Survey and Reclamation of Saline/Alkaline Scalds in the Uralla/Walcha district of Northern New South Wales

by

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ABSTRACT

This research project was initiated by the Harhnam and Bozo landcare groups in response to concerns expressed by landholders on the Northern Tablelands of New South Wales about the apparent increase in saline/alkaline scalds in the early 1990s. The aim was to investigate the extent and severity of bare scalds with a view to testing different methods of making them productive again. The project was initiated in 1992 and funded under the National Landcare Program (NLP) program, formerly the National Soil Conservation Program (NSCP). The project concentrated on the districts of Uralla, Wollun and Walcha, an area of approximately 30000 hectares.

Two surveys (landholder and field surveys) were carried out initially to gauge the extent of the problem within the study area. A total of 82 saline/alkaline sites were located from the landholder survey, and more detailed information collected from 50 of these in field surveys. The surveys indicated a wide variety of characteristics among the scalds and the general pattern appeared different from the pattern of salinity described for Western Australia and Victoria. Twenty experimental sites were then chosen based on similar site characteristics such as position in the landscape, slope, site characteristics and vegetation and five replications of a control and 4 treatments consisting of ponding, reverse interception drains and the application of gypsum and epsomite were set up. The gypsum and epsomite were applied inside steel rings at the same sites.

A total of 46 piezometer tubes were installed across the two landcare groups at a depth of 4 metres to tap shallow groundwater. The electrical conductivity (EC) and pH of water from the piezometer tubes were highly variable across all the scalds sampled in the two landcare groups.

The average EC to different depths can be estimated using electromagnetic induction surveys. Two instruments (EM31 and EM38) each with slightly different characteristics, were used for a broadscale survey of several sites and more detailed surveys of the 20 experimental sites. These surveys again emphasised the variability among the different scalds and indicated that the highest levels of salinity do not necessarily occur beneath the bare scalded areas. Soil cores and piezometer tubes located in the centres of scalds need not necessarily provide information which is representative of each scald. Electromagnetic surveys of individual scalds would be beneficial if they were carried out prior to either the installation of piezometers or further studies of scald characteristics.

The treatments all proved successful in modifying specific aspects of the treated scalds. The ponding treatment lowered soluble salt concentrations in the soil profile by dispersing salts with water pumped to areas away from sites of concentration. The reverse interception drains alleviated waterlogged sites and re-directed both surface and lateral flow of water from the scalds. The gypsum and epsomite at 5 tonnes per hectare proved successful in changing the chemical status within the soil profile to a depth of at least 400 mm. The sodium ions were replaced by the divalent cations of calcium and magnesium. Calcium was provided by the gypsum and the epsomite provided magnesium. The surface infiltration rates were improved at the reverse interception drains and the gypsum and epsomite treatments, but did not change over time for the ponding and the control treatments.

The reverse interception drain scalds were colonised by *Cynodon dactylon* (couch), *Hordeum marinum* (sea barley grass) and *Pennisetum alopecuroides* (swamp foxtail grass) while the chemical applications were associated with the introduction of other grasses such as *Bromus brevis* (short brome), *Eleusine tristachya* (goose grass), *Festuca elatior* (fescue), *Paspalum dilatatum* (paspalum), *Lolium rigidum* (annual ryegrass), *Phalaris aquatica* (phalaris) and *Vulpia bromoides* (squirrel-tailed fescue). Little change occurred in the vegetation at the control scalds or those with ponds.

This study provides some basic information to assist landholders in the choice of specific treatments for saline/alkaline scalds. Each scald requires its own evaluation of the problems at that site and the best treatment to adopt should be based on the individual scald. Chemical ameliorates can be used on flat land, while ponds can be positioned on slopes of 1-2% and reverse interception drains can be used on slopes above 2%.

Apart from the implementation of treatments, landholders can also assist future research by monitoring individual saline/alkaline scalds. This can be accomplished by pegging the margins of scalds and periodically mapping and photographing them to gauge their expansion or contraction. It is only through such a reliable data base that the actual patterns of development of saline/alkaline scalds can be understood.

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DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not currently submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used have been acknowledged in this thesis.

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