, 1913}, Sectional report on the supply and distribution of fruit and vegetables, Sydney, 1914, p. xxxvii.
\textsuperscript{119} \textit{Ibid.}, pp. 76–7.
\textsuperscript{120} \textit{Ibid.}, p. 71.
\textsuperscript{121} Lee and Lam, \textit{Sons of the Soil}, p. 171.
\end{flushright}
Thursday produce auctions. As Alex McLellan recalls, at that time most Chinese and European market gardeners carried their produce to Wellington by horse and cart, leaving Otaki at 4am. So popular was Edwards’ new service he was soon working six days a week, and he had to buy extra trucks and recruit more drivers.\textsuperscript{122} In an attempt to preserve the State’s rail monopoly the New Zealand government passed legislation from the 1930s restricting the transport of goods by road in areas where rail operated. However, from the 1950s trucks were increasingly used to transport vegetables.\textsuperscript{123} They proved to be faster and more efficient than rail.

**Water storage and irrigation equipment**

As outlined in Chapter Two (pp. 114–16), Chinese market gardeners in arid areas of Australia made inventive use of storm water flows and soakages to harness irregular rainfall. The dams and water races they constructed are prime examples of technological and environmental adaptation. There are many examples of practical ‘making do’ in the variety of methods Chinese market gardeners used to raise and store water and store liquid manure on their gardens. On the Chinese market garden site in Cobar recorded by McGowan, for example, storm water was channelled via sluice gates into two large dams on the gardens. Water was pumped from the dams into a water tower, then reticulated into large 440 gallon (2,000 litre) ship’s tanks placed at strategic points around the garden. The tanks were partly sunk into the ground, so that hand-carried watering cans could be easily filled, in an adaptation of the in-ground water reservoirs typical of gardens in southern China.\textsuperscript{124}

In Pine Creek in the Northern Territory, Nellie Fong recalls that her husband watered

\textsuperscript{122} McLellan, ‘Market gardening in Otaki’, p. 62.
\textsuperscript{123} The first piece of legislation was the *Transport Licensing Act*, 1931 (Murphy, *History of the Horticultural Industry*, p. 16).
the plants in their market garden using a kerosene tin and stored liquid manure in 44 gallon drums, in place of the traditional large ceramic jars used in China. She vividly recalls the stench of the fertiliser, fortified with oxblood:

… and when they kill, the ox blood, we always take the tin out there for them to drain the ox blood into the tin. And that's our fertiliser, the liquid one – and can they smell! The whole garden smell... We put them in a drum first, a big 44 gallon drum. And when we needed to fertilise them we just put them in the bucket and then dip it in water and then water it. For the seedlings it would be a very fine one, very thin one, and for the manure one it would be a stronger one.125

Kerosene tins were favoured by Chinese market gardeners for making watering cans, with the addition of spouts to produce a thin stream of water. In 1878 a correspondent to the *Queenslander* newspaper wrote:

Kerosene tins, each holding four gallons, are held in favor by the Chinese for making sprinkling pots. To these tins, and also to round tins of about the same capacity, spouts of tin are soldered. The spouts are about two feet in length. A man takes two of these tins upon a stick of bamboo across his shoulders; the stick usually is about five feet long. John trots off … to his waterhole or well. Dipping down one shoulder he fills a tin; then he dips down the other without taking the load from his shoulders, and trots back to where the water is to be applied. He has a hand upon each tin, and as he trots along the alleys the water is poured out in a flat, full stream with a shaking motion that thoroughly wets two feet on each side. This goes on until the whole of the cultivation is soaked.126

Over twenty years later the *Queenslander* described a very similar watering can, made from a kerosene can transformed using padding, pieces of spouting and rope, used by a Chinese gardener on a remote pastoral station.127 Kerosene or other tins fulfilled many other useful purposes. In New Zealand, for example, with the addition of a handle, they were used as containers for blood and bone or bone dust, or for harvesting peas in the Wairarapa.128 Some market gardeners such as Kim Young in Ohakune adapted smaller tins for sowing fine seeds

126 *Queenslander*, 19 January 1878, p. 27.
127 *Evening Post*, Wellington, 3 February 1912, p. 10, reprinted from the *Queenslander*, February 1912.
128 Lee and Lam, *Sons of the Soil*, pp. 167, 141.
such as carrots, by punching holes in the bottom.\textsuperscript{129}

In the Sydney suburb of Manly in the early-twentieth century, Chinese market gardeners cultivated their crops along the streams running into the Manly and Curl Curl lagoons. Local resident Charles Goodman recalls that in the 1920s they used baths to store liquid fertiliser, a smelly mix of pig manure and nightsoil.\textsuperscript{130} In Granville, Sydney, in the 1930s the Leung (anglicized to Long) family had the luxury of galvanised iron pipes running through their market garden. At every second tap through the garden was an old bath which was filled with water to make filling the watering cans easier. At other taps there were more traditional rectangular water storage tanks dug into the ground, with cleated planks for walking down into the water to fill the watering cans, balanced in typical Chinese style on each end of a flat bamboo shoulder pole. According to Ma Leung’s daughter Marjorie, the watering cans were manufactured specifically for Chinese gardeners. The back-breaking work of hand watering came to an end in 1940 when Marjorie’s brother Norman installed a ‘Skinner’ irrigation system with sprinklers fixed on hardwood posts 6 feet above the ground. Then all that was required was to turn on the tap and rotate the sprinkler to water the desired section of the crop.\textsuperscript{131}

Traditional Chinese methods of raising irrigation water from watercourses and the characteristic network of irrigation trenches and water reservoirs traversing the gardens, endured in Australia and New Zealand. There are numerous descriptions of the traditional foot-powered chain pump in use. In 1886 the Melbourne \textit{Argus}, for example, published an account of the 6 acre garden of Ah Sam on the Barwon River in Geelong. The report describes

\textsuperscript{129} \textit{Ibid.}, p. 237.
\textsuperscript{130} Terry Metherill, ‘Faster: Manly in the 1920s’, unpublished ms., 2006, City of Ryde Library Service, , p. 3.
the age-old methods used for raising water and the water reservoirs scattered throughout the
garden.

The land, formed of two slopes, north and south, runs parallel with the river, and in the
centre, on top of the rise, and at about fifty feet from the Barwon, there is a Californian
pump, worked by three men by treadle motion. In a comparatively short time, sufficient
water can be pumped up to flood the whole six acres; but with an eye to economising
labour in seasons when so much moisture is unnecessary, Ah Sam has constructed
slabbed pits at every few yards along the various paths, and the water, as it flows from
the shoot, passes along the different channels, and fills these pits before it can overflow
the ground generally. 132

In the early-1900s Chinese market gardeners in Forbury, South Dunedin used foot-
powered chain pumps to drain water from their low-lying land, emptying it into drainage
channels along the adjoining road.133 Figure 4.10 shows a chain pump in use in South
Dunedin. It is very similar in design to the chain pump photographed by King in China in
1909–1910, illustrated in Chapter One (Figure 1.2).134

In many cases water was raised by horse power, using a whim or horse capstan.135 In
western New South Wales in the 1890s, for example, whims were used in Chong Lee’s garden
adjacent to the Chinese camp on banks of the Lachlan River at Hillston and in the large garden
(known as the Garden of Eden) in the Chinese camp on the banks of the Darling River at
Bourke.136 They were also used to raise water from wells, for example in Gilgandra and
Tenterfield.137 The horse was not generally used as a draught animal in southern China, but in

132 Argus, 8 December 1886, p. 15.
133 Pawakapan, ‘Chinese in Dunedin’, p. 38.
134 Franklin King, Farmers of Forty Centuries, London, 1949, p. 78.
135 A whim is a device similar to a windlass used in mining, consisting of a drum with a vertical or horizontal
axe. A rope is wound around the drum, then through a system of pulleys and each end is suspended down the
mine shaft. As the drum rotates one end of the rope, carrying an empty bucket, is lowered while the full
bucket at the other end is raised. Early whims were horse-driven; later they were powered by steam engines
Figure 4.10: A foot-powered chain pump in use in South Dunedin, early 1900s.\textsuperscript{138}

Australia and New Zealand Chinese market gardeners quickly made use of it. Many observers commented on the care and attention Chinese market gardeners gave their horses, as they were so important to their gardening operations.\textsuperscript{139} Tom Parr, who worked in the Hillston gardens in his school holidays for 5 shillings a week in the early 1900s, recalls that the Chinese raised water from the river using small buckets holding about 2 litres, fastened to an endless chain driven by a horse.

There were no engines in those days, none for pumping water for market gardens. Their method of getting the water up to the surface from the river was by means of small buckets, say perhaps holding half a gallon ... These were fastened to an endless chain

\textsuperscript{138} Photograph courtesy Kings High School, Dunedin.
\textsuperscript{139} For example, see Donald History and Natural History Group, Georgie Ah Ling, pp. 6, 15, 26; and, George Lee Kim interviewed by Paul McGregor, 17 May 1994, Tape 1, Australia-China Oral History Project, National Library of Australia, TRC 3522/4/4.
and the buckets completed the circle, thus circulating a continuous stream of water. This setup was driven by one horse going round and round continuously. He had to be driven or he would stop. The horse was blindfolded, mostly because he got too cunning and it necessitated someone to keep him going.  

In other cases the whim was powered by a windmill. McGowan records that the two market gardens established by 1896 in Booligal in western New South Wales were both irrigated by windmills which pumped water from the Lachlan River. In 1902 the Brisbane Courier described the home-made windmill used by unnamed Chinese market gardeners on a plot of ‘several acres’ in the Brisbane suburb of Ennoggera. The quantity of water raised is considerable, and may be exaggerated:

Irrigation is the main factor, the water being pumped from the creek and wells with a home-made windmill, which does good work. The water is raised to a height of from 15ft. to 20ft. from the well or creek, and distributed by gravitation. A whim raises water from another well by means of appliances similar to a Californian pump. The wells, which are 15ft. to 20ft in depth, have about 6ft. of water in them … On the afternoon of our visit the windmill, which has sails of canvas, lifted 10,000 gallons of water from a well.

Windmills were still in use in New Zealand in the 1930s. In 1933 Ding Chun and his son Chew Chung Ding moved their market gardening operations from the Kaikorai Valley to Outram where they used a windmill to pump water from an underground bore into 44 gallon drums. A few years later they bought a Fordson tractor and attached two of the drums to it to carry the water for irrigating their crops.

Chinese market gardeners turned to new power sources, key developments of the British industrial revolution which were transferred to Australia and New Zealand from the late-nineteenth century. Inanimate power sources such as coal, oil, petroleum and steam

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141 Barry McGowan, *Dust and Dreams, Mining Communities in South-East New South Wales*, Kensington, 2010, p. 16.
142 *Brisbane Courier*, 3 May 1902, p. 15.
replaced human and animal sources in many industries.\footnote{See for example Crafts, ‘The industrial revolution’, p. 54; and, Von Tunzelmann, ‘Technological and organizational change in industry in the early Industrial revolution’, in O’Brien and Quinault (eds), The Industrial Revolution and British Society, pp. 256, 259.} Horse-powered whims were succeeded by steam pumps in some areas of Australia by the late-nineteenth century. In 1902, for example, the *Brisbane Courier* reported on the successes in irrigation achieved by an unnamed Chinese market gardener, in Warwick, west of Brisbane.

He has thirty acres of land under cultivation, and on the bank of the river has erected a four horse power steam pump. By this means the water is raised from the river, and it is then conveyed through long shallow trenches to different parts of the ground, and lodged in small dams, which are located at the side of the trenches, and from these dams it is spread over the plots in the usual way.\footnote{Brisbane Courier, 6 August 1902, p. 2.}

Steam-pumps were in common use until the 1920s, but declined in the 1930s with the introduction of electric pumps. In the 1920s and 1930s the Chinese market gardeners who farmed land along the Nepean River in Camden, New South Wales pumped water from the river using a four-inch centrifugal pump, belt-driven and powered by a portable 15 horsepower Marshall or Ruston steam engine on four wheels. Shafts could be fitted to the movable turntable at the front of the engine mount so that draught horses could move the pump to wherever it was required. Local historian R. Nixon notes the important role played by the ‘engine man’ in the syndicates which operated the market gardens. Ranking third in importance after the ‘boss’ of the garden, who had the largest financial stake in the enterprise, and the man responsible for marketing produce, the engine man maintained the irrigation pumps along the river.\footnote{This was not a rigid hierarchy. The boss could also be the man responsible for marketing produce (R. Nixon, ‘The Chinese community of Camden’, unpublished ms., Camden Historical Society, 1976, pp. 3–5).}

Sometimes he sought the assistance of local European trades people such Joe Kearns, who ran a motor garage in Camden, or Stan McKnight, the engineer at the local milk factory. By the late 1930s steam engines were wearing out and parts were no longer
available. Electric pumps required far less maintenance than the old steam pumps, releasing another man to work on other tasks in the gardens.¹⁴⁷

In the Sydney suburb of Willoughby, a centrifugal pump powered by an electric motor was installed in the King family garden in the 1920s or 1930s, to raise water from Sailors Bay Creek.¹⁴⁸ The water was distributed through the garden via galvanised iron pipes to several taps. Sprinklers attached to rubber hoses could be moved around the garden as required. This irrigation system would have revolutionised the gardeners’ lives, releasing them from the daily toil of hand watering. Mechanised irrigation systems incorporating electric pumps and sprinklers also saved Chinese market gardeners much time and labour in New Zealand, for example in the Loo Kee garden in Hawke’s Bay in the 1940s and Chung Pat’s garden in Christchurch in the mid-1950s.¹⁴⁹ It was still necessary to move irrigation pipes to water different sections of the garden. As Alec Young, whose father Young Yut Jim ran a market garden in Mangere from the early 1950s, recalls: ‘shifting the irrigation piping at night was hard work’.¹⁵⁰

In 1920 a Queensland newspaper reported the handsome returns achieved by a Chinese market gardener in Mitchelton, northwest of Brisbane, as a result of intensive irrigation using an oil engine and pump. His tomato crop that season brought him a gross return of £1,000 on the Melbourne market.¹⁵¹ In New South Wales, McGowan records the use of petrol pumps in Cobar, Bourke and Goulburn from the 1920s.¹⁵² In Wagga Wagga a local resident interviewed as part of the Golden Threads project recalls that the local Chinese market gardeners used a

¹⁴⁷ Ibid.
¹⁴⁸ The market garden was established by William Ah King in the 1880s and remained in the King family at least until the 1950s (Ian Rannard, The Forgotten Gardens: The Story of the Last Market Gardens in Willoughby and Northbridge, NSW, Douglas Park, 2005, pp. 14–6, 21–2).
¹⁴⁹ Lee and Lam, Sons of the Soil, pp. 101, 251.
¹⁵⁰ Ibid., p. 401.
¹⁵¹ Northern Advocate, 8 January 1920, p. 1.
suction gas engine which ran on charcoal: ‘It was a great big engine, a big fly wheel on it, it used to produce gas from the charcoal, like a gas producer on a car, and the gas used to drive the engine’.  

Mechanical pumps were costly in the late-nineteenth century. In 1892 the Riverine Grazier reported that in Hay ‘the company of Chinese gardeners who lease from the Council acres of land nearly opposite the slaughter yards have just had erected an engine and pump at a cost of £280’. This represents a major capital investment at a time when workers on Chinese market gardens earned around £52 per annum. Thus it is likely that only the most successful market gardening syndicates could afford this technology, while many others continued traditional animal or human-powered methods of raising water. As this case indicates it is unwise to make general statements about the pace and timing of technological change, for the location, size and financial success of Chinese market gardens were important factors in how readily gardeners adopted technological advances. Thus the adoption of mechanisation was unevenly spread, both geographically and temporally.

Horse-powered pumps and horse-drawn vehicles were in use in many areas long after steam pumps and later, petrol and electric pumps and motor vehicles, became widely available. For example, the Chinese market gardener Georgie Ah Ling, who first came to the Victorian town of Donald to assist his cousin in his market garden in the late 1920s, continued to use traditional Chinese agricultural methods throughout his long life. After his partner died in the late 1940s he worked alone on his small garden. He hand watered his crops, never sprayed them with pesticides and delivered his produce by horse-drawn vehicle until the early 1980s. However, at some time he purchased a Clutterbuck oil engine to pump water from the

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153 Golden Threads: Chinese in Regional New South Wales Database, 1999, record S17, Notes, p. 3.
154 Riverine Grazier, 24 June 1892, quoted in McGowan, Dust and Dreams, p. 16.
nearby reservoir, easing the heavy work of lifting water by hand (Figure 4.11).\textsuperscript{156} Preserved in the Agricultural Museum in Donald, this engine is an Australian-made copy of the British Blackstone oil engine and was manufactured from around 1916 by James Martin and Co in Gawler, South Australia for Clutterbuck Brothers.\textsuperscript{157}

![Figure 4.11: Clutterbuck oil engine, Donald Agricultural Museum, Victoria.\textsuperscript{158}](image)

**Fertilisers**

The two essentials of market gardening were water and manure to maintain soil fertility. Chinese market gardeners adapted their methods of fertilising their fields and controlling pests in Australia and New Zealand by taking advantage of the availability of new products. In the late-nineteenth and early-twentieth centuries they had a ready supply of animal manure to maintain the fertility of their soil, provided by horses, cows, pigs, sheep and chickens, even in cities. The suburbs of cities in Australia and New Zealand were still teeming

\textsuperscript{156} Donald History and Natural History Group, *Georgie Ah Ling*, p. 11.

\textsuperscript{157} Don Beatty, ‘Clutterbuck Oil Engine’, *Gawler Machinery Restorers Club Inc. Newsletter*, 18, 1993, pp. 9–11. This is an interesting example of technology transfer between Britain and Australia, and the development of domestic Australian industry (*Advertiser*, Adelaide, 4 April 1917, p. 10).

\textsuperscript{158} Photograph Joanna Boileau, June 2012.
with animal life. In her study of food production in Australian cities, Andrea Gaynor vividly describes the crowing of cocks at daybreak, the lowing and stamping of dairy herds, rats scuttling in laneways and horses hauling delivery carts.\(^\text{159}\) In Sydney, Melbourne, Brisbane and Perth, the main source of fertiliser was horse manure and straw, which came from racing, livery and tramway stables.\(^\text{160}\) Sheep were another source of fertiliser. Gardeners in Camden, west of Sydney, for example, purchased large quantities of sheep manure from the Flemington sale yards.\(^\text{161}\)

Urban market gardens were generally located close to water sources, such as lakes and creeks, and close to other industries requiring water, such as slaughterhouses, tanneries, dairies, poultry farms, piggeries and stables. These industries all supported market gardening as they provided ready sources of fertiliser. In Sydney, for example, the suburb of Botany was known as Struggletown in the late 1880s and 1890s. It had an unsavoury reputation due to the sights, sounds and smells of the glue works, tanneries and fellmongeries which were interspersed between Chinese market gardens and the houses of factory workers and fishermen.\(^\text{162}\) In Perth, Chinese market gardens were located around the fringes of Smith’s Lake north of the city, side by side with piggeries, dairies and dumps for nightsoil.\(^\text{163}\)

In country towns the surrounding primary industries provided plentiful manure from sheep, cattle, horses and pigs. In the 1860s in Deniliquin, New South Wales, for example, Chinese gardeners obtained sheep manure from a sheep yard about 4 miles away and stored it

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\(^{160}\) *Brisbane Courier*, 16 January 1889, p. 3; and, Gaynor, *Harvest of the Suburbs*, p. 23.


\(^{162}\) Dawson et al., *Australians, A Historical Library*, p. 204.

\(^{163}\) In 1899 Chinese market gardeners around Smiths Lake were accused of polluting the lake. An investigation by an inspector from the Central Board of Heath revealed that the main sources of pollution were waste from the piggeries, dairy cattle drinking from the lake and nightsoil being dumped beside it (Gaynor, *Harvest of the Suburbs*, pp. 25–6).
in two tanks sunk into the ground, each about 6 feet square. In New Zealand, Chinese market gardeners in Otaki obtained manure from local sheep and dairy farms, poultry farms and from the racing stables in Palmerston North. Gardeners also collected waste from local slaughter yards for use as fertiliser, performing a useful recycling service, for example in the Perth suburb of Bayswater in the early 1900s and in Daylesford, Victoria, in the 1860s.

Chinese market gardeners used prodigious quantities of manure, especially on sandy, peaty soils. In Perth, 200 tons of stable manure was ploughed into one 6 acre garden in Bayswater during the non-growing season. This was mainly animal manure from neighbouring stables and dairy farms and waste from the sewerage treatment works at Welshpool. Thus Chinese market gardeners made a significant contribution to recycling the huge quantities of manure produced by animals in cities. In 1878 the Queenslander reported that in Brisbane:

It is something for the Chinese gardeners to say that they are the heaviest users and purchasers of manure … Before John appeared on the scene, the trouble was to get rid of stable and other manure; it used to be smuggled out to the borders of the town during the night and deposited in vacant allotments and out of the way places. It is not so now. Many Chinese gardeners have a standing arrangement with draymen resident in their vicinity who bring them as much manure as they please, and for which from Is. 6d. to 2s. 6d. per load is paid.

In many cases Chinese market gardeners in Australia and New Zealand continued traditional methods, collecting their own urine and nightsoil to produce liquid manure. According to David Horsfall, in the late-nineteenth century Chinese market gardeners in

164 Sydney Morning Herald, 13 January 1865, p. 8, from the Deniliquin Chronicle, 31 December 1864.
166 Gaynor, Harvest of the Suburbs, p. 23; and, Daylesford Mercury, 13 July 1866, reprinted in the Argus, Melbourne, 14 July 1866, p. 6.
168 Andrea Gaynor estimates that the 2,632 horses in the City of Melbourne in 1891 would have produced 13,160 tons of manure, based on a figure of five tons per horse per annum (Gaynor, Harvest of the Suburbs, p. 23).
169 Queenslander, 19 January 1878, p. 27.
Victoria were the collectors of nightsoil ‘in scores of country towns’. \(^{170}\) For example, there are reports of gardeners collecting nightsoil in Geelong in 1870. \(^{171}\) George Lee Kim, who grew up on his grandfather’s market garden in Bendigo in the 1920s, describes the use of horse manure mixed with straw for raising young seedlings and liquid manure produced from diluted nightsoil:

They used to make up liquid manure by soaking different ingredients in a tub of water. They would get some of that strong liquid manure and put it in the watering cans and dilute it. Ten or twenty times, then they would feed the young seedlings. Everyone realises the Chinese use a lot of nightsoil to make this liquid manure, the vegetables really love it .... The way the young seedlings would come on with the liquid manure is unbelievable … They used to use their own night soil, they weren’t allowed to collect from elsewhere, there was a bylaw.\(^{172}\)

Human waste was often collected under cover of darkness, hence the euphemism nightsoil. In 1873 several gardeners in the Sydney suburb of Randwick were threatened with prosecution for dumping nightsoil on their properties and then loading vegetables for market in the same cart. Habits like these led to Randwick becoming one of the first municipalities in Sydney to appoint an Inspector of Nuisances, later known as a Health Inspector.\(^{173}\) In Western Australia in the early 1900s, the Fremantle municipality sold nightsoil to gardeners. After the Engineer for Roads and Bridges submitted a report complaining about the state of the gardens along the Jandakot Road in 1908, all sales of nightsoil were banned and the Fremantle Board of Health’s health inspector was removed from office.\(^{174}\)

It is often difficult to establish whether Chinese gardeners were using nightsoil as fertiliser, as when questioned by health officers they usually denied it. In Brisbane in 1889, the authorities were concerned about the Chinese market gardens in the city becoming sources of

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\(^{171}\) *Bruce Herald*, Otago, 24 August 1870, p. 7.


disease. In a report to the Central Board of Health that year, Mr P. McMahon, curator of the Botanic Gardens, stated that a little house dust and small quantities of artificial manures were the only manures which the Chinese gardeners would admit using; they declared they would not use nightsoil or sewage under any circumstances. In Melbourne in 1879, a correspondent to the Argus responded to claims made by the Fruiterers Association that Chinese-grown vegetables were the source of a plethora of diseases. He stated that the manures used by the Chinese were always decomposed before they were applied to the beds and mainly consisted of ‘bone dust, guano, and stale vegetables, also tannery refuse when readily obtainable’.

By the early-twentieth century local government authorities increasingly regulated the keeping of animals within town and city boundaries, in the interests of public hygiene. However, dairies, stables, market gardens and poultry farms remained scattered through the expanding suburbs of urban areas well into the 1920s and 1930s. The oral histories collected by the City of Ryde Council in Sydney paint a picture of a semi-rural landscape, dotted with Chinese market gardens, poultry farms, orchards, stables and dairies. Owen Bennett recalls ‘that was all rural and there was animals everywhere. Lots of stock.’ Horses in particular were a familiar presence in suburban streets. Well into the twentieth century they were used to deliver bread, milk, fruit and vegetables and many other goods and they were an integral part of the localised structure of food production and retailing in the days before refrigeration.

