Messina (*Melilotus siculus*) – a new pasture legume for saltland

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Introduction

Messina (*Melilotus siculus* ((Turra) Vitman ex B.D. Jacks)) is a new annual pasture legume for saltland in temperate Australia and regions of the world that experience Mediterranean climates. Messina has greater tolerance to the combined stresses of salinity and water-logging than existing commercial pasture legumes. Coupled with desirable agronomic traits these characteristics give messina the capacity to rehabilitate saltland and increase productivity on land where existing legumes fail. This paper reviews the agronomic performance of messina in relation to top soil salinity levels.

Methods

In June 2010, 21 low coumarin messina accessions were sown at three trial sites in the upper South East of South Australia (36.14°S, 140.03°E). All sites had alkaline soils (clay loams to loamy sands) and two incurred inundation over winter. The sites experienced a typical Mediterranean climate. Two elite messina accessions have been identified and their performance has been compared with the current commercial saltland legume options; *Trifolium michelianum* Savi (cv. Frontier), *Medicago polymorpha* L. (cv. Scimitar) and *Melilotus albus* Medik. (cv. Jota). The average number of days from sowing to first flower, seasonal dry matter (DM kg/ha) and seed production (kg/ha) were assessed. Seasonal top soil (0-10 cm) salinity (EC_e, dS/m) was also assessed (data not presented).

Results

The average number of days from sowing to first flower was 118 and 119 for messina A and B respectively, compared to Frontier (117 days) and Scimitar (111 days). Jota was not assessed.

Messina dry matter production in spring 2010 was comparable to Frontier, but significantly greater than Scimitar (Table 1). In winter 2011 messina again performed as well as Frontier, but poorer than Scimitar. In both the winter and spring of 2012 messina dry matter production was significantly greater than the three controls. Overall Jota performed poorly.

Mean seed availability for the 2010, 2011 and 2012 harvests was significantly higher for messina (messina A 2084 kg/ha and messina B 2362 kg/ha) than Frontier (537 kg/ha), Scimitar (1299 kg/ha) and Jota (589 kg/ha).

Discussion

The maturity of messina is comparable to Frontier and Scimitar, indicating it will be adapted to similar rainfall environments (350-500 mm pa). Similar results have been recorded in Western Australia, the major target zone for messina in Australia (P. Nichols unpublished data). Importantly, messina has performed well on moderately acidic saline soils in WA (Nichols *et al.* 2008).

Messina seedlings can germinate at high salinity levels, in contrast to those of Frontier (low tolerance) and

Table 1. Multi-site ANOVA of seasonal dry matter production (kg/ha) at three trial sites.

	Spring 2010A	Winter 2011A	Spring 2011	Winter 2012	Spring 2012
Messina A	3277	1283	5520	612	2826
Messina B	3228	1548	4067	581	2790
Frontier	3988	1856	7420	269	924
Scimitar	1704	2716	5725	223	1200
Jota	320	184	1575	21	553
LSD (P=0.05)	788	870	1578	231	1191

A: Sites 1 and 2 assessed only.

Scimitar (moderate tolerance) (Nichols *et al.* 2009; Rogers *et al.* 2011; Teakle *et al.* 2012). Autumn top soil salinity levels at the three trial sites increased from an average of 4 dS/m (low salinity) in 2011 to 10 dS/m (high salinity) in 2012. Messina outperformed Frontier and Scimitar at these higher salinity levels, indicating that its greatest contribution to increasing pasture productivity will occur in highly saline environments where existing pasture legumes fail. The poor performance of Jota during these trials can be attributed to its low waterlogging tolerance.

Messina is a prolific seed producer. High second year seed reserves are typically the result of substantial hard-seed carryover from year one (Nichols *et al.* 2009). This feature appears important for annual legume persistence on saltland, where environmental uncertainty increases the requirement for a long-term hard-seed residual (Cohen 1967; Venable and Brown 1988).

Conclusion

The greatest contribution of messina to improving pasture productivity appears to be on highly saline soils where existing legumes fail. Prior to its commercial release, some outstanding information is required to ensure the successful uptake of messina. This includes determining its area of adaptation, undertaking studies to confirm its value and safety for grazing animals, and determining management strategies for optimum pasture and animal performance.

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