1 - 18

**Austrodonanthia** - a productive pasture genus: a brief review

2. Growth habit, nutritive value and production

○ Anowarul ISLAM, Peter DOWLING, Denys GARDEN and Paul MILHAM (NSW Agriculture, Orange, Australia; CSIRO, Canberra, Australia; Faculty of Agriculture, Miyazaki University, Japan)

Key words: Growth, nutritive value, polyploidy, production, tolerance.

**Growth habit, nutritive value and production**

*Austrodonanthia* spp. are fine-leaved grasses with a tussocky growth habit. They are characterised by the presence of white hairs on the floral parts, resulting in the common names of silver-top, white-top or fluffy-top (Cashmore 1932). The grass has long hairs on the ligule, and the lamina is folded in the bud with parallel-thickened lines on the leaf blade, characteristics that assist in identification of the genus (Mitchell 1996). The presence and pattern of hairs on the lemma assist in identification to species level (Wheeler et al. 1990). The *Danthonia/Austrodonanthia* genera are polyploid in nature worldwide (i.e. somatic chromosomes 2n = 12, 24, 36, 48, 72, 96 and 120) (Abele 1959), while *Austrodonanthia* in Australia (28 species) had somatic chromosome counts of 24, 42, 48, 72 and 96. Increasing levels of polyploidy were associated with increased hairiness of the lemma, which could be useful in species identification (Abele 1959).

There is increasing evidence of the value of native grasses for grazing. Robinson and Archer (1988) and Archer and Robinson (1988) conducted experiments comparing the productivity and forage quality of perennial native and introduced grasses using the same rate of fertiliser and irrigation. They found that the average seasonal growth of two highly regarded native temperate *C*4 grasses (*Microlaena stipoides* (Labill.) R. Br. & *Austrodonanthia bipartita* (Link) H.P. Linder (Syn. *Danthonia linkii* var. *linkii* Kunth)) and two common native *C*3 grasses (*Bothriochloa macra* (Stud.) S.T. Blake and *Themeda australis* (R. Br.) Stapf) was greater than the introduced perennial phalaris (*Phalaris aquatica*; an important pasture species in New South Wales) from late spring to autumn, whereas phalaris was more productive during winter only. They also demonstrated that the year-long green *C*4 grasses *A. bipartita* and *M. stipoides* were in general more nutritious than *C*3 grasses, and that the yield of *P. aquatica* declined during the 3-years of the study. Similar results were reported by Robinson and Whalley (1991) and Robinson (1993).

Being native to Australia, *Austrodonanthia* spp. are well adapted to Australian conditions. They have the ability to tolerate drought (Rivelli et al. 2001) and acidic soils (Dowling et al. 1996) and persist well under high grazing pressure (Robinson and Dowling 1976). Digestibility of *Austrodonanthia* is comparable to some introduced pasture species such as phalaris and fescue (e.g. 45-74%) (Archer and Robinson 1988), and crude protein content may also be high (10-17%, Lodge and Whalley 1989). While *Austrodonanthia* spp. clearly grow under low pH conditions, there is a lack of knowledge of inter- and intra-specific tolerance to low soil pH and associated high availability of Al and Mn.

**Some recent studies, results and significance**

Recently, some systematic detailed investigations have been conducted in Australia on *Austrodonanthia* for the first time (Islam 2000; Islam et al. 2001, 2002), and some results are presented here. The *Austrodonanthia* genus had a wide diversity of yield potential (Fig. 1), while survival is marginally greater than phalaris at low pH’s (Fig. 2b), and emergence is no better than the other genera (Fig. 2a). However, there are marked inter- and intra-specific variations for both cases. Among the species/accessions tested (183 accessions and 15 species collected on the Tablelands of New South Wales, Australia; Dowling et al. 1996), *A. duttoniana* and *A. fulva* appeared to have the greatest commercial potential, because of their productivity and acid-tolerance. The results also suggest that *Austrodonanthia* could improve the productivity of pasture systems on acidic soils on the Central Tablelands of NSW, Australia and drier adjoining regions.

There may be many valuable accessions of *Austrodonanthia* but very little is known about their individual attributes. When this information is available, improved types of *Austrodonanthia* may be obtained by selection and breeding. In this way, highly productive and acid tolerant pasture species can be developed.

**References:**


Fig. 1. Yield potential of Austrodanthonia accessions (1, 2, 3, 4 = A. racemosa; 5, 6 = A. duttoniana; 7, 8 = A. fulva; 9, 10 = A. penicillata; 11, 12 = A. pilosa). Columns associated with the same letters are not different (P < 0.05).

Fig. 2. Emergence (a) and survival (b) of Austrodanthonia and other genera in relation to soil acidity (pH's). Vertical bars are standard errors.

Acknowledgment: We thank Dr. Masahiko Hirata for his assistance in preparing the manuscript.