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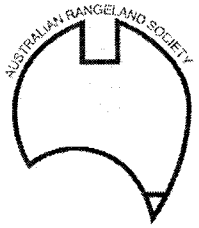

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PHENOTYPIC VARIATION IN TWO NATIVE GRASSES FROM SOUTH-WEST QUEENSLAND WITH RELATION TO DOMESTICATION POTENTIAL

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ABSTRACT

*Twenty-two ecotypes of mulga mitchell (*Thyridolepis mitchelliana*) and 20 ecotypes of mulga oats (*Monachather paradoxa*) grown under glasshouse conditions exhibited intra-specific phenotypic variation for a number of morphological characteristics. Significant variation in seed yield, seed size, plant height and tiller number was observed between ecotypes. The impact of this variation on the domestication of these species for agricultural use is discussed.*

INTRODUCTION

Seed of native mulga pasture species benefits reclamation efforts in south-west Queensland's mulga country (Johnston and Evenson 1992). Native pasture species are adapted to both the local climatic and soil conditions. They offer the best chance for pasture establishment and land reclamation and there is a demand for this seed from graziers and Landcare groups. While the harvesting of natural stands will play an important role in the early supply of seed of native species, selection and 'domestication' may offer superior material in terms of grazing, reclamation and seed production characteristics.

Visual evidence suggests phenotypic variation exists between ecotypes of native grass species in south-west Queensland. In Australia such variation has been described for *Danthonia linkii* and *D. richardsonii* by Lodge and Schipp (1993) and overseas for *Bouteloua rigidiseta* by Miller and Fowler (1994). However, no such examination has been made in south-west Queensland. An examination of this variability may yield ecotypes with desirable seed production, land reclamation and grazing characteristics.

METHODS

Seed collected by hand across south-west Queensland in June and July 1990 was grown in a glasshouse trial between May and November 1991 to compare 22 ecotypes of *Thyridolepis mitchelliana* and 20 ecotypes of *Monachather paradoxa*. Four replicates (4 pots) of each ecotype were sown in plastic pots (20 cm diameter, 19 cm deep) filled with a sandy red earth soil. Ten seeds of each ecotype manually dehusked using grooved rubber rubbing boards were sown in each pot. Following emergence, seedlings were thinned to achieve three evenly spaced tussocks per pot. Five attributes were measured at approximately fortnightly intervals in each replicate (average tussock height above soil surface (cm), number of tillers, average flower height above soil surface (cm), number of tillers flowering, average height above leaves of flowers (cm)). Ripe seed was hand harvested every second day to provide an additional three attributes for comparison between ecotypes (1000 seed weight (g), number of clean seeds and proportion of clean seeds (number of clean seeds/total number caryopses)).

An analysis of variance was used to compare sites for each attribute. Principal component analysis and a hierarchical classification were used to examine possible grouping of sites. Each replicate (pot) was treated individually to examine the spread of entries from one site (93 sites × 8 attributes for *T. mitchelliana* and 71 sites × 8 attributes for *M. paradoxa*).

RESULTS

For *M. paradoxa* significant differences between ecotypes were observed in tussock height, flower height and height above leaves of flowers. For *T. mitchelliana* significant differences between ecotypes were observed in tussock height, number of tillers, flower height and height above leaves of flowers.

As hand harvested seed collected in the trial was pooled across replicates statistical analysis of seed production data was not conducted. The mean and standard error were used to compare ecotypes.

Seed production attributes also varied between ecotypes. Seed size (1000 seed weight) ranged from 1.8129 g to 1.1741 g for *M. paradoxa* and 1.173 g to 0.7058 g for *T. mitchelliana*.

Based on the hierarchical classification using a combination of the eight attributes, six groups of *M. paradoxa* and seven groups of *T. mitchelliana* were identified.

DISCUSSION

The groups identified support the hypothesis that ecotypes of these species exist and can be separated based on morphological attributes. These attributes may reflect the way each ecotype has adapted to its local environment (soil fertility, soil water, soil depth, competition from other vegetation, rainfall, temperature, humidity and grazing history).

Any program evaluating and selecting within these species must recognise the importance of this variability. In selecting ecotypes to be used across a range of mulga landscapes in south-west Queensland it would be important to maintain a degree of variability in the material selected for further evaluation and seed increase.

Based on these results a range of the better performing ecotypes were selected for further comparisons and seed increase, thereby maintaining variability in the material selected. A comparable approach is used by the Plant Materials Centres of the United States Department of Agriculture in their native species evaluation and selection work (Tober, pers. comm.).

ACKNOWLEDGEMENTS

Financial support from the Land and Water Resources Research and Development Corporation and the Queensland Department of Primary Industries was greatly appreciated.

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