NUTRITION AND DISEASE CONTROL IMPROVE VICTORIAN MALLEE PASTURES

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Abstract

A project commenced in 1996 to assess the relative importance of soil nutrition and root disease on annual medic (*Medicago littoralis*) decline in the Victorian Mallee. Interim results show significant increases in medic production when nutrients are applied (17%) and when soil diseases controlled (23%).

Key words: Victorian Mallee, annual medic (Medicago), soil nutrition, root diseases

Approximately 50,000 km^2 of agricultural land in the Mallee areas of southern Australia is currently affected by low annual medic pasture productivity, with medic pastures seldom providing worthwhile benefit to the farming enterprise (6) (7). Many factors have been implicated in the decline of medic pasture production, including: inadequate nutrition, root diseases, sulfonylurea herbicide residues, inappropriate grazing management and continuous cropping (2) (3) (4). This paper presents preliminary results from experiments in the Victorian Mallee to determine the relative importance of soil nutrition and root disease in the medic decline syndrome.

Materials and methods

Two experiments were conducted in 1996 at sites with a history of poor medic performance: Wymlet (35^o08' S, 142^o10' E) and Werrimull (34^o02' S, 141^o35' E). At both sites pastures regenerated from *Medicago littoralis* seed (> 120 kg seed/ha) in 1996.

Four treatments were compared at each site using a randomised complete block design with six replicates: control, fertiliser, disease control, and fertiliser plus disease control. The fertiliser treatment involved split applications of phosphorus (11 kg P/ha total) and zinc (6 kg Zn/ha total) in June and August. The disease control treatment involved control of nematodes with Temik? and control of soil fungal diseases with a mixture of fungicides: 0.5 l/ha Folicur? plus 4 kg/ha Fongarid? plus 4 kg/ha Benlate? applied at monthly intervals from June to October.

In August, weeds were effectively controlled by Broadstrike? and Verdict? and insects by Endosulfan?, with no adverse effects to medic production noted. Soil tests (10 cm depth) on control plots gave Olsen P levels of 12 mg/kg at Wymlet and 11 mg/kg at Werrimull. Mean growing season rainfall in 1996 was similar to the long term average.

Medic herbage production was measured by ground level cuts (0.75 m^2 per plot). Medic seed yields were measured using a suction seed harvester (0.4 m^2 per plot). Percentage ground cover was measured using equipment described by Little and Frensham (5) with 40 observations per plot. Ten soil cores of 2.5 cm diameter (10 cm depth) per control plot were taken in May and October for assessment of root disease and identification of soil pathogens.

As treatment effects were similar at both sites, results were pooled for statistical analysis (Table 1). Interactions between fertiliser and disease control were not statistically significant ($P<0.05$).

Results

Medic herbage yield was increased 17% by fertiliser application and 23% by disease control (Table 1). Medic seed yields were not significantly affected by treatments. Experimental swards were dominated by medic, with small amounts of grass and broadleaf weeds (Table 1). Fertiliser significantly increased grass ground cover and reduced the percentage of bare ground.

Table 1 Effect of fertiliser application and disease control on medic herbage yield (Oct 96), medic seed yield (Nov 96) and ground cover (Aug 96). Mean of Wymlet and Werrimull sites.

Parameter?	Fertiliser .?		Disease control .?		SED?
?					
	Minus?	Plus?	Minus?	Plus?	(df=31)?
Herbage yield (kg DM/ha)?	1190?	1390 *?	1160?	1430 *?	60?
Seed yield (kg/ha)?	420?	400 ns?	400?	420 ns?	20?
Ground cover (%)?	54?	57 ns?	55?	56 ns?	3?
Medic?	7?	11 *?	9?	9 ns?	1?
Grass?	3?	3 ns?	3?	3 ns?	1?
Broadleaf weeds?	36?	29 *?	33?	32 ns?	3?
Bare ground?					

?

* Treatments significantly different (*P<0.05*); ns Treatments not significantly different (*P<0.05*).

Fertiliser effects are averaged over disease control treatments. Disease control effects are averaged over fertiliser treatments.?

Medic root disease symptoms were observed at both sites for plots with no disease control treatments. A high number of *Pratylenchus* nematodes were isolated at Wymlet (118 per plant) compared to Werrimull (2 per plant). *Rhizoctonia* (mostly *R. solani*) infected 60% of roots at Wymlet and 3% of roots at Werrimull. *Pythium* (mostly *P. irregulare*) infected 70% of roots at Wymlet and 68% of roots at Werrimull. The pathogenic fungus, *Arkoola* sp. was isolated at low frequencies at Wymlet, but not Werrimull. *Fusarium* spp occurred on all plants examined, but isolates were not pathogenic.

Discussion

Inadequate nutrition and root disease are important factors contributing to the performance of annual medics in the Victorian Mallee. Amor (1) reported that improved phosphorus nutrition in the Victorian Mallee could increase medic herbage yields, with effects being greatest in years of higher rainfall. In 1961, he found total dry matter production of a second year medic pasture increased from 3060 kg/ha with no fertiliser to 4340 kg/ha with 16 kg P/ha. In the current project, medic dry matter increased from 1190 kg/ha with no fertiliser to 1400 kg/ha when 11 kg P/ha was applied. Improved nutrition significantly increased the performance of annual medics in the present study, but the relatively low yields indicate that other factors are contributing to the poor performance of annual medics.

Bellotti and Kirby (2) suggested that *Pratylenchus* reduce annual medic production. The present study does not indicate the relative contribution of individual pathogenic organisms to medic production. Further research is still required to determine the relative importance of specific disease organisms and their relative effects on medic decline.

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