

# Developing an acid-tolerant tall fescue

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Current tall fescue (*Festuca arundinacea* Schreb.) cultivars used in Australia have been selected for overall agronomic performance under good management practices, as well as under favourable pH, fertility, and moisture. These cultivars of tall fescue are moderately tolerant of soil acidity (up to 15% ECEC Al.ex); however, the development of a cultivar with increased acid tolerance will extend the potential zone of adaptation and use of tall fescue in Australia. The NSW Agriculture collection of tall fescues at Glen Innes comprises a range of cultivars, temperate material (spring/summer active), Mediterranean material (winter active, summer dormant), and ecotypes collected from northern New South Wales. This paper presents results from a glasshouse screening of a subset of this material for acid tolerance.

## Methods

Shoot and root growth of 23 tall fescue lines were measured in Al-added, unlimed, and limed soil over a 6-month period. The glasshouse experiment had three replicates arranged in a randomised block design.

A bulk sample from the subsoil (10 to 20 cm) of an acid (pH<sub>Ca</sub> 4.2, 41% ECEC Al.ex) red ferosol soil was collected from a property near Ebor (30°17'S, 152°25'E) in northern New South Wales. The soil treatments—A (pH<sub>Ca</sub> 4.0, 44% ECEC Al.ex), B (pH<sub>Ca</sub> 4.5, 36% ECEC Al.ex) and C (pH<sub>Ca</sub> 5.1, 0% ECEC Al.ex)—were achieved by adding aluminium sulphate (Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>.H<sub>2</sub>O), using unamended soil, and adding lime (CaCO<sub>3</sub>) respectively.

## Results

Shoot and root data were averaged for the temperate lines, Mediterranean lines, and northern New South Wales ecotypes and are presented in Table 1. Tiller number and shoot weight of the temperate lines and ecotypes in Soil A and Soil B were significantly greater than the Mediterranean lines. Shoot-growth responses to lime were variable, particularly for the Mediterranean lines where there was a decrease in tiller number with lime. There was no significant difference in root weight between the temperate and Mediterranean lines for the three soils; however, the

ecotypes had significantly greater root weight. The ecotypes also showed greater rooting depth compared to the temperate and Mediterranean lines in soils A and B (data not presented).

The variation in tolerance to low pH and high aluminium among the tall fescue lines in this study indicates potential for selecting and developing cultivars for greater tolerance to acid soils. The performance of the ecotypes in soils A and B indicates the potential for cultivars with deeper and more

extensive root systems, which would also be better adapted to drought.

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Table 1. The effect of soil acidity on shoot and root growth of temperate lines, Mediterranean lines, and northern New South Wales ecotypes of tall fescue grown in three soils: A (pH<sub>Ca</sub> 4.0, 44% ECEC Al.ex), B (pH<sub>Ca</sub> 4.5, 36% ECEC Al.ex), and C (pH<sub>Ca</sub> 5.1, Nil ECEC Al.ex).

Measurement	Soil A: Very High Al			Soil B: High Al			Soil C: Nil Al			I.s.d (P=0.05)
	Temp	Medit	Ecotype	Temp	Medit	Ecotype	Temp	Medit	Ecotype	
Tillers per plant	7.8	6.4	8.6	8.0	4.8	7.6	13.0	3.9	10.7	0.95
Shoot weight (g/plant)	0.29	0.21	0.29	0.26	0.29	0.32	0.35	0.25	0.41	0.09
Root weight (g/plant)	1.0	0.92	1.46	0.99	0.89	1.40	1.24	1.03	1.75	0.22