By the interwar period supplies of manure in cities were declining as the number of horse-drawn vehicles decreased, suburban dairies, stables and poultry farms were displaced by

175 Brisbane Courier, 30 September 1889, p. 7.
176 Argus, Melbourne, 7 June 1879, p. 8.
177 Owen Bennett, interviewed by Lesley Goldberg, 3 November 1998, City of Ryde Library Services, transcript, pp. 17, 20.
housing and industry and sewerage systems were constructed. However, large areas of cities and many country towns were still serviced by night carts.\textsuperscript{179} Like other market gardeners, Chinese market gardeners turned to other sources of fertiliser and increasingly purchased commercial products such as blood and bone and superphosphate. Articles published in the \textit{Tung Wah Times} between 1902 and 1930 indicate the interest with which Chinese market gardeners followed the latest developments in agriculture, both in China and Australia. For example, a report was published of a Sydney company winning an award for high quality fertilisers in 1902, and in 1908 there was a report of a new chemical fertiliser being manufactured in Foshan, in Guangdong.\textsuperscript{180} The newspaper also provided advice on the best fertilisers for specific crops. In 1926, for example, a report was published on a new fertiliser developed specifically for onions and tomatoes.\textsuperscript{181} It is difficult to quantify what proportion of Chinese market gardeners used commercial fertilisers and to what extent they continued to use animal manures. The relative cost was obviously a factor, and the size and financial success of the market gardening enterprise. As the \textit{Tung Wah Times} reported in 1930, high customs duties increased the cost of imported fertilisers.\textsuperscript{182}

The availability of commercially manufactured fertilisers from the 1840s, as advances in knowledge of the role of trace elements in plant nutrition were taken up by industry, was a major advance in agriculture in Britain.\textsuperscript{183} The German chemist Von Liebig’s research paved the way for the development of chemical fertilisers.\textsuperscript{184} Von Liebig was well aware of the prior

\textsuperscript{179} Gaynor, \textit{Harvest of the Suburbs}, pp. 88–9.
\textsuperscript{180} \textit{Tung Wah Times}, 19 April 1902 p. 3, c; and, 24 October 1908, p. 3, b-d.
\textsuperscript{181} \textit{Tung Wah Times}, 27 February 1926, p. 6, b-c.
\textsuperscript{182} \textit{Tung Wah Times}, 6 December 1930, pp. 6–7, a-d.
\textsuperscript{184} Von Liebig recognised the importance of both phosphorous and nitrogen for plant growth but after visiting leading agriculturalists of the day in England, became convinced phosphorous was the most important. There was a major shift from phosphorous to nitrogen-based fertilisers in the twentieth century as modern science recognised that crop yields were more often nitrogen limited than phosphorous limited (Leigh, \textit{World’s
example set by Chinese farmers, describing them as ‘the most admirable gardeners and
trainers of plants, for each of which they understand how to prepare and apply the best adapted
manure’. Superphosphates, made by treating phosphate rock with sulphuric acid, made trace
elements more readily available to plants and were easier to apply than traditional animal
manures and composts.

These developments reached Australia and New Zealand where domestic fertiliser
industries were established from the 1880s. In New Zealand, for example, local production
of superphosphate began in 1882 at the Kempthorne, Prosser & Company plant near Dunedin.
Several other plants were established in the North Island over the next few years. The rapid
expansion of commercial fertiliser industries in Australia and New Zealand, mainly for use on
pastures, was stimulated by the advent of refrigeration in 1882 and the rapid growth of the
meat and dairy industries. There was also a developing export trade in blood and bone and
superphosphate from Australia to New Zealand by the early 1900s. Chinese market
gardeners were important domestic customers in Australia. In 1910, Mr H. Anderson,
Undersecretary for Agriculture in New South Wales, observed:

Chinese vegetable gardeners are the best customers for our highest quality of blood and
bone manure, and I need hardly remind you that the Chinese and Japanese were intense

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Greatest Fix, pp. 193–4).


187 Crop yields and soil fertility in New Zealand declined steadily from the 1840s to the 1870s, as a result of a slash and burn approach to land clearing and continuous cropping. The nutrients from the ash of forests burnt during land clearance were soon depleted and the bumper crops which the first European settlers celebrated became a thing of the past. Lack of phosphorus was identified as the main deficiency. In 1880 the first shipment of superphosphate was imported by W. E. Ivey (director of Lincoln School of Agriculture, now Lincoln University) (Benjamin Evans, A History of Agriculture, Production and Marketing in New Zealand, Palmerston North, 1969, pp. 5–7; and, Gary Hawke and Ralph Lattimore, Visionaries, Farmers and Markets: An Economic History of New Zealand Agriculture, Report to the Foundation for Research Science and Technology, Wellington, January 1999, pp. 1, 17.

188 Bay of Plenty Times, 13 December 1884, p. 2, 8 April 1885, p. 2; and, Taranaki Herald, 29 November 1884, p. 2.

189 Evans, History of Agriculture, pp. 5–7; Hawke and Lattimore, Visionaries, Farmers and Markets, pp. 1, 17; and, Sydney Morning Herald, 17 June 1912, p.11.
Cultivators thousands of years before New South Wales was discovered. These nations have nothing to learn from us with regard to petite culture and the utilisation of every possible source of fertility for the soil.\textsuperscript{190}

The growth of these industries supported the development of the market gardening industry. After World War II a range of artificial fertilisers were readily available, including superphosphates, sulphate of ammonia, sulphate of potash and nitrate of soda. More concentrated composite fertilisers, which required smaller quantities, were introduced in the 1960s.\textsuperscript{191}

In New Zealand blood and bone and bone dust were still being used well into the 1950s, in conjunction with sheep manure. In Otaki for example, Chinese gardeners obtained blood and bone and bone dust from the meat works in Wanganui and Wellington. Dow Chung, who grew up on his father’s market garden in Otaki in the 1940s and went on to become a market gardener himself, describes the laborious method of spreading fertiliser by hand:

Blood and bone was tipped into a four gallon tin and with the aid of a strap, the heavy tin was carried over our shoulders. We would grab out handfuls of manure and throw it around the plants.\textsuperscript{192}

Many Chinese market gardeners were willing to adapt their traditional gardening practices to the changing world around them and adopt more scientific approaches to horticulture. One was James Chung Gon, in Launceston. By the late 1940s, if not earlier, he was experimenting with artificial fertilisers and adopting scientific methods of soil analysis and the addition of trace elements. In 1953 the \textit{Mercury} newspaper in Hobart reported:

In addition to the high cost of labour, he is finding it more difficult to grow good crops on the garden because it is impossible to obtain adequate supplies of stable manure. Even artificial fertilisers, like blood and bone, are hard to obtain, he says, and they have

\textsuperscript{190} \textit{Advocate and the Emu Bay Times}, Tasmania, 5 November 1910, p. 7.
\textsuperscript{191} Thorpe \textit{et al.}, ‘Otaki’s market gardens’, p. 27.
\textsuperscript{192} Dow Chung, quoted in Lee and Lam, \textit{Sons of the Soil}, p. 167.
become extremely expensive … In recent seasons Mr Chung Gon has been experimenting with various types of artificial manures to replace the hundreds of cart-loads of stable manure that once were carted into the garden every month. He uses six tons of blood and bone, half a ton of ammonia and a quarter of a ton of potash every year. Latest tests have been with a special mixture of a dozen different trace elements.\textsuperscript{193}

**Pest control**

Chinese market gardeners in Australia and New Zealand continued their traditional methods of pest control, well into the twentieth century. For example, Esma Smith, who grew up in Forbes, New South Wales in the 1940s, remembers that her father walked up and down the rows of vegetables painstakingly collecting beetles in a small funnel-shaped wooden container. He would then pour hot water through it.\textsuperscript{194} This age-old Chinese method of hand picking was recommended in British pest control manuals distributed in Australia in the 1890s as the surest and most cost-effective method of controlling pests such as the caterpillars of cabbage moth.\textsuperscript{195}

Arsenic-based pesticides were developed in Europe and North America in the nineteenth century; they included Paris Green (a copper-based arsenate), London Purple and arsenate of lead.\textsuperscript{196} In fact arsenic-based pesticides had been known in China for centuries.\textsuperscript{197}

\textsuperscript{193} *Mercury*, Hobart, 28 July 1953, p. 12.
\textsuperscript{194} Esma Smith, interviewed by Rob Willis, 4 September 2009, Forbes, NSW, National Library of Australia, Voices of the Bush oral history project, ORAL TRC 6125/11.
\textsuperscript{195} Gaynor, *Harvest of the Suburbs*, p. 29.
\textsuperscript{196} In 1894 the Massachusetts Experiment Station published the results of trials of a new pesticide, arsenate of lead, developed as an alternative to the even more toxic Paris Green. These results were quickly reported in newspapers in New Zealand and Australia, indicative of the ongoing intellectual and scientific exchange between Australia, New Zealand and the United States in the late nineteenth century. For example, see *Otago Witness*, 11 October 1894, page 11; and, *Traralgon Record*, 9 November 1894, p. 15).
\textsuperscript{197} Arsenic-based pesticides were recorded in China as early as 900 AD. Lead arsenate, the most widely used of the arsenical insecticides, was first developed in the USA in 1892. It was widely used in Australia, Canada, New Zealand, the USA and England to control insect pests on fruit trees, garden crops and grasses. Although scientists were aware of the persistence of arsenate residues on produce from around 1919, no effective substitutes were found until 1947, when the synthetic organic insecticide DDT was introduced (Francis Peryea, ‘Historical use of lead arsenate insecticides, resulting soil contamination and implications for soil remediation’, Proceedings, 16th World Congress of Soil Science Montpellier, France, 20–26 August 1998, http://soils.tfrec.wsu.edu/leadhistory.htm, accessed 1 March 2012). See also E. Murphy and M. Aucott, ‘An assessment of the amounts of arsenical pesticides used historically in a geographical area’, *Science of the...
They were used by Chinese market gardeners in Australia and New Zealand, for example by James Chung Gon in Launceston, and were highly toxic to animals and humans. In 1935 a Chinese gardener in the Perth suburb of Osborne Park poisoned several head of cattle when he threw cabbage leaves over the fence of his garden onto a roadway. He had sprayed the cabbages heavily with arsenate of lead against pests and the passing cattle eagerly ate the pile of leaves, with fatal results.

Other methods of pest control used by Chinese and European gardeners included kerosene emulsion, tobacco dust and derris dust. Kerosene emulsion (a mix of kerosene, soap and water) was particularly effective for treating cabbage moth. In 1910 a correspondent to a Queensland newspaper reported:

A large grower, an up-to-date Chinese gardener, told me that he used nothing else on his cabbages, and that where the moth was plentiful he gave them regular sprayings until the plants got ahead of the pest.

Tobacco dust, a traditional remedy familiar to both European and Chinese gardeners, was widely used in the nineteenth century to combat aphids and thrips, although repeated applications were required for the treatment to be effective. Derris dust was developed in the 1930s in the United States as a less toxic alternative to arsenic-based insecticides, and after local testing, was in use in Australia by 1935 and in New Zealand by 1936.

In their recollections of the 1930s some European observers comment that Chinese

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Mercury, Hobart, 28 August 1942, p. 3.
Queenslander, Brisbane, 19 November 1910, p. 30.
Daily Telegraph, Napier, 1 November 1882, p. 4; and, Clarence and Richmond Examiner, Grafton, 28 September 1895, p. 5.
West Australian, 3 April 1935, p. 11; and, Evening Post, Wellington, 2 April 1936, p. 25. The active ingredient of derris dust is rotenone, a neurotoxin derived from the roots of several species of tropical plants. It is still popular today with organic gardeners for the control of caterpillars, aphids, thrips, and mites. It also has a long history of use as a fish poison (Pesticide Action Network, ‘Fact sheet: rotenone’, http://www.pan-uk.org/pestnews/Actives/rotenone.htm, accessed 5 March 2012).
market gardeners were conservative and reluctant to use any modern sprays, so that the quality of their produce was not as good as European or Italian producers. However, there is evidence that Chinese market gardeners adopted modern artificial pesticides while continuing to use more traditional methods. Chung Gon, for example, continued to use traditional methods to control white butterfly through to the 1940s, interplanting cabbages with lettuce. He sprayed young plants with arsenate of lead and treated more mature plants by dusting lightly with derris dust. He also used tobacco dust to control aphids. Another method he used to control the white cabbage butterfly was to place a lamp with a naked light in the garden at night; the pests would fly into the flame and get burnt. Drawing on his Chinese experience he also developed innovative methods of controlling pests. To protect the fruit in his orchard from birds he suspended large, slow-burning coils of incense from the trees with dozens of small fire crackers attached to them. As the spiral burned the crackers ignited and exploded, dropping into a tin drum on the ground below.

The use of artificial pesticides and herbicides expanded after World War II. In New Zealand they were widely used by the 1950s, for example by the Luen brothers on their 35 acre garden in Mangere. Wally Ha, who came to Australia in 1952 to work on his uncle’s market garden in La Perouse, recalls:

It was all manual work. It was cheap labour, £8 a week. We had to turn the soil by hand and carry water in two buckets hung from a pole over our shoulders. After several years we began to buy some machines, rotary hoes and sprays.

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203 For example, in Ryde, Sydney. Norman Boon, interviewed by Pauline Curby, 1998, City of Ryde Library Service.
204 Mercury, Hobart, 28 August 1942, p. 3. During the War years the Australian government’s Dig For Victory Campaign promoted the cultivation of fruit and vegetables by home gardeners and there was renewed interest in the techniques used by Chinese market gardeners.
206 Lee and Lam, Sons of the Soil, p. 390.
The pesticide industry supported the development of the market gardening industry, as market gardeners turned from traditional pest control methods to commercial products. Advertisements in the *Tung Wah Times* for arsenate of lead pesticides (manufactured by Coopers) and the less poisonous derris dust pesticides (marketed by McDougall Brothers under the brand name Katakillia) suggest that both products were still used by Chinese market gardeners in the 1930s. By the 1960s artificial pesticides and herbicides were widely used. Between 1962 and 1964 the Chinese language *New Zealand Chinese Growers’ Monthly Journal* included advertisements placed by Henry H. York and Co (for Folidol M50, a new organic phosphorous compound recently developed by Bayer in Germany); Ivory Spray Chemicals; Shell Agricultural Chemicals; and, Dow Chemicals International.

**New growing methods**

Particularly innovative and creative Chinese market gardeners kept abreast of the latest technological developments in Australia, New Zealand and overseas, as well as changing consumer tastes and the changing demands of food manufacturers. They experimented with new growing methods and crop varieties. One such leader in his own community was Alan Wing of Hawke’s Bay in New Zealand. In the 1940s he subscribed to the *English Growers Journal* and the *American Fruit Growers and Vegetable Growers* magazine produced by the UCLA (University of California Los Angeles). In the 1940s he was one of the first growers in Hawke’s Bay to import an English Rainer jet irrigation system and in the 1960s he seized the opportunity to experiment with growing lettuce on polythene, a new method developed in

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208 Gordon Ha still operates the family garden in Botany today.

208 It is interesting to note that debate over biological methods of pest control versus chemical methods arose in California in the 1880s, predating Rachel Carson’s indictment of DDT in *Silent Spring* by eighty years (Ian Tyrell, *True Gardens of the Gods: California – Australia Environmental Reform 1860–1930*, Berkeley, 1999, p. 174).

208 *Tung Wah Times*, 19 July 1930 p. 8 d; and, 5 September 1931, p. 8 c.

210 *New Zealand Chinese Growers’ Monthly Journal*, 1 January 1962, p. 3; 1 February 1962, p. 6; 1 August 1963, p. 2; 1 July 1964, p. 4; and, 1 August 1964, p. 3.
America only the year before. Alan recalls:

My most well known vege that I grew that made a name for itself … was lettuce. I grew them on polythene. I was the first one … . It would have been in the 1960s. I imported a ton of polythene … As a sideline these Americans wanted an agent to sell their polythene. The product was only a year old in America then. They were using it to grow lettuce. As soon as this guy came down from Auckland, they went and saw the auctioneer, Charlie Slater, in Hastings. They said to him, ‘Look, we’ve got a new product here. Do you know of any enterprising vegetable growers that would like to use polythene to grow lettuce on?’ Straight away the auctioneer said … ‘Alan Wing, go and see him’.211

Joe and Fay Gock, market gardeners in Mangere, were also innovators, entrepreneurs and community opinion leaders. During the 1960s they developed modern methods of growing kumara in hotbeds. With the assistance of the Department of Industrial and Scientific Research they developed a temperature controlled kumara storage and curing shed which extended the length of time the crop could be stored and dramatically reduced losses.212 Innovation and developing new product to meet changing consumer demands has become even more important with the changes in the market gardening industry over the last two decades and the rise of large supermarket chains.213

**Seeds and new crop varieties**

In seeds lay the germ of market gardeners’ hopes and their future prosperity. Chinese market gardeners introduced Chinese plant species to Australia and New Zealand, applied their intensive horticultural methods to European crops and developed new crop varieties. Many new immigrants, both European and Chinese, brought the seeds of trees, flowers and

211 Alan Wing, interviewed by Lily Lee, 22 February 2007, recording held by interviewer.
212 Lee and Lam, *Sons of the Soil* pp. 412–13. Kumara are difficult to store, requiring warm, well ventilated conditions. Any cuts or scratches sustained during harvesting can allow a host of fungal and bacterial diseases to enter, unless the kumara are cured by exposing them to high temperatures and high humidity for several days (Helen Leach, *1,000 Years of Gardening in New Zealand*, Auckland, Wellington, 1984, p. 59).
vegetables with them to New Zealand and Australia. Keeping fragile plants and seeds viable on long ocean voyages was a challenge. Horticulturalists and nurserymen recommended various means of packaging and storing them, and often disappointed settlers found that they had not survived the journey.\textsuperscript{214} Stored in the poorly ventilated holds of ships, they often succumbed to mould or were eaten by rats.\textsuperscript{215} Dawson documents the failures and also the spectacular successes which pioneer gardeners in New Zealand reported in their letters home as well as their requests for seeds. Settlers exchanged seeds, cuttings and plants, and immigrant gardeners established nurseries.\textsuperscript{216} Similarly, Paul Fox documents the key role which the burgeoning plant trade between Britain and Australia, conducted by nurserymen on both sides of the globe, played in refashioning the Australian landscape as it introduced exotic flora from around the world.\textsuperscript{217}

The Chinese entrepreneurs who first established market gardens on the goldfields in Australia and New Zealand in the 1860s brought seeds with them from China or obtained them through local Chinese merchants. In 1864 a correspondent to the \textit{South Australian Advertiser} in Adelaide wrote an account of the vegetables imported from China by Chinese who settled in Victoria, which included varieties of Chinese cabbage, melon seeds and fresh ginger. The most popular vegetables were varieties of the \textit{Thornea} family, which he noted were available in Melbourne and could be grown successfully from seed in the Victorian climate:

There are several varieties resembling turnips, but ribbed like a sweet melon (\textit{Thornea Battatas}), and weighing from half a pound to three pounds, sweet taste, and good either roast or boiled, and highly nutritious. Another variety resembles in form beetroot or wurtsel, weighs two to three pounds, and being very palatable is often used raw; the

\textsuperscript{214} \textit{Ibid.}, pp. 126–9.
\textsuperscript{215} Dawson, \textit{History of Gardening}, pp. 126, 129.
\textsuperscript{216} Ibid., pp. 103–5, 117–8.
flavor is that of the sweet chestnut. The mode of propagation is from seed.\textsuperscript{218}

The correspondent noted he had tried unsuccessfully to grow varieties of *Thornlea* from roots. Although they produced vigorous runners, the frost destroyed them before they bore seed.\textsuperscript{219}

Chinese gardeners in New Zealand also imported the seeds of Chinese vegetables direct from China, as evidenced by an incident reported by Alexander Don. In 1883 he met a Chinese man *en route* to the Round Hill goldfields from Riverton who was carrying a sack of turnip seed. He told Don that he had imported the seed from China because he considered it was better than the local variety.\textsuperscript{220}

Chinese market gardeners quickly turned to growing a wide variety of European vegetables for the European market and commercial nurseries supplied them with seed. Seed and plant nurseries became a burgeoning industry in Australia and New Zealand from the mid-nineteenth century, as plants and seeds from around the globe were propagated in the British colonies.\textsuperscript{221} In New Zealand, there were four nurserymen in Dunedin by 1850 and many others established businesses in Christchurch, Wellington and Auckland over the next decade.\textsuperscript{222}

They imported exotic species from Asia as well as the familiar European vegetables and fruit which formed an essential part of new settlers’ diets. James Beattie and John Adam document the wide range of plants from Asia that came into New Zealand, highlighting the polyglot, multicultural nature of the British Empire and the complex circulation of ideas, people, goods and plants between continents. As Beattie notes, little has been written about the important role of Chinese immigrants in introducing gardening practices and plants from their

\textsuperscript{218} *South Australian Advertiser*, Adelaide, 8 October 1864, p. 2.
\textsuperscript{219} Melon seed, a popular ingredient in Chinese cooking, was imported in large quantities but was kiln dried before being exported, so would not germinate (*ibid.*).
\textsuperscript{221} The Wardian case, a miniature greenhouse similar to a modern terrarium, was invented in England around 1829 by Dr Nathaniel Ward. It revolutionised the transport of plants around the globe (*Fox, Clearings*, p. xv).
\textsuperscript{222} Dawson, *History of Gardening*, p. 120.
In her study of gardening on the Victorian goldfields, Suzanne Hunt explores the transmission of the latest ideas in gardening through magazines, newspapers, journals and books as well as the establishment of horticultural and acclimatisation societies. As they did in New Zealand, these societies were arbiters of taste and fashion and promoted the moral, social and health benefits of gardening and the development of civic pride through the establishment of public parks and gardens. Colonial nurserymen were at the forefront of experimentation in what plants could be grown in different climatic zones in Australia and New Zealand. They also saw the opportunity for marketing their products to Chinese gardeners. One was the entrepreneurial nurseryman Thomas Lang of Ballarat, who imported a million plants into Victoria between 1858 and 1870. Quick to capitalise on the commercial possibilities of the expanding goldfields towns, Lang imported seeds from as far afield as the Himalayas and Shanghai. He prominently displayed the seeds he imported from China in the window of his Ballarat store with Chinese labels. To entice his customers, Lang offered them a few free seeds of exotic varieties such as Portugal black melon, early sugar melon, Persian melon and red and black fleshed Maltese melon. As Hunt observes, Lang probably imported seeds from China to supply Chinese market gardeners with familiar plants and herbs to cater for the large

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226 Fox, Clearings, p. 43; and, Hunt, ‘Vegetable plots and pleasure gardens’, pp. 270–1.
Chinese population in the Ballarat region. Chinese merchants also played their part in introducing Chinese plant species. In northern Australia a wide range of the subtropical fruit and vegetables familiar to immigrants from southern China could easily be cultivated and there was a significant trade in seeds and preserved foodstuffs. Eddie Quong grew up on his parents’ market garden in Pine Creek in the Northern Territory which his grandparents, newly arrived from China, had established in the late-1880s or early-1890s. They grew rice, fruit and vegetables, including Chinese vegetables to supply the large Chinese population in the Territory. Quong recalls that his grandmother did not bring vegetable seeds with her, but they could easily be obtained from China. At that time there were frequent shipping services between Hong Kong and Darwin, and constant contacts between Chinese people living on the coast and those living inland at Pine Creek. He highlights his grandparents’ horticultural skills:

They used to grow their own vegetables and the Chinese from Kwangtung [Guangdong] province, they were experts. And my grandmother always used to say that as a little girl she was always growing vegetables, and knew exactly how vegetables were grown.  

