

# agMOOCs



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- **Grape (*Vitis vinifera*) is one of the important fruit crops of India used for table purpose, resin and wine making with good medicinal value due to the presence of large amount of antioxidants.**
- **Area 120 million ha Production 2602 million tonnes (indiastat,2014-15)**
- **Insect pests are the important production constraints in grape cultivation apart from diseases.**
- **In grape, 85 species of insect pests have been reported in India (Atwal and Dhaliwal, 2005).**
- **Among them, mealybugs, thrips, leaf hoppers, mites, Flea beetle, Girdle beetle, stem borers and grape leaf folder are important pests causes serious damage to the vineyards.**

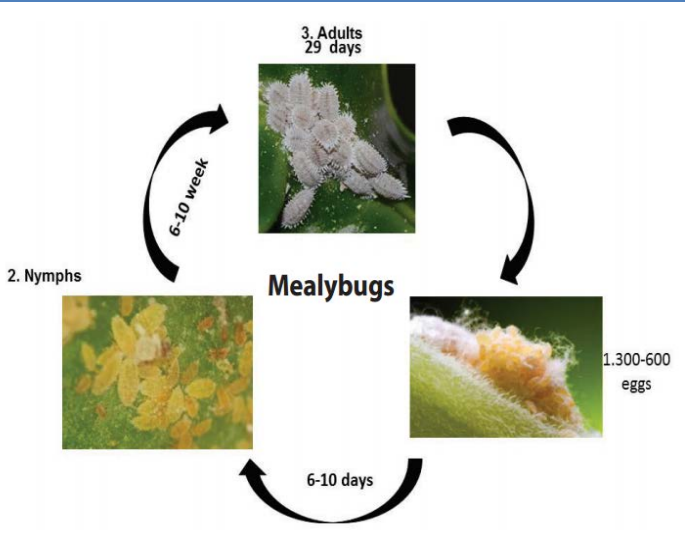


# Pests of Grapes

<b>Pests of National Significance</b>	<b>Pests of Regional Significance</b>
<b>Mealybugs</b>	<b>Red mites</b>
<b>Flea beetle</b>	<b>Rose chafer beetle</b>
<b>Girdle beetle/Grape cane girdler</b>	<b>Cock chafer beetle</b>
<b>Thrips</b>	<b>Grape leaf roller</b>
<b>Hoppers</b>	<b>Scale Insects</b>
<b>Stem borers</b>	
<b>Leaf eating caterpillar</b>	
<b>Grape leaf folder</b>	

# Mealybug : *F. virgata* Cockerell, *M. hirsutus*, *P. Maritimus* (Hemiptera:Pseudococcidae)

➤ The pink mealybug and the citrus mealybug are causing severe loss in many grape growing areas of Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu.



**Favourable condition :** high temperature of 30-40°C, low humidity (less than 40%)

### Nature of damage

- 1 Nymphs and adults suck the sap from the trunk, buds, leaves, shoots, nodes, flower panicles and bunches.



### Damage symptoms

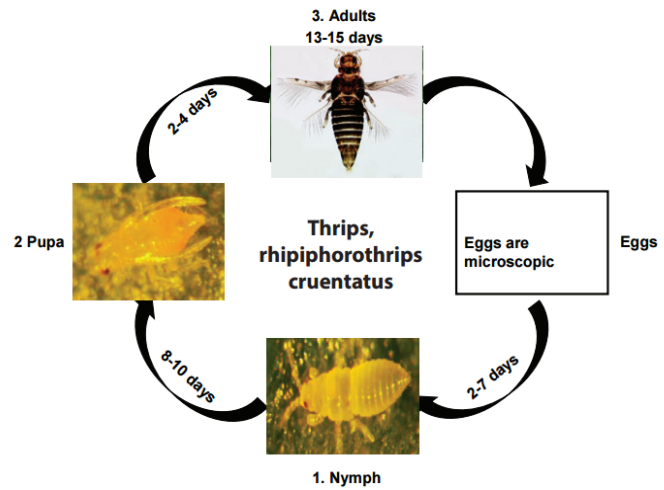
1	Malformation of leaves and shoots tip.
2	Honeydew secretion results in sooty mould development
3	Bunches with sticky, white wax masses are unfit for marketing as table grapes and unfit for raisins preparation



