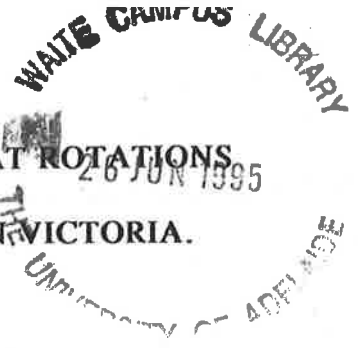


**IMPROVING MEDIC PASTURES IN PASTURE-WHEAT ROTATIONS
IN THE MALLEE DISTRICT OF NORTH-WESTERN VICTORIA.**



by

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in fulfilment of the requirements for
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ABSTRACT

The thesis examines how pasture management techniques improve the productivity of annual medic-based pastures and the following wheat crop in a ley-farming system in the Victorian Mallee. The effects of the environment in determining the long-term persistence of the pasture is an important factor in the study.

A field experiment involving the sowing of a mixture of Harbinger AR (early maturity) medic and Paraggio (mid-season maturity) medic was established at the Mallee Research Station, Walpeup, Victoria, in 1991. In Year 1 of the three-year study, the medic establishment phase, herbage and seed yields, and pasture composition were affected by sheep grazing pressure and herbicide treatments. Increasing the stocking rate reduced ground cover, herbage production and seed yields. Selective grass control reduced total herbage production over the winter period but increased medic seed yields; however, Pasture topping in the spring with glyphosate reduced the medic seed yield. Winter cleaning with glyphosate reduced winter herbage production and reduced the grass component in the pasture but caused no reduction in seed yields.

In the regenerating medic pasture, plant densities were increased through mechanical pod burial which improved seed soil contact. Differences in the second year pasture phase (Year 2) resulted from the previously-applied herbicide and grazing treatments. Reduced weed competition in Year 1 resulted in increased medic seedling density, cumulative herbage production and seed yields in Year 2.

Growing a mixture of two medic cultivars with early and mid-season maturity benefited seed yields in seasons of both lower-than-average and higher-than-average rain respectively. The seed reserves of each cultivar retained during the pasture-pasture-wheat rotation were

influenced by relative seed yield, seed size and seed permeability which was controlled by both inherent and environmental factors.

Grazing during the growing season and over the summer period was shown to reduce both medic seed yield and the medic seed survival. The seed reserve of the larger-seeded cultivar (Paraggio) declined at a greater rate than the smaller-seeded cultivar (Harbinger AR). Furthermore, a higher stocking rate in both pasture years reduced the grass component and increased the total pasture productivity in Year 2.

The percentage of permeable medic seed varied depending on the cultivar, the herbicide treatment applied in Year 1 and the amount of herbage present at seed maturity. However, permeable seed levels were significantly less following Year 2 with above average rain than Year 1 with below average rain.

All herbicide treatments and the higher stocking rate reduced annual grass component of the medic pasture with a resultant decline in the incidence of *Gaeumannomyces graminis* var *tritici* Walker (Take-all) in the cereal phase of the rotation (Year 3) and with a consequent increase in wheat yield and grain protein.

Results of these studies indicate that management practices, including increased sheep stocking rates and selective grass control herbicide treatments, can make significant improvements in the productivity of annual medic-based pastures. Large fluctuations in the productivity of pastures from year to year are caused by the amount of rain. Stocking rates are determined by the productivity of pastures in dry years and there is likely to be a surplus of pasture in other years. Therefore fodder conservation has a role in sustaining stocking rates.

STATEMENT

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

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