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A STUDY OF THE EFFECTS OF GROUND COVER
ON OVERWINTERING SLUG POPULATIONS
AND THE EFFECT OF COULTER DESIGN
ON SLUG INCIDENCE IN DIRECT
DRILLING

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ABSTRACT

A two stage study involving the effect of vegetation cover on overwintering slug populations, and the effect of coultter design on slug incidence and damage in a direct drilled cereal was carried out during the 1980/81 growing season.

The first stage of the study showed that ground cover affected slug activity on the soil surface, but only in the most adverse environment did any actual decrease in slug populations occur. Differences occurred in the effectiveness of the trapping techniques depending on the density of the ground cover. Pitfall traps appeared to be more effective in dense ground covers, while brick or shelter traps appeared to be more effective in low density ground covers and especially with bare ground. Rainfall, soil temperature and soil moisture were measured and it appeared that slug numbers recorded in the traps were correlated to different environmental parameters depending on the ground cover. In dense covers the slug number recorded was correlated to temperature, in medium density ground covers the numbers had a slight correlation to soil-moisture, and in low density ground covers they were correlated to rainfall.

The second stage of the study involved two dates of drilling, using three coultter types (triple disc, hoe, chisel coultter) and measuring slug numbers occurring in the seed grooves and slug damage to seeds and seedlings. It was found that coultter design had no effect on slug ingress into the seed groove, or on slug damage to the direct drilled crop. There was however a strong correlation between slug numbers in the seed groove and seed and seedling damage ($r=0.78$, $r=0.93$ respectively). Pre drilling conditions affected the number of slugs entering the seed grooves (the denser the vegetation the greater the slug number occurring in the seed groove), and slug damage to the seedlings. Moisture levels also affected the number of slugs entering the seed grooves and seed and seedling damage by slugs. Moister conditions produced the greater number of slugs in the seed grooves and the highest seed and seedling damage.

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Slugs are an ever present problem in agriculture and horticulture. They damage a wide variety of plants such as wheat, barley, brassicas, root crops, celery, tomatoes and pasture plants. Little quantitative information is available on the status of slugs as pests, but it is clear that they cause considerable damage throughout the temperate regions of the world.

With the development of new sowing techniques that involve little or no cultivation of the soil, slugs are becoming a much greater problem in the agricultural scene than has previously been the case. Patterson et al (1980), Edwards (1975), Anon (1973), Edwards & Lofty (1979), Whiting & Lofty (1967) have all observed increased slug numbers in direct drilled areas and greater plant damage by slugs than in ploughed and/or cultivated areas.

It has been noted that using these non tillage systems allowed slugs to completely destroy a crop before the seeds have germinated or the seedlings have had a chance to emerge and to be exposed to their normal range of pests or to express their potential for growth and production (Baker per comm, Anon 1973, Edwards, 1975). Matthews (1972) states that this "no tillage system of crop production heralds a revolution that is as striking as the shift from horse power in agriculture, ameliorating many deficiencies of cultivation". It is therefore necessary to develop methods to overcome arising pest problems such as slugs before this new method (direct drilling) can become widely accepted.

Relatively little is known of the species of slugs present in New Zealand; Coleman (1970) states that slugs are a natural although rather temporary part of the organic complex of the soil, which they use for shelter and to provide some food and scavenging territory. It is this, along with their aggregated sparse distribution that makes it difficult to carry out field experimental work.

The present study examined the effects of slugs on a direct drilled crop, the effect of coulter design on the slug numbers moving into the seed grooves, and the effect of winter ground cover and irrigation on slug populations.