# Thrips : *Scirtothrips dorsalis*, *Thrips hawaiiensis* , *Rhipiphorothrips cruentatus* (Thripidae: Thysonoptera)



**Life cycle:**

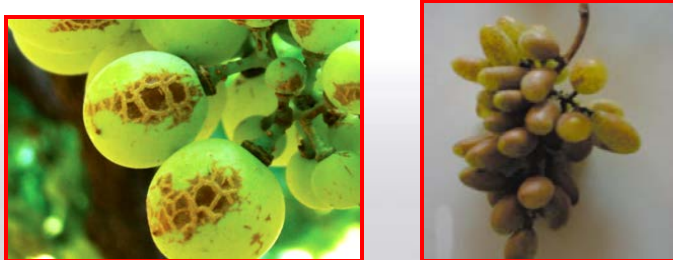


## Nature of damage

1	Nymphs and adults by rasping the lower surface of the leaf with their stylets and sucking the oozing cell sap
2	The thrips also attack blossoms and developing berries

## Symptoms

1	Curling of the leaves is observed in case of heavy incidence
2	The injured surface is marked by the number of minute spots thereby producing a speckled silvery effect.
3	The affected berries develop a corky layer and become brown and fetches low price in the market

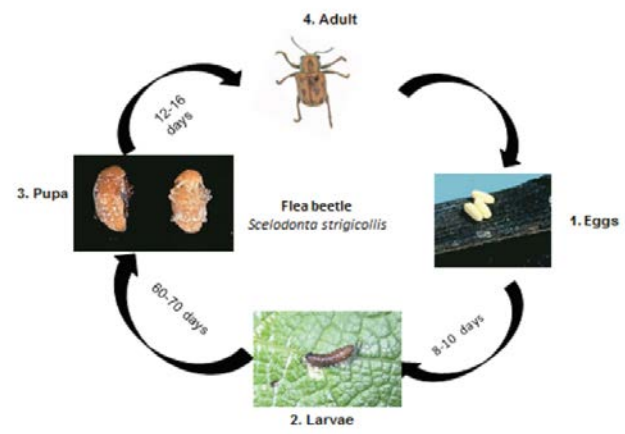


# Flea beetles : *Scelodonta strigicollis*(Olivier)(Coleoptera: Chrysomelidae)



➤ Regular and serious pest

**Life cycle:**



## Nature of damage

1	The adult beetles scrap the sprouting buds after each pruning
2	The beetles also feed on tender shoots and leaves and tendrils causing substantial damage
3	Larval damage can also occur on the foliage and is typically limited to several leaves and vines.

## Symptoms

1	Damaged buds fail to sprout
2	The tender shoots may wither and drop down
3	The greatest economic loss occurs when beetles feed on buds from “bud swell” until the “first leaf separates from the shoot tip” stages.
4	Once shoot growth reaches 7 cm, damage caused by the grape flea beetle normally does not affect yield



➤ *Tetranychus urticae*, *T. cinnabarinus*, *T. neocoleonicus*, *Oligonychus mangiferus*, *O. punicae* and *Eutetranychus orientalis* are found causing damage to grapevine in India. Among them, the two spotted red spider mite *T. urticae* causes severe loss in Maharashtra and Andhra Pradesh.

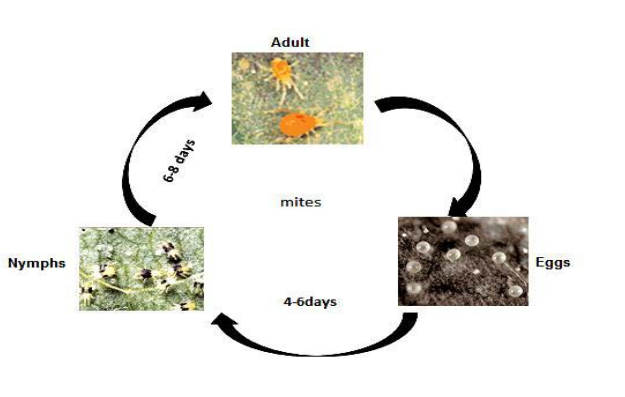


**Nature of damage**

1	Both nymphs and adults suck the cell sap from lower surface of tender leaves
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**Symptoms**

