Evaluation of annual medics (*Medicago* spp.) in the Victorian Mallee

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ABSTRACT

Cultivars/lines of annual medic (*Medicago* spp.) were evaluated in replicated experiments at 6 locations in the Victorian Mallee during 1991-1997. Spatial multiplicative mixed models were used to analyse herbage and seed production to produce an overall cultivar/line ranking that indicates general adaptation. Although significant differences in cultivar ranking were recorded, the magnitude of differences in pooled means was relatively small for herbage production (<1%, mean 1.9 t DM/ha). Differences in seed production were greater, with cultivars Herald, Caliph, Parabinga, Paraggio, Jester and Harbinger respectively ranked (1=highest) 13, 17, 18, 27, 29 and 35 (42 lines, 15 experiments). Mean seed production was respectively 543, 540, 528, 475, 471 and 442 kg/ha. Data from these experiments has been used to support the release of the aphid resistant annual medics Caliph, Herald and Jester.

KEY WORDS

Medicago, medic, Mallee.

INTRODUCTION

The Victorian Mallee, with low annual rainfall (<375 mm) and alkaline soils, has over 1 million ha of annual pasture. Annual medics (*Medicago* spp.) are the main pasture legumes used in the Mallee, with the main varieties used being Harbinger, Parabinga and Paraggio (4). Performance of these cultivars in the Victorian Mallee has been reported previously (1, 5). The research reported in this paper was initiated to identify annual medics with improved herbage production and seed yields for the Victorian Mallee.

MATERIALS AND METHODS

Cultivars/lines of annual medic from the National Annual Medic Improvement Program were evaluated in replicated experiments at 6 locations in the Victorian Mallee during 1991-1997. In total 42 lines of annual medic were evaluated, with 9-17 lines in each experiment. Lines evaluated were considered to be adapted to sandy soils, were aphid resistant and were early flowering. Experiments were located at Birchip, Walpeup, Culgoa, Tempy, Werrimull, and Wymlet.

Experimental sites were selected on the basis of low background contamination, soil uniformity and low number of problem weeds. Sites were cultivated and sprayed with Trifluralin (400 g/litre a.i.) at 1.5 litres/ha five days before sowing. Scarified medic seed was sown at 150 viable seeds/m^2 in plots 15m by 2m. Seed was sown 1-2 cm deep with a small plot seeder with trailing harrows after sufficient rainfall for adequate germination. Plots were immediately sprayed with endosulfan at 1 litre/ha for insect control. Six weeks after sowing (3+ trifoliate leaf stage) all sites were sprayed with a mixture of Broadstrike? at 25 g/ha plus Verdict? at 400 ml/ha and Le-mat? (omeathoate) at 200 ml/ha. Sites were not grazed during the growing season.

Dry matter (DM) production was measured by cuts taken after flowering and before leaf drop (late September or October) from two randomly placed 0.2 m^2 quadrats per plot. Herbage was cut to ground level with hand or electric shears, hand sorted to separate medic and dried at 100?C. Medic seed yield was measured after senescence using a suction harvester (two 0.2 m^2 quadrats per plot) to harvest pods and a peg thresher to process them.

Spatial multiplicative mixed models were used to analyse data (3, 6). The analysis incorporated data from all experiments/locations to produce an overall cultivar/line ranking that indicates general adaptation.

RESULTS

Variation in growing season (April-October) rainfall (GSR) was associated with variation in experiment means for herbage and seed production. Experiment means for herbage production ranged from 600 to 4920 kg DM/ha with 60% of variation associated with GSR (r^2 = 0.598, n = 12). Experiment means for seed production ranged from 80 to 1210 kg/ha and 50% of the variation was associated with GSR (r^2 = 0.499, n = 15).

Although significant differences in cultivar ranking were recorded for herbage production, the magnitude of differences in pooled means was relatively small (line/cultivar mean 1904-1917 kg DM/ha). The range in pooled means for seed production was relatively large (372-709 kg/ha), with means and ranks for selected cultivars shown in Table 1. The cultivars in Table 1 are either the main cultivars used in the Mallee (4) or recently released cultivars (Caliph, Herald, Jester).

Table 1. Herbage production (39 lines, 12 experiments) and seed yield (42 lines, 15 experiments) of selected annual medic cultivars in the Victorian Mallee. (Rank 1=highest).

	Herbage production		Seed yield	
Cultivar	**kg DM/ha**	**Rank**	**kg/ha**	**Rank**
Herald	1911	8	543	13
Caliph	1917	1	540	17
Parabinga	1915	2	528	18
Jemalong	1911	8	512	20
Paraggio	1913	6	475	27
Jester	1912	7	471	29
Harbinger AR	1908	20	464	31
Harbinger	1911	8	442	35

DISCUSSION

Results presented were for first year swards sown at relatively high seeding rates, with important characteristics not measured. For example, early season growth, seed softening patterns and natural regeneration were not measured but are characteristics that influence suitability of medics for different Mallee farming systems. Results were intended, and have been used, to form part of the information

package for release of new cultivars. Caliph, Herald and Jester are new medic cultivars released since the initiation of this research.

Seasonal growth conditions had a larger effect on herbage production than cultivar, with relatively small differences between cultivars measured in these experiments. It was concluded that presently available annual medic cultivars have relatively similar potential for herbage production when established at non-limiting plant populations.

The correlation between rainfall and medic seed production has been reported previously (2). Substantial differences in seed yield between lines were measured despite seasonal growth conditions having a greater effect on seed production than cultivar. Differences in seed production for the 42 lines evaluated (372-709 kg/ha) was greater than the range (442-543 kg/ha) measured for new cultivars and cultivars presently used in the Mallee (4). The new cultivars Herald and Caliph had relatively high rankings for seed production. It was concluded that Herald and Caliph have a higher potential for seed production than cultivars presently used to a greater extent in the Mallee (Harbinger, Parabinga and Parraggio).

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