

Management of

ARMY WORMS & CUT WORMS



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Terms Used

Instar - the form of an insect between successive molts.

Oviposition - The act of laying or depositing eggs

Larva- Immature stage of insects occurring between egg and pupal stages having complete metamorphosis.

Alternate host- Either of two or more hosts on which a harmful organism must develop to complete its life cycle.

Nocturnal - Active at night.

Tolerance- Can withstand the damage without affecting the yield.

Nuclear Polyhedrosis Virus (NPV) - A virus pathogen affecting larvae.

Cocoon- A silken case in which a pupa is formed.

Insecticide resistance- Can withstand the effect of insecticide toxins.

Pheromone - A substance secreted by a female insect to the exterior causing a specific reaction in male receiving insects.

Chemical Method

It is vital that biological control methods be given priority over the use of insecticides for the following reasons:

- The female moth *Spodoptera* spp. typically covers egg masses with a mat of scales while the egg masses of the *Mythimna* spp. are well protected between the leaf sheath and the stem. This behavior could prevent desiccation of the eggs and reduce parasitism and exposure to insecticides.
- Earlier larval instars/stages prefer to feed under a typical web forming an enclosure that protects them from insecticide sprays.
- Tolerance of older larvae to insecticide is generally greater than that of younger larvae owing to an inherent higher content of detoxifying enzymes.
- The pupal stage occurs in an earthen cell about an inch beneath the soil surface. This behavior again allows them to be isolated from natural enemies and insecticide sprays.

Use insecticides properly by considering the following:

- Rotate the use of several registered insecticides to prevent the development of the pest's insecticide resistance.
- Encourage localized treatment of infestation since the pests are often clumped or aggregated, apparently because of the egg-laying patterns of the adult females. Normally, damage is concentrated in certain areas of the field. Treatments confined to these areas reduce the amount of insecticide used and preserve helpful organisms as well as reduce insecticide resistance.
- Sprays are more effective than granules.
- During outbreaks, spray nurseries in the evening with Cypermethrin at 50g ai/ha or Chlorpyrifos at 200 g ai/ha using knapsack sprayer.
- Improve timing of application of insecticides with the use of pheromone trap catches.



Introduction

Armyworms (*Mythimna* spp.) and Cutworms (*Spodoptera* spp.) are among the defoliators of the rice plant. They eat the leaves and injure panicles of the rice plant.

Defoliation of the rice plant is affected by:

- The availability of inputs such as water to support recovery.
- Crop growth stage. From seedling to tillering stages, the plant can recover and compensate for defoliation damage, sometimes resulting in yields higher than that of undefoliated plants. Larval damage may stimulate tillering, which in favorable conditions, can increase yield. When the infestation occurs relatively late in the growing season, about 3-4 weeks before heading, there is less panicle injury. Defoliation may not be damaging if it occurs before grain initiation. However, the defoliated crop will mature later than the undefoliated crop and may not reach maturity if there is a short growing season.

Species Identification

Larvae of armyworms and cutworms are stout and hairless and they curl into a shape of C when held in the hand. However, the larvae of armyworms and cutworms are indistinguishable from one another. The larvae of the armyworms can be distinguished from the other species by a longitudinal dark band midway down the side of the body. Wing color patterns which largely distinguishes the *Spodoptera* spp. show variations and are therefore not dependable for confirming the identity.

If identification is necessary, the larvae should be reared to adult stage and sent to specialists for them to determine species based on the reproductive organ.

ARMYWORM



common armyworm
Mythimna separata (Walker)

Larva has a longitudinal dark band mid-way down to the side of the body.

Larva feeds on the aboveground parts, mostly on leaves, often leaving only the midribs.

Outbreaks cause severe losses characterized by the sudden appearance of larvae in immense number, which also disappear suddenly.

Larva is stout and hairless and curl into a shape of C when held in the hand. Color varies considerably within the species.