1	Development of brown burnt patches on the infested leaves, which wither and finally dry
2	Discoloration of leaves leads to reduction in photosynthesis thereby affecting the vigour of plants
3	Severe infestation of spider mites results in delay in maturing and ripening of bunches and reduction in sugar content thereby affecting the quality of grapes

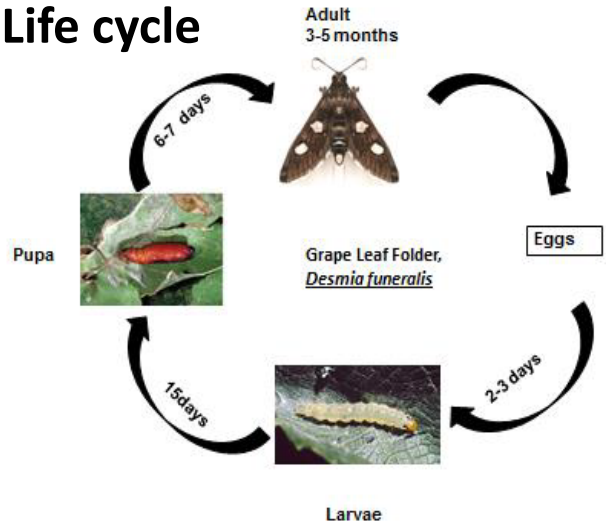


**Favourable condition :**

Highly active during summer months

# Grape leaf folder : *Desmia funeralis* (Hubner) (Lepidoptera: Pyralidae)

## Life cycle



## Nature of damage

1	Larva folds the leaf, exposing the under surface; the edge is held in place by bands of silk thread
2	Larvae roll muscadine leaves, which are thinner than bunch grape leaves



## Symptoms

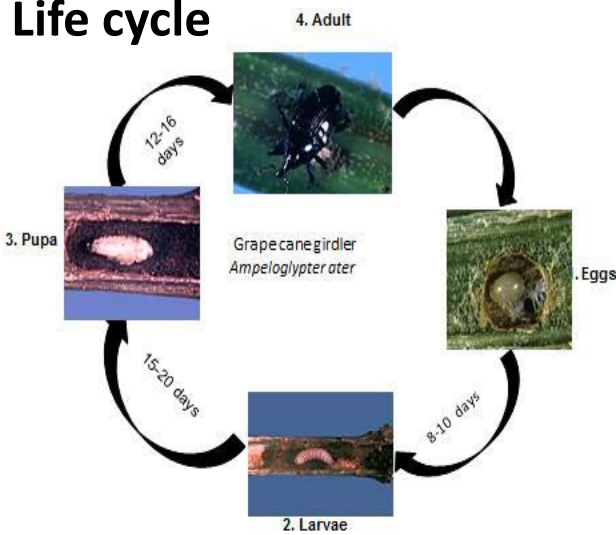
1	<b>Skeletonize the upper surface of the leaf</b>
2	When the larvae are numerous the injury to the vine becomes conspicuous, even at a considerable distance, because the light color of the under surface of the folded leaves contrasts boldly with the dark green of the upper side normally presented, thus giving the vine a patchy appearance





