



## Snails and slugs as crop pests

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Snails and slugs are part of the class of creatures called gastropods. Gastropod comes from the Greek word *gastros* (stomach) and *podos* (foot). They are the animals without backbones, having asymmetrical, unsegmented and spirally coiled body. When snails have a well-developed shell, slugs have only a rudimentary shell often enclosed in a visceral hump. Snails and slugs are hermaphrodites but there is reciprocal exchange of spermatozoa as they mature before development of eggs. Self-fertilization is prevented. They have good protection against dehydration; hence they avoid direct sunlight and environments with a low relative humidity. They hide during day time in moist places or under debris and feed mainly at night when the temperature drops and humidity rises. Snails secrete light yellow slime and slugs secrete colourless slime which becomes silvery after drying.

In India, 1500 species of land snails occur but the number of species of slugs are limited. Among these nine species of snails and 12 species of slugs have been reported as the pest

of ornamental plants, vegetables, fruits and field crops. The common snail, *Helix* spp., is found in Himachal Pradesh, Uttar Pradesh, Andhra Pradesh, Bihar, Maharashtra and Odisha. Another phytophagous species, the giant African snail, *Achatina fulica* Fergusson, has been reported to be serious pest of fruits, vegetables and ornamental plants in the coastal areas of Odisha, West Bengal, Assam, Tamil Nadu and Kerala. The common garden snail *Laevicaulisalte* Fergusson, has been observed feeding on a number of ornamental plants including balsam, portulaca, pot-marigold, verbena, dahlia, cosmos, narcissus and lily in Punjab and Himachal Pradesh. The black slug *Filicaulisalte* Fergusson feeds on the seedlings of several economically important plants. Another slug *Limax* spp, occurs all over the India.



**Life-cycle of some major species:** Snails and slugs have similar biologies. They are hermaphrodites - both members of a mating couple can lay eggs. Mating usually takes place from mid-autumn to mid-winter when favourable moist conditions return after summer. Two to four weeks after mating, spherical pearl-white eggs are laid into moist soil. Egg laying can continue from the break of the season to late winter. However, eggs cannot survive a hot, dry summer or lie dormant in the soil. After laying, eggs hatch in two to four weeks, but young slugs and snails usually become sexually mature after one year.

**Giant African snail (*Achatina fulica*) :** It lays 50-200 eggs once a year on the soil surface or little below. It lays about 1000 eggs in its life span of 5 years, out of which

about 80 percent are viable and hatch within a week. The shell and the body of the snail keep on going till about 8-12 months. The life span of the snail is 3-5 years.

**Garden slug (*Laevicaulisalte*) :** It lays eggs in groups of 6 to 45 in moist soil. Maximum egg laying is

seen in the month of September. Eggs are oval, whitish or creamish in colour and transparent, strung along a thread. Incubation period ranges from 9-18 days with an average of about 13 days. Adults mature within a period of 240-323 days with an average of 271 days and measure 55 mm in breadth and 50 mm in length. They are found in soil under debris and survive during unfavorable conditions like food scarcity and low moisture during summer months. They remain active throughout the year but their severity is noticed in cool and damp situations.

**Brown slug (*Filicaulisalte*) :**

It lays dirty creamish white spongy eggs in masses (74-80 eggs/mass) on damp soil in polythene bags containing nursery plants. Newly hatched juveniles resembling adults in colour and appearance tend to remain

close to the hatching spot and start feeding immediately. They become mature and start egg laying at the age of about 8-9 months and lay eggs twice a year. The adult is about 8.0-8.5 cm in length, 1.5-2.0 cm in breath and 7-8 g in weight. Average life span is 390 days with the longest being 567 days.

**Some other species:** The brown garden snail, *Cornuaspersum* (formerly *Helix aspersa*), is the most common snail causing problems in California gardens. It was introduced from France during the 1850s for use as food. Another troublesome snail is the white garden snail, *Thebapisana*. It currently is established only in San Diego County but has been found in Los Angeles and Orange counties as well. Several species of slugs also cause damage including the gray garden slug (*Deroceras reticulatum*, formerly *Agriolimax meticulatus*), the banded slug (*Lehmanniapoirieri*), the three-band garden slug (*L. valentiana*), the tawny slug (*Limacus flavus*) and the greenhouse slug (*Milaxagagates*).

**Damage :** Snails are not known to damage seeds, but may damage germinated seeds close to the soil surface. However, slugs, especially black keeled slugs, will feed in the furrows on seeds of legumes. These slugs are not known to feed on ungerminated canola or cereal seeds. Irregular pieces chewed from leaves and shredded leaf edges are typical of snail and slug presence. Damage to canola and legume crops can be difficult to detect if seedlings are chewed down to the ground during emergence. Cereal crops are likely to survive damage by slugs and snails, while canola and lupins can not compensate for the damage or loss of cotyledons. If cereals are deep sown into a fine, firm seedbed, the slugs and snails are not able to feed on the growing point and emerging crops may recover from damage after treatment.

Different species of slugs cause differing amounts of damage. Cereals are less likely to sustain damage from reticulated slugs, than from black keeled slugs. Canola crops need careful monitoring to assess plant losses.

**Transmission of diseases :** Snails and slugs act as the carrier of propagules of plant pathogens. Spores of *Alternaria* sp., *Fusarium* sp. and *Phytophthora* sp., have been found in the faeces and the slime. The Snail, *A. fulica* is known to transmit black rot disease caused by *Phytophthora palmivora* Butl. On cocoa. The infection of snails and slugs in the field can be detected by the slimy trails left behind them as they crawl about.

#### Factors conducive to infestation :

- A nearby crop, weedy or grassy areas such as

headlands could be a source of slugs and snails

- Long grass in drains
- Wet areas from leaking irrigation
- Following a pasture crop
- Minimum tillage
- Wet, moist weather

#### Management :

– A protective border can be used to prevent the movement to crops. Lines of sawdust, ash, lime, and copper sulphate are effective barriers but efficacy is often reduced on wetting.

– Keep area under crops free from weeds, creating a belt of clear land around garden or farm and use barrier strip of dehydrating chemical like common salt, quick lime or copper sulfate.

– Smooth copper or zinc sheets (0.8 mm thick) can be used as mechanical barriers.

– Poison bait consisting of 10 per cent of carbaryl 50 WDP in wheat bran having 6 per cent mango flavour can be used to attract and kill the pests. Offer 2.0 g of this bait on paper pieces to pests at 2 m distance in the evening. Collect the dead animals for the next 2-3 mourning and bury them in soil.

– Spray copper sulphate 3 per cent @ 12kg dissolved in 400 litres of water per ha.

– Dust 15 per cent metaldehyde @ 50 kg per ha or spray 50 per cent metaldehyde power @ 10 kg per ha in 500 liters of water per ha or sprinkle 5 per cent metaldehyde pellets around infested fields.

– Use of predatory snail *Eugladinarosea*. It is a fast and voracious predator, hunting and eating other snails and slugs. The smaller species of prey are ingested whole. So named as ‘cannibal snail’.

– Some predatory beetles and lizards feed on them, but birds and rats are the most effective among birds. Ducks, chickens or Guinea fowl can provide effective controls.

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