THE EFFECT OF PASTURE SPECIES ON THE GROWTH OF SOLDIER FLY LARVAE

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Summary

The weights of soldier fly (*Inopus rubricaps*) larvae feeding on white clover (*Trifolium repens*), Lotus major (*Lotus pedunculatus*), Paspalum (*Paspalum dilatatum*), and lucerne (*Medicago sativa*) were found to be significantly lower than those of larvae on phalaris tuberosa (*Phalaris tuberosa*), ryegrass (*Lolium perenne*), prairie grass (*Bromus catharticus*), tall fescue (*Festuca arundinacea*) Yorkshire fog (*Holcus lanatus*) and cocksfoot (*Dactylis glomerata*). No significant differences in larval survival were found amongst host species nor were there any significant overall relationships between larval weights and dry matter production.

INTRODUCTION

In recent years much research has been carried out on the development of pastures resistant to insect damage. Pasture composition is known to have a major influence on populations of pests such as grass grub (*Costelytra zealandica*) (Kain *et al* 1975), black beetle (*Heteronychia arator*) (King 1976), white-fringed weevil (*Graphognathus leucoloma*) (East 1976) and porina (*Wiseana cervinata*) (Farrell 1976). This paper reports on the results of a pot trial investigating the effects of pasture species on the growth and development of soldier fly (*Inopus rubriceps*) larvae.

METHOD

Ten host species were selected as shown in Table 1.

The trial was carried out in plastic pots (17 x 17 x 18 cm) with 12 replicates of each species. Ten plants were established in sterile soil in each pot. First instar larvae were obtained by incubating fertilised eggs, obtained from females trapped during the spring emergence in November 1975, on agar at 20°C. Fifty larvae were introduced into each pot in late November. The pots were randomly arranged in an insectary and dry matter cuts taken monthly. As the species chosen varied in seasonal growth habits, 3 pots from each species were washed to remove larvae every 3 months, about the end of each season. The final assessment was delayed until after the spring emergence in 1976, so that the numbers, sex, weight and fecundity of adults emerging after one year could be assessed.

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Pasture Pests

RESULTS

The larval weight gains are presented in Fig. 1.

FIG 1 : MEAN LARVAL WEIGHTS FROM A PASTURE SPECIES POT
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Larval weights did not differ significantly at the first assessment at the end of summer; but by the end of autumn, the larvae on the legumes and paspalum had dropped in weight significantly below the other species ($P < .001$). This situation was maintained at the later assessments, although the weight on lucerne was unexpectedly high at the final wash.

Larval survival remained high (over 60%) throughout the trial with no significant differences between species.

The numbers of adults emerging from each host species after 11 months larval growth are presented in Table 1.

Pasture Pests

TABLE 1: The influence of pasture species on the number of adults emerging after 11 months larval growth.

<i>Species</i>		<i>No. adults</i>
Prairie grass	cv 'Matua'	59
Tall fescue	cv 'G4710'	46
Perennial ryegrass	cv 'Nui'	42
Yorkshire fog		29
Phalaris tuberosa	cv 'G14'	24
Cocksfoot	cv 'Apanui'	4
Paspalum		1
Lotus major	cv 'Maku'	1
White clover	cv 'Huia'	0
Lucerne	cv 'Wairau'	0

As a group, the legumes and paspalum produced fewer adults than the remaining grasses ($P < .01$) and this was presumably related to the lower larval weights. It appears soldier fly larvae may have to reach a certain minimum weight before they can respond to a stimulus to pupate. As the heavier larvae emerge as adults, mean weights of the remaining larvae on the favourable species were lower than they would have been if the trial had been concluded just before the spring emergence. This is reflected in the high mean larval weight for cocksfoot, from which inexplicably few adults emerged.

No significant differences were found in the weight or fecundity of the adults that emerged from the different species. Larvae recovered from the legumes and paspalum at the final wash were put back into new pots of the respective species. Adults emerging from these pots in autumn 1977 did not appear to differ in weight or fecundity, although insufficient numbers prevented analysis.

No significant relationship was found between total dry matter production and larval weight. However, at the trial completion, the majority of the grasses were yellowing and beginning to die, whilst the legumes and paspalum appeared to be flourishing. Presumably the large larvae on the grasses were putting greater stress on the plants than the more slowly growing larvae on the legumes and paspalum.

DISCUSSION

The results indicate that white clover, lucerne, lotus major and paspalum are less favourable for larval growth than ryegrass, prairie grass, phalaris tuberosa, tall fescue, cocksfoot and yorkshire fog. Soldier fly has a flexible life history, taking from 11 to 36 months or longer to complete the larval stage (Wilcocks 1973). The results from this trial show that this may largely be dependent on the effect of the host species on larval growth.

Soldier fly-infested pastures tend to lose the ryegrass component and white clover, paspalum and/or weeds become dominant. Possibly the more rapidly growing larvae, feeding on ryegrass, put a greater stress on the plant than larvae feeding on white clover or paspalum.

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Tolerance of the pasture species to soldier fly attack may also play an important role. High numbers of larvae are frequently observed under paspalum. This may be the result of prolonging the larval stage, leading to more generations being present under paspalum than under ryegrass in the surrounding pasture.

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