7) Horn worms - *Hippotion celerio, H. oldeniandie* and *H. boerhaviae*

The caterpillars feed on leaf leaves. They have a horn like structure at the tail end.

Egg

Larva

8) Bag worm - *Clania crameri*

The caterpillars are unique in having characteristic bags fabricated out of silk, grasses and sticks inside which they live and feed on the leaves and tender shoots. The fully grown caterpillar measures 3 cm in length with stout head and thorax and soft abdomen. The caterpillar attaches itself to a twig and pupates inside the bag.

9) Bark eating caterpillar - *Inderbela* sp.

The caterpillar tunnels into the stem usually at the junction of bunches, comes out and feed on the bark after constructing galleries with pieces of bark and faeccal pellets. Incase of severe incidence, the branches dry up. Removal of galleries and insertion of aluminium phosphide tablet or injection dichlovos/ chlorpyriphos is recommended to kill the caterpillar

10) Hairy caterpillars - *Euproctis fraterna & E. lunata*

The caterpillars feed on the leaves in groups.

MANAGEMENT OF CATERPILLARS

1. Plough deeply to expose the pupae present in the soil in case of Helicoverpa and Spodoptera.
2. Setting up of pheromone traps @ 8-10/ha to lure the moths and kill them in case of Helicoverpa and Spodoptera.
3. Application of Nuclear Polyhedrosis Virus (NPV) @ 250 LE/ha for the control of Helicoverpa and Spodoptera.
4. Spray Bacillus thuriengiensis (Btk) @I kg/ha for the control of all the caterpillars.
5. Insecticides can also be used to control the caterpillars by keeping the PHI in mind. These insecticides have to be applied on the appearance of the pest. It is very difficult to control these caterpillars in the later stage.

List of chemicals recommended to control the caterpillars**

Insecticide	Dose	Pre Harvest Interval (days)
*Methomyl 40 SP	1.00 g/L	61
*Phosalone 35 EC	2.00 mL/L	40
Chlorpyriphos 20 EC	2.00 mL/L	40
*Endosulfan35 EC	2.0 mL/L	40
*Carbaryl 40 WP	2.0 g/L	40
Lambda-cyhalothrin 05 EC/CS	0.50 mL/L	30
Spinosad 45 SC	0.25 mL/L	28
Emamectin benzoate 05 SG	0.22 g or mL/L	25

* Not permitted on export table grapes as per European Commission Regulation Sanco Doc-3010-Directive 91/414/EEC dt. 30-5 -2008.

** Recommendation of chemicals for the management of caterpillars is of advisory nature for the good viticulture practices and therefore, not covered under any legal scrutiny.

Extension Folder No. 24

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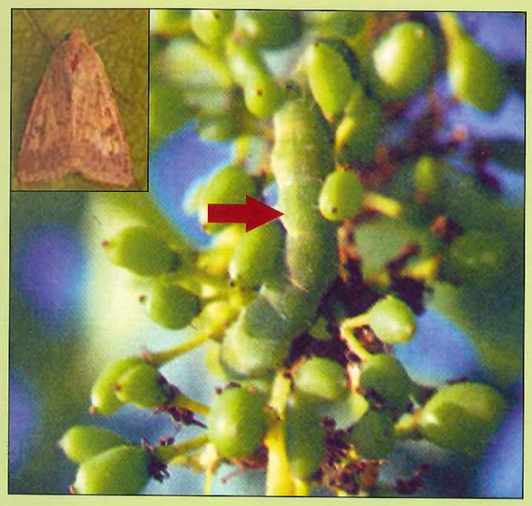
Management of Caterpillers on Grapevine



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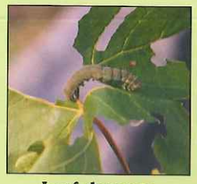
Several caterpillars are known to damage the bark, leaves, flower panicles and bunches leading to severe loss to grape growers.

1) Gram caterpillar - *Helicoverpa armigera*

The pest appears on berries 70-80 days after October pruning, usually in December-February. The caterpillar initially feeds on the leaves and then on the berries of peanut size by inserting its head into the berry leaving the rest of the body outside. The damage goes up to 50%.


Leaf damage



Berry damage

Adult moth is stout and yellowish brown with a V shaped speck on light brown fore wings and dark border on the white hind wings. It lays about 500 spherical yellowish white eggs singly on tender parts. Eggs hatch in 4-5 days. The larvae are greenish brown with dark grey yellow stripes along the sides of body. There are five larval instars completing in14-19 days. Pupation takes place in the soil. Pupal period lasts for 12-15 days. The life cycle is completed in 30-40 days.

Life stages of Helicoverpa


Egg


Larva


Pupa


Adult

2) Tobacco caterpillar - *Spodoptera litura*

Spodoptera litura appears during November-December. The caterpillars feed on the leaves in groups and make the leaf surface papery. Later they feed on the rachis of bunches and unripe berries of pea size. The loss goes up to 30%.

Adult moth is stout with whitish wavy markings on the dark brownish fore wings and a brown patch along the margin of white



Leaf damage


Bunch damaged

hind wings. It lays about 500 eggs in mass covered with brown hairs on the leaves. Eggs hatch in 4-5 days. The caterpillars are pale green with dark markings initially which later turn dark brown with numerous longitudinal bands. There are five larval instars completing in 15-20 days. Pupation takes place in soil or plant debris. Pupal period is 10-12 days. The life cycle is completed in 30-40 days.

Life stages of Spodoptera


Egg


Larva


Pupa


Adult

3. Leaf roller/folder - *Sylepta lunalis*

The caterpillar rolls up leaf margins towards the midrib and feeds inside the rolled leaf. Under field conditions the presence of the pest is revealed by funnel shaped leaf rolls.


Leaf roller damage



Larval feeding

Adults are dirty brown with white spots on the fore and hind wings. The body is covered with hairs and the head is brownish black. They lay about 100 creamy white oval eggs on the lower surface of leaves. Eggs hatch in 2-3 days. The larva is greenish with translucent body with dark brown head. There are five larval instars completing in about 15 days. The parasitoids *Apanteles dita* and *Cardiochiles fulous* are found attacking the larvae up to 70% in nature. Pupation takes place inside leaf rolls and plant debris on the ground. Pupal stage lasts for 6-7 days. The life cycle is completed in about 25 days.

4) Castor capsule borer - *Conogthes punctiferalis*

The pest is noticed in December-April. The caterpillar bores into the stalk and construct the silken web. The feeding is also noticed on berries, and pupation takes place within the galleries of frass and excreta. The loss goes up to 50 %.

Adult moths are orange yellow with black markings on both the wings. They lay eggs individually on the stalk of tender berries. Eggs are pinkish oval flat laid singly or in groups. Eggs hatch in 6 days. The larva is pinkish with fine hairs. There are five larval instars completing in 15-20 days. Pupation takes place in silken cocoon inside the bunches or in the frass that colleted after feeding. Pupal stage lasts for 7 days. The whole life cycle is completed in 30 days.


Adult


Larva

5) Leaf and berry webber - *Adoxophyes prevatana*

The caterpillars initially feed on the leaves and later migrate into berries. They web and feed within causing direct yield loss. The presence of a single caterpillar within a bunch destroys the entire bunch.

6) Berry plume moth - *Oxyptilus regulus*

The larvae feed on berries by remaining outside. They are brownish with radiating hairs all over the body. Pupation takes place within the damaged bunch.