Farmers have been modifying the genetic makeup of the crops they grow for thousands of years by selecting for traits such as higher yield, faster growth and resistance to disease and pests. To economise many Chinese market gardeners continued to collect seeds from their own plants in addition to purchasing them from commercial seed suppliers. In New Zealand in the 1930s, Alice and Percy Lee for example enlisted their children to collect seed from their 11 acre market garden in Christchurch. George Sue, who grew up in a market gardening family in Otaki in the 1940s, recalls that Chinese market gardeners saved the seeds from their plants,

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228 Eddie Quong, interviewed by Diana Geise, 1993, National Library of Australia, TRC 3005.
particularly the seeds of the Chinese vegetables which they grew for their own consumption. Only a few varieties of Chinese vegetables could be grown in the New Zealand climate, and with the political upheavals taking place in China in the 1930s and 1940s imported seeds were difficult to obtain.\textsuperscript{230} In the 1950s, before modern hybridized seeds were widely available, many gardeners were secretive about their own seed varieties. Percy Luen of Luen Bros market garden in Mangere recalls:

\begin{quote}
It would not be protocol to ask a fellow grower where they got a certain variety of seed from … To keep the strain of seed exclusive to themselves, most gardeners saved the seeds of crops that had performed well.\textsuperscript{231}
\end{quote}

Lowe Ling Sing, who ran a market garden in Greytown in the Wairarapa district in the 1940s, still saved his own seed but also bought seeds from Arthur Yates and Te Aro Seeds in Wellington.\textsuperscript{232} In the early-twentieth century in Perth, Chinese market gardeners obtained seeds from local seed merchants and from China. Rural and metropolitan gardeners in Western Australia also exchanged seeds from their own plants; the change of soil and climate was thought to benefit seed strains.\textsuperscript{233}

By the late-nineteenth century seed merchants were large business enterprises. Carters and Suttons in London for example, targeted intending migrants to the colonies. In Australia and New Zealand, Yates marketed the latest varieties of plants suitable for local conditions and published artistically designed mail order catalogues and gardening guides.\textsuperscript{234} Entrepreneurial Chinese businessmen also saw the commercial opportunities for supplying their market

\textsuperscript{230} George Sue, interviewed by Joanna Boileau, Auckland, 7 April 2012.
\textsuperscript{231} Lee and Lam, \textit{Sons of the Soil}, p. 390.
\textsuperscript{232} \textit{Ibid.}, p. 144.
\textsuperscript{233} Atkinson, ‘Chinese market gardening’, p. 47.
gardening compatriots with seed. Chan Moon Ting (also known as James Chin Ting), who emigrated to New Zealand with his two brothers in 1886 and ran a general store in Wellington, established the Te Aro Seed Company in 1913 in partnership with Yee Chong Wing. They later established a nursery and large glasshouse in nearby Hataitai where they propagated a wide variety of seedlings. Ting was active in the local Chinese community and as his company grew sales representatives travelled around the country advising Chinese market gardeners on the latest seed varieties and taking orders. The decorative cover of their 1949–50 Garden Annual (Figure 4.12) has a distinctively Chinese feel, showing a young Chinese girl with sprays of spring blossom behind her. The cover also displays the green and yellow logo of the New Zealand Horticultural Trades Association.

Commercial advertising provides an indication of the potential market for seeds among Chinese gardeners. Seed merchants in Australia and New Zealand were aware of the importance of Chinese in the market gardening industry and placed advertisements in Chinese language newspapers, despite their relatively small circulation. However, it is difficult to determine the level of response to such advertising, which would have been linked to Chinese gardeners’ level of literacy in Chinese. In the early 1900s in Sydney, seed merchants Anderson & Co. and George Austen & Co. employed a translator to write to Chinese gardeners and advertised in the Chinese Australian Herald. Seed merchants also advertised regularly in the Tung Wah Times from 1899, particularly between 1917 and 1927. In New Zealand, the seed merchant R. A. Nicol advertised regularly in the Man Sing Times, published only from

235 The Te Aro seed company continued trading until the late 1950s; Ting’s sons George, Arthur and Leslie took over the business after he retired (Lee and Lam, Sons of the Soil, pp. 123, 277).
1921 to 1922. A number of seed merchants advertised in the *New Zealand Chinese Growers’ Monthly Journal* from its inception in 1949. Te Aro Seeds Ltd, trading as Yee Chong Wing & Co, was the most frequent advertiser.

![Figure 4.12: Cover of Te Aro Seeds Limited Garden Annual, 1949–1950.](image)

Individual Chinese market gardeners also played an important role in improving plant varieties through breeding. In New Zealand in the 1950s, for example, Peter Lee’s father Lee Bak Yew, a market gardener in Oamaru, developed his own seed stock from a single pod of Brussels sprouts. The seeds were originally from the Suttons variety ‘Full Basket’, imported

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238 R. A. Nicol Seeds Merchant, advertisements in *Man Sing Times*, 22 August 1921, p. 26b; 31 August 1921, p. 20d; 12 September 1921, p. 25; and, 21 September 1921, p. 18b.
from England, but Peter believes his father’s variety was better adapted to local conditions and superior in flavour.\(^{241}\) In the late 1950s Joe and Fay Gock in Mangere experimented with growing seedless watermelons for the summer market. After reading that seedless watermelons had already been developed in America, they obtained seed and successfully developed their own variety suited to New Zealand growing conditions.\(^{242}\)

![Bilingual advertisement for F. M. Winstone Seeds, New Zealand Chinese Growers’ Monthly Journal, 1951.\(^{243}\)](image)

Sometimes market gardeners worked with the food processing industry or government horticultural research bodies. During the 1950s, in cooperation with canning firm Watties, Alan Wing experimented with growing over one hundred different varieties of cauliflower in Hawke’s Bay. He was in search of the variety that was the fastest maturing and best adapted to local conditions. Alan recalls his conversation with the Watties representative:

I said, I want you to import for me, all the cauliflower seeds of the world - for that one year, so there is no repetition. He got me over 100 varieties of cauliflower. Only two ounces of each. I wanted it for research … He said ‘we like people like you’. I grew them all and found the right variety for Watties. That’s the only way. The cauliflowers,

\(^{241}\) Lee and Lam, *Sons of the Soil*, p. 75.
from sowing the seed, to planting out, to harvesting, took 84 days. That’s the fastest timing that I needed because he was processing asparagus. The cauliflower variety was all year round. Was a French variety … Not English. … That’s research for you.244

Two other innovators and community leaders were Albert Young and Poy Young, who were initially partners in a market garden and store in Napier in the 1930s, Loo Kee and Co, and in 1944 established separate enterprises. Albert Young established a thriving market garden of 30 to 40 acres at nearby Bay View with other partners, supplying the Napier store and the Wellington market with vegetables and Watties with tomatoes for sauce. Albert had a commanding personality. He was well respected in the Chinese community and was always ready to offer advice and encouragement to his compatriots.245 Poy Young established a 30 acre garden at Bay View with his wife. He gained a reputation for the quality of his produce and set the standard for other growers. Brian Young, the son of Albert Young, recalls:

Poy Young was number one by a mile … They were known around here as a top grower.
Poy Young was a visionary. He was one of the first to purchase and use a tractor-driven rotary hoe. He was the first to experiment with Brussels sprouts in the Hawke’s Bay. They were early in the season and grown from 1958.246

Built Structures

Built structures are another aspect of Chinese market gardening which developed over time, mirroring technological and economic changes. As Chinese market gardeners prospered and adopted technological developments, they made improvements to their accommodation and built additional structures to house horses and store carts, fertilisers, pumps and other farm equipment. From the earliest years of Chinese market gardening in Australia, there was a range of built structures on gardens, including underground cellars for storing produce, the precursors of twentieth century cool rooms. An 1863 account of a Chinese market garden on

244 Alan Wing, interviewed by Lily Lee, 22 February 2007, quoted in Lee and Lam, Sons of the Soil, p. 247.
245 Lee and Lam, Sons of the Soil, p. 250.
246 Brian Young, interviewed by Lily Lee, 12 October 2006, quoted in Lee and Lam, Sons of the Soil, p. 254.
the Loddon River in Victoria describes the accompanying structures.

On entering the garden the visitor’s attention is first attracted by the odd look of the quadrangle in which he finds himself. One side is formed by the most comfortable looking stable, hay store and pigsty; another by the dwelling house and bedrooms of the Chinese; the other two by the fencing of the garden. In the yard is a cellar for the preservation of cut vegetables, and a large piece of land is covered in with branches laid on poles which serve as a sort of arbour under which the owners appear to dine.\textsuperscript{247}

In Lyall in Victoria, land records show that in 1891 Ah Que took over the license for a 1 acre garden on Myrtle Creek from Ah Quong, a relative who was returning to China. In 1907 a Land Department report listed the improvements Ah Que had made to his land; they included a mud and stone hut with bark roof, stables, a fowl house, small kitchen and fencing around the site.\textsuperscript{248} Gardeners made use of whatever building materials were available. Eardley and Eileen Gifford describe the functional cottages erected for the workers on Chinese market gardens in the St George district in Sydney, ‘built without levels or plumb lines, always in a glorious higgledly piggledy fashion’. Tree trunks were used for uprights, galvanised iron sheets for walls and roof, and the small windows were covered with chaff bags nailed along the lintel, keeping out flies and mosquitoes.\textsuperscript{249}

In Camden, west of Sydney, Colleen Morris documents the development of part of the property originally owned by James Ruse which was occupied by Chinese market gardeners from the 1880s until the 1920s. In 1893 their single dwelling consisted of one large room with a verandah along one side with an adjacent galvanised iron toilet. By 1912 a second dwelling, cart shed and stable had been erected at the southern end of the garden.\textsuperscript{250} Similarly, in her

\textsuperscript{247} Inglewood Advertiser, December 1863, quoted in David Horsfall, \textit{March to Big Gold Mountain}, Melbourne, 1985, p. 12.
\textsuperscript{248} Ken James, \textit{Chinese Miners and Market Gardeners of Lyall and Myrtle Creek, Central Victoria}, Camberwell, 2005, p. 36.
\textsuperscript{250} Morris, ‘Chinese market gardens in Sydney’, pp. 5–6.
history of market gardening in Melbourne, Joanne Monk notes the growing number of built structures on gardens and the use of corrugated iron on buildings and sheds from the 1920s.\textsuperscript{251} The photograph in Figure 4.14, taken between 1910 and 1919, shows the dwellings and outhouses on a Chinese market garden in Melbourne.

![Figure 4.14](image.png)

\textbf{Figure 4.14:} Dwelling and sheds on a Chinese market garden in Hawthorn, Melbourne, c. 1910–1919. Believed to have been in the Urquart Estate. Watering cans and gardening implements are visible in the foreground.\textsuperscript{252}

Larger, more prosperous market gardening operations had more capital to develop infrastructure, including accommodation for workers. Ming Quong, a successful entrepreneur in Auckland in the late 1880s and 1890s, leased a 22 acre portion of the Epsom farm of the prominent businessman John Logan Campbell as a market garden. He also had a house and 23 acres of land in Surrey Crescent closer to the city where a number of his kinsmen lived and worked. The latter property included 18 acres of vegetable crops and 5 acres of orchard. In

\begin{flushleft}
\end{flushleft}
1894 he advertised his market garden in Surrey Crescent for lease and listed the infrastructure associated with his enterprise. It included: ‘a good 5 roomed house, with cow shed, stables, piggeries, outbuildings etc’ and he even had town water and a telephone laid on. From 1895 Quong operated a grocery and fruiterer business in the city.

In New Zealand the accommodation needs on market gardens changed from the late 1930s as wives and children were allowed to enter the country and the structure of market gardening enterprises began to change from all male partnerships to family-run businesses. For example, Norman Yee and his cousin George Tong established a market garden near Oamaru in the 1930s. After their wives and children arrived from China in the late 1940s and early 1950s the cousins established separate family businesses. By the 1960s the buildings on Norman Yee’s garden included the family house, several storage sheds, bunkhouses for the workers and a separate kitchen-dining room. James Ng describes the buildings on the King Brothers market garden in Ashburton which was established in 1892 and operated until around 1966. After the families of the nine partners in the business, most of whom were related, arrived in New Zealand the cooperative business structure of the firm was maintained. By the 1950s there was a small village on the 150 acre garden, including several cottages, numerous sheds housing a communal kitchen, dining room, wash room and additional bedrooms, as well as a workshop and a garage to house a truck and a car.

Glasshouses and cool rooms came into use between the wars. There is evidence that Chinese market gardeners in the Melbourne suburb of Hawthorn and also in Otaki in New Zealand raised seedlings under glass in the early 1900s. Among the earliest market

253 Auckland Star, 10 April 1894, p. 8.
254 Lee and Lam, Sons of the Soil, pp. 324–5.
255 Ibid., pp. 67–8.
257 Sandra Pullman, 'Along Melbourne's rivers and creeks', Australian Garden History, Vol. 12, No. 5, 279
gardeners in New Zealand to establish a full-scale glasshouse was Joe Ah Chan, who established a market garden in Thames in 1923 with his wife and family, and grew glasshouse tomatoes.\(^{258}\) In Christchurch in the 1930s, Alice and Percy Lee had five glasshouses where Alice raised seedlings for planting out. The glasshouses were heated by coal fires which meant hard work for Percy and their older boys lugging sacks of coal.\(^{259}\) Glasshouses were a particular asset in the colder climate of the South Island, extending the growing season of many crops. In the 1930s Chinese growers in Greymouth (William Young), Oamaru (Young Sai Kit) and Christchurch (Alice and Percy Lee) were all growing tomatoes, lettuce and spinach in glasshouses in addition to outdoor crops.\(^{260}\) In the North Island, Lee Oy Ling was one of the first Chinese growers in Mangere to establish a glasshouse where he grew large quantities of tomatoes and beans from the late 1930s.\(^{261}\)

From the mid-1950s commercial glasshouse production of tomatoes and to a lesser extent cucumbers, beans and lettuce became an important feature of the horticultural industry in New Zealand. This had traditionally been the preserve of Europeans, but an increasing number of Chinese growers took up glasshouse growing, for example in Oamaru, Christchurch, Lower Hutt and Otaki.\(^{262}\) In Auckland glasshouses with automatic heating and watering systems became popular as Chinese growers came under increasing pressure from residential and industrial development and intensified their operations.\(^{263}\) This mode of production promised higher returns per acre and was suited to the small size of landholdings, for example in Mangere, Avondale, Onehunga and Otahuhu.\(^{264}\) Lee and Lam note that many of

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\(^{258}\) March/April 2001, p. 9; and, Thorpe et al., ‘Otaki’s market gardens’, p. 27.

\(^{259}\) Lee and Lam, *Sons of the Soil*, p. 310.


\(^{261}\) Lee and Lam, *Sons of the Soil*, pp. 37, 68, 97.


\(^{263}\) Lee and Lam, *Sons of the Soil*, pp. 68, 70, 73, 81, 96–7, 129, 159.


\(^{264}\) Lee and Lam, *Sons of the Soil*, pp. 341, 358–60.
the Chinese growers who took up glasshouse growing from the early 1960s such as Harry Luen, George and Percy Luen, Jack Chong, Poy Lee and Sherman Lowe were young men, a second generation of growers who were educated in New Zealand and quickly gained the scientific and technical knowledge required to grow under glass.265

While glasshouses reduced labour costs they represented a considerable capital investment. They were also expensive to run and subject to rising fuel costs, whether coal in the earlier years or later diesel or electricity. Some growers, for example Peter Lee in Oamaru, gave up heating their glasshouses, planting later in the season to avoid the initial frosts.266 Andrew Lum, a second generation grower who grew up on his family’s garden in Panmure in the 1940s and 50s and later established his own garden in Kumeu, states that he decided not to grow lettuces hydroponically in glasshouses as the set up costs were too great for him to make the change to glasshouse growing.267

A significant adaptation of traditional Chinese horticultural practices in Australia and New Zealand was the fencing of plots. As noted in Chapter Two, in southern China garden plots were generally unfenced. Animals were abundant in towns and cities in the late-nineteenth and early-twentieth centuries; most obviously fences kept out grazing animals, which could destroy crops. Fences were constructed of whatever materials were available, including timber posts and rails or wooden palings.268 Live hedges, although popular with Europeans, particularly in more temperate climates in New Zealand and southern Australia, do not appear to be a feature of Chinese

265 Ibid., p. 403.
266 Peter Lee interviewed by Lily Lee, 11 March 2008, quoted in Lee and Lam, Sons of the Soil, p. 81.
267 Lee and Lam, Sons of the Soil, p. 425.
268 For example, a brush fence made of wire and thistle around a Chinese market garden was reported in New Zealand (Tuapeka Times, 26 September 1874, p. 2). Post and rail or paling fences around Chinese market gardens were reported in Perth, Melbourne and Gilgumnia, NSW (Western Australian, Perth, 30 March 1898, p. 2; North Melbourne Advertiser, 4 August 1882, p. 3; and, Alderdice, Gilgumnia, p. 27). In New Zealand post and rail fences were reported in Auckland and Lower Hutt (Auckland Star, 8 March 1889, p. 2; 3 October 1890, p. 3).
market gardens. Often fences were ineffective barriers. Contemporary newspapers regularly report cows, sheep or chickens breaking into the plots of Chinese market gardeners and destroying their crops. From the late-nineteenth century, barbed wire was used as a cheap and effective barrier. In Perth in 1912 a correspondent to the West Australian complained that an unnamed Chinese market gardener in Maylands had erected a 6 foot high fence made of ‘eleven strands of torture inflicting barbed wire’ around his garden, making access along the narrow street dangerous.

The first Chinese arrivals on the Victorian goldfields staked out their claims and surrounded their dwellings and gardens with protective fences. A rare insight into the world of early Chinese immigrants to Australia is the autobiography of Ah Siug Jong, a miner on the central Victorian goldfields from the mid-1850s. It includes a map and detailed description of his tent and garden on the diggings, which was surrounded by a bark fence.

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269 In 1897 for example, Ah Tip’s ‘splendid’ 8 acre garden in Coburg was destroyed by a flock of 400 starving sheep which broke though the wire fence. The drover was later charged with allowing the sheep to trespass and not allowing them to graze sufficiently while on the road (Mildura Cultivator, 7 August 1897, p. 2; and, Argus, Melbourne, 15 September 1897, p. 5).

270 Barbed wire fences around Chinese market gardens were reported in Victoria in 1897 and 1907 (Argus, Melbourne, 15 September 1897, p. 5; and, Camperdown Chronicle, 14 November, 1907, p. 6); in Perth in 1912 and 1928 (West Australian, Perth, 28 November 1912, p. 8; and, 2 November 1928, p. 18); and, in Rockhampton, Queensland in 1943 (Morning Bulletin, Rockhampton, 19 January 1943, p. 4). Barbed wire was invented independently in France and America in the 1860s. In America, numerous patents had been taken out by 1867 and between 1873 and 1899, companies manufacturing barbed wire proliferated (Allen Knell, The Devil’s Rope: A Cultural History of Barbed Wire, London, Reaktion Books, 2002, pp. 16–19). Barbed wire was imported to Australia and New Zealand from America from the late 1870s (Brisbane Courier, 2 May 1878, p. 4; and, Otago Witness, Dunedin, 21 July 1877, p. 13).


272 Born in Canton around 1837, Ah Siug Jong arrived in Victoria in 1855. By 1867 he was living in the Avoca district, where he was involved in a fracas with other Chinese miners and charged with assault. He was found to be of unsound mind and detained in mental asylums for over twenty years. He died in Sunbury Asylum in October 1900. His reminiscences, both a personal exoneration and a plea for justice, were written from 1872 while he was incarcerated in a lunatic hospital in Yarra Bend (Ruth Moore and John Tully, Introduction, in Ah Siug Jong, A Difficult Case: An Autobiography of a Chinese Miner on the Central Victorian Goldfields, Daylesford, 2000, pp. 1–4).

273 The accuracy of this map has been demonstrated. Ruth Moore and John Tully located the site of Jong’s dwelling to within three or four metres, and also the remains of the chimney and cook houses as marked on his map (ibid., pp. 136–8).
Figure 4.15: Plan of tents and gardens on the Andersons Hill diggings, Victoria, late 1860s, drawn by Ah Siug Jong.274

Jong’s plan (Figure 4.15) shows a complex of five tents, with a narrow walkway between them and three separate cook houses. There are two small gardens adjacent to the tents in the upper part of the complex and a larger garden in the lower right hand corner, probably communal. Jong marks the location of furniture (beds, tables, storage boxes for clothes and tools, and even the ‘piss pot’ in the yard) and the activities carried out in different spaces. The whole complex is surrounded by what appears to be a fence and a front gate is clearly marked. A notation along the right hand side reads ‘door lock up’, an indication of the

274 Ah Siug Jong, Diary, State Library of Victoria, p. 6 [original ms. 1866-72].
occupants’ concern for security. Jong describes in detail his own dwelling and garden:

Tent 3 piece calico, 6 yds long, 3 yds wide, walls 2 yds high. Front yard 1 perch [c. 5m] long, about 4 yds wide. Side garden 6 yds long and 2 yds wide [c. 6m by 2m], with a door. Here I built house for fowls. I liked living there and made a garden. I made the garden in August 1866 and by October 1866 I had melons and vegetables growing. The garden fence was made of bark.

The division of spaces in this tent complex is designed to meet the needs of single men in the often hostile environment of the goldfields, with its surrounding fence, open courtyard spaces for communal activities and individual tents for sleeping, storage of personal effects and to meet needs for privacy. It represents an adaptation of the traditional layout of houses in southern China which were designed to meet the needs of extended family units. Typically these comprised a series of rooms for sleeping, storage, and cooking opening onto a central courtyard used for communal activities. The narrow laneways between houses were also used for communal activities.

CONCLUSION

As Frost has observed in Australia, Chinese agriculture was complex and dynamic. The skills of Chinese immigrants lay not only in the transfer of agricultural techniques from China but in their entrepreneurship and innovation, adapting their techniques to the Australian environment. This chapter has shown how Chinese market gardening underwent technological change and adaptation from the time the first Chinese gold miners in Australia and New Zealand began to grow crops commercially to supplement their incomes. It has

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275 Ibid., pp. 67–9.
explored the complex interplay between the continuity of traditional Chinese horticultural practices and the adaptation of these technologies to new social and environmental conditions.

There was considerable continuity in Chinese horticultural practices in Australia and New Zealand, which involved a high degree of manual labour and limited application of mechanisation due to the small size of plots, intensive cultivation methods and the wide variety of crops grown. However, Chinese market gardeners adapted their traditional horticultural techniques to new environments and markets and adopted European technological developments which were appropriate to the scale and work organisation of their enterprises. These were both process and product innovations, including steam and petrol powered irrigation pumps, motor vehicles and tractors as well as commercially produced fertilisers, pesticides and improved seed varieties.

The factors influencing the take up of technology are complex and interrelated. They included social and economic factors, in particular the desire to maintain links with kin and home village in China and the obligation to support family members financially. Other factors were the high capital cost of equipment such as pumps, irrigation systems, motor vehicles, tractors and greenhouses; the scale and financial success of market gardening enterprises; and, fluctuations in the supply of labour on gardens, mainly in response to changing government immigration policies.

The evidence presented in this chapter challenges the stereotype of Chinese market gardeners as conservative peasants resistant to change. It highlights the role of particularly innovative and entrepreneurial market gardeners as change agents within the Chinese community as they modified existing technology, experimented with new crop varieties and growing techniques and passed on their practical experience to others. Commercial firms such as agricultural equipment manufacturers and seed merchants played an important part in the diffusion of ideas and innovation, for example by employing Chinese salespeople, advertising
in Chinese language media and holding field demonstrations. The food processing and produce marketing industries also played a key role, acting as intermediaries between growers and changing consumer demands.

Thus, a detailed study of Chinese market gardening demonstrates that technology transfer is not a simple unidirectional process. Rather, it involves a complex interaction between migrants and the technologies of the host country. Supportive industries were crucial in supplying the raw materials or production inputs required for market gardening, including manure, fertilisers and pesticides, seeds and mechanical equipment such as pumps, irrigation plant and cultivation tools. Technological developments in transport facilities, in particular the expansion of railways and tramways, were also crucial in expanding the market reach of market gardeners. Technological change is also shaped by social forces. The role of the social environment in the history of Chinese market gardening in Australia and New Zealand is examined in the following chapter.
CHAPTER 5

THE SOCIAL ENVIRONMENT

Now, mark the inconsistency of the superior races. The voice of numerous mass meetings has quite recently called out loudly against patronising the Chinese in any shape or form; but immediately upon the Chinese adopting the resolution of keeping back their vegetables, murmurs and complaints arise in every direction.

*Burra Record*, 29 July 1881, p. 3.

An understanding of the changing social environments within which Chinese market gardening operated is integral to a fuller understanding of its development in Australia and New Zealand. Such an approach is evident in recent studies in technology transfer that see technological change as emerging from specific historical contexts and shaped not only by economic and technological constraints and incentives, but also the social environment. This includes social relations, cultural values, political institutions and organisational structures.\(^1\)

This chapter explores the social environment within which Chinese market gardening developed and flourished in Australia and New Zealand from the mid-nineteenth century and the ways in which it provided opportunities and imposed constraints upon Chinese market gardeners. A key analytical framework for interpreting the impact of the social environment is that of social capital. The chapter begins by teasing out the relevant aspects of technology transfer and social capital, especially the concepts of bonding and bridging social capital which provide the organising features of the chapter. The second section focuses on bonding social capital, the ties within social groups which bring people together and mobilise solidarity. It explores the social networks between market gardeners and their compatriots both in China and within the overseas Chinese communities in Australia and New Zealand. The third section discusses bridging social capital, the ties which bring people together across

diverse social divisions, breaking down barriers of language, culture and ethnicity. It explores the varied social relationships that developed between Chinese market gardeners and the predominantly European communities in which they lived, and how these relationships had both positive and negative impacts upon their lives.

