

Slugs Pests and Slug Control in Potatoes

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Slug biology

- Three main types of slugs cause damage to potatoes:-
 - Field slug - *Deroceras reticulatum*
 - Garden slug – *Arion hortensis* aggregate
 - Keeled slugs - espec. *Tandonia budapestensis*



Field slug - *Deroceras reticulatum* - short life-cycle, breeds at any time of year, more surface-active and feeds to greater extent on green plant material than other species



Garden slug – *Arion hortensis* aggregate - annual breeding cycle, breeds in late spring-early summer, less surface-active than field slug, but adults are active on soil surface during breeding season



Keeled slugs - especially *Tandonia budapestensis* - annual breeding – eggs hatch autumn to spring. Subterranean habits, but adults are active on soil surface during breeding season

Slug biology & population dynamics

- Very dependent on moisture
- Eggs laid in batches in soil
- Slugs feed below soil as well as on surface
- Juveniles less surface-active than adults
- Slug distribution is usually patchy within field and numbers fluctuate enormously from year to year and also within a year

Slug behaviour

- Hide in soil during day
- *Some* individuals become surface-active at dusk
- Degree of surface activity is very dependent on moisture and temperature
- Slugs can spread from field margins into crops for a limited distance
- Feed on potato tubers when they start to mature

Agronomic factors influencing slugs

- Cultivation reduces slug nos.
- Straw incorporation increases nos.
- Weed control during inter-crop period deprives slugs of food source
- Potato varieties differ in susceptibility
- Irrigation: timing important in potatoes
- Time of harvest – the later the harvest the greater the risk

Assessing the risk of slug damage in potatoes

(Rogers-Lewis, 1977; Rayner *et al.*, 1978)

- Traps baited with small quantity of methiocarb pellets were placed between rows when soil surface moist, in July & Aug. (NOT NOW ALLOWED)
- Threshold:
 - 1 slug/trap over 2-3 days, OR
 - 3 slugs/trap/week
- Conclude that traps are useful for assessing need for slug pellets, but not timing of application.

Controlling slug damage

- Very little published research since 1970s
- Slug pellet applications are targeted at surface-active slugs (but *Arion* and especially keeled slugs show little surface activity during growing period of potato crops)
- Metaldehyde and methiocarb pellets are both effective (iron phosphate pellets also available)
- Results are very variable
- Timing of application is thought to be critical

Timing of pellet applications

- Difficult to achieve optimum timing
- Early season sometimes effective, BUT
- Applications from mid July more effective
- Kill slugs before start to feed on tubers, otherwise not likely to contact pellets
- Apply at first opportunity when soil moist after mid July

Number of pellet applications

- Single pellet application between mid July & early August usually effective,
- No signif. benefit from second application
- Some growers apply up to 6 times & still achieve poor control
- Need to follow new guidelines on max. quantity of metaldehyde/ha, to reduce risk of metaldehyde getting into water

New approaches to slug control in potatoes

- Assessing slug risk
- Possible pre-planting treatments
- Slug-parasitic nematodes

Assessing slug risk

- Trapping using non-toxic baits

Trapping using non-toxic baits

- Traps were normally baited with slug pellets and left for three nights.
- Slug pellet baits are now NOT permitted in traps
- Chicken layers' mash is a suitable non-toxic bait for use in traps & recent results in an Arable Link Project (winter wheat & oilseed rape) show that trap catch after one night is about equivalent to trap catch after three nights in traps baited with slug pellets.







Trapping to assess slug activity

- Traps baited with chicken layers' mash put out overnight when soil surface is moist give a good indicator of the number of **large slugs** in soil
- Very dependent on moist soil surface
- Tapping alone gives only part of the picture – mainly the larger individuals in the slug population
- Trapping should be done at different times of year in order to assess which species are present

