A phytotonic effect of endophyte on ryegrass establishment

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In a trial sown at Hamilton in 1980, the density of Ellett and Victorian perennial ryegrass in 1983 was greater (P<O.05) than the three other cultivars tested (Grasslands Nui, Kangaroo Valley Early and Grasslands Ruanui). Interestingly, only Ellett and Victorian were heavily infected with the endophyte *Acremonium loliae* (90 and 62% of plants infected respectively); other lines were low in endophyte (0-10% of plants infected) according to the method of Harvey *et al.* (1) using 50 plants per cultivar and 3 tillers per plant. Information was then sought on the effect of endophyte on establishment.

Methods

On 15 May 1984, plots were drill sown to eight ryegrass clover mixtures. Three cultivars of ryegrass were each represented by two lines of seed that were subsequently confirmed as having high and low levels of infestion with *A. loliae.* Endophyte levels were determined in 80-100 seedlings. Seeding rates were adjusted to allow for differences in seed weight and germination test. All plots were sown with clover, and 400 certified germinable grass seeds per m^2. Plot size was 6.0 m x l.5 m and there were eight replicates.

Plots were sprayed with omethoate on two occasions to control red legged earth- mite *(Halotydeus destructor).* Seedling density was measured in two rows per plot. Counts were made over 0.5 m per row; the two lengths counted were each selected as the median of a set of three. Eighty sods (9 cm x 6 cm deep) were taken on a grid basis on 26 June and examined for evidence of pests (arthropods, insects, nematodes).

Results and Discussion

Highly significant differences were observed in seedling density between cultivars, and between high and low endophyte lines within two cultivars (Table 1). These results emphasise the need to consider endophyte status when evaluating ryegrass cultivars. The mechanism by which the establishment of infected seeds was enhanced is unknown. Overseas workers have reported that the endophyte enhances grass resistance to insect attack (2) and that ectoparasitic nematodes can reduce seedling establishment (3). No evidence of either problem was found in our study.

TABLE 1. Description of seed. and seedling density in early winter

Ryegrass cultivar	Endophyte status† (%)	1000 seed st. (g)	Germn. test (%)	Seedling density June 19, (no/m^2)
Ellett	80	2.30	94	228 A*
Ellett	0	1.93	97	151 BC
Grasslands Ariki	66	1.86	85	198 AB
Grasslands Ariki	0	1.97	85	129 D
Victorian	68	1.93	85	136 CD
Victorian	1	2.09	86	105 D
Grasslands Nui	0	2.12	93	211 AB
Kangaroo Valley	8	2.17	92	138 CD

† % of plants infected; * Means with a common letter do not differ (P<0.01).

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