TECHNOLOGY TRANSFER AND SOCIAL CAPITAL

In her study of technology transfer in colonial Australia Jan Todd highlights the social aspects of the recipient economy. She interprets the cultural and social milieu of Australia as a filter, acting as a gatekeeper in determining the success or otherwise of imported technologies.\(^2\) Similarly, in his study of migrant communities in rural Australia, Bruce Missingham argues that while cultural values and traditional skills are important resources, they must be understood within the context of social factors including distribution of wealth and economic opportunity, class and inequality. He emphasises the important role of community networks in migrant settlement and suggests that the concept of social capital, with its networks of reciprocity and trust, can improve our understanding of the role of social relationships within and beyond ethnic communities.\(^3\) Archaeological theorists also highlight the importance of the social environment in cultural and technological change. Stephen Mithen, for example, argues that the role of social interaction and cooperation in cultural change is too often downplayed, and conflict and competition overemphasised.\(^4\)

This chapter applies these understandings, in particular the concept of social capital, to the histories of Chinese market gardeners in Australia and New Zealand. While the concept of social capital is multidimensional and highly context specific, lending itself to multiple

definitions, in broad terms it is a way of conceptualising the resources of community, shared values and trust which we draw on in our daily lives.\(^5\) What most definitions have in common is a concern with the value of social networks, bonding similar groups of people and bridging between diverse groups of people with norms of trust and reciprocity.\(^6\) The distinction between bonding and bridging social capital has particular relevance to this discussion of the relations between Chinese market gardeners in Australia and New Zealand, their kin and native place in China, the overseas Chinese community and the host societies in which they lived.\(^7\)

Also of relevance is the view that social capital can be used for both positive and negative ends. As John Field, Paul Dekker and Eric Uslaner observe, some forms of civic engagement, such as the activities of gangs or demonstrations arising from political discontent or intolerance of diversity may have negative consequences, both intentional and unintentional.\(^8\)

**BONDING SOCIAL CAPITAL**

Intricate social networks developed between market gardeners and their compatriots, in China and within the overseas Chinese communities in Australia and New Zealand. These networks helped to sustain bonds of kinship and native place, and through processes of chain migration they ensured the continuity of Chinese culture, language and horticultural skills across the generations. They therefore supported the transfer of knowledge and technology across national borders, between market gardeners settled overseas and between generations.

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\(^7\) Bonding social capital refers to the diverse multifunctional ties that develop within social groups, for example within under-resourced minority groups in response to poverty or discrimination; and, bridging social capital to social networks that create links between diverse groups within a society (Jenny Onyx and Paul Bullen, ‘The different faces of social capital in NSW Australia’ in Dekker and Uslaner (eds), *Social Capital*, p. 46; Claridge, ‘Definitions of social capital’; and, Field, *Social Capital*, pp. 32–3).
These networks also helped Chinese market gardeners build their businesses and negotiate their relationships with the wider community. At the same time, there were also divisions and tensions within the Chinese community; like any social group Chinese people had their disputes.

**Chinese market gardeners and their homeland**

After the gold mining era, market gardening provided an opportunity for a more settled existence and a base for continued chain migration supplying additional labour for gardens. However, Alexander Don’s *Roll of Chinese* demonstrates that market gardeners remained highly mobile, moving within New Zealand and making return visits to China to visit family and often to marry. In the 1920s and 1930s, once families had become established overseas, the younger generation were often sent back to China to receive an education in their native language and culture. This was also an opportunity to find wives for overseas-born sons. These ongoing contacts and experiences were an important avenue for maintaining Chinese traditions and transferring skills from one generation to the next. The overseas Chinese who returned to their home villages conveyed news and information about opportunities overseas, and some of those who returned to Australia or New Zealand with a Chinese education became invaluable community leaders. One was Andrew Chong, who was fluent in Chinese and English and went on to a university education in New Zealand. He played a key role in establishing the Dominion Federation of New Zealand Chinese Commercial Growers in the

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1940s and assisted in negotiations with European growers’ organisations.

Overseas Chinese communities contributed to the modernisation of education in China and raised funds to build schools in their home villages. This benefitted both returnees and the local community. Eric Wong Ming, for example, whose father was a gold miner in Australia then became a relatively successful market gardener in New Zealand, attended the new local school in his home village of Gwa Leng between the ages of ten and fourteen. The school was built with funds sent from Gwa Leng expatriates living in Australia and New Zealand. 12

The bonding social capital represented by the maintenance of ties to China also had its negative effects. Events in China, such as natural disasters and civil unrest, had a direct impact on market gardeners living overseas as they received appeals for assistance from their home villages, for example to provide funds to build forts to protect communities from bandits. These appeals increased market gardeners’ uncertainty about the future of their homeland, their anxieties about their families in China and the pressure on them to support them financially. 13 Such financial demands further limited their capacity to accumulate capital and expand their businesses. As Charles Sedgwick observes in his study of the New Zealand-Chinese community, individual Chinese market gardeners in New Zealand, along with those in other occupations, were involved in a political quest to increase the power and prestige of their family or village in China. Their remittances enabled their families to buy land, open businesses and move up the social ladder. 14 Accordingly, they responded pragmatically to changes in China and New Zealand. They had to weigh up many factors in making decisions,

12 After narrowly escaping being kidnapped by bandits in Gwa Leng, at the age of 16 Eric travelled to New Zealand where he found work with various cousins and fellow villagers (Chan (ed.), Zengcheng New Zealanders, p. 43).
13 In 1912, for example, Alexander Don reported that it had been a bad year for Chinese gardeners in New Zealand. They had had a poor summer for their crops and civil unrest in their home districts affected them, making them restless (Sedgwick, ‘Politics of survival’, p. 327).
including immigration restrictions, their financial situation, the need to support newly arrived kin and conditions in their home village. For example, Alexander Don observed that seven out of ten men living in Round Hill between 1882 and 1889 had wives at home in China looking after children and other family members and many worried that if they went back to China with less than £100 savings they would lose face and not be able to repay their debts.

These anxieties were lessened to some extent by the formation of same place organisations (tongxianghui) in Australia and New Zealand. These mutual aid organisations brought market gardeners and their compatriots together, maintaining language and culture and co-ordinating responses to the appeals they received from their home villages. For example, the Chinese in Sydney established various same place societies, most run by the same merchants who provided day-to-day assistance through their stores. Similar organisations were established in New Zealand between 1900 and 1936. Market gardeners were active members of these organisations.

Market gardeners also joined with their compatriots in political action, signing the petitions which overseas Chinese communities used to voice their concerns before Chinese consular representation was established in Australia or New Zealand. These petitions concerned immigration issues such as the poll tax, the establishment of diplomatic

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15 Such decisions concerned matters such as business plans, the amounts of remittances, return visits to China or migration plans for family members.
18 Generally each district had its own society. In 1907 people from the neighbouring Zengcheng and Dongguan counties established a combined organisation, the Loong Yee Tong (Williams, ‘Brief sojourn’, pp. 19–20).
19 These included: in Auckland, the Kwong Chew Club for people from Siyi county (1920); and in Wellington, the Poon Fa Association for people from Panyu county (1916); the Tung Jung Association for people from Zengcheng and Dongguan counties (1924); and, the Seyip Association for people from Siyi county (1936) (Sedgwick, ‘Politics of Survival’, p. 588).
representation as well as opium smoking and gambling which dissipated savings.\textsuperscript{21} For example, a petition presented to the New Zealand government in 1903 urging the establishment of a Chinese consulate contained 314 signatures collected from twenty-seven towns. The signatories were representative of the distribution of occupations in the 1901 census, including a high proportion of market gardeners.\textsuperscript{22} In 1901 six petitions were circulated around the country, warning of the dangers of opium smoking and urging the Government to limit opium imports. Auckland market gardener G. W. Moy organised the petition in Auckland, and twenty-one of the thirty-six signatories were market gardeners. In Christchurch, twenty-three of the thirty-three signatories to the petition were market gardeners.\textsuperscript{23} These petitions are evidence of the growing political activity of Chinese market gardeners and their compatriots which forged links between diasporic communities and back to China.

From the late-nineteenth century, overseas Chinese also began to take a greater interest in developments in China at the national level. John Fitzgerald documents the close interest which the Australian-Chinese community maintained in political developments in China, and the important role which local fraternal organisations played in promoting the transformation of China into a modern egalitarian democracy.\textsuperscript{24} Similarly, James Ng documents the interest with which Chinese-New Zealanders followed events in China, from the first generation of gold seekers.\textsuperscript{25} As the work of Fitzgerald in Australia and Sedgwick and Ng in New Zealand also demonstrates, Chinese communities in both countries made consistent appeals to China

\textsuperscript{21} Petitions or memorials were a recognised Cantonese method of addressing authorities (Ng, \textit{Windows on a Chinese Past}, Vol. 3, p. 113). See Sedgwick, ‘Politics of Survival’, pp. 656–8, for a list of petitions presented by Chinese groups and individuals in New Zealand between 1883 and 1908.
\textsuperscript{22} Sedgwick, ‘Politics of Survival’, p. 297.
\textsuperscript{25} Ng, \textit{Windows on a Chinese Past}, Vol. 3, pp. 107–11.
for representation and freedom of movement in response to the introduction of restrictive immigration policies.\(^{26}\)

While these representations did little to modify immigration restrictions, they provide evidence of organised communities which alerted authorities in China to the situation in their adopted countries. As a result Chinese commissioners visited Australia in 1887 and Australia and New Zealand in 1906–1907. These visits reinforced existing local level networks between overseas Chinese and their homeland. They coincided with the Chinese government’s renewed interest in its overseas population from the late-nineteenth century and resulted in the appointment of Chinese consuls in Australia and New Zealand in 1909.\(^{27}\) This was an important step. The Chinese government was now able to negotiate directly with the Australian and New Zealand governments rather than through British colonial authorities, and overseas Chinese communities had strong advocates for their interests and aspirations.\(^{28}\) The consuls also promoted the formation of national Chinese organisations in their host countries with varying degrees of success.\(^{29}\)

Despite efforts to establish national Chinese organisations and break down clan and district divisions within overseas Chinese communities, there is evidence that local loyalties remained strong, particularly during the unsettled period between 1916 and 1928 when the Kuomintang under the leadership of Chiang Kai Shek finally established control over China.


\(^{27}\) Before 1860 the Qing Government expressly prohibited emigration. It was not until the 1870s that China began to take a greater interest in the welfare of its citizens overseas, responding to the petitions they made outlining their grievances and to the significant contribution they made to the Chinese economy through remittances (William Tai Yuen, *The Origins of China’s Awareness of New Zealand, 1674–1911*, Auckland, 2005, p. 71).

\(^{28}\) The first Chinese consuls appointed were Liang Lanxun, based in Melbourne, and Huang Rongliang, based in Wellington (Fitzgerald, *Big White Lie*, p. 111, Sedgwick, ‘Politics of Survival’, pp. 172, 264; and, Tai Yuen, *China’s Awareness of New Zealand*, pp. 80–1, 85).

\(^{29}\) Two attempts were made to establish national Chinese organisations in New Zealand, in 1909 and 1928, promoted by the Chinese Consuls of the time. Both lapsed after promising starts in membership and donations (Ng, *Windows on a Chinese Past*, Vol. 3, pp. 156–7).
Faced with civil war in China and local opposition to their dominance in the market gardening industry, Chinese market gardeners in Australia and New Zealand turned to their traditional sources of support – clan and native place networks. In New Zealand, these networks provided basic support for members and cut across the complex, shifting alliances that emerged in response to the civil war in China.\textsuperscript{30} Writing about the Chinese in the Rocks in Sydney in the early-twentieth century, Lydon observes that local loyalties were according to clan and family rather than a larger sense of nation. These bonds constituted a fundamental social matrix of protection, status and identity.\textsuperscript{31}

The ongoing conflicts in China between Chiang Kai Shek’s nationalist government and the Communist Party created further divisions within Chinese communities in Australia and New Zealand.\textsuperscript{32} However, the Japanese invasion of China in 1935 led to a temporary truce between the opposing parties and overseas Chinese communities were united as never before as they worked to raise funds to support the war effort. In New Zealand, a national New Zealand Chinese Association was formed with headquarters in Wellington. In a massive collective effort employers were levied 10 shillings per week towards the war fund and employees, many of whom worked on market gardens, were levied 2 shillings.\textsuperscript{33} There are conflicting views on whether the donation campaign promoted community solidarity and contributed to the breakdown of clan and county alliances. Manying Ip argues that the campaign was coercive and backed up by threats of sanctions.\textsuperscript{34} However, Sedgwick observes

\textsuperscript{30} The two major factions supported by New Zealand-Chinese were the Kuomintang and the Chee Kung Tong (Sedgwick, ‘Politics of Survival’, pp. 588–9).
\textsuperscript{33} Between 1937 and 1944 New Zealand Chinese raised over £190,000 in levies and donations and a similar amount in war bonds (Ng, \textit{Windows on a Chinese Past}, Vol. 3, pp. 169–70, 177–8). See also Sedgwick, ‘Politics of Survival’, p. 286.
that after the major threat posed by the Japanese had passed, Chinese-New Zealanders were more concerned with getting their families to New Zealand, and local loyalties became paramount once again.\textsuperscript{35} Their remittances to China decreased and instead they used their capital to expand their businesses and improve their standard of living. The Chinese community also relied on their local support networks during the hard times of the 1930s Depression.\textsuperscript{36}

**Market gardeners within the overseas Chinese community**

In addition to negotiating their links to their homeland and its changing political and economic climate, Chinese market gardeners in Australia and New Zealand formed part of an evolving local Chinese community which provided opportunities for building bonding social capital. From the early days on the goldfields market gardeners relied on Chinese labour and the maintenance of kin and family ties were central to their financial success. The cooperative work organisation which characterised Chinese market garden enterprises and the social and business ties between market gardeners, fruit and vegetable retailers and general merchants supported the growth of market gardening enterprises.\textsuperscript{37} Here the focus turns to the ways that dependence on Chinese labour and kin and family provided an important form of social capital that helped to shape the opportunities available to Chinese market gardeners within their communities and promoted the transfer of horticultural knowledge and skills.

This social capital entailed reciprocal obligations between partners and the workers they employed on their gardens, who were often related or from the same village or district in China. It was also a key factor in technology transfer. New arrivals from China received food, shelter and employment, and often training in horticultural methods and crops appropriate to

\textsuperscript{37} These issues are discussed in more detail in Chapter Three.
Australia and New Zealand as well as how to manage business relationships with Europeans. The skills they gained equipped them to later establish their own gardens.\textsuperscript{38} In return the new arrivals had financial and family obligations to their employers and the obligation to contribute to the business through their labour.\textsuperscript{39} There were also reciprocal obligations between partners in market garden enterprises who were often responsible for different aspects of the business, such as planning the seasonal range of crops and crop rotations, transport and marketing.\textsuperscript{40} Jim Ng, who worked for short periods on the Ng clan garden in Ashburton in the 1950s, recalls there were about nine shareholders or ‘bosses’, most related. He describes the working relationships on the garden and how the younger generation learned gardening skills from their elders:

I cannot remember anyone ordering us about. Whoever knew of what had to be done must have quietly made it known to the seniors of our work group of youths, and the Chinese childhood teaching of ‘getting on with the job’ ensured the completion of the task.\textsuperscript{41}

The intricate network of clan and village ties within each market garden enterprise extended to other market gardens within a region, and beyond that to fellow kinsmen and countrymen who owned businesses in other towns and cities. These bonding networks were an efficient, informal support system – a source of labour as well as financial and social capital. Close ties were maintained between relatives and fellow villagers working on gardens in different locations and partners and employees moved between them as the need arose. There was also frequent movement between the main businesses operated by Chinese: laundries,

\textsuperscript{38} Lee and Lam record many examples of the newly arrived kin of established market gardeners in New Zealand learning their skills on their market gardens before establishing their own gardens. One was Young Sik Wik Wing who joined his father on his garden in Forbury, Dunedin, and in 1941 established a garden in Waitati in partnership with a kinsman from the same village in China, Young Yuen Tan (Lily Lee and Ruth Lam, \textit{Sons of the Soil}, Pukekohe, 2012, p. 59).
\textsuperscript{40} These issues are discussed in more detail in Chapter Four.
\textsuperscript{41} James Ng, interviewed by Lily Lee, 13 March 2008, quoted in Lee and Lam, \textit{Sons of the Soil}, p. 108.
fruit and vegetable stores and market gardens. A typical story is that of cousins Norman Yee and George Tong, who came from neighbouring villages in Toi Shan district. Norman arrived in New Zealand in 1919 at the age of eleven and George in 1923, aged twelve. Norman helped his uncle in his laundry and then worked for another uncle on his market garden in Christchurch. George joined his father in his laundry in Wellington. In the late 1920s the two cousins established a market garden near the racecourse in Oamaru. From the 1930s they ran a garden in the Totara district, south of Oamaru, G. Tong and Co. George’s brothers, Yee Poy and Yee Yuen, also joined the partnership. Over the years they employed many kinsmen who in turn went on to establish their own gardens.

Market gardening provided for the first time some stability and the possibility of a planned life, with regular savings and flexible business partnerships which allowed visits home. It also entailed a new sense of responsibility since, unlike mining which had previously provided the main employment for Chinese, gardens had to be maintained over an extended period of time to ensure a constant return. In some cases there was relatively little individual contact with China, which meant that gardeners relied even more on local support networks. George Lee Kim recalls growing up on his father’s market garden in Bendigo in the 1920s and 1930s, and the self-sufficiency of the Chinese community:

The Chinese in Bendigo … helped each other with their troubles, looked after one another, they were a long way from home. There was not much contact with China itself, none were church goers, there was no Chinese church in Bendigo. They had their own shops, gardens, gambling was mainly through John O’Hore; he handled their money … the money would go back through charities, he made donations.

42 It is easier to trace these networks and movements in New Zealand, where the Chinese population was much smaller than in Australia and distances not as great.
43 Lee and Lam, Sons of the Soil, p. 67.
This self-sufficiency and networking flowed into exchanges at railway stations and central markets when organising the transport and sale of produce. Business opportunities mingled with opportunities to relax and socialise, although the business exchanges were not always based on reciprocity and trust.

When Chinese market gardeners in rural areas, such as Otaki in New Zealand, gathered at railway stations to send their produce to city markets they socialised and shared information about daily concerns such as weather, crops and prices. Charman Moy, who followed his father into market gardening in Otaki in the 1950s, recalls:

At the railway, Oh it was a great time. We will go in there, we will just have a big long talk. That’s probably the only time we relax ourselves! [interviewer: you’d check out what everybody was growing?]… How many, yes and ask what price they’re getting, and make sure that the markets are not giving us too cheap a price.46

These bonding social contacts enabled market gardeners to keep in touch with market trends. However, gardeners were not always open in exchanging information about the prices they received and there was sometimes an element of competition. Dow Kwan Chung recalls:

I know one grower, he always reckoned he got top money in the market – whether he does or not, I’m not sure. His quality wasn’t … I doubt that he would get the top price all the time , but he hears what the top price is and he seemed always to get it – according to him!47

The advent of central produce markets in cities from the late-nineteenth century provided gathering places for urban Chinese market gardeners. They were often located close to Chinatowns, so gardeners could visit nearby Chinese restaurants and stores and meet their countrymen after delivering their produce.48 In Sydney from the 1880s, gardeners from

48 For example, in Perth and Sydney (Anne Atkinson, ‘Chinese market gardening in the Perth metropolitan region, 1900–1920’, Western Geographer, Vol. 8, 1984, p. 48; and, Shirley Fitzgerald, Red Tape Gold
outlying suburbs often stayed overnight in cheap lodgings in the Haymarket, close to the city markets. In New Zealand, Otaki market gardener Kee Yung recalls the scene at the central markets in Wellington in the 1950s. His account also highlights the key role which women played in running family market garden enterprises in the post-war period.

At the market, it opens around 4am. Undo the rope and talk to other growers while we’re waiting for the door to open, and then we back the truck in there and unload them. After that, we all go for breakfast. That’s a very enjoyable time, that time. At a Chinese restaurant opened to accommodate these early customers. One they call Great Wall Cafe and all the Chinese there they make a lot of noises! … And after we watch the sales of produce we go for morning tea again! Great life isn’t it! I’ve got a feeling poor wife at home, she’s working trying to manage workers, feed them and tell them what to do in garden, while I enjoy myself in big market.

Market gardeners maintained regular contacts with Chinese merchants who assisted them in many ways through their business networks. In Sydney for example, merchants played a key role in housing newly arrived countrymen, providing them with food, lodging and information about job opportunities in Sydney and rural areas. They helped market gardeners negotiate with bureaucracy and acted as banks, providing them with finance for their enterprises, helping them remit money to their families in China and bailing them out if they were arrested for gambling. They also arranged return travel to China and sponsored new migrants, legally and illegally, redressing to some extent the decline in numbers of the Chinese community in Australia and labour shortages on gardens. Merchants felt obliged to help their community. As the grandson of Way Kee, a Sydney merchant and leader of the Doon Goon district people, explains: ‘If my grandfather did not go and bail them out [Chinese arrested for

49 For example, in Robertson’s Lane, off Goulburn Street, Kow You Men ran a lodging house catering for up to 100 men (Fitzgerald, Red Tape Gold Scissors, pp. 68, 89).
gambling], being a leading man, it would not look well’. Market gardens and stores were often linked by common district ties. Kwong War Chong and Co and War Hing and Co in Sydney, for example, were frequented by market gardeners from the home districts of their proprietors.  

The relationships between merchants such as Way Kee and workers on market gardens are indicative of divisions within the Chinese community based on county of origin, class and occupation. As Lydon notes, these divisions defined differences but they could also be bridged by shared experiences of discrimination and exclusion from mainstream society. Lydon describes communication within the Chinese community as a cultural pidgin, which she defines as 'a complex language of images, gestures and things, spanning as well as defining difference'.  

