

## Crop Damage with Snail Menace – An Untold Story

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### Introduction

A snail is a shelled gastropod. The common name snail is used for most members of mollus can class ‘Gastropods’ with coiled shells that are large enough for the animals to retract completely into them. The snails are used as food items in certain parts of the world but in Indian context, these are pests and vectors of diseases causing crop damage. The snails with lungs and gills have diversified extensively that a few species with gills are found on land and many species with lungs are found in freshwater. Even a few marine species have lungs. These snails can be found in a very wide range of environments like ditches, deserts and the abyssal depths of the sea. Although land snails may be more familiar to laymen, marine snails constitute the majority of snail species and have much greater diversity and a greater biomass.

Majority of snails have thousands of microscopic tooth-like structures on banded ribbon-like tongue called a radula that works like a file and ripping food into small pieces. Many snails are herbivorous, eating plants or rasping algae from surfaces with their radulae, though a few land species and many marine species are omnivores or predatory carnivores. The pest snails and slugs damage plant seeds, seedlings, underground tubers, leaves and fruits. The damage to seedlings often can result in the death of plant causing large amount of production losses.

The snails are hermaphrodites and lay 50 – 200 yellowish eggs on soil surface with hatching taking place in about a week’s time and the young ones grow up to a year and reach sexual maturity. The life span of snails is around 3 – 5 years. Those eggs hatching towards the end of rainy season take a long time to mature as they undergo hibernation and aestivation.

### Paddy Crop and Snails



Golden apple snails are highly invasive and cause damage to rice crops. They were introduced to Asia from South America in the 1980s as potential food for people in few Asian countries but it unfortunately became a major pest of rice. These snails eat young and emerging rice plants by cutting the rice stem at the base and thereby destroying the whole plant.

Snails are able to spread through irrigation canals, natural water distribution channels and during floods. When water is absent, apple snails bury themselves in the mud and hibernate for up to six months. When water is re-applied to fields, snails may emerge. They damage direct wet-seeded rice and transplanted rice up to 30 days old. Once the rice plant reaches 30–40 days, it will become thick enough to resist the snail.

The golden apple snails have muddy brown shell and golden pinkish or orange-yellow flesh. They are bigger and lighter in colour compared to native snails. Its eggs are bright pink in colour. The snail damage can be confirmed by checking for missing hills, cut leaves and stems. If no control measures are taken, they can completely destroy 1 m<sup>2</sup> of field overnight. This damage could lead to more than 50% yield loss. The critical time to manage golden apple snails is during land preparation and crop establishment or planting especially the first 10 days after transplanting and during the first 21 days after direct seeding. After this, the crop is generally resistant to snail damage and snails are actually beneficial by feeding on weeds.

### **Measures for Controlling Snail Menace in Fields**

The most effective control of pests involves a combination of cultural, chemical and biological measures.

#### **Cultural Control**

To best control the snail, farmers should work together to reduce snail numbers in their area by conducting mass snail and egg collection campaigns during land preparation and planting or crop establishment based on their convenience. It is ideal to keep the fields drained as much as possible during the vulnerable stages of the rice plant (below 30 days) or 25 – 30 day transplant old seedlings for low density nursery beds. The apple snails find it difficult to move in less than 2 cm of water and keep water level below 2 cm during the vulnerable stages of the rice plant. Construct small canals or canalettes (e.g., 15–25 cm wide and 5 cm deep) after the final land preparation using a sack containing a heavy object around



the edges of rice fields or at 10–15 m intervals. Canalettes facilitate drainage and act as focal points for snails making manual collection or killing easier.

For other crops, organic content of the soil helps to increase its moisture content and makes it more attractive to slugs and snails by providing them with more food as they eat soil organic matter. Good hygiene which helps in preventing moisture retention is ideally preferred. The use of tobacco leaves, heartleaf false pickerelweed, papaya leaves and citrus leaves in strips across the field or in canalettes can be useful to stop snail and slug problem.

The snails invade fields through canals, rivers and reservoirs. The placing of barriers where water enters and exits the field like a wire or woven bamboo screen or mesh bag on the main irrigation water inlet and outlet can prevent snail entry.

### **Biological Control**

The use of natural predators like red ants that feed on the snail eggs while ducks and sometimes rats eat young snails. Several wild birds to feed on golden apple snails and domestic ducks can be put into fields during final land preparation or after crop establishment when plants are big enough from 30–35 days from transplantation. Ducks, chickens or guinea fowl can provide effective, long-term control in orchards, vineyards and gardens and the biggest problem in using birds is protecting them from foxes. A flock of two dozen ducks can clear as large as 20 hectares of area.

Organic solutions like beer, wine and yeast products attract slugs and snails. The liquid in small amounts can be poured into plastic containers buried in the soil up to the top of container. When the slugs and snails crawl towards the liquid, they will drown when left overnight. The overturned flowerpots, citrus halves and boards can be placed in the garden to attract the pests. A small stone under the rim of the flowerpot to allow the snails and slugs to gather under then when left overnight and Citrus halves also work in the same way as the fruit scent acts as a lure. Another simple method is to set a wide board on the affected ground that allows slugs and snails to hide under the board which can be flipped to remove and dispose of them.

Coffee grounds can be scattered on top of the soil which will deter slugs and snails and they are killed when sprayed with a very strong solution of coffee. Strong garlic sprays act as deterrents and kill soft bodied snails and insects.



Diatomaceous earth containing about 80 – 90% is the sharp, jagged, skeletal remains of microscopic creatures and silica lacerates soft-bodied pests, causing them to dehydrate. This powder can be sprinkled on around garden beds or individual plants. It is less effective when the soils are wet but are very effective during dry weather. The snails and slugs do not like dry surfaces. The use of continuous lines of sawdust and ash can be used as barriers but their effectiveness is drastically reduced once rains start as they will be washed away and care should be taken when watering the gardens.

### **Chemical Control**

Sometimes chemical control may be needed when cultural and biological practices fail. Chemicals for controlling snails and slugs include methiocarb, metaldehyde and iron EDTA can be used as baits. Iron EDTA baits pose a reduced risk of poisoning to children and animals if proper care is not taken. Few types of slugs may be naturally tolerant to methiocarb and metaldehyde baits. Timing is the most critical aspect of control when using baits especially from mid-March to April when water is not available in the fields because:

- Adult snails and slugs can be killed before they get a chance to lay their eggs as they are usually laid in soils which are damp enough to germinate grasses.
- Snails and slugs are hungry after spending the summer period inactive and there is little alternative feed to compete with the baits.
- The ground is comparatively bare so the chance of a snail contacting a bait is increased.
- Rain is infrequent and the field lives of baits are extended.

The size of the bait is important, especially for broad scale applications. The smaller the bait pellet, the more baits are present per unit weight and the better the coverage. For instance, if the size of bait is halved in all three dimensions, there will be eight times as many baits for the same weight. Also, clear the ground surface before baiting by mowing or cultivating and spraying weeds along treelines and fencelines which will improve the performance of baits. The use of baits in strips around the perimeter can prevent re-invasion of an area especially for vegetable crops.

Generally copper products should not be mixed with other baits for improving their performance as copper is highly repellent to snails and slugs and they will not eat bait that has been contaminated with copper products rendering the baits useless. The lines of lime



and copper sulphate are pest repellent and can be used to prevent migration into an area. The use of superphosphate fertilizer in rings around the butts of trees may stop snails reaching the trunks and bands of thin copper sheet around tree trunks prevent snails from climbing. This method must be combined with skirt pruning and control of under-canopy vegetation to stop snails getting into the trees by other routes.

