

Agronomic requirements of a new semi-dwarf rye variety 1. phosphorus and sowing rate

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Cereal rye has a valuable role in controlling soil erosion on sand ridges and related light soil types. The current variety grown in southern Australia, S.A. Commercial is usually grown with little fertiliser and at low sowing rates (35 kg/ha). Breeding work at the Waite Agricultural Research Institute has produced semi-dwarf, high yielding lines and this study was designed to determine whether these new lines require higher phosphorous (P) and sowing rates to realise their greater yield potential.

Methods

A trial using a semi-dwarf line (PN-1037) was sown on June 3, 1987 on an eroded sand ridge at Wanbi Research Station. The rainfall for the June-November period (150mm) was 15% below average. Six fertiliser treatments were included, five P rates (5,10,15,20,30 kgP/ha applied as triple superphosphate) and one P plus N (ammonium sulphate) treatment equivalent to 8 kgP and 6 kgN/ha. These fertiliser treatments were arranged in a factorial design with four sowing rates (35,45,55,65 kg/ha).

A second trial was sown on June 14, 1988 at Lameroo to compare the responses to sowing rate of a soon to be released semi-dwarf variety (B88) and S.A. Commercial. The June-November rainfall was 210 mm, 10% below average. A split plot design was used with varieties as the main treatments and six sowing rates (25,40,55,70,85,100 kg/ha) as subplots. The trial received 12 kgP and 5 kgN/ha applied as mono-ammonium phosphate.

Results and discussion

In the 1987 trial, grain yield showed a significant response to fertiliser treatment. There was little difference between the five P treatments but addition of 6 kgN/ha resulted in a large increase in yield (Figure 1).

Figure 1. Grain yield response of a semi-dwarf line to P (&N). 1987

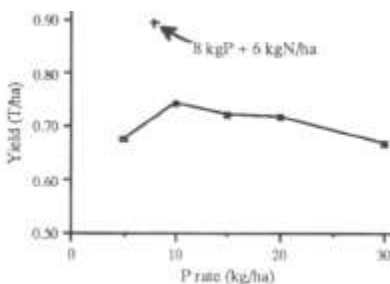
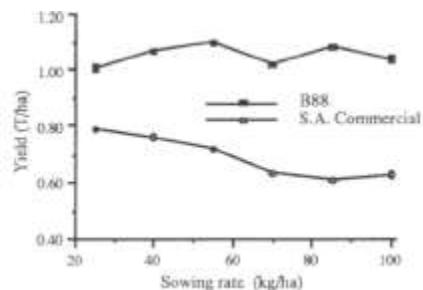


Figure 2. Grain yield response of varieties to sowing rate, 1988



Sowing rate had no significant effect on yield in 1987 but a significant variety x sowing rate response occurred in the 1988 trial (Figure 2). B88 showed little response to sowing rate but the yield of S.A. Commercial decreased with increasing sowing rate. More tillers of S.A. Commercial died at the higher sowing rates and it also lodged late in the season. The reduction in yield of this variety at high sowing rates was associated with a greater reduction in grain weight. This was possibly due to the combined effects of lodging (1) and a dry spring during the grain filling phase. This study has shown that current P and sowing rates used for rye are unlikely to limit the yield potential of the semi-dwarf lines. A more detailed study of response to N is presented elsewhere (2).

1. Fischer R.A. and Stapper M. (1987), Field Crops Res. 17: 245-258.
2. Dean G.J. and McDonald G.K. (1989), Proc. 5th Aust. Agron. Conf., Perth