Ideas for slug control in broadacre crops

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Abstract

Many crop producers in the high rainfall regions of southern Western Australia are finding slugs difficult to control. A laboratory trial was conducted to evaluate management options for slug control. Feeding preferences, amount of plant consumption and mortality rate from a single baiting event were trialled for two common slug pests: reticulated slug (*Deroceras reticulatum* (M?ller)) and black-keeled slug (*Milax gagates* (Draparnaud)). The results suggest that a single bait application is inadequate to cause high slug mortality. Black-keeled slugs cause more damage to canola than reticulated slugs. Given a food choice, slugs consume less barley (*Hordeum vulgare* L.) than the Brassica species, canola (*Brassica napus* L.) and wild radish (*Raphanus raphanistrum* L.).

Key Words

Deroceras reticulatum, Milax gagates, Black-keeled slugs, reticulated slugs, canola, Brassica napus, barley, Hordeum vulgare, wild radish, Raphanus raphanistrum

Introduction

Worldwide, the incidence of slugs causing economic damage to crops, especially canola, is increasing (Young and Armstrong 2001). Most pest slugs found in Australia have been introduced (Horne and Page 2006). In the high rainfall regions of southern Western Australia, the two main pest species are the reticulated slug, *Deroceras reticulatum* (M?ller) and the black-keeled slug, *Milax gagates* (Draparnaud). A laboratory trial was conducted to evaluate management options for slug control. Feeding preferences, plant consumption and mortality rate from a single baiting event were investigated.

Methods

Canola, wild radish and barley were grown in tote boxes measuring 30 cm x 50 cm. Canola and wild radish seedlings at the cotyledon stage and barley with 3 leaves, were then transplanted randomly into tote boxes as per the following treatments: Treatment 1: 8 canola seedlings + bait (0.2 g); Treatment 2: 16 canola seedlings; Treatment 3: bait only (0.2 g); Treatment 4: 8 canola seedlings and 8 barley seedlings; Treatment 5: 8 canola seedlings + 8?wild radish seedlings; Treatment 6: 8 canola seedlings, no baits. A metaldehyde bait Meta[?] (15 gac/kg) was used at 0.2 g per tote box (equivalent to 5 kg/ha). Three slugs of the same size of one species were placed in each tote box. Experiments were conducted concurrently for black-keeled and reticulated slugs, with five replicates for each slug species.

The number of plants intact, chewed and chewed to ground level were counted and scored. A score of 1 was given to all plants that were intact, a score of 0.5 was given to all plants that were chewed and a score of 0 was given to all plants that were chewed to ground level. Scores from all treatments for each slug species were analysed using ANOVA and log transformed to stabilise variance. Scores from Treatment 2 (16 canola plants) were halved to be comparable to treatments 1, 3 and 4 (8 canola plants).

Results and discussion

Baiting decreases slug damage

A single baiting event significantly lowered the consumption of canola by slugs when compared with the consumption of canola grown with other plant species combinations (Figure 1). In baited plots only 12%

of canola plants (Treatment 1) sustained damage whilst on average 22% of unbaited canola plants (Treatments 2, 4, 5) were damaged (Figure 1). Even when the planting density of canola was doubled without a baiting application (Treatment 2), 17% of plants were damaged.

However, a single baiting event (5 kg/ha) was not effective in killing all slugs. After 14 days, when slugs were exposed only to bait as a food source (Treatment 3), 40% of black-keeled slugs remained alive compared to 33% of reticulated slugs (Figure 2). This suggests that repeated bait applications are necessary to achieve high slug mortality. These results agree with field trial data from Michael and Dore (unpublished data), which showed that repeated applications of baits at a rate of 5 kg/ha achieved better control of slugs than single bait applications at a high rate of 15 kg/ha.

Baits are the most effective chemical control for slugs. Michael and Dore (unpublished data) have shown that copper based sprays such as Socusil[?] are not as effective as baits in controlling slugs because they rely on direct contact to cause slug mortality. Unless spray applications coincide with large populations of slugs present on the soil surface, good control is not achieved (Michael pers. comm. 2004).

