Austrodanthonia caespitosa shows potential as a new pasture grass for the low rainfall wheatbelt

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Abstract

A wild ecotype of the native grass Austrodanthonia caespitosa (Gaudich.) H.P.Linder (wallaby grass) has proven to be highly persistent at Barmedman and Dareton in the low-medium rainfall (300-450 mm) wheat belt of southern New South Wales. A. caespitosa demonstrated superior persistence and long-term higher herbage yield compared with phalaris and cocksfoot. This ecotype was also superior to the A. richardsonii (Cashmore) H.P.Linder cultivar Taranna, and an unselected line of A. fulva. A native to the western districts of NSW, A. caespitosa is well adapted to surviving during summer drought and good seedling recruitment allows it to increase its density where initial establishment is low. The species is showing potential as both a ground cover and pasture sown in low input pastures and between rows of citrus and grape vines.

Introduction

There are very few perennial grass cultivars that can persist in the lower rainfall (300-500 mm) regions of the eastern Australian wheat belt which can typically experience 4-6 months of summer drought. In these situations, introduced temperate grasses adapted to higher rainfall regions, such as phalaris (Phalaris aquatica L.); cocksfoot (Dactylis glomerata L.) and fescues (Festuca arundinacea), have insufficient drought tolerance to persist well in this semi arid region. Native grass species including members of the Austrodanthonia genus are naturally well adapted and highly palatable, but no ecotypes from low rainfall environments have been developed as commercial cultivars. Suitable perennial grass cultivars are needed for marginal cropping areas being returned to low input grazing and in inter-row areas between citrus or grape vines to provide a low water requiring ground cover and reduce the need for herbicides (Jessop and Giddings 2006).

Methods

Experiment 1 . Two natural populations of Austrodanthonia (A. caespitosa and A. fulva) were compared with the commercially available cultivars, Taranna wallaby grass (A. richardsonii), Sirolan phalaris, and Currie cocksfoot, at Barmedman (147?26'E, 34?09'S) in southern NSW, average annual rainfall 480 mm. The species were sown on 30 May 2003, except for A. caespitosa which was sown on 12 Aug. in 2 x 4 m plots in a randomised block design with 4 replications. Plots were assessed for basal frequency in Nov. 2003 and Jul. 2005 and herbage yield in 1.0 m² fixed quadrats in winter and spring each year. Annual rainfall for the 3 experimental years was 280, 300 and 450 mm respectively.

Experiment 2 . The same selection of A. caespitosa sown in Expt 1 was sown between citrus rows at Dareton (142?00'E, 34?05'S) in southern NSW, average rainfall 286 mm. It was sown at 10 kg/ha into the surface of a dry seed bed on 27 May 2005 and gently raked. All plots were initially watered with 8 mm and thereafter relied only on rainfall. Swards were slashed in early summer after seed was mature. Herbage cover was assessed by scoring the proportion of the ground covered in a 0.25 m² quadrat compared with a set of calibrated standards 6 and 12 months after sowing. The change in the number of adult plants and seedling recruitment the following autumn was also assessed.
Results

Phalaris and cocksfoot had the highest frequency (75%) in the first year at Barmedman but by the third year their frequency had declined to very low levels (<10%) (Figure 1a). In contrast, the basal frequency of all 3 Austrodanthonia lines increased over time with A. caespitosa having the highest cover (43%) of all species by the end of 2005. Herbage yield followed the same pattern with the yield of the phalaris and cocksfoot declining over time whereas the yield of the 3 Austrodanthonia species increased (Fig. 1b). A. caespitosa was superior to the other Austrodanthonia species in terms of both yield and frequency although this may reflect its higher initial establishment.

Figure 1. (a) The frequency (%) and (b) herbage yield (kg/ha) of 3 species of Austrodanthonia compared to Sirolan phalaris and Currie cocksfoot sown at Barmedman NSW in 2003.

A. caespitosa sown between citrus rows in a low rainfall environment in Expt 2 showed a decline in plant numbers but maintained surface cover (Table 1) due to an increase in the size of individual plants. Seedling recruitment was observed 12 months after sowing. Most plants in a populations of A. caespitosa have a very short life (<2 years) in arid environments, but a few individual plants can live up to 12 years (Williams and Roe 1975), producing large numbers of seed and up to 200 seedlings/m² when conditions are suitable (Williams 1970).

Table 1. Change in aerial cover, adult plants and seedling recruitment of A. caespitosa over summer when sown between citrus rows at Dareton in southern NSW.

<table>
<thead>
<tr>
<th>Aerial cover (%)</th>
<th>Adult plant density (plants/m²)</th>
<th>Seedling recruitment (plants/m²)</th>
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<tbody>
<tr>
<td>A. caespitosa</td>
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<td>A. ritchardsonii</td>
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<td>A. flava</td>
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<td>Sirolan</td>
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<td>Currie</td>
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Conclusions

A. caespitosa has demonstrated superior persistence to A. fulva, A. richardsonii, phalaris and cocksfoot in a low rainfall environment and an ability to increase its density through seedling recruitment. Its ability to successfully recruit has also been reported by Waters et al. (2005). These are important attributes if the species is to play a role in providing ground cover in low input grazing systems or in intensive horticultural industries where a low maintenance inter-row cover is required. Experience with Austrodanthonia spp. suggests seed harvesting and cleaning can be problematical. Its fluffy seed is not readily sown by conventional machinery but seed coating or mixing the seed with fertilizer may overcome this limitation.

References