# Grapevine stem girdler : *Sthenias grisator* (Cerambycidae :Coleoptera)

## Life cycle

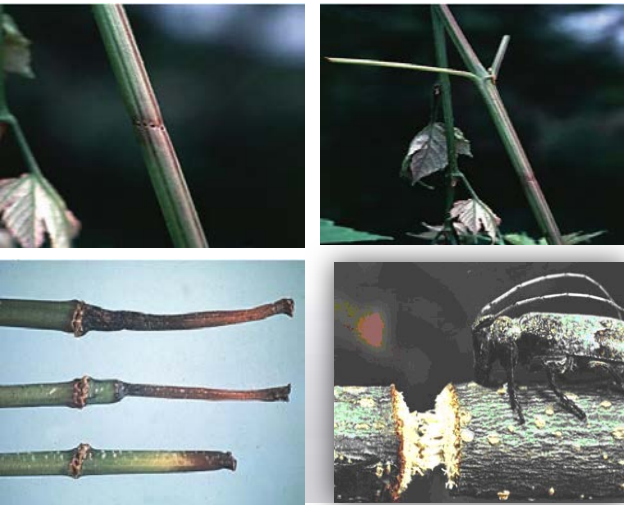


## Nature of damage

1	Adult beetle girdles (ringing) the vine as a pre – ovipositional operation
2	The adult beetle lays eggs in the girdled portion. After hatching of the eggs the grubs tunnel into the dry wood

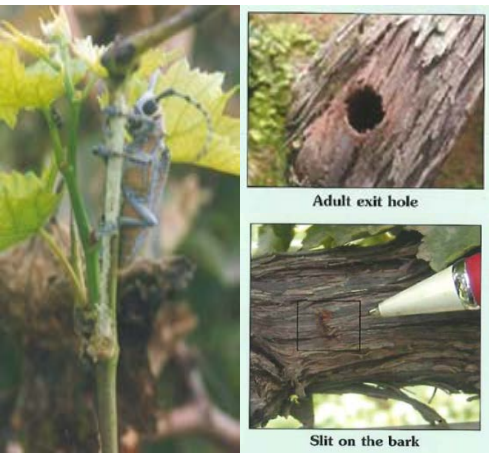
## Symptoms

1	Girdling results in the terminal growth of the new shoots to bend over above the upper girdle and drop to the ground
2	Later the whole infested shoot dies back to the lower girdle and falls from the vine
3	Vines 'pruned' by the grape cane girdler have a ragged appearance suggesting serious injury to the plant.
4	Girdling of the terminal growth has little or no effect on the crop unless fruit-producing nodes are close to attacked shoot tips



# Grapevine Stem Borer: *Coelosterna scabrator* (Cerambycidae : Coleoptera)

- Only species reported on grapes in India
- Reported from Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu
- Serious in old and neglected gardens and also vines which are stressed



1	Adult beetles cut round holes from inside the trunk and branches
2	Adult damage tender shoots by scraping and making slits on the outer bark for egg laying
3	Larva damage by feeding in side the trunk/branches and boring/tunneling upwards and downwards



Frass and Faecal matter on ground

1	<b>Presence of saw dust like substance under the vine indicates the damage done by the grub.</b>
2	Gummosis (oozing of resinous substance from the hole)
3	Plant show typical yellowing of leaves, Shedding of leaves, drying and dieback of branches.
4	The maturity of berries is also delayed which ultimately affects the grape production in terms of both yield and quality.



Yellowing of leaves

## Hoppers: *Empoasca fabae*, *Erythroneura comes* (Hemiptera: Cicadellidae)

- Leaf hoppers are destructive pests in north India and some parts of South India
- Pest is active from June-October and February-April



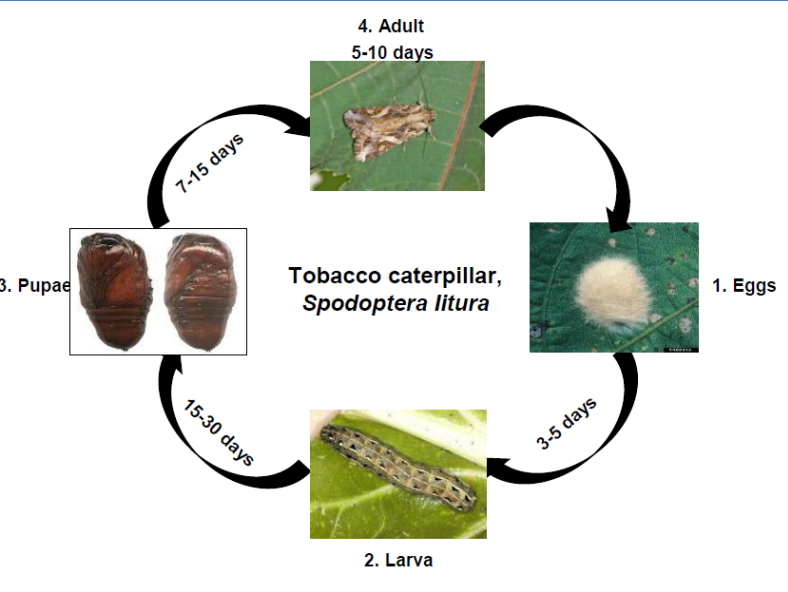
- 1 Nymphs and adults suck the sap on the under surface of the leaves

