

Garden solutions

Slugs & snails

A hosta bears signs (above) of gastropod damage; mulches (below left) are one form of control against slugs and snails (below) that feast on young leaves.

With so many options for limiting damage caused by these gastropods, the RHS is researching which combination of controls could be most effective >>

Author: **Hayley Jones**, Entomologist, RHS Garden Wisley, Surrey.
Photography: **Neil Hepworth** and **Tim Sandall**



The gastropod fauna

of the UK (land-based rather than aquatic) consists of more than 40 species of slug and 100 species or more of snail. They have wide-ranging diets that include live and dead plant material, lichen, fungi and some are even carnivorous. It is the gastropods that like to eat cultivated plants, however, that cause problems both in agriculture – slugs have been devastating crops for centuries – and for home gardeners. Slugs and snails have taken first place on the annual RHS list of top 10 pest enquiries from members in seven of the last 10 years.

Limiting damage

There is a huge array of control methods available, including barriers such as gravel and copper, traps filled with beer or bait, biological control by nematodes, and pesticides in the form of slug pellets. Many of these controls attempt to answer the need for alternatives to slug pellets, especially those based on metaldehyde, as gardeners become more aware of the threat pellets pose to pets and wildlife. Despite all of these controls, slugs and snails are still a problem for gardeners, and some products and methods recommended have not actually undergone much scientific work to prove their usefulness.

In response to this situation, the RHS has launched ongoing research into slug and snail control. This will assess the effectiveness of different methods and work on ways to successfully combine tools into strategies, known as an 'Integrated Pest Management' approach. The key principle is to adopt a holistic, preventative approach to pest control that minimises the use of pesticides. A first step is to make your garden a less welcoming environment for gastropods by encouraging wildlife such as birds, frogs, hedgehogs, moles, slowworms and ground beetles, which are known to eat slugs and snails. It is unlikely there will ever be a 'silver bullet' against these pests, and home gardeners will need to tailor control strategies to their own gardens to get the best results. ●

Why slug and snails are such a problem

In praise of snails p130

These slimy pests love our gardens because we want to grow what they love to eat.

Land gastropods tend to eat broad-leaved plants that are fast-growing, especially younger plants or those with lower levels of the toxins often produced to deter grazers. So it is no wonder that slugs and snails can be the scourge of a vegetable patch, as humans also like to eat sweet-tasting plants that we can grow and harvest quickly. Gastropod preferences can likewise be seen among our ornamental plants, such as hostas and dahlias, with softer, fleshier-leaved plants being favoured over those with tough or spiny leaves.

The wet and mild climate of the UK, along with our varied landscape, is ideal for gastropods. Damage tends to peak in spring and again in autumn, with a quieter period during summer when it is drier. Snails are dormant over winter, but slugs are active throughout the year (although much less so in winter).

Slugs and snails are also very productive. As hermaphrodites, they have both male and female reproductive organs, while many species can also self-fertilise so only one individual is needed to start a new population. Some slug species can lay hundreds of eggs at once, and can reproduce multiple times each year.



RHS / ANDREW HALSTEAD

Gastropods often found in the garden: black slug (*Arion ater*, above) and common garden snail (*Cornu aspersum*, below).



Half a grapefruit filled with beer and left in the garden overnight will soon indicate the size of the problem.

Snails

Although there are many species of snail in the UK, most of them are not large or numerous enough to cause noticeable damage, but banded snails and garden snail (see p130) are frequently found in gardens. Snails require calcium to form their shells, so most species are restricted to calcareous areas; snails can become much more of a problem on limestone and chalky soils than in other areas. These gastropods tend to hide in nooks and crannies during the day, and have been known to 'roost' in shrubs and trees.



Snails usually eat at night, and find cover under which to hide during the day.

GAP / VICTORIA FIRMSTON

Slugs

There are nine species of slugs that have confirmed pest status. We do not know for certain which species do the most damage in gardens, but in agriculture it is grey field slug, some *Arion* species and keeled slugs (*Milax* species, which live underground) that are most common. Slugs have no external shell: they have evolved to have a reduced shell just under their skin. This means that they can easily travel underground, and will hide there during daytime.

Plants most at risk

- ❖ daffodil and tulip flowers
- ❖ dahlias
- ❖ delphiniums
- ❖ hostas
- ❖ lettuces
- ❖ *Lobelia cardinalis*
- ❖ peas and beans
- ❖ potatoes and other tubers
- ❖ sweet peas

SCIENCE: *Gastropod trial at RHS Gardens*

The RHS has collaborated with BASF (UK producer of nematode biological control) to carry out an 'Integrated Gastropod Management' experiment that tests six control strategies (four are combined strategies) for gastropods:

- 1 Control (no treatment) to compare with the other strategies
- 2 Mulch (straw-based)
- 3 Mulch + synthetic pellets (metaldehyde) on top
- 4 Mulch + organic pellets (ferric phosphate) on top
- 5 Mulch + reactive nematode biological control (once damage is seen)
- 6 Mulch + preventative nematode biological control (applied regularly from early spring).