Larva undergoes 6 instar in an average of 28 days.

Adult moth is pale and brick red to pale brown. It has a very hairy body covered with dark specks and patches.

Eggs are laid in clusters between the leaf sheath and the stem near the joint of the leaf sheath and leaf blade.

CUTWORM



common cutworm
Spodoptera litura (Fabricius)

Full-grown larva is brown to brownish black tinged with orange. Thoracic segments have 1-2 dark spots near the base of the legs. The abdominal segments have generally two light brownish lateral lines on each side-- one above and one below the spiracles.

Larva feeds on the roots and shoots, which are often cut-off at ground level or various levels. Leaves or panicles may be detached.

Can defoliate rice fields, generally in patches, from early vegetative growth to harvest

Larva undergoes 5 instar in an average of 22 days.

Moth is grayish black with a white blotch on its forewings.

Eggs are laid in batches on the lower surface of the leaves covered with grayish hairs from the anal tuft of the female moths.

Rollers. Drag or roll large tree trunk in pasturelands to destroy young caterpillar in those places.

Destruction of cocoons and pupae. Plaster the sides of the bunds to inhibit moths to exit and larvae to enter. the larvae will be compelled to pupate in more exposed places where they will be subjected to natural enemies and weather.

Sweeping. Use sweep nets to collect the larvae after flooding the seedbed.



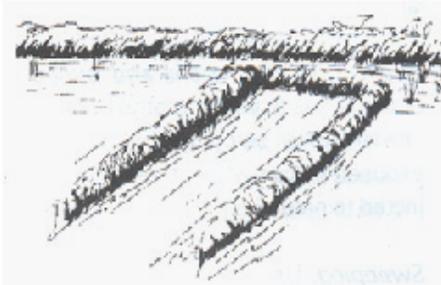
Natural Methods

Beneficial organisms. Several species of beneficial organisms regulate the pests at various life stages- eggs, larvae, pupae, and adults. Altogether, 36 predatory insects from 14 families and 12 species of spider attack them. Under moist conditions, diseases caused by protozoa, fungi, viruses, and nematodes are also regulated. Ants and wasps prey on eggs, larvae and pupae.

- Attract insect-feeding birds by placing bamboo perches in the field. Cattle egret, crow, black drongo, and common myna pick up larvae and pupae hiding around paddy field, in the stubble of paddy crop and along the bunds.
- Chickens and ducklings are greedy eaters of larvae. If the beds are near houses, chickens and ducklings can be released to the field.
- Apply 500 Nuclear Polyhedrosis Virus (NPV) infected larvae per hectare in the evening if needed. This will expose them to the virus that can kill them.
- Apply neem kernel extracts during the early stages of crop growth if necessary.

During larval infestation in the field

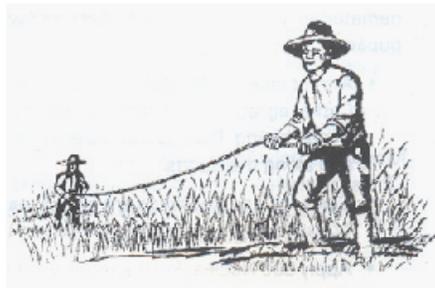
Digging steep trenches. This technique isolates the larvae. It also prevents them to reach new fields. This is good for dry areas and where good supply of water is available at the time of outbreak. Water trap pits should be 7-9cm deep.



Water barriers. These may be used where there is plenty supply of water or established system of irrigation. These are done by filling in broad channels around the field with water. These will prevent invasion of larvae from non-rice habitats and their spread to new fields.

Manual collection of larvae. After flooding the seedbed, larvae will be forced to go on top of the plant. Collect the larvae in cans with water and crude oil as trap. Make seedbeds of small sizes to avoid stepping on seedlings.

