Variation within the species *Macroptilium atropurpureum* regarding adaptation to grazing

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Introduction

The twining legume *Macroptilium atropurpureum* cv. Siratro was released around 1960 (Hutton 1962) and the rust-resistant cultivar Aztec was released in 1994 (Bray and Woodroffe 1995). The species showed great potential for pastures in northern Australia and was planted over some 220 Kha in the 1960s and 1970s. The species was high-yielding and readily eaten by cattle. However, by the early 1980s, the species had declined dramatically in grazed pastures. Clements (1989) showed that a major problem with Siratro was the frequency of removal of growing points. This leads to less regrowth after grazing, less seed set and hence less regenerative capacity. Accessions with greater branching characteristics may overcome this problem.

Materials and methods

Seeds of 175 elite accessions from the CSIRO collection were scarified and germinated at room temperature in Petri dishes. When the radicle had just emerged (1–5 mm long), germinated seeds were planted 1.5 cm deep in 18 cm diameter pots. There were 3 plants/pot and 4 pots of each accession, arranged in a randomised block design. Measurements included: days to emergence, cotyledon node height, number of nodes on Days 15 and 30 and branches on Day 30, days to flowering and seed yield. The data were used to determine the age of branching (in plastochron units) and probability of branching. Plants were subsequently transplanted to the field and plant yield and rust resistance measured.

Results

Branching characteristics among the accessions had a wide range (Table 1). As branching was a key desirable characteristic, the results are summarised in 3 groups (see Table 1). Group 2 included cv. Siratro. Group 1 had a lower age at branching, higher probability of branching, earlier flowering date and higher early seed yield than the other 2 groups. Plant yields were similar across all 3 groups but Group 1 had a higher proportion of plants with cotyledon nodes below-ground and a higher proportion of accessions with a zero rust rating. Eight accessions from Group 1 had zero rust ratings and cotyledon nodes below ground level. Of these, 3 (CPI 91352, CPI 84578 and CQ 1392) yielded >2000 kg/ha.

Conclusions

There are several accessions with more desirable characteristics for grazing and survival than those of cv. Siratro. As well as having more branches, those with cotyledon nodes below-ground will be more frost-tolerant. These also flower earlier than Siratro and some resist rust, although the resistance will be from a single gene rather than multiple genes as for the bred line cv. Aztec. Cultivar Aztec was not available at the time of this experiment but has similar characteristics to cv. Siratro. Further development with this species should be made with accessions from Group 1.

References

Bray, R.A. and Woodroffe, T.D. (1995) *Macroptilium atropurpureum* (DC.) Urban (atro) cv. Aztec. *Australian Journal of Experimental Agriculture,* **35**, 121.

Clements, R.J. (1989) Rates of destruction of growing points of pasture legumes by grazing cattle. *Proceedings of the XVI International Grassland Congress, Nice, France.* **2**, 1027–1028.

Hutton, E.M. (1962) Siratro — a tropical pasture legume bred from *Phaseolus atropurpureus*. *Australian Journal of Experimental Agriculture and Animal Husbandry,* **2,** 117–125.

Table 1. The number of accessions, median age at branching (in plastochron units), probability of branching, days to first flower, early seed yield and plant yield, and percentage of accessions in group with zero rust rating and cotyledon nodes below-ground, for the 3 groups based on branching (0–2, 3–5 and 6–8) (standard errors are given in brackets).

Group	No. of branches at Day 30	No. of accessions	Age at branching	Prob. of branching	% Cot. nodes below-ground	Days to 1st flower	Early seed yield (g)	Plant yield (kg/ha)	Zero rust rating (%)
1	6 to 8	45	3.7 (0.7)	0.8 (.12)	49	77 (15)	2.9 (3.0)	1760 (401)	47
2	3 to 5	111	4.0 (0.7)	0.6 (.16)	43	85 (19)	2.8 (2.7)	1540 (399)	37
3	0 to 2	19	4.7 (1.1)	0.3 (.17)	26	100 (23)	1.1 (1.2)	1640 (302)	26