As in any social group, relations within the overseas Chinese community were complex and not always harmonious. From the late-nineteenth century internal political divisions and rivalries between district and dialect groups emerged in response to changing political events in China and also in response to local issues such as gambling. A major incident involving Chinese market gardeners and other members of the community occurred in Sydney in March 1892 when a riot broke out between rival factions over a gambling case. Illustrating the complexity of European-Chinese relationships, there were even alliances across the racial divide. According to a newspaper report the smaller of the two factions 

52 Williams, *Chinese Settlement in NSW*, p. 16. See also Yong, *New Gold Mountain*, p. 36.  
53 Kwong War Chong and Co was run by several partners from the Zhongshan district in Guandong and used by market gardeners from that district, while War Hing and Co was the meeting place of market gardeners from the Yiu Ming Hung Fook Tong Society, which had its roots in the Gao Yao and Gao Ming districts (Williams, *Chinese Settlement in NSW*, p. 21; and, Fitzgerald, *Red Tape Gold Scissors*, p. 163).  
55 Sedgwick, 'Politics of Survival’, p. 149.  
56 A crowd of around 200 Chinese gathered outside the Water Police Court where a case of extortion in a game of *pak a pu*, a Chinese lottery, was being heard. A fight occurred between two factions of the Loon Yee Tong. Twelve men were arrested, seven of whom were gardeners (Lydon, *Many Inventions*, pp. 124–9).
enlisted the aid of European larrikins to protect market gardeners and other faction members, and their leader sought refuge on market gardens on the Cooks River.\textsuperscript{57}

Market gardens were a microcosm of the Chinese community, and working relationships were also not always harmonious. Contemporary newspapers reported disputes over money (for example wages and gambling debts), thefts and assaults. In 1899 in Australia, the \textit{Tung Wah Times} reported a court case between two Chinese market gardeners in Melbourne over unpaid wages.\textsuperscript{58} In New Zealand in 1904, an Invercargill newspaper reported a dispute between four partners in a Chinese market garden and an employee who absconded with a large portion of their assets.\textsuperscript{59}

Nineteenth-century Chinese market gardeners were almost exclusively male, but their social and working environment changed from the early-twentieth century as the gender ratio gradually became more balanced. In Australia the females added to the Chinese community largely comprised the offspring of relationships between Chinese men and women of European or Aboriginal descent, rather than new migrants. It was not until 1959 that the wives and children of Chinese-Australian citizens were officially permitted to enter the country permanently.\textsuperscript{60} In New Zealand immigration restrictions were relaxed during the Sino-Japanese war of the late 1930s, allowing wives and children to enter the country under humanitarian visas. This was largely in response to the lobbying of Chinese community organisations and consular representatives.\textsuperscript{61}

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\textsuperscript{57} Evening News, Sydney, 15 March 1892.
\textsuperscript{58} The plaintiff alleged that the defendant owed him back pay and demanded compensation of £100. The court ordered the plaintiff to pay the defendant £15 plus court costs and lawyers costs (\textit{Tung Wah Times}, 12 August 1899, p. 2 c-d).
\textsuperscript{59} Low Ming, Kim Poy, Chow Ying and Joe Ming alleged that their employee Chow Chock stole a sum of £23.8s.6d, a significant portion of the partnership’s assets, and absconded to Wellington with a young white woman (\textit{Southland Times}, 12 September 1904, p. 4).
\textsuperscript{61} Windows on a Chinese Past Vol. 3, p. 183. Australia’s response to Japanese expansionism was relatively low key, moderated by admiration for Japan’s economic achievements and its status as a major trading partner
\end{flushright}
The increasing number of wives and children indicates the emergence of settled communities. This resulted in a significant shift in social dynamics, as women and children added to the stock of social capital. In New Zealand, Jean Meng Yee, grand-daughter of Louie Yee Hing, who established a market garden in Gisborne in the late 1890s, describes the changes that occurred by the 1950s:

The women were the stabilisers. They were the ones that kept the thing going. … before the womenfolk came out a lot of the men were drifters, they were just (living) sort of hand to mouth, whereas when the women came it was like building a nest egg, building a home for the children … So when the family was together you had the incentive to work harder.62

In New Zealand the arrival of Chinese growers’ wives and children enabled market gardening enterprises to expand and diversify, and was the starting point for many family businesses combining market gardens and fruit and vegetable stores. These businesses were established as family members arrived between 1948 and 1955, and Chinese people became more settled within local communities.63 The story of the King Bros market garden in Ashburton, established in 1921 by a group of men from Wing Loong village in Toi Shan, all with the surname Ng, was typical of many similar cooperative enterprises in New Zealand. The first of the Ngs arrived in Gore in 1905, where they established a laundry and market garden. In 1921 they moved to Ashburton after a flood forced them to move to less fertile higher ground. They grew vegetables on 50 to 80 acres, supplying Christchurch and the Ashburton district, and by the early 1940s there were nine shareholders. The first women and children joined the all-male community in 1939 and 1940, when three men brought their families to New Zealand under the war refugee scheme. With their assistance, the syndicate opened a fruit shop in Ashburton in 1947. As James Ng recalls:

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63 Lee and Lam, Sons of the Soil, p. 284.
64 Ibid., p. 157.
There were so many of us we had a whole village up in Allenton … We cooperated with each other so we did well as a community. Our sense of family is very important.64

One of the major attractions of market gardening was the opportunity to bond with family, as gardeners worked with their wives, children and other kin in a shared enterprise. Market gardening also offered independence and flexible hours. George Sue, who grew up in a market gardening family in Otaki in the 1940s and 1950s and later had his own market garden in Levin, recalls:

It was a good lifestyle for me, it gave me the opportunity to be with the family, there were times when my kids were in primary school, I could take time off to go to sports days, to be with them, and catch up with work later … you had meals with them, they were able to work alongside you.65

There was also the satisfaction of tilling the soil and producing a good harvest. George Yee and his wife Lora had market gardens at Masterton and then at Taradale near Napier in the 1940s and 1950s. Looking back on his life as a market gardener, George talks about the appeal it had for him:

If you put the work in then you see the things grow. You get great satisfaction in having created that. When you harvest, you can make good money … True freedom – you do what you like. You just do the garden – no one bothers you. Hard work – but if you get used to it you don’t feel it.66

While bonding social networks promote community and reciprocity within minority ethnic groups, they can also promote racial inequality, as they constrain the formation of bridging links with the wider society, limit access to its resources and opportunities and strengthen the bonds within dominant groups in society.67 The development of a structured Chinese business community, with bonding social and financial networks linking market

64 Lee and Lam, Sons of the Soil, pp. 105–7. See also Ng, Windows on a Chinese Past Vol. 3, pp. 211–12.
65 George Sue, interviewed by Joanna Boileau, Auckland, 7 April 2012, recording held by interviewer.
gardening partnerships, hawkers, fruit and vegetable retailers and general merchants, can be seen as a response to an uncertain political, social and economic environment.\textsuperscript{68} The move of Chinese immigrants from gold mining into market gardening and their increasing urbanisation in the late-nineteenth century occurred at a time when European society was becoming increasingly antagonistic to their presence.\textsuperscript{69} Restrictive immigration policies had a significant social and economic impact on market gardening enterprises from the 1880s until well into the twentieth century. They strengthened existing mutual support networks within the Chinese community and within the European community, while reinforcing the physical and social barriers between them.

**BRIDGING THE CULTURAL DIVIDE**

Bridging social capital had positive and negative consequences for Chinese market gardening and technology transfer. The first part of this section discusses relationships between Chinese and Europeans at the broader societal level. Europeans held complex and often contradictory attitudes towards Chinese people. These attitudes could be modified through exchanges related to food and changing dietary patterns, shared desire to develop the land and the contribution which Chinese made to the economy. The second part of this section examines the networks and relationships that market gardeners formed with the wider community at the local level, focusing on the variety of daily interactions which Chinese market gardeners had with the wider community – with neighbours, customers, employees, contractors, produce auctioneers, local government officials and police. These relationships

\textsuperscript{68} Sedgwick, ‘Politics of Survival’, p. 318.

could be positive, fostering understanding and familiarity between cultures, bridging ethnic and social boundaries and promoting business opportunities. They could also be negative, imposing constraints on the successful operation of market gardening enterprises, requiring negotiation and accommodation and at times generating conflict.

**Aliens, heathens and criminals or law abiding, industrious citizens?**

Nineteenth century European attitudes towards Chinese immigrants in Australia and New Zealand were complex and often ambivalent. As Manying Ip and Nigel Murphy observe in their study of cartoons depicting Asians in New Zealand, in an era of colonial nationalism, Europeans saw Chinese people as alien, heathen and immoral – the essential ‘other’. In the nineteenth century Western nations asserted their power over China, scrambling for treaty ports and extra-territorial rights; China was seen as decadent and corrupt, ‘the sick man of Asia’. These attitudes were part of a complex set of beliefs and values, including belief in the superiority of the European race and European technology, fear of economic competition and a strong fear of miscegenation. These beliefs and attitudes impacted on the lives and business enterprises of Chinese market gardeners, affecting their relations with Europeans and restricting the formation of the relationships of reciprocity and trust so central to the concept of social capital.

The comments of the French journalist Edmund Marin La Meslee, who visited Australia in 1883, were typical of the complex racial attitudes that Europeans held in his day.

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70 Ip and Murphy, _Aliens at My Table_, pp. 8, 18. The term ‘sick man’ has been applied to many different countries and regions since the late-nineteenth century, including Russia, Turkey and China. The first usage was in relation to China in the late-nineteenth century, when the country was being torn apart by civil war and had been forced into a series of unequal treaties by western powers (David Scott, *China and the International System, 1840-1949: Power, Presence, and Perceptions in a Century of Humiliation*, New York, 2008, p. 9).

71 Henry Reynolds, for example, places Australia’s evolving policies towards indigenous people between 1850 and 1950 in the context of international thinking on race and human evolution. Influenced by early ethnographers and social Darwinism, there was a firm belief in a hierarchy of races, with Caucasians at the top. Any mixing of races was seen as disadvantageous, producing individuals inferior in physical and mental capacity (Henry Reynolds, *Nowhere People: How International Race Thinking Shaped Australia’s Identity*, Camberwell, 2005, pp. 100–1).
On one hand he wrote of the Chinese: ‘They are vegetable purveyors and without them those delicious necessities for European tables would be beyond the reach of most people … a contribution, however phrased, for which to be grateful.’ On the other he shared the general anti-Chinese paranoia of the time, commenting that the introduction of cheap Chinese labour threatened the livelihoods of workers, farmers and storekeepers: ‘for sober, patient, industrious Chinese can always undersell the European and so necessarily bring about his downfall’. Europeans’ fear of economic competition from Chinese immigrants is illustrated in a cartoon published in New Zealand in the 1890s, a period when Chinese market gardeners dominated the industry and supplied hotels, shipping companies and restaurants (Figure 5.1). They even supplied Bellamy’s, the exclusive restaurant in Parliament House in Wellington, a situation that caused a scandal in 1896 and 1897. It appears that New Zealand politicians were still dining on Chinese-grown vegetables in 1904.

The ambivalence of European attitudes towards Chinese people was reflected in their relationships with Chinese market gardeners. Europeans purchased their produce, but were often wary of establishing closer social relationships. Parents would warn their children to keep their distance from Chinese market gardeners and not to enter their houses when they went to buy vegetables. Judith Bourke, who grew up in Willoughby in Sydney, recalls ‘we were frightened of the gardeners and used to run through the garden on the way home in case we met one’. Dorothea Nichol and George Redding, who grew up in Ryde in the 1930s, both recall how they were frightened of the Chinese market gardeners in their neighbourhood even

73 Observer, 18 July 1896, p. 2; Tuapeka Times, 8 July 1897, p. 5; and, Poverty Bay Herald, 8 November 1904, p. 4.
though they gave them presents of sweets and Chinese stamps. At the same time, close relationships between Chinese market gardeners and the local community were often formed.

Figure 5.1: ‘The Chinaman on top again’, cartoon by William Blomfield in *New Zealand Observer and Free Lance*, 6 August 1892.

Chinese people were closely associated with providing food to Europeans, as growers, hawkers and fruit and vegetable retailers. Food was therefore a key bridge between European and Chinese cultures, contributing to building the networks of relationships that constitute social capital. Chinese market gardeners in particular had a significant influence on the diets of Australians and New Zealanders, stimulating cultural change. In his gastronomic history of Australia, Michael Symons lists the staples of the colonial diet as salt meat, sugar, flour and

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75 Dorothea Nichols, interviewed by Pauline Curby, 29 July 1997, City of Ryde Library Services; and, George Redding, interviewed by Pauline Curby, 1998, City of Ryde Library Services.
76 C-23129-1/2, Alexander Turnbull Library, Wellington. Published in Ip and Murphy, *Aliens at My Table*, p. 113.
tea, describing them as the ‘rations of an ocean-going empire’. This culinary heritage was remarkably enduring. A feature of the European diet in New Zealand and the Australian colonies throughout the nineteenth century was the high consumption of meat. With their emphasis on grazing and meat production, mutton and beef was cheap and readily available to all social classes and became the preferred source of protein.

Many pastoral workers and labourers, particularly in the Australian outback, complained of their monotonous diet of meat, damper and tea, and the lack of fresh vegetables. This was exacerbated by the widely held belief that it was not possible to grow vegetables in the outback and that Europeans were unsuited to heavy agricultural work in the tropics. The fact that Chinese market gardeners all over Australia showed that it was possible to grow vegetables in a variety of climates reinforced the demands of pastoral workers for more fresh vegetables in their rations. In Queensland in 1878, a correspondent to the Brisbane Courier observed that in the early days of the colony Chinese gardens were unknown and these pastoral workers would have been derided as ‘impractical epicures’. Nevertheless, he said times had changed and their claims were reasonable:

There is scarcely any occupied part of the colony to which the industrious Mongolian [gardener] has not penetrated and he is ever ready to follow the bushman to the remotest spot, provided it be provided with permanent water.

By the 1890s dietary attitudes were changing. Commentary in newspapers from the 1870s and 1880s shows there was already public awareness of the health benefits of vegetables and of the role of Chinese gardeners in promoting the health of the community. In

79 Brisbane Courier, 21 October 1878, p. 2.
80 See for example Brisbane Courier, 7 January 1887, p. 5.
1874, for example, a New Zealand newspaper reported on around twenty Chinese market gardeners in Charleville, Queensland, who also kept boarding houses. Their establishments were well patronised by stockmen coming in from the bush, for they were served ample quantities of fresh vegetables and could ‘drink and gamble to their hearts content without the interference of the police’. The editor commented:

At Jimmy Ah Que’s, when a man has spent his last shilling in drink, he is, they say, allowed a week's board free, and the vegetable diet pulls him around in no time.\(^8^1\)

In 1886 another New Zealand newspaper commented on the laziness of Australians and their neglect of vegetable cultivation, in contrast to the industry of the Chinese:

Were it not for the indefatigable industry of the Chinese, who have an unsolicited monopoly of market gardening in Victoria and New South Wales, the people of these colonies would have nothing to eat with the meat (of which they eat three times as much each day as they properly should do) except bread and potatoes and ere long they would be seized with scurvy and die like sheep with the rot.\(^8^2\)

The growing understanding of nutrition among the medical profession and the efforts of health authorities to raise public awareness of the importance of a balanced diet to human health made inroads into the negative attitudes that shaped social interactions across the cultural divide. In 1893, Doctor Phillip Muskett published *The Art of Living in Australia* in which he deplored the eating habits of Australians, in particular their unvarying diet of meat three times a day.\(^8^3\) He emphasised the health benefits of the many varieties of vegetables which were easily grown but rarely made their way to Australian dining tables, particularly salad greens such as chicory, endives, lettuce, mustard and watercress. Chinese market

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\(^{8^1}\) *Grey River Argus*, 19 November 1874, p. 3.


\(^{8^3}\) Muskett, *Art of Living in Australia*, not paginated.
gardeners were the main suppliers of salad greens and he noted their important role in supplying fresh vegetables to the public. Similarly in New Zealand, in September 1896 Doctor Emily Ryder of Invercargill gave a health lecture to an audience of women, advising them to eat meat no more than once a day, increase their consumption of vegetables, fruit and cereals, and drink less tea.\textsuperscript{84} Newspapers in New Zealand also commented on the healthy, economical diet of Chinese people, which included little meat.\textsuperscript{85} Thus changes in dietary preferences contributed to the building of relationships across the cultural divide, between Chinese market gardeners and European consumers. Chinese market gardeners benefitted from increasing demand for their produce and in turn they influenced European diet through making a wide range of fresh vegetables readily available to householders at reasonable prices.

Another potential bridge between cultures which could counter negative attitudes towards Chinese people was a shared commitment, and attachment, to the land. Producing a year-round supply of vegetables for European consumers involved a long-term commitment to the land and maintaining its fertility. Discussing the symbolic attributes of gardens and fields, archaeologist Kathryn Gleason highlights their social and cultural significance – as constructed landscapes and bounded spaces, they shed light on cultural issues such as power relations, colonisation, work and leisure, economy and subsistence. They are ongoing projects, part of the cycle of daily, seasonal and annual changes, and inspire a host of feelings including delight in nature, fear of crop failure or hope for prosperity and a good harvest.\textsuperscript{86} Like all peoples, by engaging with the land European and Chinese settlers legitimised their place in the world, asserted their identity and laid claim to territory.\textsuperscript{87}

Relationships with and access to land helped define relationships between Chinese and

\textsuperscript{84} Tuapeka Times, 20 May 1896, p. 2.
\textsuperscript{85} Southland Times, 14 May 1899, p. 4.
\textsuperscript{87} See for example Barbara Bender, Landscape: Politics and Perspectives, Providence, 1993, pp. 2–3, 9.
Europeans. The European view of Chinese people as aliens and sojourners, and in some cases legal restrictions against Chinese owning land, which prevailed well into the twentieth century, restricted their access to land and meant that most Chinese market gardeners were leaseholders. However, the Chinese in Australia are now recognised as pioneers, playing a key role in land clearing in North Queensland and western New South Wales.\(^88\) This suggests that Chinese and Europeans shared common attitudes towards the land, in particular their dislike of ‘wasteland’. In her study of Chinese–Australian autobiographical writing, Yuanfang Shen observes that many Chinese immigrants in Australia saw themselves as having a pivotal role in ‘building the country’. In her analysis of their narratives she argues that they constructed their identities as pioneers and the equals of Europeans in their endeavours to develop the land. Writing in the 1920s, Taam Tze Pui depicts Australia as an uncultivated realm (in Chinese huang (wasteland) or chunudi (virgin land)), which was open to both Eastern and Western efforts to develop it.\(^89\) In New Zealand Chinese market gardeners also played a key role in clearing land, such as in the Ohakune district.\(^90\) Meng Foon, a former market gardener and currently Mayor of Gisborne, reflects on the earlier generation of market gardeners:

> The Chinese market gardeners who came to Gisborne were all pioneers, they came with a dream that this was a better place than home. They had literally the shirts on their backs but with hard work, saving all their wages, they slowly started to spread their wings. They were a resilient lot, heads down, arse up, working under the sun, stars and moon, all weathers. They held on to the dream.\(^91\)

Thus both Europeans and Chinese in Australia and New Zealand can be seen as


\(^89\) Taam Tze Pui was a pastoral worker in Queensland, among other occupations (Yuan Fang Shen, *Dragon Seed in the Antipodes; Chinese-Australian Autobiographies*, Carlton North, 2001, p. 50).


\(^91\) Lee and Lam, *Sons of the Soil*, p. 295.
colonists, civilising an uncultivated land. The limited written records that Chinese immigrants left behind in Australia indicate that they saw themselves as contributing to the economic development of the country and at least some wished to settle permanently. They emphasised this common purpose in their attempts to reach across the cultural divide. When a delegation of South Australian parliamentarians toured the Northern Territory in 1882, they saw first-hand the contribution that Chinese market gardeners had made to the development of the Territory, visiting flourishing market gardens and plantations of tropical crops including plantains, bananas, lychees and custard apples. In Darwin, the Chinese residents held a banquet for the delegation at Pickford’s Hotel. A speech was read out on their behalf, in which they stated:

We claim that had it not been for the influx of Chinese to the Territory it would not now present the encouraging position which it maintains ... It has frequently been urged that we are a migratory race but no inducement has been held out for us to settle in this country. Had there been, many of us before now would have been cultivators of the soil instead of being mere labourers on your goldfields. As we well know that vast portions of this settlement are suitable for agriculture, we would like opportunities of settling and making permanent homes.

Elsewhere in Australia, Chinese community leaders made similar points. In 1879 the Melbourne merchants Lowe Kong Meng and Louis Ah Mouy and the missionary and social reformer Cheong Cheok Hong published a pamphlet arguing against immigration restrictions and pointing out that their countrymen had been good colonists. By their use of the term ‘colonists’ they underlined the commitment of Chinese immigrants to their adopted country,

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92 As Kylie Mirmohamadi observes, in the process of harnessing the land for ‘productive’ use, successive waves of settlers swept away native flora and fauna, dispossessed the indigenous inhabitants of their country and imposed new colonial spaces. Aboriginal people were placed in the realm of nature rather than culture (Kylie Mirmohamadi, ‘Wog plants go home: race, ethnicity and horticulture in Australia’, Studies in Australian Garden History, Vol. 1, 2003, p. 93).
94 Ibid., p. 179.
and they specifically referred to the contribution of market gardeners:

Had it not been for them, the cultivation of vegetables, so indispensable to the maintenance of health in a hot climate like this, would scarcely have been attempted in the neighbourhood of some of the goldfields, and the mortality of children would have been very much greater than it really has been.\(^95\)

Later petitions made to the New Zealand and Australian governments by their Chinese communities also emphasised the contribution that they made to the national economy in producing fruit and vegetables. In 1895 for example, Sun Kwong Lee and seven other Chinese community leaders presented a petition to the New Zealand Parliament with 209 signatures protesting against immigration restrictions.\(^96\) One of the seventeen points made in the petition was that since the arrival of the Chinese, fruit and vegetables, previously beyond the reach of many workers and poorer people, were in plentiful supply at reasonable prices.\(^97\)

Chinese people were willing to share their horticultural skills with Europeans and Europeans were willing to learn from them. In 1899 students and curriculum advisors from a Sydney agricultural college visited a Chinese market garden in Botany where they observed their vegetable growing techniques. The report of their visit in the *Tung Wah Times* noted that Chinese ‘do not hold their knowledge exclusively to themselves’ and described how impressed the European visitors were: ‘they come humbly to learn and respect them (Chinese gardeners) as teachers’.\(^98\)

While Chinese market gardeners in rural areas shared with Europeans a desire to till the soil and make it productive and demonstrated their skills in intensive cultivation, this

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\(^95\) Lowe Kong Meng, Cheok Hong Cheong and Louis Ah Mouy (eds), *The Chinese Question in Australia, 1878–79*, Melbourne, 1879, pp. 7–8.


common link to the land did not operate as strongly in urban areas. However, in cities other social factors operated to create bridges between cultures. The Chinese community congregated in Chinatowns in cities such as Melbourne, Sydney, Auckland and Wellington, and in camps and Chinese quarters on the fringes of country towns, where they found mutual support. The clear social and class divisions which remained within European society well into the twentieth century meant that Chinese people lived side by side with the poor and the working classes in inner city suburbs, providing opportunities for contacts between cultures. In an illustration of how social capital can reinforce inequality, in the latter half of the nineteenth century entrenched inequalities between rich and poor were reinforced by anti-Chinese attitudes, particularly in the growing cities. Melbourne and Dunedin, for example, expanded rapidly after the gold rushes in response to large injections of capital, but side by side with grand civic buildings such as banks and theatres were pockets of poverty. In these inner city suburbs cheap housing, stables, businesses and factories coexisted with rural land uses such as poultry raising. They developed in an era before town planning and the introduction of building and zoning regulations, and suffered from overcrowding, poor drainage and inadequate sewerage systems.99 Here, Chinese market gardeners who established gardens in outer suburbs regularly visited and interacted with their compatriots and their European neighbours. They came to socialise, purchase goods from Chinese stores and on market days often stayed overnight in cheap lodgings operated by their compatriots.100

Alan Mayne explores the myths surrounding inner city ‘slums’. In Australia social reformers, city planners and charity workers, supported by the popular press, characterised slums as poverty traps and sources of crime, prostitution, gambling and disease. Chinese were

100 Fitzgerald, Red Tape Gold Scissors, pp. 67–8; Atkinson, ‘Chinese market gardening’, p. 48; and, Lee and Lam, Sons of the Soil, pp. 315–6.
stereotyped as disease and vice ridden, and class, race and gender differences were conflated. Similarly in New Zealand, the area in the centre of Dunedin around the Exchange, where from the late 1860s Chinese immigrants lived crowded together with poorer immigrants from the British Isles and a small number from Lebanon, was known as ‘the Devil’s half acre’. The area was largely ignored by authorities until the early-twentieth century when concerns about the living and working conditions of the poor focused attention on it as a hot bed of gambling, prostitution and epidemics. Smaller Chinatowns in rural centres were also often located at the ‘poor’ end of town. Janis Wilton comments that while market gardens in regional New South Wales were usually located on the edges of towns near water sources and on suitable alluvial soil, this also placed Chinese people on the periphery of white social and working life.

At the same time Chinese immigrants were often described as sober, hardworking, industrious and law abiding, attributes which promoted their acceptance by the wider community and the building of social capital. In his study of the Chinese community in north-east Victoria and south-western New South Wales, for example, Rod Lancaster notes the close interactions between Europeans and Chinese and the value that Europeans placed on Chinese participation in the local economy. Many Chinese men worked in the vineyards in the Wahgunyah district in Victoria and on pastoral properties in New South Wales, and European employers valued their reliability. They were described as ‘sober, persevering, industrious and trustworthy’.

Barry McGowan makes a similar point in his study of Chinese pastoral

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workers and market gardeners in western New South Wales.¹⁰⁵

Prevailing anti-Chinese attitudes were modified by the significant contribution Chinese market gardeners made in providing fresh produce. Even the *Bulletin*, known for its strong anti-Chinese stance, acknowledged the contribution of Chinese market gardeners. An 1890 editorial quipped: ‘we know the Chinaman better than most people ... he produces two things – vice and vegetables’.¹⁰⁶ In New Zealand, an editorial in the *Star* newspaper in 1888 observed that there was another side to the ‘Chinese question’ in Australia:

From one end of the great island continent to the other they are the providers of garden produce for a nation, either too careless to attempt the necessary task of providing it for themselves, or incapable of the ceaseless, tireless industry by which alone, in most portions of that arid country, it is possible to accomplish it.¹⁰⁷

Despite the complex and often ambivalent attitudes that underpinned relationships between Europeans and Chinese, there were a number of factors that operated as bridges across cultures. These included the significant contribution which Chinese market gardeners made in providing fresh produce at reasonable prices and enhancing European diets; a shared commitment to the land and making it productive; and, shared spaces in inner city suburbs. The following section turns to the day-to-day relationships between Chinese market gardeners and Europeans at the local level.

**Interactions in the local community**

Nineteenth century representations of Chinese market gardeners and fruit and vegetable hawkers depict them as isolated and interacting little with the wider community.¹⁰⁸

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¹⁰⁶ *Bulletin*, 1 May 1890.


More recent histories also comment on the social isolation of Chinese market gardeners, for example in studies of Chinese market gardeners in Perth, Sydney and New Zealand.¹⁰⁹ But Chinese market gardeners depended on European clientele in order to earn a steady income and they interacted with the local community every day – with neighbours, customers, employees, contractors, produce auctioneers, local government officials and police. These relationships could be both negative, imposing constraints on the successful operation of market gardening enterprises, and positive, promoting business opportunities and building bridges across the ethnic divide. For example, in her study of the Chinese on the west coast of the South Island in New Zealand, Julia Bradshaw documents the range of contacts between the European and Chinese communities, including cross-cultural marriages, business relationships and participation in agricultural shows. Chinese market gardeners also made donations to local charities, churches and hospitals.¹¹⁰ In townships in Central Otago from the 1870s, market gardeners often developed cordial relationships with the European community. In Arrowtown for example, the market gardener and later storekeeper, Ah Lum, was held in high regard by European residents from the 1880s (Figure 5.2). Well versed in English, he became a recognised Chinese community leader.¹¹¹

¹¹⁰ Julia Bradshaw, Golden Prospects: Chinese on the West Coast of New Zealand, Greymouth, 2009, pp. 52, 70–1.
¹¹¹ Ah Lum was still listed as a market gardener in 1917; he died in 1925 (Lee and Lam, Sons of the Soil, p. 27).
**Figure 5.2:** Ah Lum (front) in his Arrowtown garden, with local resident George Romans (rear); undated.\(^{112}\)

**Good neighbours**

The work of Bradshaw in New Zealand, McGowan in New South Wales, Lancaster in Victoria and Cathie May and Henry Reynolds in northern Australia, supports the contention that the European community was generally tolerant of the Chinese living among them.\(^ {113}\) This accords with the strand in Chinese historiography which shifts the focus away from the sojourner model to the settled Chinese communities which developed in Australia and New Zealand and their relationships with the wider community.\(^ {114}\) Even during periods of strong anti-Chinese sentiment, such as the 1880s, the courtesy and politeness of Chinese market gardeners in their dealings with their customers was noted. As a correspondent to the *Otago Witness*, Vincent Pike, wrote:

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\(^{112}\) Photograph courtesy Lakes District Museum, Arrowtown, EP2111.


