

**PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY
BIENNIAL CONFERENCE**

Official publication of The Australian Rangeland Society

Copyright and Photocopying

© The Australian Rangeland Society 2012. All rights reserved.

For non-personal use, no part of this item may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior permission of the Australian Rangeland Society and of the author (or the organisation they work or have worked for). Permission of the Australian Rangeland Society for photocopying of articles for non-personal use may be obtained from the Secretary who can be contacted at the email address, rangelands.exec@gmail.com

For personal use, temporary copies necessary to browse this site on screen may be made and a single copy of an article may be downloaded or printed for research or personal use, but no changes are to be made to any of the material. This copyright notice is not to be removed from the front of the article.

All efforts have been made by the Australian Rangeland Society to contact the authors. If you believe your copyright has been breached please notify us immediately and we will remove the offending material from our website.

Form of Reference

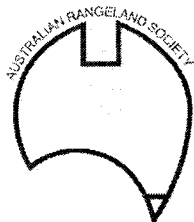
The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite (*Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

Disclaimer

The Australian Rangeland Society and Editors cannot be held responsible for errors or any consequences arising from the use of information obtained in this article or in the Proceedings of the Australian Rangeland Society Biennial Conferences. The views and opinions expressed do not necessarily reflect those of the Australian Rangeland Society and Editors, neither does the publication of advertisements constitute any endorsement by the Australian Rangeland Society and Editors of the products advertised.



The Australian Rangeland Society

THE DOMESTICATION OF MITCHELL GRASS FOR USE IN THE MARGINAL CROPLANDS AND SEMI-ARID PASTORAL ZONES OF EASTERN AUSTRALIA

C.M. Waters¹ and H.I. Nicol²

¹ NSW Agriculture, Agricultural Research Centre, Trangie NSW 2823

² NSW Agriculture, Agricultural Research and Veterinary Centre, Orange NSW 2800

INTRODUCTION

Despite the evaluation of many exotic species over the past two decades only buffel grass (*Cenchrus ciliaris*) has been identified as suitable for use in the semi-arid rangelands. No native species are available for use in these areas, a situation which contrasts to that found in the United States where some 56 native species are available for use in similar areas (Vallentine 1971).

Mitchell grass (*Astrebla* spp.) is a long-lived, drought tolerant group of native species that is also palatable to livestock. It is found primarily on heavy grey clay soils over extensive areas in northern New South Wales and western Queensland. Where it still exists, it provides a productive, stable plant community for pastoral enterprises (Orr and Holmes 1984). The periodic availability of Mitchell grass seed does not meet the regular demand from both the pastoral and amenity industries. To address this deficiency, superior lines of barley Mitchell grass (*Astrebla pectinata*) and curly Mitchell grass (*A. lappacea*) have been identified based on seed production and leaf production. The performance of these lines has been evaluated at four field sites in SW Queensland and NW New South Wales. As a result of this evaluation program one cultivar of curly Mitchell grass and one of barley Mitchell grass, each with superior agronomic characteristics, are to be released late this year.

This paper presents an overview of the development of these new cultivars as well as their distinguishing characteristics.

METHODS

A total of 433 whole plants (lines) were collected from 156 sites throughout western New South Wales and central western Queensland. From this parent population, seed heads from each plant were bagged to collect pure seed from which plants were grown to become the second and the same procedure followed for the third generation. A total of 25 elite lines formed the third generation.

Field sites were established at four locations, Augathella (North), Walgett (East), Nevertire (South) and Brewarrina (West), to evaluate the agronomic performance of the elite lines. These sites were chosen to represent the likely area in which these new cultivars are to be used. Four replicates of each line were transplanted at each site and watered fortnightly for eight weeks until plants commenced flowering. Dry matter production and the proportion of leaf were determined for each plant at the end of the growing season.

Lines were ranked according to the mean leaf production and a principal components analysis used to identify the set of characteristics which best distinguished highest performing lines in the third generation.

RESULTS

From the original parent population useful levels of variation were observed, providing a basis for the selection of superior lines. The selection criteria used to develop these were as follows: parent to second generation (high seed head density and large amounts of green leaf growth in the cooler months); second to third generation (short culm and inflorescence length); third generation to the final selections (high amounts of dry matter production and a high proportion of leaf in summer).

Generally, plants with low total dry weight also tended to be smaller plants (shorter and smaller basal diameter) but have longer culms. Approximately 80% of the variation between curly Mitchell grass lines could be described by size measurements such as total dry weight, plant height, inflorescence length and width, culm length and basal diameter, a further 8% by seed weight. For barley Mitchell grass size differences were less important in distinguishing lines, inflorescence characteristics such as inflorescence width and seed weight being the most important characteristics.

Despite the suitability of Mitchell grass to grey clay soils both final selected lines came from red soils, the curly Mitchell grass selection from Middleton (north-western Qld) and the barley Mitchell grass from Camerons Corner (far western NSW). The curly Mitchell grass selection has shorter culms but longer and wider inflorescences than its comparator line. The barley Mitchell selection tended to have longer culms as well as longer and wider inflorescences than its comparator. Both selections had significantly higher total dry matter production as well as a higher proportion of leaf than non selected comparators (Table 1).

Table 1. A comparison of the final plant selections and comparator for curly Mitchell grass and barley Mitchell grass, showing the distinctiveness of the selected line of each species. Values are means (with standard errors).

	Curly Mitchell grass		Barley Mitchell grass	
	Final plant selection	Comparator	Final plant selection	Comparator
Culm length (cm)	89.2 (11.1)	127.0 (25.0)	128.0 (21.4)	76.0 (23.7)
Inflorescence length (mm)	232 (27.2)	122 (27.9)	110.0 (30.1)	88.0 (24.7)
Inflorescence width (mm)	7.92 (0.52)	7.41 (1.18)	10.51 (0.66)	8.50 (2.01)
Total dry matter (g)	189.0 (67.1)	82.0 (31.3)	205.0 (21.3)	102.0 (55.1)
Leaf (g)	71.0 (22.7)	26.0 (7.9)	60.1 (16.0)	31.0 (19.2)

ACKNOWLEDGEMENTS

Funding for this work is being given jointly by the International Wool Secretariat and Grains Research and Development Corporation.

REFERENCES

- Orr D.M. and Holmes W.E. (1984). Mitchell grasslands. *In* 'Management of Australia's Rangelands'. (Eds G.N. Harrington, A.D. Wilson and M.D. Young). CSIRO, Melbourne. pp. 241-254.
- Vallentine, J.F. (1971). 'Range Development and Improvements.' 2nd. Ed. Brigham Young University Press, Provo, Utah.