

**Soil Physical Effects of Stubble Retention  
on Early Crop Growth**

by

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A thesis submitted for the degree of  
Master of Science in Agriculture  
of the  
University of New England  
Armidale N.S.W.  
Australia

June 1994

## **Acknowledgements**

I would like to express my thanks to the Australian Government for providing the scholarship through the Australian International Development Assistance Bureau (AIDAB), and to Jember University, Jember, East Java, Indonesia for granting me study leave, that enabled me to undertake this course of study.

I wish to thank the Department of Agronomy and Soil Science, University of New England, Armidale, N.S.W., Australia, for providing training facilities for my studies.

I gratefully acknowledge my supervisors: Dr. P. V. Lockwood and Dr. D. A. MacLeod, of the Department of Agronomy and Soil Science, University of New England, for supervision, encouragement, and advice during my course and in the preparation of this thesis.

I would like to extend my gratitude to Ms. N. Deane, Mr. D. M. Wheatley and Mr. R. L. Wright, of the Department of Agronomy and Soil Science, University of New England, for technical help and advice during the experimental work; and to Dr. D. R. Evans for refining my English.

My appreciation goes also to all post-graduate students and staff members of the Department of Agronomy and Soil Science, University of New England, for their suggestions and assistance.

Finally, I would like to thank my wife Ita and my daughter Fiona for their support and understanding during my long absence.

## Abstract

The early growth of crops is often affected by stubble retention and no-tillage. This study was conducted to determine if soil physical properties, in particular soil temperature differences under no-tillage stubble retained and burned, could explain differences in early growth of two contrasting crops such as wheat and soybean, which were grown in different locations and seasons. No-tillage fallow with no soil disturbance except at sowing and complete chemical fallow for weed control (NT); no-tillage fallow with no soil disturbance except at sowing, complete chemical fallow, and with stubble burned (NB); same as NB, but with artificial stubble at a low intensity (S1); and same as NB, but with artificial stubble at a high intensity (S2) were tested to determine the influence of soil temperature on early growth of wheat at the Douglas McMaster Research Farm, Warialda (black cracking clay) and on early growth of soybean at the University of New England Research Station, Laureldale (chocolate soil). The treatments allow shading and insulating effects to be separated from other effects such as soil N deficiency, phytotoxicity, or plant diseases which were usually found in the conservation tillage systems. The relationship between dry matter and average soil temperature at 65 DAS (12 to 65 days after sowing) in the Warialda experiment was the only result where dry matter was increased (by  $220 \text{ kg ha}^{-1} \text{ }^{\circ}\text{C}^{-1}$ ). The difference between soil temperatures in the NT and NB treatments was  $0.36 \text{ }^{\circ}\text{C}$ , which would give a predicted dry matter difference of  $75 \text{ kg ha}^{-1}$ , which is close to the measured difference of  $53 \text{ kg ha}^{-1}$ . There is no such effect for other treatments derived from the relationship between dry matter and any measurement of soil temperature for both experiments.

## Table of Contents

Preface .....	ii
Acknowledgements.....	iii
Abstract.....	iv
Table of Contents .....	v
List of Figures.....	vii
List of Tables.....	ix
Chapter 1 Introduction.....	1
Chapter 2 Review of Literature .....	3
2.1 Introduction.....	3
2.2 Conservation tillage systems and early crop growth .....	3
2.3 Effects of tillage and stubble management on soil physical properties .....	5
2.3.1 Effects of tillage and stubble management on soil temperature.....	5
2.3.2 Effects of tillage and stubble management on soil strength.....	11
2.3.3 Effects of tillage and stubble management on soil water .....	14
2.3.4 Effects of tillage and stubble management on soil aeration.....	17
2.3.5 Conclusion .....	18
2.4 Effects of soil physical properties on early crop growth.....	18
2.4.1 Soil temperature and early crop growth .....	18
2.4.2 Soil strength and early crop growth .....	19
2.4.3 Soil aeration and early crop growth .....	22
2.4.4 Soil water and early crop growth .....	23
2.5 General Conclusion.....	26
Chapter 3 Influence of Stubble Management on Early Growth of Wheat .....	27
3.1 Introduction.....	27
3.2 Materials and Methods .....	28
3.2.1 Penetration resistance and soil moisture content.....	31
3.2.2 Soil Temperature.....	32
3.2.3 Plant and other soil measurements .....	33
3.2.4 Relationship between soil temperature and early growth of wheat.....	33
3.3 Results .....	34
3.3.1 Soil water.....	34
3.3.2 Penetration resistance .....	36
3.3.3 Plant growth and development.....	37
3.3.4 Soil temperature .....	39
3.4 Discussion .....	44
3.4.1 Soil water.....	44
3.4.2 Penetration resistance .....	44
3.4.3 Plant growth and development.....	44
3.4.4 Relationship between soil temperature and dry matter.....	45
3.4.5 Other factors that could affect dry matter .....	45

3.4.6 Use of relationship between soil temperature depression and dry matter to predict difference between NT and NB .....	47
Chapter 4 Influence of Stubble Management on Early Growth of Soybean .....	50
4.1 Introduction.....	50
4.2 Materials and Methods .....	50
4.2.1 Soil Temperature.....	53
4.2.2 Plant Development and Plant Growth .....	53
4.2.3 Soil Moisture Content .....	54
4.2.4 Relationship between soil temperature and early growth of soybean.....	54
4.3 Results .....	55
4.3.1 Soil water.....	55
4.3.2 Plant growth and development.....	56
4.3.3 Soil temperature .....	58
4.4 Discussion .....	66
4.4.1 Soil water.....	67
4.4.2 Plant growth and development.....	67
4.4.3 Soil temperature .....	67
4.4.4 Relationship between soil temperature and dry matter.....	68
Chapter 5 General Discussion .....	69
References .....	71
Appendices .....	79
Appendix 1. Experimental design and plot lay-out of Warialda Experiment.....	79
Appendix 2. Experimental design and plot lay-out of Laureldale Experiment.....	80