\(^{114}\) Reeves and Mountford, ‘Sojourning and settling’, p. 124.
You shall find them with baskets nicely poised on shoulder, passing from house to house with their own peculiar sliding, shuffling trot, dispensing crisp vegetables with much patience and politeness. For whatever else he may be – gambler, opium smoker, liar, cheat – and he is roundly accused of being each and all – John Chinaman is never boorish. He may not be so ready to ‘savey’ (understand) as the amenities of intercourse require, but in his commercial transactions, especially with women, his civility is boundless and his smiling forbearance is something marvellous to behold.\textsuperscript{115}

Figure 5.3: Chinese-English pronunciation guide and phrase book (published 1923), owned by Georgie Ah Ling. Titled *Pronunciation of English for Chinese: Become Proficient Without a Teacher* (*Tang Ziyin Yingyu: Wu Shi Ji Neng Tongxiao*).\textsuperscript{116}

Thus the daily dealings which market gardeners had with their customers built bridging social capital and were the foundation of successful Chinese market gardening enterprises. Adequate communication in English was essential and many larger enterprises delegated sales

\textsuperscript{115} *Otago Witness*, 1 March 1884, p. 11.

\textsuperscript{116} Collection of Donald Agricultural Museum, Victoria.
and marketing to the partner who had the best facility in English. Market gardeners used dictionaries and phrase books to help them communicate with the wider community. Chinese market gardener Georgie Ah Ling’s collection of belongings, housed in the Donald Agricultural Museum in Victoria, includes well-used copies of a Chinese dictionary and a Chinese-English pronunciation guide and phrase book published in Hong Kong in 1923 (Figure 5.3).

These books reflect processes of cross-cultural exchange and Georgie’s social interactions with his neighbours. The language in the phrasebook is practical and functional, and it is divided into sections relating to daily life in Australia, including business and legal interactions, health, food and clothing. It conjures up the world of Chinese-Australians in the early-twentieth century and how they negotiated their dealings with Europeans. It also reflects Georgie’s personal situation. Despite his efforts to communicate, Georgie found it difficult to master English; local resident Jean Baker recalls that she found him hard to understand. Yet he made long-term friendships with many Donald residents. Another example is an English-Chinese word and phrase book published in Sydney in the 1880s which illustrates the extensive business and personal relationships that Chinese maintained with Europeans. Its contents cover the main areas of Chinese commercial activity in Sydney in the 1880s, notably fruit and vegetable growing and retailing, storekeeping, domestic service, carpentry and furniture making.

With the advent of central city markets and the auction system from the late-nineteenth century market gardeners had regular dealings with produce agents and auctioneers, both

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117 Refer to Chapter Three for a discussion of division of labour within market gardening partnerships (pp. 170–1).
118 Donald History and Natural History Group, *Georgie Ah Ling, Donald's Friend*, Donald, 2008, p. 25.
European and Chinese. These relationships always had to be negotiated, the grower wanting the best price for his produce by selling at the most advantageous time, the auctioneer requiring a reliable supply of good quality produce. The relationship between growers and auctioneers was open to collusion, by manipulating the order in which produce was sold in order to obtain the best price for a particular grower. In New Zealand, Chinese growers in Otaki developed relationships with individual auctioneers in the main produce firms operating in Wellington, directing different crops to their preferred firm. Discussing the produce merchants he used, Andrew Yung recalls:

I used to be a Leary one — lettuce, beans to Leary’s … because the lettuce auctioneer’s always looking after me. When the lettuce price, he reckon it will be cheap, he sold mine first. When he reckoned the price was going up, he sold mine last. … All my tomatoes – Market Gardeners. …. I gave the whole lot to Market Gardeners, not even one case to other markets, and so Alan was always looking after me.

Promoting long-term business relationships with their customers and building networks of reciprocity and trust, many market gardeners were generous in giving credit to their customers. In New Zealand, James Ng records that following traditional methods, market gardeners and vegetable hawkers kept track of the credit owed them by marking the sums owed by customers on convenient doorposts or fences. The amount of this credit and the terms of repayment were undoubtedly a matter for negotiation between gardeners and their customers. There are many accounts of Chinese market gardeners giving gifts of sweets, fresh fruit and vegetables to the local children they met on their rounds in cities and in country towns. At Christmas or Chinese New Year they often gave jars of preserved ginger or lychees to their regular customers. In New South Wales, for example, these stories come from the

120 Refer to Chapter Three for a discussion of the activities of ‘forestallers’ (p. 198).
122 Ng, Windows on a Chinese Past, Vol. 1, p. 323.
Sydney suburbs of Botany, Ryde and Rockdale, and also from the towns of Dubbo, Murwillumbah, Narranderah and Narrabri.\(^{123}\) In the Sydney suburb of Willoughby, cicadas formed a bridge between cultures, when Chinese market gardeners found out that the local children were catching them in the pussy willow trees.\(^{124}\) Don Rannard, who grew up in Willoughby in the 1930s, recalls:

> We came home from school one day and found that one of them must have spent all day catching hundreds of cicadas. He came up with a big smile on his face with a birdcage full of cicadas and gave them to us. They were all Yellow Mondays and Greengrocers.\(^{125}\)

There are similar stories in New Zealand local histories. In the North Island town of Paeroa, there were at least four Chinese market gardens between 1910 and the 1950s. Colleen Bennett, who grew up there in the 1940s and 1950s, recalls:

> We had to pass the Chinaman’s gardens in Old Te Aroha Road and found, on reaching our teens, that Ah Wong’s family were not to be dreaded but were very nice people. Somewhere around our family circle are the ginger jars that they used to give Dad, just about every Christmas.\(^{126}\)

There was also reciprocity in these relationships. Owen Bennett, who also grew up in Ryde, recalls that as children they would catch eels in the creeks and exchange them with the local Chinese market gardeners for vegetables: 'They’d eat them; they loved the eels’.\(^{127}\) In an earlier, more systematic example of reciprocity, in 1895 the *Northern Territory Times and*
*Gazette* reported on illegal traffic in beef in Borroloola near the Gulf of Carpentaria. Cattle poachers traded the beef with Chinese market gardeners in exchange for fresh vegetables and other food supplies.128

Adding to the networks created between the Chinese and European communities were the regular dealings between market gardeners and their European landlords and contractors who assisted them with ploughing and repairing machinery. In the Melbourne suburb of Brighton, for example, a stable, relatively harmonious community of European and Chinese market gardeners grew up in the 1880s and 1890s. Many Chinese market gardeners leased land from Europeans who were themselves market gardeners, which meant that they had shared interests and concerns.129 In the Sydney suburb of Botany in the 1920s and 1930s, William Stephen, a prominent land owner and mayor for some years, leased land to Chinese market gardeners. At Chinese New Year the gardeners gave the rent collector who came every Sunday gifts of Chinese tea, dried lychees, ginger and fire crackers.130

In New Zealand many Chinese market gardeners leased land from Pākehā and Māori landowners. In the Otaki district, for example, Chinese gardeners leased land from Māori at Te Horo, around Otaki township and Ohau. According to Lily Lee and Ruth Lam and Manying Ip, relations between Māori and Chinese were generally good – they were friends, neighbours and relatives, and shared common cultural traits such as close attachment to the land, respect for ancestors and strong emphasis on kinship and extended family.131 In 1916 the *Evening Post* noted: ‘If he (the Chinese) favours anybody, it is the Maori’.132

Chinese market gardeners participated in the activities of the communities in which

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128 Three gardeners, Ah Song, Ah Que and Hang Yee, were charged with being receivers and each fined £10 (*Northern Territory Times*, 10 May 1895, p. 2).
they lived, making donations to hospitals, schools, churches and other charities and participating in local agricultural shows and celebrations. For example, in Greymouth on the West Coast of the South Island, Chinese market gardeners donated vegetables to the Grey Valley Hospital. In the 1870s and 1880s Chinese market gardeners regularly won prizes in the Greymouth Horticultural Society Exhibitions.

In Dunedin and Wellington individual Chinese businessmen, including market gardeners, merchants and laundry owners, made regular charitable donations. Some already had business connections with institutions. For example merchant and greengrocer Sun Kwong Lee, who had a contract from 1888 to supply vegetables to Wellington District Hospital, was a regular donor to the hospital. In 1891, the Secretary of the Parnell Memorial Committee wrote a letter of thanks to Lee for the participation of the Chinese community in the eight-hour day demonstration and electric light carnival. Their displays of fireworks and handsome tableaux were particularly appreciated. Chinese residents in Dunedin were regular donors to the Dunedin hospital fund. In 1904 the Otago Witness published the names of over ninety Chinese residents, including a number of market gardening syndicates, who donated a total of £85 to the fund.

There are many similar examples of Chinese market gardeners in Australian cities and

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133 They included the market gardeners Harry in 1894 and Ti Li in 1916. Grey River Argus, 3 January 1894 p. 2; and, 22 December 1916, p. 2.
134 For example, Ah Kong won prizes in 1874 and 1875 and Ah Kum won prizes in 1884, 1885 and 1886 (Bradshaw, Golden Prospects, pp. 70–1).
135 Evening Post, Wellington, 17 March 1888, p. 2. In 1908 the Chinese community in Wellington donated over £111 to the hospital, in 1910 over £123 and in 1913 around £70 (Evening Post, 29 December 1908, p. 2; 13 August 1910, p. 7; and, 25 February 1913, p. 2).
136 New Zealand was the first country in the world to introduce the eight-hour day. Immigrant tradesmen and labourers adopted it from their arrival in the 1840s and 1850s. However, their stand lacked legal sanction or general support across occupational groups. From 1882 numerous attempts were made to enshrine the eight-hour day in legislation and annual eight-hour day demonstrations were held in the main centres. The numerous bills introduced in the 1880s and 1890s failed to obtain parliamentary approval, but other enactments made the eight-hour day virtually universal in New Zealand (Herbert Roth, ‘Eight-hour day movement’, Te Ara Encyclopaedia of New Zealand, http://www.teara.govt.nz/en/1966/eight-hour-day-movement/1, accessed 21 January 2013).
137 Evening Post, Wellington, 2 June 1891, p. 2.
country towns supporting local charities. In 1909 the *Tung Wah Times* reported that Chinese market gardeners in Bendigo had made donations to the local hospital. In New South Wales, Chinese market gardeners Tip Nooey in Narrandera and Mow Hee in Dubbo were regular donors to their local hospital funds in the late-nineteenth and early-twentieth centuries. In Sydney in the early 1920s, Chinese market gardeners supplied free vegetables to unemployed workers and the Board of the Unemployed Workers Association published a letter of thanks in the *Tung Wah Times*.

Chinese market gardeners became involved in other community organisations such as sporting groups. This was indicative of a reduced social distance between them and their European neighbours, as overseas Chinese communities became increasingly westernised from the early-twentieth century, influenced by political and economic changes in China. Chinese in Australia and New Zealand adopted European dress and engaged in European sports and pastimes, contributing to the breaking down of social barriers and the building of social networks between the two communities. The Chinese community in New Zealand, for example, participated in sports such as cricket, football, athletics, horse racing, and by the 1920s, car racing.

These exchanges and interactions contributed to better understanding between Chinese market gardeners and the wider community and promoted business relationships. They countered the general hostility towards Chinese at the political level and provide some

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139 *Tung Wah Times*, 25 December 1909, p. 7b.
140 Gammage, *Narrandera Shire*, p. 144; and, *Dubbo Liberal and Macquarie Advocate*, 3 June 1908, p. 4; and, 13 January 1909, p. 3.
141 *Tung Wah Times*, 19 March 1921, p. 7b.
142 In 1910 Alexander Don commented on the progressive outlook of more recent Chinese arrivals in New Zealand and their enthusiasm for the great changes taking place in their home districts, including railways, government schools for girls and improved roads and civic buildings (*Outlook*, 4 October 1910, p. 13).
143 In 1925 the Auckland market gardener and merchant Clement Ah Chee competed in the Auckland Automobile Association’s annual motor car race meeting at Muriwai, driving a Buick. He came third in the touring car handicap (*Evening Post*, Wellington, 23 February 1925, p. 2).
evidence of cooperative relationships. However, these cross-cultural relationships had to be nurtured and worked at, and were complicated by the multi-racial nature of the wider societies in which Chinese immigrants lived, with their ethnic and class divisions. As Ip points out in relation to Chinese-Māori relationships in New Zealand, there were many hurdles to be surmounted in bridging cultural gaps.144

**Conflict, cooperation and circumvention**

Cross-cultural relationships were not always harmonious. The operation of bonding social capital within groups in the wider society reinforced anti-social behaviour and Chinese gardeners were often made to feel unwelcome in the communities in which they lived. They were attacked by groups of larrikins or neighbourhood children who threw stones, subjected them to racist taunts or stole vegetables. Noel Tyrell, who grew up in Ryde, recalls how he and his friends would throw rocks on the roof of the Chinese market gardeners’ house in Cox’s Road.145 In New Zealand newspapers carried regular reports of thefts of produce from market gardens, thefts of money and goods from market gardeners’ huts and physical attacks on them, particularly in the late-nineteenth and early-twentieth centuries.146 James Ng records that larrikinism was commonplace in Dunedin by 1882.147 The frequency of attacks on Chinese market gardeners provoked comment in both the mainstream media and church publications. In 1889 the *New Zealand Presbyterian* reported: ‘A Chinaman living alone cannot leave his house or garden on Sundays (to attend church) for fear of his windows being broken or his

144 Ip, Being Māori- Chinese, pp. 7–8.
145 Noel Tyrell, interview, City of Ryde Library Services, 1998.
146 For example attacks in Auckland were reported in 1881, 1892, 1894, 1898 and 1905 (Hawke’s Bay Herald, 6 June 1881, p. 2; Colonist, 29 March 1892, p. 4; New Zealand Herald, ‘100 years ago today’, 10 June 1994, p. 9; and, 18 June 1998, p. 14; and, Bay of Plenty Times, 6 November 1905, p. 2). In Wellington attacks were reported in 1886, 1888, 1898 and 1909. (Evening Post, Wellington, 20 January 1886, p. 2; 29 October 1888, p. 3; 20 June 1898, p.4; and, 8 February 1909, p. 7).
garden beds spoiled in his absence.” However, as Ng points out, in New Zealand serious incidents of violence between Europeans and Chinese were widely scattered in time and place and relations between the two races improved from the 1920s with the rising prestige of China.

As Chinese market gardeners established businesses in the growing cities in the later nineteenth century, fences were important in marking the boundaries between them and their European neighbours. Fences signified ownership, marking the boundary between the spaces occupied by Chinese gardeners and the sometimes hostile European community around them. These boundaries were often transgressed. Newspapers in Australia, including Chinese language newspapers such as the Tung Wah Times, carried regular reports of larrikins breaking into market gardens, particularly in urban areas. One of the most serious incidents occurred in the Sydney suburb of Waterloo in 1879. Fifty European larrikins pulled down and burnt the fence surrounding Tat Lim’s market garden and turned in horses to destroy his crops. They assaulted Lim and his co-workers and broke the windows of their house. Lim sought redress through the courts but, according to police reports, the rioters were discharged. These negative interactions and the unpredictable behaviour of Europeans contributed to a lack of trust between them and Chinese market gardeners, a key component in social capital.

Market gardeners also had regular interactions with the police and the justice system. Although discriminatory legislation was enacted against them in most colonies, at least in Australia the Chinese had in principle equal rights before the law, and could seek redress through the court system. This was facilitated by the early establishment of policing on the

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148 New Zealand Presbyterian, 1 Nov 1889, p. 85. See also Cromwell Argus, 4 August 1885, quoted in Ng, Windows on a Chinese Past, Vol. 3, p. 26, fn. 17a.
149 Ng, Windows on a Chinese Past, Vol. 3, p. 79.
150 Sydney Morning Herald, 7 January 1879, p. 5.
151 Two key components of social capital are building trust between individuals and groups and establishing interlocking networks of relationships between them (Onyx and Bullen, ‘The different faces’ p. 45; Claridge, ‘Definitions of social capital’; and, Dekker and Uslaner, Social Capital and Participation, p. 1).
Although many incidents probably went unreported, contemporary newspapers in both Australia and New Zealand report many cases in which market gardeners who had been subjected to racist attacks or thefts went to the police and the offenders were brought before the courts and fined. In Auckland in 1898, it was reported that the Chinese market garden in the inner city suburb of Newton had been destroyed by vandals. The frequency of such attacks led the Mayor to call for the deployment of additional police in the area. The seriousness with which the courts regarded these offences is indicated by one case in 1909 in which two young men were sentenced to three months prison for the theft of vegetables, valued at 5 shillings, from a Chinese garden near Masterton. In some areas the Chinese market gardeners developed a long-term relationship with local police. In South Dunedin in 1909, Chinese market gardeners presented Sergeant Conn with a pair of vases on his retirement, to show their gratitude for his protection over the years.

Mirroring their relationships with the general European community, the relationships of Chinese market gardeners with European market gardeners varied from conflict to cooperation, as social, economic and political conditions changed. Despite efforts to boycott Chinese-grown vegetables and the establishment of European growers associations in Australia and New Zealand, these movements generally met with public apathy. The ready supply and reasonable prices offered by Chinese gardeners ensured they continued to have a market for their produce. The reality was that few Europeans wanted to take up the work of

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154 Grey River Argus, 12 February 1909, p. 3.
155 As discussed in Chapter Three, fear of economic competition and European hostility towards Chinese people was greatest at times of economic hardship, for example during the depressions of the 1890s and the 1930s.
156 As discussed in Chapter Three, fear of economic competition and European hostility towards Chinese people was greatest at times of economic hardship, for example during the depressions of the 1890s and the 1930s.
market gardening. In Australia local associations of European market gardeners were established in various states, for example in the Cooks River district in Sydney in the 1880s, in Melbourne in 1900 and in Adelaide in 1907, but most were short lived and no national organisation was established. In 1891 in Queensland, a deputation from the Labourers Union travelled to Barcaldine to enlist local support for a boycott of Chinese storekeepers, cooks and gardeners. Many residents were willing to consider action against cooks and storekeepers but, as the Brisbane Courier reported:

… they could not see why the gardeners should be boycotted when there were no Europeans willing to take their places; neither could they see how a community could do without the vegetables usually supplied by the Chinaman and so much appreciated by bushmen and other travellers coming in to town for a spell.

In New Zealand, the Canterbury European Market Gardeners Association in Christchurch and the Hutt Farmers Producing Association in the Hutt Valley were both established in 1895. Other anti-Chinese commercial growers groups were established in Auckland in 1908. But by the early-twentieth century their focus had shifted from a strong anti-Chinese platform towards promoting the interests of growers more generally and they remained regionally focused until well into the twentieth century. The first national organisation of market gardeners, the Dominion Council of Tomato, Stone Fruit and Produce Growers (Dominion Council), was not established until 1929.

From the 1920s there is evidence of cooperation between Chinese and European market gardeners, at least in New Zealand. In 1923, for example, Chinese and European market gardeners in the Hutt Valley established a co-operative fruit and vegetable marketing

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158 Sydney Morning Herald, 13 August 1886, p. 4; Argus, Melbourne, 5 April 1900 p. 3, and, Border Watch, Mt Gambier, 3 August 1907, p. 3.
159 Brisbane Courier, 6 January 1891, p. 3.
160 Murphy, Success Through Adversity, pp. 13–14.
161 In 1939 the Council changed its name to the Dominion Council of Commercial Gardeners (ibid., pp. 16–17).
firm in opposition to Wellington retailers who threatened to force them to buy back the containers they used to ship produce. In Auckland, the marketing company Produce Markets, established in 1929, had a large number of Chinese shareholders and in 1930 three Chinese directors were appointed – Thomas Doo Senior, his son Thomas Doo Junior and Fong Foo Foy. During World War II, when Chinese growers played a major role in supplying the armed forces in the Pacific, attitudes towards them improved. Their standing in the community rose and they were complimented for their patriotic effort in Parliament. When Japan surrendered in August 1945, the Chinese community were enthusiastic participants in the celebrations held around the country on ‘VJ Day’, for example in the market gardening centre of Oamaru (Figure 5.4). These cooperative ventures helped market gardeners make their operations more cost effective through improved marketing, reduced costs of inputs such as transport and fertilisers and promoted their joint interests. The exchange of knowledge and information between Chinese and European market gardeners also facilitated the transfer of technology from European society to Chinese market gardeners, as they adopted the latest developments in irrigation systems, fertilisers, pesticides and agricultural equipment.

During the war legislation was passed governing registration of the market gardening industry and greater efforts at cooperation between the Dominion Council and the newly formed Dominion Federation of New Zealand Chinese Commercial Growers, established in 1943, were made. In Otaki, the Otaki District Commercial Gardeners Society formed a united organisation with Chinese growers in 1942, named the Otaki District Commercial Gardeners Association. The Association played an important role in protecting gardeners’

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162 In the 1930s and 1940s Produce Markets was the main auction company in Auckland, selling eighty per cent of the vegetables produced by Chinese growers (ibid., p. 15).
164 Bert Cooksley, president of the Dominion Council from 1938 to 1952, worked hard to foster harmonious relationships with Chinese growers and bring them under the umbrella of the Council. They were invited to form district associations and attend Council conferences (Murphy, Success Through Adversity, pp. 27, 29).
mutual interests and reducing costs by purchasing fertilisers and seeds in bulk and standardising transport rates.165

![Chinese community float in VJ Day Parade, Oamaru, 1945.](image)

**Figure 5.4:** Chinese community float in VJ Day Parade, Oamaru, 1945.166

Other significant interactions across the cultural divide which impacted on the daily lives of Chinese market gardeners were their dealings with state and local governments. The employees of these bodies represented another ‘outside group’ with strong internal bonding ties and the backing of government authority. Like their European neighbours, from the late-nineteenth century Chinese market gardeners became increasingly reliant upon collectively provided services such as water, power, roads, sewerage and waste disposal and were subject to an increasingly complex set of regulations governing these services.167 As early as 1874 residents in Wellington, New Zealand, complained about ‘sanitary reformers’ from the city

166 Photograph courtesy North Otago Museum, Oamaru, Accession No. 3742.
council forcing householders to buy closet boxes. In a letter to the *Evening Post*, one resident argued that household manure was a valuable fertiliser for gardens, citing the example set by Chinese market gardeners. By the late-nineteenth century Chinese communities were becoming increasingly urbanised, and as governments became more concerned with solving emerging social and environmental problems in cities, market gardeners required a more sophisticated understanding of the legal environment in which they were operating their businesses, including local bylaws.

Market gardeners were subject to visits by a variety of local government officials including sanitary inspectors, health officers, building inspectors and engineers. Municipal councils in Australian cities such as Brisbane, Sydney, Melbourne, Perth and Bendigo made inspections of Chinese market gardens and conducted campaigns against practices such as washing vegetables in polluted water, diverting water from street drainage to irrigate gardens and carting vegetables in the same vehicles used to transport manure without cleaning them. In Melbourne for example, after complaints from local residents in Richmond, health authorities instituted proceedings against two Chinese market gardeners for keeping insanitary premises. They were each fined £5 and costs. In 1905, all wells in the New South Wales country town of Dubbo, many of which were located on Chinese market gardens, were filled in by order of the Council after a water scheme was installed in the town. This would have had a major impact on market gardeners’ operations, forcing them to pay for council water supplies.