Flooding and using ropes dipped in kerosene. Flooding helps the young plant to be saved from excessive defoliation, and thus can recover. It also exposes the larvae to their natural enemies such as birds and parasites. Ropes dipped in kerosene can also be dragged across the top of the plants to detach larvae from the plant and expose them to natural enemies.



Manual collection of egg masses and larvae from trap crops. Collect the egg masses and larvae from trap plants on alternate days.

Common armyworms and cutworms in the Philippines

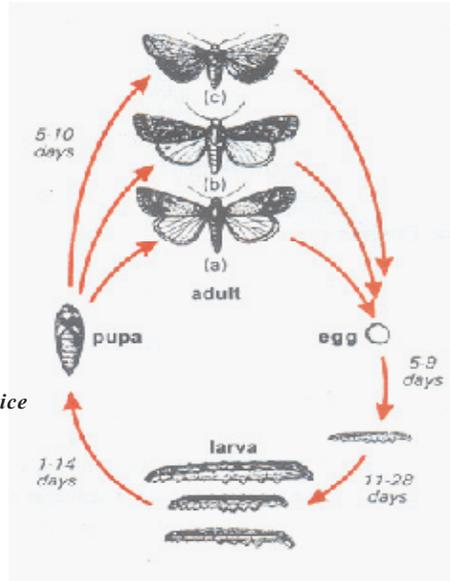
Preferred Common Name	Other Popular Names	Scientific Name
Common Armyworm	Chinese armyworm Cosmopolitan armyworm Ear-eating caterpillar Oriental armyworm Paddy armyworm Paddy armyworm of Graminaeae Paddy climbing armyworm Rice armyworm Rice earcutting caterpillar	<i>Mythimna separata</i> (Walker)
Rice Swarming Caterpillar	Grass armyworm Lawn armyworm Nutgrass armyworm Paddy armyworm Paddy cutworm Paddy swarming caterpillar Rice armyworm	<i>Spodoptera mauritia</i> (Boisduval)
Common Cutworm	Armyworm Rice cutworm	<i>Spodoptera litura</i> (Fabricius)
Local Names		
"Uod sa punlang palay"-Tagalog		"Uod sa humay" or "tagustus"-Visayan

Common Causes of Outbreaks

- Prolonged drought followed by heavy rainfall encourages growth of young grasses, which provide good shelter for succeeding larval generations. Drought or floods kill their natural enemies.
- Moths are capable of long distance flight and have great dispersive powers that facilitate their dispersion and oviposition on different hosts.
- Moths mate as early as 1-3 days after emergence from the pupal cases. They lay about 500-2,600 eggs after 2-3 days of mating.
- Larvae can survive dry periods on many alternate host plants allowing them to transfer from one crop to another.
- Superior adult moths live for 5-12 days
- Outbreaks are often associated with weather condition such as after a drought or flood. Wind, notably rainstorms, also transport moths leading to massive egg laying.

- High tillering rice varieties with dense foliage coupled with high use of nitrogenous fertilizer.
- Larvae and adults remain unnoticed as they are nocturnal. During the daytime, they hide between the tillers of the plant or in the soil around the base of the tillers.

Life cycle of an armyworm/cutworm/rice swarming caterpillar
 (a) *Mythimna separata* (Walker)
 (b) *Spodoptera mauritia* (Boisduval)
 (c) *Spodoptera litura* (Fabricius)



Common Armyworm

Mythimna separata (Walker)



- Cosmopolitan pest of grasses. Found in all grass ecosystems.
- Occurs sporadically in big numbers in all rice ecosystems. However, it is abundant in upland and rainfed wetland environments
- Often abundant in low-lying, flooded rice fields with luxuriant growth.
- Infestation in severe areas where paddy crop remains submerged for 2-3 days owing to heavy rain.
- Infests waterlogged fields that have dried about 14 days before the maturity of the crop.

■ HOST PLANTS

- Rice, maize, sugarcane, wheat, barley, oats, finger millet, and sorghum are major hosts.
- Peas, soya beans, pigeon peas, sugar beet, Chinese cabbage, and many species of grassy weeds are alternate hosts.

