Strategies for irrigating white clover with saline water on the heavy soils of Northern Victoria

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In northern Victoria, shallow saline water tables pose a major limitation to irrigated perennial pasture production. Salinity mitigation strategies such as the re-use for irrigation of moderately-saline drainage water, or pumped groundwater, are limited by the salt tolerance of the pasture species, in particular the low salt tolerance of white clover. White clover yields begin to decline at a soil ECe (electrical conductivity of saturation extract) of 1.5 dS/m and decrease thereafter by 12% of potential yield for each 1.0 dS/m increase in ECe (1).

To maximise the re-use of saline water, whilst maintaining productivity, strategies need to be developed specifically for the growth of white clover. Recent research in northern Victoria has indicated that both irrigation management and cultivar selection/breeding can play important roles in developing these strategies.

With saline irrigation water, several factors affect the time required for soil salts to accumulate to a level at which white clover growth is reduced; such as soil type, water salinity, evapotranspiration, number and frequency of irrigations, and quantity of winter rainfall. Some of these factors are capable of manipulation. Field results have shown that white clover, established on non-saline soil in the Shepparton Region of northern Victoria, can be irrigated with water of ECw (electrical conductivity of irrigation water) of 2.4 dS/m for one irrigation season with little or no loss in yield (1.0 dS/m 640 ppm total soluble salts). Subsequent irrigation seasons require the use of water of a lower salinity if yields are to be maintained. Winter rainfall is important for leaching and influences the water salinity that can be applied in the next season. Field results have also indicated water as high as 4.5 dS/m can be used for part of the irrigation season without affecting yield. Further research on such responses will increase the scope for using saline water for irrigation.

Field and greenhouse experiments have indicated a useful range of inter- and intra cultivar variation for salt tolerance for white clover. Field results for five white clover cultivars irrigated with water up to ECw of 4.5 dS/m (19 irrigations in 198)4/85) showed cultivar Haifa had a maximum yield reduction of 50% compared with that for cultivar Irrigation of 80%. Similarly, plant-to-plant variation within cultivars is high with coefficients of variation for yield under salinity around 35%. A range of plant selections for salt tolerance have been made from within a single cultivar and this approach, combined with cultivar selection, seems promising.

The development of cultivars with increased salt tolerance, combined with management strategies suited to irrigating white clover with saline water, will maximise the productive use of saline irrigation water.

1. Maas, E.V. and Hoffman G.J. 1977. *J.* Irrig. Drainage Div. ASCE 103 115-34.