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169 As noted in Chapter Four, from the early-twentieth century Chinese market gardeners in cities and country towns had to abide by a host of local government regulations regarding such things as sanitation, building standards and treatment of animals (p. 254).
170 *Brisbane Courier*, 16 January 1889, p. 3, 30 September 1889, p. 7; *Mercury*, Hobart, 15 September 1910, p. 3; *West Australian*, Perth, 28 February 1906, p. 9; *Star*, Ballarat, 9 July 1891 p. 3; *Argus*, Melbourne, 14 February 1911, p. 9; 8 October 1907, p. 6; and, *Bendigo Advertiser*, 14 October 1903, p. 2.
171 *Star*, Ballarat, 9 July 1891, p. 3.
172 Foley, ‘Chinese in the Community’, p. 5.
Pest control regulations also impacted upon market gardeners by the early-twentieth century. In Perth in 1901, a Chinese market gardener, Sam Wah, was fined 2 guineas under the *Insect Pests Amendment Act 1898* for neglecting to eradicate fruit fly in his orchard. The agricultural inspector had given him a warning and a written notice, but when he returned about three weeks later he again saw affected fruit lying on the ground. The magistrate imposed a light fine as this was the first prosecution under the amended Act.173

Since Chinese market gardeners were a major presence in Australian cities in the early-twentieth century and highly visible because of their race it is probable that they were more likely than European market gardeners to be prosecuted for infringing regulations. One correspondent to a Perth newspaper was sympathetic to the Chinese. In a letter to *West Australian* newspaper in 1906 he observed, in relation to the practice of carting vegetables to market and bringing back manure in the same vehicle:

> Certainly our own white people are just as great offenders in this practice as they are, and in fact it is they who are to be blamed. The Chinese are only following a custom of the land, and for this they are hardly to be condemned.174

Chinese market gardeners’ interactions with local government authorities could be hampered by language and cultural barriers. As many gardeners did not speak English well they were unaware of many regulations until they were visited by inspectors. Some local governments made efforts to bridge the language barrier. In the Melbourne suburb of Brighton in the early 1900s, the local Board of Health took the sensible step of translating health regulations into Chinese and circulating them among Chinese market gardeners.175 Similarly in Brisbane in 1899, the Central Board of Health recommended the distribution of notices in


175 Bate, *History of Brighton*, p. 360.
English and Chinese to all market gardeners setting out hygiene regulations.\footnote{The proposed regulations included storing vegetables in properly ventilated stores and not in dwelling houses; washing vegetables only in clean water; keeping carts used for transporting vegetables clean; and, not placing manure heaps where they could drain into any well or creek. They were enacted and were still in force in 1904 (Brisbane Courier, 30 Sept 1889, p. 7; and, 4 November 1904, p. 4).}

Chinese language newspapers also played a role in communicating local government regulations to market gardeners. In 1899 the \textit{Tung Wah News} published an article advising Sydney market gardeners about the often bewildering array of regulations of which they should be aware. They were advised that they should get a certificate for their horses which would make it easier to find them if they got lost. They were also warned not to ride an injured horse and to tie up their carts so their horse would not run away, otherwise they might be fined.\footnote{Tung Wah News, 19 July 1899, p. 2.} In the 1920s the \textit{Tung Wah Times} (successor of the \textit{Tung Wah News}) carried regular warnings to Chinese market gardeners to abide by council regulations regarding washing vegetables with clean water and caring for their horses.\footnote{Tung Wah Times, 10 September 1921, p. 7 a; 3 December 1921, p. 7 b; 8 October 1921, p. 7 a; 6 May 1922, p. 7 a; 12 June 1926, p. 7 b-d; and, 26 June 1926, p. 7 a-d. } Market gardeners’ operations, both Chinese and European, were certainly circumscribed by such regulations. However, by raising awareness of local government regulations and bylaws and the penalties for infringing them among the Chinese community, the Chinese language media increased their familiarity with the society in which they lived.

In New Zealand, municipal authorities in Auckland, Christchurch, Invercargill and Gisborne received similar complaints about practices such as using nightsoil as fertiliser and washing vegetables in polluted water, and inspected Chinese market gardens. In most cases the offenders were prosecuted and fined.\footnote{Auckland Star, 25 March 1887, p. 2; Star, Canterbury,18 May 1895, p.7; 4 October 1878, p. 3; Southland Times, Otago, 28 April 1886, p. 2; and, Poverty Bay Herald, Gisborne, 19 August 1913, p. 4.} It was acknowledged in some cases that Chinese market gardeners had improved the condition of formerly unusable swampy land and brought it into productive use.
Springs (then Auckland’s major water supply) in 1887, Mr J. Pond noted:

I passed through the Chinese garden and found nothing which could in any way injure the purity of the water supply, and I consider the high state of cultivation to which they have brought this ground greatly preferable to the swampy state it was in before.¹⁸⁰

Like other city dwellers, Chinese market gardeners were affected by zoning regulations and the expansion of road networks to accommodate increased traffic as urban populations grew. In Wellington in 1898, for example, the widening of Adelaide Road in Newtown, one of the main access roads to the city, took in a strip of Chinese market gardening land 20 feet wide. It was also proposed to purchase the 6 acre market garden run by ‘a Chinaman’ to replace the area of recreation reserve lost from the Basin reserve, at the city end of Adelaide Road.¹⁸¹

One response of Chinese market gardeners to the maze of regulations surrounding them was to find creative ways to circumvent them. They actively subverted government regulations, sometimes laying claim to land or key resources such as water that were not legally theirs. In Cooktown in North Queensland, Chinese gardeners sometimes extended the high wattle fences around their garden plots to encroach onto road reserves or to maintain exclusive access to water sources.¹⁸² In another case Ling Fong, owner of a large market garden in the Perth suburb of Maylands, came to the attention of the Perth Road Board and the local media in 1929 when it was discovered that he had extended his land into a road reserve and erected a fence to keep stock out.¹⁸³

After local councils introduced charges for water usage, some Chinese market

¹⁸¹ Evening Post, Wellington, 1 July 1897, p. 5; 17 June 1898, p. 4; and, 7 September 1898, p. 2.
¹⁸³ The garden area had apparently been extended some years previously, by the previous owner who had returned to China, and Ling Fong denied any knowledge of the road reserve running through it (Mirror, Perth, 14 September 1929, p. 5; and, 21 September 1929, p.5).
gardeners found ways to evade paying them. In 1899, inspectors from the Melbourne Metropolitan Board of Works visited the premises of Ah Lip and Ah Cheong, Chinese gardeners in Coburg, after unusually low levels of water usage had been recorded relative to the acreage of their garden. After encountering some resistance from the gardeners and around sixteen of their countrymen who had come to their aid, the inspectors discovered that they had tampered with the water meter.\textsuperscript{184}

Another regulation affecting market gardening operations was the prohibition on working on Sundays, particularly in the period from the 1880s to World War I. The Labour movements in Australia and New Zealand strongly supported reducing the working hours of Chinese in all their occupations, in reaction to what was seen as unfair competition.\textsuperscript{185} New Zealand newspapers often reported prosecutions of Chinese market gardeners for infringing such bylaws, for example in Wellington in 1887 and in the Te Matai Valley near Napier in 1909.\textsuperscript{186} In 1907, Chinese gardeners in Auckland who had been trying to save their potato crops after a long spell of wet weather had the charges against them dismissed.\textsuperscript{187} Restrictions on working on Sundays particularly affected larger enterprises such as Chan Dah Chee’s in Auckland, which had contracts to supply set quantities of vegetables to shipping companies, clubs and hotels. In 1907 five of Chee’s employees were charged in the Police Court with gardening on Sundays. The defence argued that they were engaged in necessary work harvesting vegetables, not digging new ground or other market gardening tasks. It was pointed out that Chee had about fifty contracts to fill on the Monday morning for the supply of vegetables to steamers and clubs and it was impossible to meet these orders without working

\textsuperscript{184} \textit{Barrier Miner}, Broken Hill, 17 February 1899, p. 2.
\textsuperscript{185} \textit{Nelson Evening Mail}, 2 April 1904, p. 3; \textit{New Zealand Herald}, 6 September 1906, p.6, 11 May 1908, p. 6; \textit{Auckland Star}, 14 February 1905, p. 2; and, \textit{Evening Post}, Wellington, 1 July 1921, p. 11.
\textsuperscript{186} \textit{Bruce Herald}, Otago, 28 October 1887, p. 3; \textit{Evening Post}, Wellington, 18 January 1909, p. 3. See also Lee and Lam, \textit{Sons of the Soil}, p. 149, and, Ng, \textit{Windows on a Chinese Past}, Vol. 3, p. 84.
\textsuperscript{187} \textit{Hawera Normanby Star}, 30 November 1907, p. 7.
on Sunday. Similar arguments were made in other cases where Chinese gardeners were prosecuted for working on Sundays, although magistrates did not always agree.

Chinese market gardeners in Australia also faced restrictions on working on Sundays, as they were reminded by the *Tung Wah Times*. There was some recognition of the need to harvest crops on a Sunday in preparation for sale on a Monday. In 1921 a deputation from the Sydney Market Gardeners Association met the Minister for Labour and Industry Mr Cann to protest against the recently determined award for horticultural and garden employees which limited their working hours to forty-eight per week, on the grounds that it favoured the Chinese who were not bound by the award and worked long hours. The delegation suggested that gardeners should be allowed to work for up two hours on a Sunday, but this should be limited to the harvesting of perishable vegetables.

Linked to these restrictions were concerns to regulate the activities of Chinese market gardeners during their limited leisure hours, particularly gambling and opium smoking. While Europeans indulged in both these pursuits, the general hostility towards Chinese people and their visibility ensured their involvement had a high profile. A case reported in New Zealand in 1933 illustrates the extent to which Europeans indulged in gambling and also the higher fines meted out to Chinese. After a raid on five premises in Haining Street, Wellington’s Chinatown, police arrested twenty-one Chinese and twenty-three Europeans. Six Chinese, including two gardeners, were charged with frequenting a common gaming house and fined £3, while the twenty-three Europeans on the same charge were each fined £1. Fifteen Chinese were charged with being keepers of a gaming house and fined £50 each. The premises had

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188 *Bush Advocate*, Hawke’s Bay, 5 November 1907, p. 5.
190 *Tung Wah Times*, 12 October 1907, p. 7a.
191 *Recorder*, Port Pirie, 28 July 1921, p. 3.
been under surveillance for two months.\textsuperscript{192}

By the late-nineteenth century Chinese community leaders in Australia and New Zealand were concerned that opium smoking and gambling was detrimental to the image of Chinese people. In Sydney, for example, leading Chinese merchants such as Quong Tart campaigned to ban opium in the 1890s.\textsuperscript{193} In Dunedin in 1917, there were complaints by what the local newspaper termed the 'better class of Chinamen' that younger men were neglecting their work by gambling on Sundays. This resulted in a police raid and charges being laid against several market gardeners. The Magistrate hearing the subsequent court case observed that the Chinese gardeners had every right to be confused by the workings of the law and were placed in a no-win situation. If they worked in their gardens on Sundays they were prosecuted and if they came to town they were prosecuted for gambling and accused of neglecting their work.\textsuperscript{194}

Police on both sides of the Tasman raided market gardens in search of illegal immigrants and evidence of illegal opium smoking. In Australia in 1931, Ah Wah and Lee Tîy, Chinese gardeners, were fined £5 in Redfern Police Court for smoking opium in Tuck Wah’s garden in Botany. During the raid on the previous Saturday night police found that an elaborate warning system had been erected. Forcing their way through strands of barbed wire, they set off alarm bells which enabled many Chinese in neighbouring huts to escape. The police only arrested two of them.\textsuperscript{195} In 1919, Yee Kum and Ah Mon, who had been smuggled into New Zealand the previous year, were discovered on a market garden in Auckland.\textsuperscript{196} In Sydney in 1927, police raided market gardens in Liverpool, Mascot, Botany and other

\textsuperscript{192} Evening Post, Wellington, 5 October 1933, p. 4.
\textsuperscript{193} A ban on opium imports was passed in 1905 (Williams, Chinese Settlement in NSW, p. 53).
\textsuperscript{194} Ashburton Guardian, 17 July 1917, p. 3.
\textsuperscript{195} Northern Miner, Charters Towers, 19 January 1931, p. 2; and, Sydney Morning Herald, 20 January 1931, p. 5.
\textsuperscript{196} They were charged with failing to register as aliens and were required to pay the poll tax and an additional penalty of £5, plus 9 shillings costs (Poverty Bay Herald, Gisborne, 26 June 1919, p. 5).
locations in search of twelve illegal immigrants said to have been clandestinely landed from a
steamer. Ten arrests were made.\(^{197}\)

Certainly immigration rackets and smuggling rings existed, but such stories were
readily sensationalised by the popular press. Smuggling people into the country on board ships
was the most common method the Chinese community used to defy immigration restrictions
and added to the Chinese population of New South Wales more than any other State after
Federation.\(^{198}\) As Jane Lydon and Shirley Fitzgerald observe in their studies of the Chinese in
Sydney, circumventing regulations and bending rules was an elaborate game on both sides.
Police and customs officials were often open to bribery, while in Chinese culture these
informal exchanges with officiialdom were a part of *guanxi*, the tradition of giving gifts in
exchange for material gain or to strengthen personal relationships.\(^{199}\)

These raids also caught up Europeans in the authorities’ net, indicating that market
gardens were important loci of cross-cultural interaction. For example, in New Zealand in
1905, police searching a Chinese market garden in Palmerston North discovered a European
smoking opium.\(^{200}\) In 1908 police raided tents and huts on a Chinese market garden near
Foxton in search of opium. In one hut they seized opium and smoking equipment, and in one
of the tents they found a white woman and a Chinese man.\(^{201}\) In Australia there were also raids
targeted at finding ‘fallen’ women living with Chinese men. In 1930 the *Tung Wah Times*
reported that police in Sydney had raided Chinese gardens in search of white women.\(^{202}\) These
inspections and raids indicate the level of surveillance under which Chinese market gardeners
lived, and also the efforts they made to circumvent the legal restrictions they encountered.

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\(^{197}\) *West Australian*, 14 October 1927, p. 19; and, *Sydney Morning Herald*, 13 October 1927, p. 11.
\(^{198}\) Williams, *Chinese Settlement in NSW*, p. 32.
\(^{201}\) *Colonist*, Nelson, 20 May 1908, p. 2.
\(^{202}\) *Tung Wah Times*, 29 March 1930, p. 8 e.
Cross-cultural relationships on the margins

Often situated on the margins of European society, Chinese market gardeners developed relationships with other marginalised social groups, including indigenous people. Chinese market gardeners need for additional labour contributed to the development of relationships across cultures, particularly between Chinese and Māori in New Zealand from the early-twentieth century. Many Chinese market gardeners employed Māori workers, particularly for harvesting and packing produce during peak summer periods. This was a mutually beneficial relationship. For Chinese market gardeners, Māori provided a valuable additional labour force.\textsuperscript{203} For Māori, particularly those living in rural areas where employment opportunities were limited, working on market gardens provided a much needed source of income, food and accommodation. During the 1930s Depression Māori were initially excluded from unemployment relief and, with many of their menfolk unemployed, Māori women found work on market gardens to support their families.\textsuperscript{204} They were often assisted by their relatives, as Chinese market gardeners commonly let a contract to the head of an extended family and provided them all with accommodation.\textsuperscript{205}

In market gardening centres such as Otaki, Ohakune and Pukekohe, and in many other areas of the North Island, Māori formed the core of the market gardening workforce.\textsuperscript{206} In Hamilton in the 1950s, George Lim Sum employed Māori families who lived in four cottages at the bottom of the hill from the Sum family house. At peak times he employed additional

\textsuperscript{203} Refer to Chapter Three for a discussion of the impact of immigration restrictions on the supply of labour on Chinese market gardens (pp. 175–8).
\textsuperscript{206} Māori were employed on gardens in Masterton, Greytown, Levin, Wanganui, Hawke’s Bay, Hamilton and Auckland (Lee and Lam, Sons of the Soil, pp. 142, 144, 164, 208, 264, 305, 397).
contract workers. In Hawke’s Bay, Bill Wong Bing, who ran a garden near Hastings in the 1930s and 1940s, also employed Māori. His son Bill recalls:

In those days, all the growing was done by hand and Dad had Māori workers to help him. He used to pick them up in his 1935 Chevy truck from Fernhill, Bridge Pa, Pakipaki … in the summer season, at the peak of harvesting, he sometimes got up to 80 to 100 workers. They worked on contract and they were paid so much a box or so much per weight.

After World War II there was a major movement of the Māori population to the cities in search of work. Urban market gardens, for example in Mangere, Tamaki, Mount Wellington and Pukekohe in Auckland, provided employment for Māori families. Chinese market gardeners also moved from rural areas to the city, closer to their markets, and some took their Māori workers with them. Ng Bing Wai, a prominent grower in Taranaki in the 1940s and early 1950s, moved to Auckland in 1954 and took Māori workers with him to work on his market garden in Mangere.

Thus market gardens were important loci of interaction between the Chinese and Māori communities. Their lives were entwined and this fostered close relationships that bridged the ethnic divide. Where Māori families lived on the gardens, Māori and Chinese children played together and went to school together. They all helped their parents, working on the gardens after school and at the weekends. On the East coast of the North Island in the 1940s and 1950s, Sue Chee Wing and his wife Young Yee ran a market garden in the isolated rural settlement of Waimarama, leasing land from local Māori landowners. Their children Set Sue, Lily, Cissie and Arthur attended the local school and spent their leisure hours with Māori schoolmates, swimming in the creeks and catching whitebait, eels, tadpoles and frogs.

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207 Ibid., p. 305.
208 Bill Wong Bing, interviewed by Lily Lee and Ruth Lam, quoted in Lee and Lam, Sons of the Soil, p. 264.
209 Ibid., p. 213.
2006, the locals were delighted when former Chinese pupils returned to join in the Waimarama School centenary celebrations and remember their school days. Lily Young comments: “The fact that local Māori, now kaumatua and kuia (male and female elders) of their marae, all remembered us, was a humbling experience”.\(^{210}\) In the early 1970s Dick Young employed many local Māori families on his 140 acre market garden near Waimauku, north of Auckland. Over the years he developed a close relationship with the Māori community – so much so that when his wife died in 1976 she was buried in the Māori cemetery (urupa) at Rewiti. Anita Garland, who was a young girl then, recalled:

My mother and aunts all worked for Dick Young, who had acres of land at Rewiti. He provided work for all the mothers and they were allowed to take their children (tamariki) with them. And when we were old enough, he gave us work too. The connection was very strong with Dick in the community.\(^{211}\)

Ohakune was another area where the lives of Chinese and Māori communities were closely entwined. In 1971 journalist Warwick Roger visited Ohakune and he paints a vivid picture of the Chinese market gardening community. He describes a Saturday night dance:

Māori girls danced with Chinese boys whose sisters were, in turn, dancing with European boys. Everyone had a tremendous time. The next day, at the railway station, the same youngsters and their parents worked together loading vegetables on to the train that would take them to the city markets. That night at the local picture theatre, the same young people sat through the double feature together.\(^{212}\)

Often Chinese and Māori suffered similar discrimination, forging a common bond against adversity. Tom Young, who grew up in a market gardening family in Outram near Dunedin and began market gardening in Pukekohe in the early 1950s, recalled that they were discriminated against at the cinema: “We were not permitted upstairs. We had to sit, along with

\(^{210}\) Personal communication from Lily Young to Lily Lee, 3 September 2010, quoted in Lee and Lam, *Sons of the Soil*, pp. 267–8.

\(^{211}\) Lee and Lam, *Sons of the Soil*, pp. 433–5.

Māori, on the ground floor of the picture theatre.¹²¹³

Relationships between Māori and Chinese were complex and nuanced, just as those between Chinese and Europeans. By the early-twentieth century the Māori population was increasing and they had growing aspirations for self-determination and recovering their traditional lands which had been appropriated by Europeans.¹²¹⁴ Unlike Chinese-New Zealanders, who were seen as outsiders and for much of the twentieth century were denied the right to become British subjects or citizens, Māori could make political claims as tangata whenua (people of the land), the indigenous majority at the time of colonisation.¹²¹⁵ Moreover, their status as landlords on Chinese market gardens often crossed over with their status as workers. In 1929 Māori leader and parliamentarian Sir Apirana Ngata appointed a parliamentary committee to enquire into the conditions under which Māori were employed by Asian market gardeners.¹²¹⁶ The issues were complex; they concerned not only suitable employment for Māori women, but the debate over tradition and modernity and the freedom of young Māori women to enter sexual liaisons and earn an independent income away from their home communities.¹²¹⁷

Manying Ip’s Being Māori-Chinese gives an insight into the complexities of cross-cultural alliances. There was opposition to mixed marriages in both the Māori and Chinese

²¹³ Tom Young, interviewed by Lily Lee, 1 September 2007, quoted in Lee and Lam, Sons of the Soil, p. 478.
²¹⁴ Māori political leader Sir Apirana Ngata, Princess Te Puea, great-grand-daughter of the first Māori King Potatu te Wherewhero, the Māori members of the Auckland Anglican Synod, the National Council of Women and the Akarana Māori Association all made statements regarding the need to return Māori people to the land and preserve the purity of the Māori race (Ip, Being Māori-Chinese, pp. 3–4; Ng, Windows on a Chinese Past, Vol. 3, p. 158; and, Worrall-Smith, ‘Employment of Maori women’, pp. 1, 5).
²¹⁶ The report was tabled in October 1929, and raised concerns about poor living conditions, poor health and low wages. Ultimately none of the Committee’s recommendations were implemented (New Zealand House of Representatives, Report of the Committee on Employment of Maoris, Vol. II, G 11, p. 5; Worrall-Smith, ‘Employment of Maori women’, p. 1, and, Ng, Windows on a Chinese Past, Vol. 3, p. 158).
communities, and to the ties which many Chinese men maintained with wives or concubines in their home villages in China. Many market gardeners who had wives and children in China also had children with the Māori women they employed. Ip concludes that Māori families encouraged their daughters to marry Chinese because they were seen as financially secure. Chinese men were also seen as family centred and less prone to violence.  

From the Chinese perspective, marriage within the Chinese community was strongly preferred and clan and district alliances remained an important factor. However, the marked gender imbalance in the Chinese community meant that many men formed relationships with non-Chinese women. Those with sufficient financial resources were able to return to China to find wives, but immigration restrictions meant that most wives remained in China.

The post-war movement of Māori from small rural communities to cities brought opportunities for employment and economic advancement, as well as threats of social dislocation and separation from family and tribal support networks. Concerns about the living and working conditions of Māori on market gardens resurfaced in the 1950s. The burden of providing accommodation for their workers often fell on Chinese market gardeners and they could not cope with the arrival of large numbers of extended family members. Despite efforts by the Government to address overcrowding and substandard living conditions on market gardens, living conditions remained spartan, often for Chinese gardeners as well as their Māori workers. The facts remained that Māori were the lifeblood of the market

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218 Ip, Being Māori-Chinese, pp. 8–9.
219 Williams, Chinese Settlement in NSW, p. 59; Fitzgerald, Red Tape Gold Scissors, p. 27; and, Ip, Being Māori-Chinese, p. 8.
221 Memo from Department of Labour and Employment to District Superintendent, Auckland, 4 August 1953, National Archives, ACIE 8798, EAW2619/2, Box 2, 30/1/2, Part 1; and, Letter from Minister of Labour to Rev. W. Divers, Pukekohe, 23 April 1959, Archives New Zealand, ACIE 8798, EAW2619/2, Box 2, 30/1/2, Part 1.
222 The Departments of Housing and Māori Affairs could not keep pace with the demand for housing at a time when there were limited resources and housing shortages in many other areas (Letter from Secretary, Minister of Labour to Minister of Maori Affairs. 27 July 1959, Archives New Zealand, ACIE 8798, EAW2619/2, Box
gardening industry, particularly during a period when generational changes in the Chinese community meant that sons and daughters of Chinese market gardeners were moving into other careers, and market gardeners provided Māori families with much needed employment.

In Australia Aboriginal people were employed on Chinese market gardens, but not to the same extent as Māori in New Zealand. With their multiplicity of tribal groups, languages and dialects and small, mobile communities scattered across huge distances, Aboriginal people had greater difficulties in organising politically. As the original custodians of the land, their relationships with later settlers, both European and Chinese, were characterised by ignorance, fear and mistrust. Like European settlers, early Chinese immigrants feared ‘the wild black people with spears’ and saw them as primitive and lacking civilisation.  