Adult

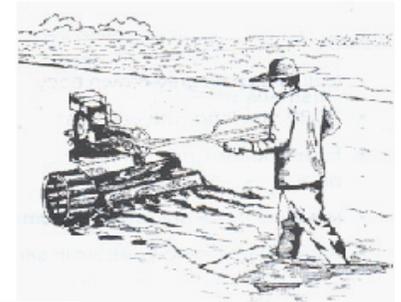
- Moth has pale grey-brown body.
- 15-20 mm long with wing span of 30-38 mm.
- Forewings are grey to reddish-brown with strongly variegated pattern and paler lines along the veins.
- Hind wings are grayish-white with grey margins, often with dark veins.
- Active at night and fly about in search for nectar.

Management Options

Cultural Methods

Clean Culture. Since the larvae feed largely on some of the wild grasses, the presence of these grasses along roadsides is a direct aid to the pest. The farmer should periodically weed the roadsides, fence rows, and fields. Clean culture is an essential factor in the natural control of this pest, and should be the rule.

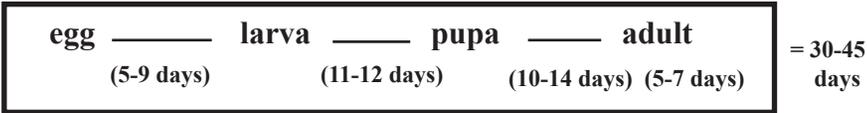
Plowing. This can effectively bury and kill the young larvae. Any larvae that might escape would find nothing to eat. It would also expose the pupae to natural enemies and weather-related mortality. Even fallow lands should be plowed.



Pasturing. Pasture animals like cows, buffalo, and goats in the non-cultivated areas.

Trap crops. Castor and sunflower are planted as trap crops around the field.





Common Cutworm

Spodoptera litura (Fabricius)

- Occurs in all rice environments.
- Serious pest in upland rice as it pupates and completes its life cycle in dry soil.
- **Host Plants**
 - Rice, maize, castor, gabi, tobacco, soya beans, peanuts, vegetables, and sweet potato are the major host plants.
 - Wild plants, weeds, ornamentals, and shade trees are the alternate hosts.
- **Damage**
 - Lowland fields suffer damage when the larvae migrate in large groups from one field to another.
 - Abundant in rice crop grown after a long dry spell.
 - Less prevalent in irrigated wetland rice.
 - Feed on leaves at any stage of the crop growth.
 - Newly hatched larvae are night feeders. They are usually found in the soil around the base of the plant during the daytime. They can chew large areas of a leaf, and at high population densities, they cause complete defoliation.
 - Damage is most serious during the seedling stage of rice when the seedlings are severed at the base. When abundant during late crop growth stage, the larvae may severely defoliate the rice crop.

Detection and Monitoring in the Field

The presence of newly hatched larvae can be detected by the scratch marks on the leaf surface.

Pupa

- Pupates in the earthen cell at 7-8 cm below the soil surface.
- Red-brown, 15-20 mm long, with two small spines at the tip of abdomen.

■ Damage

- The larvae attack the leaves and growing panicles.
- Infestation from seedling to tillering stages result in defoliation.
- Infestations before harvest cause panicle injury. Most panicle damage involves indirect damage to the seeds. When the larvae feed on a spikelet or branch of a panicle, all tissues beyond the point of injury die and turn white, and the seeds will not mature.
- Damage is more pronounced in dry rice fields because they provide suitable hiding place for the larvae as well as for pupation.
- Young larvae eat the dried leaves and then feed on green leaves. They do not make holes, but often “skeletonize” the leaves.
- 3rd instar larvae have well-developed prolegs and feed by cutting big holes in the leaves. They become more gregarious than early instars and feed voraciously on young leaves at night.
- Fifth instar and full grown larvae crawl up to the maturing rice plants at night from their hiding places (cracks and crevices in soil, in the base of plant hills or slightly above the ground level) and cut off rice panicles from the peduncles either for food or behavioral habit. They move en masse to find new fields.

