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Principles of controlling SLUGS AND SNAILS in no-till

Losses of canola seedlings due to the black-keeled slug, 'Milax gagates', in the Swartland near Moorreesburg.

Exotic slugs are becoming pests in the soya growing areas of KwaZulu-Natal. Their appearance is linked to the adoption of similar no-till practices in canola in the Western Cape. Entire fields of canola seedlings would disappear overnight without trace, sometimes necessitating replanting twice.

Once pathogens had been eliminated as the cause of such losses, attention was focused on the presence of various organisms active in the fields. These included crickets, dusty maize beetles (*gonocephalum simplex*), millipedes, slugs, isopods, cutworms and earwigs, amongst others. Initial attempts by farmers to prevent such losses, such as the burning of stubble and the use of various insecticide treatments and slug pellets, resulted in variable results.

The key to identifying the culprits was the devising of a suitable standard trap that could accommodate all these organisms, and then linking the pest organisms with the losses of seedlings. The traps were made out of 30 x 30cm melthoid squares that were placed on top of flattened soil and which were held down with two large nails.

Treatments tested

Various treatments were then applied to plots 50 x 6,6m in extent. Immediately after planting, each plot had four areas of 1 x 0,5m demarcated with string, and the number of surviving seedlings were counted and related to the numbers of the various organisms under five melthoid traps in each plot at weekly intervals.

Initial field trials in which nine treatments were tested, showed that the control plots were stripped bare, that planting double the numbers of seeds/ha or disturbing the soil by "ploughing" twice, had little beneficial effect and that seed treated with Cruiser did not significantly protect the seedlings.

Slug pellets deposited in the soil at planting had some positive effect, but the two equally effective treatments were the depositing of slug pellets in the soil plus the broadcasting of slug pellets on the surface, and the broadcasting of slug pellets on the surface at planting. The latter treatment is obviously the most effective.

A melthoid trap under which slugs hide during the day waithin a lupin field, where major losses of seedlings were found, in the Caledon district.

The culprits were identified as exotic isopods or pill bugs (*Armadillidium vulgare*) and slug species from the Mediterranean Basin (*milax gagates*, *deroceras*

The trial consisted of six treatments and six replicates (36 plots) which were randomly but equally divided between the two sites, so that each site contained three replicates of the six treatments.

panormitanum and *deroceras reticulatum*). The isopods were shown to cause about 80% of the losses of seedlings and slug pellets, containing 30% metaldehyde, and 20% carbaryl were effective in controlling both slugs and isopods.

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A further field trial determined that the slug pellets should be applied on the surface at planting and that 8kg/ha was the most cost-efficient rate of application.

There was no significant advantage in a second application of slug pellets six days after the first. In the winter rainfall region the slugs over-summer in the humus layer of the soil (up to about 20cm deep), where they congregate to conserve water, using the tunnels of earthworms initially to penetrate the soil.

Soaking rains bring them to the surface in the winter, where they feed on the seedlings along one row initially and then widen their range into adjacent rows to eventually form a bare oval patch. Several of these patches may then coalesce if the slug population is substantial.

Their primary mortality rate is caused largely by adverse weather conditions, which results in widely fluctuating numbers of slugs at the beginning of each season. It is not possible to eradicate these organisms and it is essential that the seedlings are protected for the four weeks from planting by the judicious use of slug pellets.

Earthworms, crickets and various predatory beetles are not killed by slug pellets, but millipedes are.

Changeover to no-till

Was the changeover to no-till responsible for the appearance of these organisms as pests? Possibly not entirely because it was shown that in the Western Cape the growth of the relatively new canola crop formed a favourable micro-climate for the slugs in which they laid eggs over an extended period until harvesting.

The slugs had already entered the soil to over summer in surrounding crops such as medics about 30 days prior to harvesting of the canola. In effect, the planting of canola resulted in a massive surge in the number of slugs, especially by the end of the season. Their potential threat to crops of the next season was determined by adverse or favourable weather conditions during their inactive summer months, mainly the allevia-ting effect of summer rainfall.