Certainly there were incidents where Chinese immigrants were killed (and according to some reports, eaten) by Aboriginal people. However, tensions eased by the late-nineteenth century, as restrictive legislation affected the lives of both groups and they were regarded as second-class citizens. Chinese market gardeners developed strong, enduring ties with Aboriginal people, particularly in rural areas, and oral history accounts include many stories of Chinese and Aboriginal people working together, supplying outback towns with vegetables. Eddie Quong, whose father established a market garden near Longreach in the early 1930s with a close Aboriginal friend with whom he had gone to school, recalls:

I learned a hell of a lot from indigenous peoples … I learnt bush craft … the understanding of living … about having tolerance of other people. I couldn’t learn


224 Evans, Saunders and Cronin, Race Relations in Colonial Queensland, p. 257. In 1875 a New Zealand newspaper reported that the Chinese on the Palmer River goldfields, many of whom were running successful stores and carting businesses, were very afraid of local Aboriginal people, who attacked them and their horses (Grey River Argus, 25 October 1875, p. 2).
that from anybody else as a boy.\textsuperscript{225}

Many Chinese market gardeners in northern Australia and outback areas of the southern states employed Aboriginal workers. According to several commentators in Queensland in the 1890s, including the police inspector at Mackay, local police on the Atherton Tablelands and the northern protector of Aborigines, Dr Walter Roth, Aboriginal people were generally treated more fairly by Chinese than by Europeans and they preferred to work for Chinese employers.\textsuperscript{226} On the Atherton Tablelands, European settlers could not find cheap Pacific Island labour and turned to Aboriginal people. This led to conflict with local Chinese farmers as they were more successful in attracting Aboriginal workers. This was hardly surprising given the often brutal treatment Europeans meted out to Aboriginal people.\textsuperscript{227}

In Queensland the lives of Aboriginal people were particularly closely controlled. The 1897 \textit{Aboriginal Protection and Restrictions of the Sale of Opium Act} was far more restrictive than any similar legislation operating in New South Wales or Victoria. This legislation encapsulated two major preoccupations of colonial authorities: the conflict-ridden relations between white settlers and Aboriginal communities and anxieties about the Chinese presence in Australia, expressed through pejorative views about the ‘moral vice’ of opium. The Act implemented a system of closed reserves under the direct control of government officials and gave legal sanction to the forced removal and dispersal of Aboriginal people from their traditional lands. As Aboriginal people were a source of cheap labour for white employers, the 1897 Act also empowered the Protectors of Aborigines to regulate the living and employment

\textsuperscript{225} Eddie Quong, interviewed by Diana Geise, 7 December 1993, National Library of Australia, Post-war Chinese Australians Oral History Project, ORAL TRC 3005. 
\textsuperscript{226} Reynolds, \textit{North of Capricorn}, p. 76. See also Li, quoted in Giese, \textit{Astronauts, Lost Souls and Dragons}, p. 39. 
\textsuperscript{227} One European farmer in the district boasted he had recently shot several Aboriginal people, then in the same breath complained he could not get them to work for him (Cathie May, ‘Chinese and Europeans in North Queensland: A study in race relations’, lectures on North Queensland History, Townsville, 1975).
conditions of individuals who remained in contact with white society. The legislation was justified by the desire to protect indigenous people from exploitation by both white and Chinese employers, but it is debatable to what extent it was motivated by any real concern for their wellbeing.\textsuperscript{228} Thus Chinese market gardeners, like European employers, were constrained in their access to indigenous labour and subject to surveillance by European authorities. In 1927, for example, the market gardener Sam Wah was fined £10 and costs in the Gordonvale Police Court for employing Aboriginal people contrary to the *Aboriginals Protection Act*. The newspaper report of this case noted that during similar hearings in the Cairns Police Court, the Police Magistrate, Mr Kelly, remarked that this offence gave rise to industrial unrest.\textsuperscript{229}

In New South Wales the reserve system was less strictly controlled and mission dwellers were allowed to work outside the missions. Like Māori people in New Zealand, indigenous families had the chance to work together outdoors on market gardens and earn much needed income. Ah Yook, a Chinese market gardener in Wellington, New South Wales recalls:

> We had a lot of the Aboriginal population working for us. We used to go out to the Mission and pick up a truck load full. Mums, Dads, kids. Take them out to Newrie. No restrictions on putting them on the backs of trucks.\textsuperscript{230}

The recollections of Norman Mitchell, a Kuku Yalanji man born around 1900 near Mount Carbine on the Cape York Peninsula, give a rare insight into Chinese-Aboriginal relationships from the Aboriginal perspective. Mitchell spent much of his early life in Maytown, which had been the centre of the Palmer River gold rushes between about 1873 and 1885. He vividly recalls the Chinese who remained after the gold rushes and set up business as

\textsuperscript{229} *Townsville Daily Bulletin*, 24 August 1927, p. 13, From *Cairns Chronicle*.
\textsuperscript{230} Ah Yook and Carole Gass, interviewed by Joe Eisenberg, August 1999, Golden Threads Papers.
market gardeners, storekeepers and carters in the region. For example, he describes helping a Chinese market gardener weed his plots and cooking favourite Aboriginal bush tucker in the Chinese style:

We used to go up there . . . don't know whether Dad used to take the opium or not . . . but we used to often go up there to Chinaman’s garden, you know. Give the Chinaman a hand, shiftin' grass, weed. Had a big garden growin' there and so forth. Dad used to bring 'em great big sand goanna. He used to grab 'em by the tail and slap 'em on the ground. … Chinaman would eat that minya [meat food] then. They use that fat part, oil, too, for all kinda cookin' and so forth. And they mixed in that saw-su, Chinee rum they call it. They used to have it for purpose of medicine too.231

One urban area where close relationships developed between Chinese market gardeners and Aboriginal people was La Perouse, in Sydney.232 In 1883 a camp was established at La Perouse under the Aborigines Protection Board. Many of the inhabitants came from rural areas and over time the settlement was run by a variety of church and welfare groups. During the Depression of the 1930s unemployed people built makeshift houses in two settlements called Happy Valley and Hill 60 north of the Aboriginal Mission. There was extensive interaction between these communities and the Chinese market gardeners in the area, who gave them food.

**Interrace**

A natural outcome of the daily social interactions between Chinese market gardeners and the local community in Australia and New Zealand was the development of intimate relationships between Chinese men and women of other ethnic backgrounds, both indigenous and European. Recent research in Australia has expanded and complicated our knowledge of

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Chinese families, particularly concerning the extent to which Chinese men and white women formed relationships. Kate Bagnall’s research in New South Wales and Victoria focuses on the Chinese and European women who were part of the early Chinese community. She argues that Chinese-European families are integral to the story of Australia’s early Chinese communities. Bagnall highlights the relationships that developed on the thresholds of European homes, between Chinese gardeners and vegetable hawkers and their regular customers. These customers were usually the women of the household; their encounters involved co-operation, negotiation, exchange and friendship. These daily interactions counter more negative pictures of inequality and conflict – they allowed white wives and servants to get to know Chinese people as individuals, rather than part of an anonymous group. Ignorance breeds prejudice and through these encounters European women modified their attitudes towards Chinese people, developing ideas potentially contradictory to those of the men of their household. These were relationships of mutual advantage: housewives had a regular, convenient supply of fresh vegetables at reasonable prices while Chinese gardeners developed a regular clientele for their produce and were able to earn a living in a country where they were excluded from finding work in many other fields.

There were also intimate relationships between Chinese market gardeners and Aboriginal women in Australia, although the lack of documentation makes it difficult to accurately determine their prevalence. Researching Chinese families in Western Queensland, Sandi Robb has documented Chinese and Aboriginal unions in the market gardening precinct in Cloncurry in the early-twentieth century; the majority of wives were Aboriginal. The

235 These families migrated south from pastoral stations in the northern gulf region between 1910 and 1920. Unlike those on the coast, Chinese communities in western Queensland remained small and scattered. By 1940 few market gardeners remained in major towns (Sandi Robb, ‘Beyond the coast: Chinese settler patterns
children of Chinese-Aboriginal relationships had to negotiate their dual cultural heritage. Jennifer Martiniello, the grand-daughter of the market gardener Chong Lee in Oodnadatta, who married an Arrente woman, Minnie Bell, in 1913, describes how her grandfather dictated that only English, ‘the language of power’, be spoken in the household. Despite this Minnie passed on Arrente languages and traditional cultural knowledge to all her children. Thomas Vivian Tim, who grew up in Cloncurry in the 1930s and had Aboriginal and Chinese ancestry, makes similar comments. The family had a 5 acre market garden in which they all worked. Thomas recalls:

Dad never told me much about China, he thought he was Australian, having been here so long ... I think he was happy to die in Australia ... My mother’s mother was a tribal Aboriginal woman and her cultural pull was pretty strong. So we largely grew up as an Aboriginal family.

In New Zealand, historians such as James Ng and Julia Bradshaw have documented *de facto* and marriage relationships between European women and Chinese men from an early period. One of the earliest known cross-cultural marriages was in 1871 when the *Tuapeka Times* reported the marriage in Dunedin of a Chinese man and a European woman, ‘a blooming Caucasian damsel of some twenty summers’. In 1875 a Dunedin market gardener named Ching Chee married a European woman who subsequently left him. He later lived with another woman, Esther Bella Faulkner, who bore him two children. Contrary to popular prejudice, many women who lived with Chinese men in the nineteenth and early-twentieth centuries were ‘respectable’ women who took pride in their homes, not prostitutes or ‘low

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238 *Tuapeka Times*, 9 November 1871, p. 4.

class’ women. For example, in 1906 Alexander Don reported that a European woman in Blenheim, a piano teacher who had taught English to the Chinese community, was married to a Chinese market gardener. They had several children.

Interactions between Chinese market gardeners and Māori women date from the late-nineteenth century when Chinese market gardeners began to move north to the North Island, following the growing centres of population. These interactions increased in the 1920s and 1930s as Chinese immigrants opened up more gardens. While there were casual liaisons and de facto relationships, many were enduring marriage and business partnerships. Chinese market gardeners leased land from Māori tribes and their Māori wives worked side by side with them on the garden as well as caring for children and preparing meals for employees. Chong Lee, who arrived in New Zealand in 1926 and ran a market garden in Ohau, north of Wellington, married a local Māori woman, Eva Te Hiwi of the Ngati Raukawa tribe. Together they gardened on Eva’s ancestral land and had four children. Their enterprise prospered, particularly during World War II. ‘They used to call Chong Lee the carrot king. He made his money during the war with onions and carrots’, recalls Kookie Lawton, a kaumatua (elder) of the local Māori community.

CONCLUSION

Chinese market gardeners in Australia and New Zealand not only adapted their technology and work practices to foreign and often harsh physical environments, they also had to adapt to foreign and often hostile social, cultural and political environments. As Warwick

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240 Official condemnation of Chinese liaisons between Chinese men and European women in New Zealand continued well into the 1930s. The Police Offences Act 1927 was invoked against women consorting with Chinese, and living with a Chinese man was not considered a ‘legitimate means of support’ (Ng, Windows on a Chinese Past, Vol. 3, p. 178).


242 Ibid., p. 268.

243 Lee and Lam, Sons of the Soil, p. 153.
Frost observes in Australia, they created not only a Chinese-Australian style of farming, but a Chinese-Australian culture.244

Using the concept of social capital as an analytical framework, this chapter has explored the opportunities and constraints offered by the complex networks of relationships that Chinese market gardeners maintained, with their kin and home villages in China, within their own overseas Chinese communities and with the wider community. The ties of bonding social capital extended across national borders, between Chinese market gardeners living overseas and their kin and native places in China, and between the overseas Chinese communities in Australia and New Zealand. These ties sustained them, maintaining the bonds of family, kin and native place, and ensuring the continuity of Chinese culture, language and horticultural skills across the generations. They therefore played a key role in the transfer of horticultural technology from China to Australia and New Zealand. These bonds also helped Chinese market gardeners build their businesses and negotiate their relationships with the wider community.

Importantly, these bonds within Chinese communities were sometimes fractured and were not always sustained by harmonious relations; there was friction and conflict among the Chinese, as could occur in any human group. At the same time the ties of bonding social capital within groups in the wider community could work against the interests of Chinese market gardeners. These included informal gangs of European larrikins banding together to attack gardens as well as more formal anti-Chinese associations organising boycotts against market gardeners or lobbying for restricting Chinese immigration.

The ties of bridging social capital crossed community boundaries, breaking down barriers of language, culture and ethnicity. Anti-Chinese attitudes at the broader societal level

244 Frost, ‘Migrants and technological transfer’, p. 128.
could be modified through exchanges related to food and changing dietary patterns; shared desire to develop the land and make it productive; and, the contribution which Chinese market gardeners made to the economy. At the local level, the diverse relationships that market gardeners formed in their daily interactions with the wider community fostered understanding between cultures, promoted business opportunities and helped to counter broader anti-Chinese attitudes. They ranged from business partnerships to marriage and *de facto* relationships between Chinese men and women of other ethnic backgrounds, and were the foundation for building successful market gardening enterprises.

These relationships could also be negative, imposing constraints on the successful operation of market gardening enterprises, for example the activities of local government officials implementing the maze of local government regulations that circumscribed the operation of market garden enterprises and police raids on market gardens in search of opium and illegal immigrants. They involved conflict, cooperation, negotiation and in some cases circumvention. Chinese market gardeners were active agents in their own history, as they negotiated their positions in relation to the restrictive immigration policies which dominated their lives from the late-nineteenth century until well into the twentieth century as well as changing societal attitudes. At the local level, they mitigated the constraints posed by institutional racism, government regulations and official surveillance through building personal relationships with the people from all walks of life with whom they came in daily contact. They actively manipulated these relationships to their mutual advantage, often circumventing the maze of regulations which surrounded them.

Market gardens were thus important loci of cross-cultural exchange. Often situated on the margins of European society, in inner city industrial areas or on the fringes of country towns, Chinese market gardeners developed close living and working relationships with other marginalised social groups, in particular with Māori in New Zealand, and also with Aboriginal
people in Australia. These included intimate sexual relationships, with all their complexities, ranging from enduring marriage and business partnerships to more temporary liaisons. The children of these relationships had to negotiate their mixed cultural heritage and in turn contributed to the building of bridges between cultures.
CONCLUSION

The Chinese became the model of the immigrant group who, drawn by the hope of riches, filled a gap in our horticulture and our diet.

Michael Symons, *One Continuous Picnic*, 2007, p. 84.

This thesis has explored the history of Chinese market gardens and market gardeners in Australia and New Zealand. It has also considered the ways in which that history is interpreted, dissected and illuminated through the use and adaptation of some key theoretical and conceptual approaches in the social sciences: technology transfer and the diffusion of innovation, transnationalism and social capital.

Theories of technology transfer and diffusion of innovation have informed this thesis in a number of ways. Their view that technology is an integral part of society and social forces places the process of transfer of an innovation within the context of the political, social and economic characteristics of the host society. Applying this contextual and temporal framework, this thesis positions Chinese market gardeners and the agricultural practices they brought to new lands within the particular environmental, economic and social contexts they encountered, and establishes how the history of market gardening in Australia and New Zealand was shaped by such factors as political and legal institutions as well as organisational structures. It also places this history within the context of longer term processes of social, economic and environmental change.

Influenced by recent approaches to technological transfer which see it as a dynamic, two-way process involving ongoing adaptation of innovations to suit local conditions in the host country, the thesis has demonstrated that Chinese market gardening, as an agricultural system, was not transferred unchanged to Australia and New Zealand. Ongoing interactions occurred between several different knowledge systems – indigenous, European and Chinese
horticultural traditions. Chinese gardeners adapted their skills and technology to novel environments and novel crops and adopted developments in European technology. Some Europeans readily acknowledged their superior horticultural skills and were willing to learn from them. Chinese market gardeners effectively demonstrated the application of intensive cultivation techniques and irrigation in inhospitable environments, particularly in arid regions of Australia.

Thus market gardens can be seen as places of environmental and social engagement, where Chinese settlers and their plants continued traditions from their homelands and accommodated to new biophysical and social environments. In this analysis the skills of Chinese immigrants lay not only in the transfer of agricultural techniques from China but also in their entrepreneurship and innovation, adapting their techniques to new environments. Chinese market gardeners are consequently interpreted as active agents in history and as innovators and risk takers, developing flexible strategies to cope with complex and changing business and social environments and the vagaries of climate and the changing seasons.

Applying theories and concepts in transnationalism and the Chinese diaspora, this thesis also places the development of Chinese market gardening in a cross-cultural and transnational context. It highlights the importance of community and the maintenance of ongoing ties to kin and native place in China as the foundation for successful market gardening enterprises in Australia and New Zealand, and as a source of support for individuals adopting new ideas.

The concept of social capital was used as an analytical tool to examine the opportunities and constraints offered by the complex networks of relationships that Chinese market gardeners maintained: with their kin and home villages in China, within their own overseas Chinese communities and with the wider community. It helps explain how the ties within social groups can bring people together, build bridges between cultures and mobilise
solidarity, as well as how they can have negative consequences that create conflict. Chinese market gardeners negotiated their positions in relation to the restrictive immigration policies which dominated their lives until well into the twentieth century. At the local level, they built relationships with people from all walks of life with whom they came in daily contact and actively manipulated these relationships to their mutual advantage. At the broader societal level they actively lobbied governments against the restrictive legislation imposed upon them, highlighting the contribution which they made to the economies and the national diets of Australia and New Zealand.

Taking a comparative approach has allowed the commonalities of the experiences of Chinese market gardeners in Australia and New Zealand to be identified. In both countries Chinese immigrants began gardening on the goldfields to supplement their incomes from mining. They faced similar constraints of institutional racism in their host countries, which had close social, economic and political ties as British settler societies in the southern hemisphere. Barriers of language and culture, racist attitudes, restrictive immigration policies, discriminatory employment practices and unpredictable business environments limited their occupational and social mobility and encouraged them to enter niche occupations such as market gardening. They also found similar opportunities. The rapid urbanisation of Australians and New Zealanders following the gold rushes and the high standards of living they enjoyed underpinned the growth of market gardening. There was a sustained demand for fresh produce and Chinese gardeners took advantage of the economic opportunities created in the wake of the expanding population.

This common history gave rise to similar patterns of economic and social adaptation. Market gardeners drew upon a range of economic resources which enabled them to successfully transfer traditional Chinese agricultural practices to new societies. These included flexible business partnerships, the integration of the various occupations involved in food
supply, and social and business networks based on common ties of kinship, language and allegiance to village and district in China. In both countries market gardening provided an economic base for the transition from sojourners to settlers, the formation of enduring Chinese communities and a springboard for upward mobility and expansion into other businesses.

This comparative approach has also highlighted points of difference in the histories of Chinese market gardening in Australia and New Zealand. Firstly, the pre-eminence of Chinese market gardening lasted longer in New Zealand than in Australia, into the 1960s and 1970s, whereas in Australia this leading position was in decline by the 1950s. This was largely due to the post-war influx of migrants from southern Europe into Australia, who supplanted the Chinese in market gardening.

Secondly, there were differences in relations between Chinese gardeners and indigenous peoples. Unlike indigenous people in Australia, Māori in New Zealand had a long tradition of gardening, based on the tropical crops they brought with them from the Pacific islands. From the early-twentieth century they played an important role in Chinese market gardening, as landlords and employees of Chinese market gardeners. Their lives were closely entwined, leading to intermarriage and often close business and family ties between the two communities. By comparison there is limited evidence of Aboriginal people working for Chinese market gardeners in Australia. Further research is needed on the relations between Aboriginal and Chinese people generally, and on the involvement of Aboriginal people in market gardening in particular.

Finally, in New Zealand, with its temperate climate and generally reliable rainfall, there was less emphasis on large-scale irrigation schemes. Less attention was paid to the irrigation techniques of Chinese market gardeners and they had less direct influence on the development of agricultural policy than in Australia. In Australia for example, the proponents of large scale irrigation schemes and advocates of closer settlement held up the successes of
Chinese market gardeners in irrigation and intensive horticulture as models for European settlers to aspire to.

Using these theoretical concepts and approaches, this thesis has revised and deepened understanding of the history and role of Chinese market gardeners in Australia and New Zealand. It has established that they played a key role in the supply of fresh fruit and vegetables for at least fifty years. They could be found in the most marginal areas for agriculture, from the rugged ranges of Central Otago to the deserts of Australia. Adapting their traditional skills in water management and intensive cultivation, they successfully turned the challenges of life in such environments to their advantage. They made a significant contribution to the economies of Australia and New Zealand, fuelling rural expansion and the rapid growth of country towns and cities as well as enhancing diets with a wide variety of reasonably priced fruit and vegetables. Unlike Europeans who dreamed of becoming yeoman farmers, they went against the trend of broadacre farming and specialised in labour intensive production on small acreages. Countering the stereotype of Chinese market gardeners as uneducated peasant farmers, conservative and resistant to change, they emerge as entrepreneurial, adept at identifying niche markets in land rich but labour poor Australia and New Zealand.

The thesis has also demonstrated that traditional horticultural methods Chinese immigrants brought with them had remarkable continuity in their adopted countries. At the same time Chinese market gardening underwent ongoing technological change and adaptation. Chinese gardeners introduced Chinese crops to Australia and New Zealand, grew the familiar crops favoured by European consumers and experimented with new crop varieties. They readily adopted advances in European technology which were appropriate to their intensive cultivation methods. Technological change was stimulated by developments in technology, industry, transport and communications, which flowed from population growth and urban
expansion. These developments were key factors in the successful transfer of Chinese market gardening systems, along with economic resources such as labour, capital and markets as well as the social resources provided by the networks of relationships within and without the Chinese community.

This thesis contributes to broader understanding of processes of technology transfer in a minority group settling in socially and technologically dominant societies. The transfer of Chinese market gardening systems to Australia and New Zealand resulted in the diffusion of knowledge, technological innovation and novel forms of labour organisation. This was a complex process of ongoing exchanges of human and intellectual capital between China, Australia and New Zealand, and continual adaptations to fit into the economies and societies of the host countries.

This thesis also contributes to recent interest in the concept of mobilities as a framework for historical analysis. Mobility is inherent in the transnational movements of Chinese immigrants to Australia and New Zealand from the mid-nineteenth century and in the frequent return visits of Chinese market gardeners to their home country. As this thesis has demonstrated, Chinese market gardeners in Australia and New Zealand were an integral part of the population movements sparked by the gold rushes of the 1850s and 1860s, the opening up of the land for agriculture and pastoralism and the growth of towns and cities following the gold rushes. In the case of New Zealand, this is clearly shown in the data collected by the Reverend Alexander Don in his *Roll of Chinese*.

Placing Chinese market gardening in a transnational context, this thesis contributes to broader understanding of Chinese migration, settlement and cross-cultural exchange in Australia and New Zealand. It provides a useful framework for similar studies in other regions such as Papua New Guinea, the Pacific islands, Canada and the United States.
This thesis raises a number of questions for future research. More detailed study of Chinese entrepreneurship is needed, such as the business structure of Chinese market gardening enterprises and their linkages with other Chinese businesses, including fruit and vegetable retailing and wholesaling and general retailing, and including connections across national borders – between New Zealand and Australia and beyond. Further attention should also be given to the role of clans in shaping and sustaining the industry. It would also be useful to identify sources and a research methodology for quantifying the economic contribution of Chinese market gardeners to the economies of Australia and New Zealand during the period under study, in particular their contribution to the unofficial or ‘shadow’ economies. Further research into the environmental impact of Chinese market gardening and its sustainability is also required; for example, the impact of intensive agricultural practices on soil fertility and the extent to which traditional manuring practices countered this effect. This thesis also raises the question of the symbolic aspects of Chinese market gardens and the relationship of Chinese immigrants to the land and to the natural world, an area that has been very little researched.¹

In 2001 Ian Jack noted the ‘rich heritage and history deriving from the pre-eminence of Chinese in market gardening and irrigation’, and observed that it was in need of urgent synthesis and fieldwork.² This thesis joins the work of scholars like Ian Jack, Barry McGowan, Warwick Frost, Lily Lee and Ruth Lam in going some way towards filling this gap. Innovatively, it has taken a multidisciplinary approach, integrating documentary evidence with material culture evidence and physical evidence in the landscape and binding this

together within a theoretical framework developed from studies of technology transfer and related concepts. It is hoped this broad study will provide a basis for more detailed local and regional studies and fieldwork.

This thesis also affirms that there is still much work to be done to record the remaining physical evidence of Chinese market gardens, particularly in rural areas. Barry McGowan has shown that many traces of Chinese gardening activity survive in regional New South Wales, including water races, garden layouts, fruit trees and horticultural equipment. Market gardens are endangered landscapes and have significant heritage value. They have high technological significance, revealing the adaptability and inventiveness of Chinese settlers and their skills in horticulture and water management as well as high cultural significance as tangible reminders of primary production in urban areas and the history of settlement and suburban expansion.¹ Unfortunately the majority of market garden sites in urban areas, as well as many regional centres, have been engulfed by industrial and residential development. This makes it all the more important to preserve the few surviving market garden sites, if possible, as complexes complete with buildings and other infrastructure.²


⁴ Three Chinese market gardens in La Perouse, Sydney have been listed on the New South Wales State Heritage Register for their significant heritage values. They are the last surviving examples of the once numerous market gardens in the district and have endured for almost a century (Karl Zhao, 'Chinese market gardens', *Heritage New South Wales*, Vol. 6, No. 3, October 1999, p. 15).
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### APPENDIX

**SAMPLE OF CHINESE POPULATION ON MARKET GARDENS IN NEW ZEALAND RECORDED BY ALEXANDER DON 1902–1913, BY TOWN AND COUNTY OF ORIGIN**

<table>
<thead>
<tr>
<th>North Island</th>
<th>Garden</th>
<th>Name/location</th>
<th>Number partners/workers</th>
<th>County of origin</th>
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Note:

Based on analysis of data in Alexander Don’s Roll of Chinese, published in facsimile as Vol. 4 of James Ng, Windows on a Chinese Past. Don’s transcriptions of district and place names, and his use of abbreviations, were based on Cantonese forms, as the Roll preceded the modern use of Mandarin. These have been left in their original form.