ROW SPACING AND SEEDING RATE INTERACTIONS IN PERENNIAL RYEGRASS AND TALL FESCUE SWARDS ESTABLISHED BY DIRECT DRILLING (NO-TILLAGE)

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ABSTRACT

Direct drilling is a popular and cost-effective method of introducing new, more productive pasture species into existing pasture on farms in New Zealand. The technique conserves both time and money, reduces moisture loss and the risk of soil erosion and offers some management benefits in intensive agricultural systems.

Seed drills in New Zealand commonly used for pasture establishment sow seeds in rows at 150 mm centres. While this is an acceptable row spacing for cereal crops, eg. barley and wheat, closer row spacing has been proposed for establishing pastures. However, little research has been carried out to determine optimal row spacing or seeding rates. The benefit of cross-drilling with two passes of the drill, which is a practice thought to overcome the perceived inadequacies of 150mm row spacing, is also uncertain. This study was designed to investigate the effects of row spacing and cross-drilling, and the relative importance of plant population per unit area and per unit length of drill row on pasture establishment and development.

Single pass sowing, at both 150 and 75mm row spacings together with cross-drilling were compared in an autumn sown field experiment. Two species of contrasting establishment vigour, perennial ryegrass (*Lolium perenne* L.) and tall fescue (*Festuca arundinacea* Schreb.) and two seeding rates (12 and 23 and 17 and 31 kg ha^{-1} for perennial ryegrass and tall fescue respectively) were also compared. The trial was grazed by dairy cattle throughout the measurement periods.

Emergence of 84 and 71 % of sown perennial ryegrass and tall fescue seed respectively, resulted in establishment of approximately 400-500 and 700-800 seedlings m^{-2} for medium and high seeding rates respectively for both species. Two years after sowing, medium to high seeding rates offered no advantage in terms of weed suppression or yield compared with low seeding rates.

Cross-drilling offered no advantage for either species. Total herbage yield and the proportion of sown species was the same for perennial ryegrass and tall fescue established in either cross-drilled or 150 mm rows. This was the most important result, as far as the farmer is concerned, with potential cost savings of up to $100 per hectare by not carrying a second pass of the seed drill required for cross-drilling.

The establishment performance of tall fescue in terms of herbage mass and suppression of weeds in the sward was initially improved with closer row spacing. These benefits were not apparent for perennial ryegrass. The advantage gained for fescue from reduced row spacing declined with time and by the second spring after sowing no difference was apparent between 150 and 75mm row spacing treatments. Thus, overall, drilling method had only a minor influence on botanical composition.

Tall fescue was slower establishing and had more clover and weed in the sward compared with perennial ryegrass. This contrast in growth revealed the subtle influences of drilling method and seeding rate on pasture composition.

A second trial, sown in the subsequent autumn, investigated the use of nitrogen with tall fescue at the time of sowing in both single pass and cross-drilling. The results supported those found for the effects of drilling pattern in the first trial. The use of nitrogen fertiliser in the damp, cool conditions of late autumn did not benefit sward development. Emergence of tall fescue was poorer at this time.

In contrast to the results of Trial 1, increasing the seeding rate resulted in increases in initial seedling population and improved the performance of tall fescue. There was a higher proportion and herbage mass of sown species in the sward sown at the higher seed rate. This suggests that higher seeding rates may be required for tall fescue as conditions at sowing become cooler. However, the early advantage from the higher seeding rates was not apparent 10 months after sowing.

Clover emergence was low at 46 and 52% of sown viable seed for the first and second trials respectively. However, a clover seedling population in excess of 150 plants m^{-2} was established in both trials which proved to be an adequate population for development of productive pasture.

Drills designed for sowing aggressive species such as perennial ryegrass need not incorporate the option of reducing row spacing from the common 150mm with the subsequent cost disadvantages. However, the option of reduced row spacing may be appropriate for drills designed for sowing less vigorous alternative species such as tall fescue. Increased seeding rates and cross-drilling should not be necessary for successful establishment of a productive pasture sward of temperate species. This leads to improvements in efficiency of seed drill operation in the field.

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