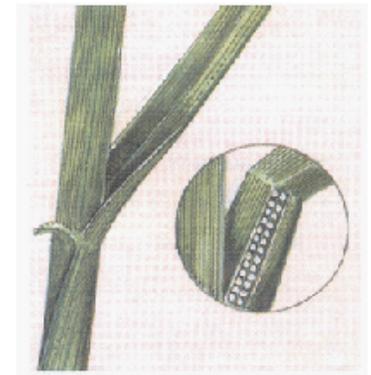


leaf damage by armyworm

■ Biology

Egg

- Not covered with hairs.
- located between the base of the leaf sheath and stem.
- White sticky substance glues the eggs.
- Spherical (0.6-0.7 mm in diameter).
- Whitish to pale yellow when freshly laid, turn dark yellow as they mature.



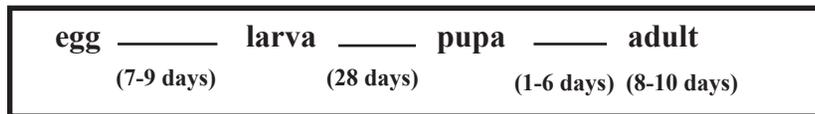
Eggs of armyworm

Larva

- 1st instar consumes eggshell.
- Has many colors but usually light brown or gray green.
- Mature larva is greenish to light mauve brown, marbled orange brown with a narrow, white dorsal line.
- Head is orange or brown.
- Yellowish lateral and subspiracular bands, longitudinal, edged white that encloses the orange brown marbling.
- Longitudinal dark band midway down the side of the body. Pale underside with whitish line on the edge.
- Four longitudinal light grey to black stripes run along green to pink body.

Pupa

- Light amber when newly pupated.
- Dark, shiny brown after pupation.
- 15-19 mm long and 5-6 mm wide.
- Possesses two stiff converging black horns at the anal end with a fine curled hook.
- Pupate in soil or on plants.



Adult

- Eyes are hairy.
- Forewings have the typical dead grass appearance.
- Hind wings are dull cream.
- Thorax and abdomen are grayish.

Rice Swarming Caterpillar

Spodoptera mauritia (Boisduval)

It is one of the armyworms that occurs in irregular and large population appearing in large quantities during the dry season and hide in their soil during the wet season. A great deal of damage can be done in a short period as each larva can consume large quantities of leaves.

■ HOST PLANTS

Rice, maize, grasses, and **sedges**.

■ Damage

- Can severely damage plants in the nursery. The larvae feed on leaves and after finishing the crop in one field, they move on to the adjoining areas.
- Rice plants and grasses are defoliated.
- Damage is inflicted anytime in the life cycle of the plant.
- Larvae are found on rice seedlings in nurseries and on young transplanted rice in the field.

■ Detection and Monitoring in the Field

- Larvae are mostly found on the youngest leaves.
- Prefer rice plants which are less than one month old.

■ Life history

Eggs

- Laid in batches (150-200 eggs/egg mass) on the lower surface of the leaf.
- Covered with buff hairs/grayish-brown hairs from the body of the moth.

Larva

- Head is mottled light brown.
- Newly hatched larva is very small and pale green without any distinctive markings.
- Full-grown larva is grass green and it migrates to the sides of the bunds and edges of the field.
- Has three longitudinal pale brown or red stripes.
- Shades of green, gray or brown with dark longitudinal stripes.
- Has two rows of C-shaped black spots along the back.

Pupa

- Pupates in earthen cell.
- Burrows into the soft earth (bunds)/edges for pupation.
- If field is flooded, it pupates on the plant.

Adult

- Dark colored.
- Mated 1-2 days after emergence from pupa.