

Effect of direct drilling techniques on seedling environment and growth response

W.D. Bellotti and G.J. Blair

Department of Agronomy and Soil Science
University of New England, Armidale. N.S.W. 2351

Stages in the establishment of sown pasture include imbibition, germination, emergence, seedling growth and, finally, survival. On the Northern Tablelands of N.S.W. seedling growth during spring and survival through the first summer are fundamental stages in the pasture establishment process. Direct drilling provides a practical compromise between prepared seedbed and aerial sowing techniques for establishment or renovation.

Methods

A range of sowing techniques was imposed in a factorial design on a clover-dominant permanent pasture growing on a chocolate basalt soil. Treatments were selected to evaluate the relative importance of drill groove type, herbicide, and species (Table 1) on emergence and survival of sown perennial grasses. Seedling environments created in each treatment were monitored and growth response of sown seedlings recorded. The experiment was sown early in June 1981 and measurements will continue through to Spring 1982.

Table 1. Effect of sowing method on seedling environment and growth response.

Treatment	In Groove+ Soil Moisture Content (0-5 cm) (%) (gravimetric)	Total Dry Matter (50)* (kg/ha ⁻¹)	Light Trans- mission (100) (%) (PAR)	Presence (50) (% sown seed) Ryegrass Fescue		Seedling Growth (100) (ht., mm) Ryegrass Fescue	
Prep. seedbed	30a	1077a	68b	85.5a	43.0a	86.0a	84.2ab
Triple disc + Herb.	40c	1162a	62b	72.0ab	54.5a	57.0bc	67.9ab
- Herb.	33ab	2429c	7a	63.6b	28.5ab	42.8a	47.2b
Tyne + Herb.	32a	1253ab	57b	81.0ab	33.5ab	88.3a	73.9ab
- Herb.	32a	1646b	3a	85.0a	28.0ab	48.1cd	42.8b
Aerial Sow	34b	1052a	48b	22.0c	14.0b	63.7b	97.3a

+ averaged over first 21 days from sowing. Means followed by same letters.

* numbers in brackets indicate days from sowing. Not sig. diff. 5% studentized range.

Results and Discussion

In-groove soil moisture content during the germination/emergence stage was highest in the triple-disc (TD) grooves. Tyne (T) grooves were intermediate, the prepared seedbed (PSB) being driest (Table 1). This is reflected in early emergence figures for fescue and ryegrass but is modified by soil seed contact in the PSB and aerial (A) treatments. Percentage emergence at 12 and 25 days was highest in the TD treatments. Herbicide application had no effect on emergence at 12 days. At 50 days ryegrass maintained a high percentage presence over all treatments except A, where poor soil seed contact reduced germination and emergence. Percentage presence of fescue was highest in the PSB and TD + herbicide treatments, followed by the TD - herbicide and T treatments. All were superior to the A treatment.

Light transmission to the ground surface was found to be closely related to above ground biomass and these environmental parameters influenced seedling morphology. Plants in the no-herbicide treatments developed fewer leaves, tillers, and were smaller than plants growing in the PSB and the + herbicide

treatments. These differences in seedling morphology are expected to confer differing capabilities to tolerate further stress or disturbance, be it defoliation, soil moisture deficit, or limiting nutrient availability.