## List of Figures

Figure 1.	Soil surface shading by vertical stubble either (a) early in the morning or late in the afternoon or (b) near midday (After Hares and Novak, 1992).....	8
Figure 2.	Variation of cone resistance with depth across the direction of travel of a slant-leg subsoiler, showing the 0.5 and 1.0 MPa contours (After Campbell and O'Sullivan, 1991). ....	12
Figure 3.	Penetration resistance and water content profiles of tilled and untilled soil (After Ehlers et al., 1983). ....	13
Figure 4.	Soil moisture content distribution with depth and different tillage systems at sowing and harvest of sorghum in Warialda (After Holland and Felton, 1985). ....	15
Figure 5.	Soil moisture content distribution with depth and different tillage systems at sowing and harvest of sorghum in Croppa Creek (After Holland and Felton, 1985).....	16
Figure 5a.	Generalised comparative value of NLWR as affected by soil water content, mechanical resistance and aeration for soils with increasing bulk density and decreasing structure in going from case A to C (After Letey, 1985).....	25
Figure 6.	Sampling strategy for soil penetration resistance and moisture determination (After Harte,1990) .....	32
Figure 7.	Weekly rainfall between 20 May - 21 November 1992 (20 weeks, week 0 is the sowing time) on the experiment sites in Warialda.....	34
Figure 8.	The effect of stubble treatments on soil moisture, at soil depth zones 0 - 100, 100 - 200 and 200 - 300 mm, 65 DAS. na shows that LSD 5% is not available (single measurement) .....	35
Figure 9.	The effect of tillage treatments on soil moisture, at soil depth zones 0 - 100, 100 - 200 and 200 - 300mm, 107 DAS. na shows that LSD 5% is not available (single measurement) .....	35
Figure 10.	Penetration resistance and moisture content profiles of stubble treatments 65 DAS. ns (not significant) .....	36

Figure 11. Penetration resistance and moisture content profiles of stubble treatments 107 DAS. ns (not significant) .....	37
Figure 12. Effect of stubble managements on the relationship between soil temperature and dry matter 65 DAS.....	41
Figure 13. Effect of stubble managements on the relationship between soil temperature and dry matter 107 DAS.....	43
Figure 14. Weekly rainfall and irrigation between 11 January - 16 May 1993 (16 weeks, week 0 is the sowing time) on the experiment sites in Laureldale. ....	54
Figure 15. Effect of stubble management on the relationship between soil temperature, (A) average, (B) maximum and (C) minimum, and plant dry matter 22 DAS.....	59
Figure 16. Effect of stubble management on the relationship between soil temperature, (A) average, (B) maximum and (C) minimum, and plant dry matter 80 DAS.....	60
Figure 17. Effect of stubble management on the relationship between soil temperature, (A) average, (B) maximum and (C) minimum, and plant dry matter 102 DAS.....	62
Figure 18. Effect of stubble management on the relationship between soil temperature, (A) average, (B) maximum and (C) minimum, and pods dry matter 102 DAS.....	63

## List of Tables

Table 1.	Some representative values of albedo of soils and plants (Campbell, 1977; Marshall and Holmes, 1979).....	8
Table 2.	Soil physical properties and morphological description of black earth (After Harte, 1990) .....	29
Table 3.	The main events during the field experiment.....	31
Table 3a.	Plant growth and development.....	38
Table 4.	Yield data for final harvest.....	38
Table 5.	The effect of stubble treatments on plant N and soil inorganic-N concentration at 65 DAS .....	39
Table 6.	Effect of stubble treatments on mean average, maximum and minimum soil temperature 65 DAS (12 to 65 days after sowing) .....	39
Table 7.	Effect of stubble treatments on mean average, maximum and minimum soil temperature 107 DAS (12 to 107 days after sowing) .....	39
Table 8.	Equations and significant levels of regression between above ground plant dry weight and days after sowing (65 and 107 DAS).....	40
Table 9.	Estimated differences in average soil temperature 65 DAS (12 to 65 days after sowing) at 10 mm depth and estimated above-ground dry matter at 65 DAS in 1990 and 1991.....	47
Table 10.	Relationship between above-ground dry matter at 71 DAS for wheat at Murrumbateman in 1983 (Aston and Fischer, 1986).....	48
Table 11.	The main events during the field experiment.....	51
Table 12.	The effect of stubble treatments on soil moisture content at soil depth 0 - 50, 50 - 100, 100 - 200, and 200 - 300 mm. ....	55
Table 13.	Plant components during the course of experiment.....	56
Table 14.	Above-ground plant dry matter during the course of experiment.....	56



Table 15.	Effect of stubble treatments on mean average, maximum and minimum soil temperature 24 DAS .....	56
Table 16.	Effect of stubble treatments on mean average, maximum and minimum soil temperature 80 DAS .....	57
Table 17.	Effect of stubble treatments on mean average, maximum and minimum soil temperature 102 DAS .....	57
Table 18.	Equation and significant levels of regression between above-ground plant dry weight and days after sowing (24, 80 and 102 DAS).....	64