### Damage symptoms:

- 1 Small white spots on leaves
- 2 Leaf turns yellow to brown, dries up and drop off
- 3 Damaged leaves curl downwards at the edges



# Leaf eating caterpillar: *Spodoptera litura* F. (Lepidoptera: Noctuidae)



## Nature of damage:

1	In early stages, the caterpillars are gregarious and scrape the chlorophyll content of leaf lamina giving it a
2	papery white appearance.
3	Later they become voracious feeders making irregular holes on the leaves.

## Damage symptoms:

1	Irregular holes on leaves
2	Later skeletonisation leaving only veins and petioles
3	Heavy defoliation



## Economic threshold levels

Sl. No.	Pest	ETL
1.	Flea beetle	20% foliar damage
2.	Mealy bug	1 % bunch infestation
3.	Thrips	5 thrips/young leaf
4	Leaf webber	10 % incidence

# Integrated pest management

## A. Vegetative stage

### I. Cultural methods

Growing of castor as trap crop all around the vineyard for oviposition.	Leaf eating caterpillar
Removal of weeds and alternate host plants like hibiscus, okra, custard apple, guava etc in and nearby vineyards throughout the year. Deep ploughing in summer or raking of soil in vineyards helps to destroy its nymphal stages and minimizing the incidence.	Mealybugs, thrips
Proper irrigation scheduling reduces the water stress and also increases the humidity thereby reducing the mite population	Mites

## II. Mechanical control

Piercing the infested plants with a sharp needle or knife to kill the caterpillar in the stem.	Stem borer/cane borer
Remove and destroy the loose bark during pruning	Mealybugs, Flea beetle and stem borer
Removal and destruction of affected shoots and excess dead wood from the canopy during pruning.	Girdle beetle
Light trap @ 1/acre (6-10 pm) Install 4-20 blue sticky coloured traps per acre to monitor thrips population.	Flea beetle Thrips
Shake vines to dislodge adult beetles, collect into trays containing kerosenated water (1 kerosene: 9 water) and destroy them. Put bundles of dry shreds of banana on the pruned end of the vines in the evening. Beetles, which take shelter on these at night, can be shaken and collected in the morning and kill them.	Flea beetle
Cutting of infested shoot bellow the lower girdle before adult emerge in the summer and destroy them may help to reduce the population of insects.	Girdle beetle/Grape cane girdler

### III. Biological control

Spraying NSKE 5 % against eggs and first instar larva	Leaf eating caterpillar
Release exotic predator, <i>Cryptolaemus montrouzieri</i> @ 10 beetles/vine	Mealybug
Neem based, emulsifiable water soluble formulations can be sprayed. Doses depend on azadirachtin concentrations in formulations viz., 50000 ppm formulation is sprayed at 1ml / l, while that with 10000 ppm and 3000 ppm can be sprayed at 2.5 ml and 5 ml per l, respectively.	Mealybug, Flea beetle



#### IV. Chemical control

Buprofezin 25% SC @ 400-600 ml in 200-400 l of water/acre or methomyl 40% SP @ 500 g in 200-400 l of water/acre	Mealybug
Imidacloprid 17.8% SL @ 120-160 ml in 400 l of water/acre or lambda-Cyhalothrin 4.9% CS @ 100 g in 200-400 l of water/acre or malathion 50% EC @ 400 ml in 600-800 l of water/acre	Flea beetle
Malathion 50% EC @ 400 ml in 600-800 l of water/acre	Girdle beetle/Grape cane girdler
Emamectin benzoate 5% SG @ 88 g in 200-400 l of water/acre or fipronil 80% WG @ 20-25 g in 300-400 l of water/acre or lambda-cyhalothrin 4.9% CS @ 100 g in 200-400 l of water/acre	Thrips