Simms *et al* (2006) trialled seed dressings of imidacloprid, methiocarb and metaldehyde to control slug damage to canola. They found that metaldehyde performed better than methiocarb and both metaldehyde and methiocarb out-performed imidacloprid. Plants with seed dressings still sustain slug chewing damage and the extent of crop damage is dependant on slug feeding pressure. Under high slug pressure, seed dressings may not prevent economic damage.

Seeding depths of crops may also aid in crop survival. Trials by Glen *et al* (1990), suggest that shallow sown wheat sustains higher seedling and seed damage than deep sown wheat. However, the least slug damage occurred where baits were broadcast and seed was deep sown.

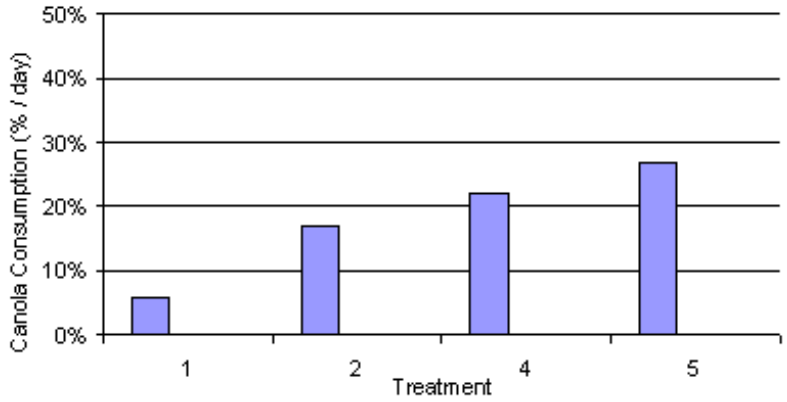

Figure 1. Average canola consumption by black-keeled slugs and reticulated slugs under different treatments. Note: Treatment 1 = 8 canola seedlings + 0.2 g bait; Treatment 2 = 16 canola seedlings; Treatment 4 = 8 canola seedlings + 8 cereal seedlings ; Treatment 5 = 8 canola seedlings + 8 wild radish seedlings.

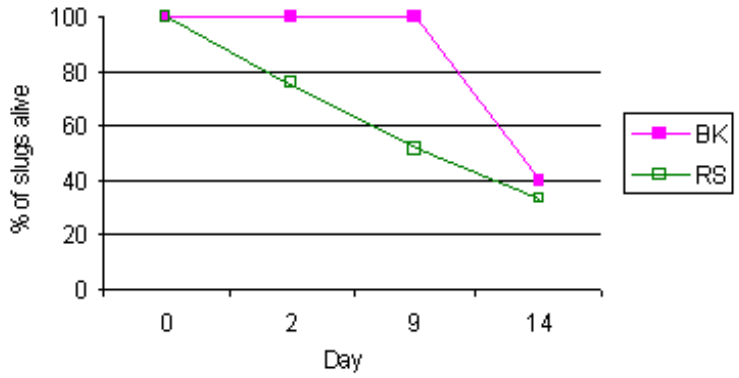

Figure 2. Average survival of black-keeled slugs (BK) and reticulated slugs (RS) baited once with metaldehyde bait.

Identification of slug species may assist in crop rotation

The amount of canola consumption differs according to slug species. It was found that black-keeled slugs consume 24% more canola than reticulated slugs. Therefore, correct identification of slug species is of importance to minimise damage to crops.

The amount of canola consumption was not significantly different when slugs were given a choice of wild radish (Treatment 4) or barley (Treatment 5). Observations suggest that both species of slugs prefer feeding on canola to either radish or barley. The amount of damage to radish was observed to be less than that of canola. Barley was observed to be damaged only when there was no canola left to consume. However, the rate of canola consumption was not significantly different between Treatments 4 and 5. Barley grown in a slug risk paddock may be less likely to sustain damage, especially if reticulated slugs are the predominant slug species present. This is supported by field observations where reticulated slugs (15 per square metre) were observed in barley crops but did not cause economic damage to crops.

Conclusion

This laboratory study indicates that baits probably need to be reapplied regularly to kill slugs. A single bait application will decrease the amount of damage caused to canola seedlings but not eliminate it. Increasing canola plant density does not decrease the amount of damage.

References

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