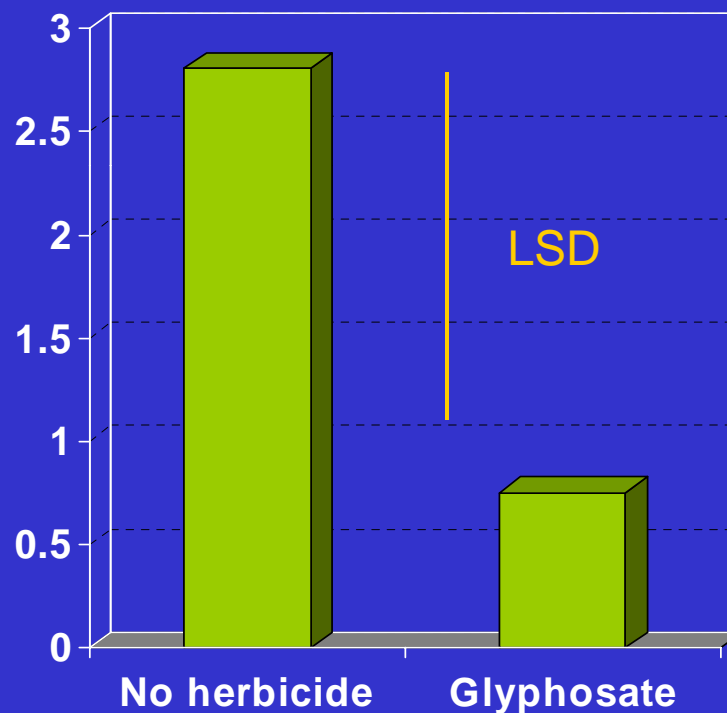
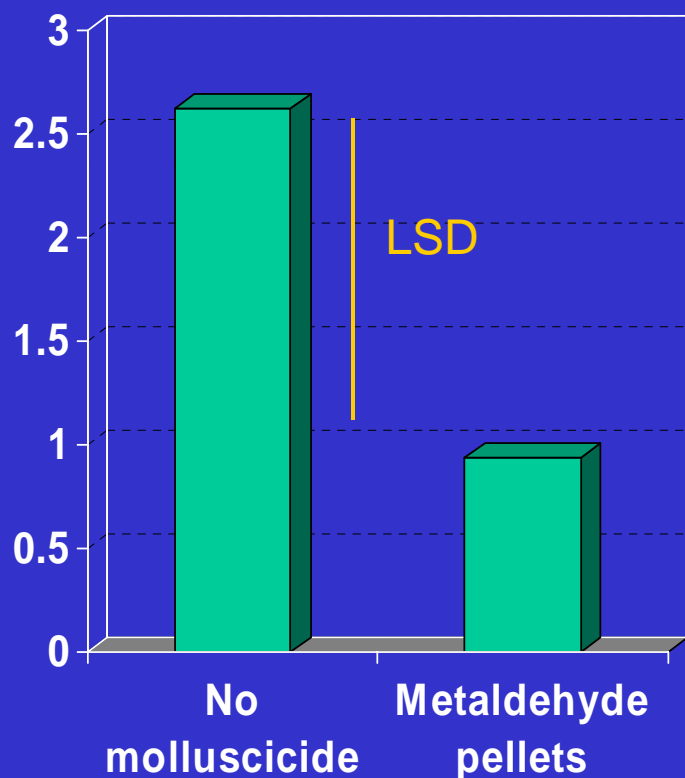
Possible pre-planting treatment with slug pellets and herbicide?

- As part of a HortLink Project, we conducted a replicated experiment in 2002 in collaboration with Langmead Farms, Sussex, where plots were treated in mid February as follows: -
 - Metaldehyde slug pellets alone (Metarex)
 - Glyphosate herbicide alone (Roundup)
 - Metaldehyde pellets + glyphosate
 - No treatment
- Iceberg Lettuce were planted early May



Effects of slug pellets and/or glyphosate applied pre-planting, on slug damage to Iceberg lettuce

No. lettuce plants per plot damaged by slugs at harvest, late June



Effects of slug pellets and/or glyphosate applied pre-planting, on slug damage to Iceberg lettuce

- Metaldehyde pellets applied mid Feb. reduced slug damage
- Glyphosate applied mid Feb. reduced slug damage
- Effects were additive – pellets and glyphosate together gave greatest reduction in slug damage
- Would a similar strategy work for potatoes?

Nematodes for slug control

- Slug-parasitic nematodes (*Phasmarhabditis hermaphrodita*) could be effective, BUT no conclusive evidence for potatoes
- Cost is much greater than pellets, BUT
- Capable of killing slugs living in soil & not active on the soil surface
- Could help now that metaldehyde use is restricted

Conclusions: Slug Control in Potatoes

- Considerable room for improvement in slug control in potatoes
- Results of slug-pellet applications are variable
- No clear PUBLISHED evidence of benefits from more than 1 application
- Pellets are normally applied in summer when key species are not very surface-active and therefore unlikely to contact pellets
- The need to restrict metaldehyde use is a powerful impetus for research to improve the timing and targeting of slug-pellet applications