These strategies are being applied to plots containing rows of daffodils, hostas, lettuce and beans. Four replicates were planted at RHS Garden Wisley, Surrey (pictured below) and four at RHS Garden Harlow Carr, North Yorkshire. Measurements of damage were taken throughout 2016, including number of leaves or flowers damaged, visual assessments of severity, gastropod presence in harvested produce and yield of vegetables.

Results from 2016 indicated that strategies perform differently depending on the plant to which they are applied. Contrary to expectations, mulch did not perform well, and may have acted antagonistically with some of the other treatments. The slug pellets performed most consistently, and ferric phosphate performed almost as well as metaldehyde.

This year, the experiment will continue, testing if the efficacy of the strategies change with prolonged use, and to gather additional data. Final results, outlining which components can be combined for a successful control strategy, will be made available in 2018.



Typical damage seen on vulnerable crops

Slugs and snails feed by rasping with their radula (a tongue-like organ covered with tiny teeth). The gastropod pushes out its radula, drawing it over and pulling food towards its mouth. On leaves the damage takes the form of slightly rough-edged holes – or sometimes a surface of the leaf is grazed away. Seedlings can be eaten in their entirety and disappear overnight. Slugs and snails will also eat stems, leaving grazed-down patches that can cause the plant's stem to bend. Slugs can also tunnel into tubers such as potatoes, allowing entry of other invertebrates and secondary rots.



Damage can vary: here, the leaves of red lettuce have been eaten, while green lettuce remain intact.



Slugs that damage potatoes often stay below ground so are best treated with nematodes.



When slugs or snails eat the outer layers (here on *Lobelia cardinalis*), weakened stems often bend over.



Moisture-loving *Ligularia dentata* is vulnerable to damage when new leaves emerge in spring.



Though not normally attacked by slugs, a *Cianthus* grown against a wall is more accessible to snails.

Controlling slugs and snails

There are a number of simple techniques and products that can be used as barriers or repellents against gastropods, such as cultivating the soil regularly to expose slugs and their eggs to predators or encircling seedlings and young plants with grit.



Traps or shelters

Beer traps can be made by sinking a jar part-way into the ground (not all the way as beetles can fall in) and partially filling with beer; slugs will be attracted to the beer and drown. Alternatively, make shelter traps from cabbage leaves or hollowed-out oranges and empty every morning.

Removing by hand

Slugs and snails do most of their feeding at night, so a reliable way to catch high numbers is to pick them off plants under torchlight. They can be disposed of with landfill waste or killed in the freezer.



GAP / JONATHAN BUCKLEY



Mulch barriers

Surrounding plants with a mulch of sharp grit, bark or moisture-absorbent material (such as wool, left) can discourage snails and those slugs on the soil surface - although there is little evidence on which of these mulches is effective.

Copper

Laboratory trials show that slugs and snails do not like to cross copper, but few show that products such as copper tape, collars and copper-impregnated matting work in reality. Copper barriers on pots may work best.



Nematodes

Biological control can be carried out with *Phasmarhabditis hermaphrodita* nematodes; these microscopic worms are specific parasites of gastropods. Nematodes are watered into the soil, where they seek out slugs to infect. They are less likely to control snails, that spend most of their time above ground. Nematodes should be used from spring to autumn when the soil temperature is above 5°C (41°F), and the soil must be kept well watered (for more see *The Garden*, July 2016 pp77-79).



Pellets

There are two pesticides available to control slugs and snails; metaldehyde and ferric phosphate slug pellets. They are normally coloured bright blue to deter birds, and contain cereal as a bulking agent to attract slugs and snails. **Metaldehyde** is an effective form of control if applied as directed on the label, as exceeding the dose can put pets at risk, harm wildlife and potentially contaminate water supplies - in fact over-application is no more effective than a sparing application of pellets. Apply at the dosage on the packaging, which is typically only 1-2g per sq m or 10-15cm (4-6in) spacing. Do not let pellets touch the foliage of edibles. **Ferric phosphate** pellets are certified as organic and are less toxic to wildlife, but should still be kept away from pets and children. Apply sparingly, typically at 5g per sq m. Both types of pellets need reapplying after rainfall.



www.rhs.org.uk For more, search the RHS website:

- ❖ 'Slugs' or 'Snails': for a profile and methods of control, and a list of plants less likely to be eaten by slugs or snails.
- ❖ 'Gastropod trial': RHS and BASF research so far on combined methods of control.

MORE INFORMATION

- ❖ The field experiment plots can be viewed at RHS Garden Wisley, Surrey: on the lower end of the Trials Field.
- ❖ RHS Garden Harlow Carr, N. Yorkshire: vegetable garden and South Field.
- ❖ *Slugs of Britain and Ireland: identification, understanding and control*, by B Rowson, J Turner, R Anderson, & W Symondson; Field Studies Council, 2014, £14.50. ISBN: 9781908819130