

TALL FESCUE BREEDING AND IMPROVEMENT

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Tall fescue, a widely-adapted grass species, has good spring-summer production, deep root system and heat tolerance and persistence over summer in moderate conditions. However, cultivars such as Demeter suffer from limitations such as low winter productivity, poor seedling vigour leading to slow establishment. In addition, presence of endophyte fungus in some cultivars causes heat stress and *fescue foot* in grazing animals. A joint project was initiated by Agriculture Victoria in collaboration with NSW Agriculture to address the need to develop cultivars having improved winter productivity and/or seedling vigour and overall productivity. In addition, a program was initiated to develop endophyte screening methodology to ensure *negative* endophyte status in the newly released cultivars. The cultivars developed would be used as an alternative/replacement improved grass in low rainfall areas (500-600 mm) of Victoria, South Australia and Western Australia where phalaris and cocksfoot are the only improved grasses grown in pastures.

METHODS

1. Winter-active/summer-dormant half-sib families have been obtained by polycrossing superior families identified from a spaced-planted winter-active/summer-dormant base population. The half-sib families are being evaluated at Hamilton and Balmoral in Victoria and Glen Innes, NSW.
2. Diverse germplasm accessions have been imported, and are being evaluated at Hamilton and Glen Innes for yield, persistence/drought tolerance and tolerance to rusts in the field. This will enable the identification of superior accessions which will be released either as new cultivars or used in hybridization programs.
3. Both ELISA and Tissue Print Immuno Blot methods are being developed at Hamilton for screening for presence or absence of endophyte. Field samples from imported tall fescue germplasm with known and unknown endophyte status are being used to develop these methods. The best of these methods will be used routinely to screen the materials prior to cultivar release.

RESULTS AND DISCUSSION

1. Several winter-active/summer-dormant half-sib families with significantly ($P < 0.05$) better yield than both cv. Demeter and the winter-active/summer-dormant standard have been identified indicating the presence of highly winter-active/summer-dormant half-sibs from which the selections could be made.
2. Several accessions with higher mean scores than the standard cv. Demeter and winter-active/summer-dormant standard have been identified at both Hamilton and Glen Innes. Analysis of variance has shown that the variance between the accessions is highly significant ($P < 0.001$). This indicates that there is a potential to select for both winter productivity and spring-summer productivity. Correlations for total productivity and spring and summer productivities are high. Winter productivity has moderate correlation with spring and summer productivities. These indicate that selections could be made for those that are productive in spring and summer and those that are productive during winter.
3. Both ELISA and Tissue Print Immuno Blot methods have been used to ascertain the presence of endophytes in known *positive* samples. Methods to ascertain *negative* endophyte status is being refined.

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