Lecture no. 21

PESTS OF BRINJAL AND TOMATO

I. PEST OF BRINJAL

Among the various pests brinjal shoot and fruit borer is highly monophagous and destructive which necessitates the grower to go in for 30 - 40 rounds of sprays. Polyphagous insects like hadda beetle, ash weevils, leafhoppers and aphids also cause severe infestation.

Major pests				
1.	Shoot and fruit borer	*Leucinodes orbonalis*	Pyraustidae	Lepidoptera
2.	Hadda / spotted beetle	*Henosepilachna dodecastigma, H. vigintioctopunctata*, *H. demurille*, *H.* implicata	Coccinellidae	Coleoptera
3.	Stemborer	*Euzophera perticella*	Phycitidae	Lepidoptera
4.	Ash weevils	*Myllocerus subfasciatus*, *M. discolor*, *M. viridanus, M. maculosus*	*Curculionidae*	Coleoptera
5.	Brown leafhopper	*Cestius phycitis*	Cicadellidae	Hemiptera
6.	Aphid	*Aphis gossypii*	Aphididae	Hemiptera
Minor pests				
7.	Leafhopper	*Amrasca devastans*	Cicadellidae	Hemiptera
8.	Mealy bug	*Coccidohystrix insolitus* / *Urentius ectinus*/ *U. hystricellus*	Pseudococcidae	Hemiptera
9.	Pod bug	*Anoplecnemis phasiana*	Coreidae	Hemiptera
10.	Cow bug	*Tricentrus bicolor*	Membracidae	Hemiptera
11.	Thrips	*Thrips tabaci*, *Frankliniella schultzei*, *Scirtothrips dorsalis*	Thripidae	Hemiptera
12.	Hard Scales	*Aonidiella aurantii*, *Aspidiotus destructor*,	Diaspidiae	Hemiptera
	Soft scale	*Parasaissetia nigra*	Coccidae	Hemiptera
13.	Spider mite	*Tetranychus cinnabarinus*	Tetranychidae	Acari
14.	Whitefly	*Bemisia tabaci*, *Aleurodicus dispersus*	Aleyrodidae	Hemiptera
15.	Budworm	*Scrobipalpa blapsigona*	Gelechiidae	Lepidoptera

16.	Leaf roller	*Antoba olivacea*	Noctuidae	Lepidoptera
17.	Leaf webber	*Psara bipunctalis*	Pyralidae	Lepidoptera
18.	Sphingid	*Acherontia styx*	Shingidae	Lepidoptera
19.	Leaf Miner	*Scrobipalpa blapsigona*	Gelechiidae	Lepidoptera
20.	Hairy caterpillar	*Selepa celtis* and *docilis*	Noctuidae	Lepidoptera
21.	Grasshoppers	*Atractomorpha crenulata*, *Oxya japonica*, *Poicilocerus pictus*	Acrididae	Orthoptera
22.	Termite	*Trinervitermes biformis, Microtermes* sp	Termitidae	Isoptera

1. Shoot and fruit borer: *Leucinodes orbonalis* (Pyraustidae: Lepidoptera)

Distribution and status

India, Bangladesh, Malaysia, Thailand, Burma, Srilanka, Laos, South Africa, Congo. It is a major and regular pest of brinjal causing damage to even 30 -50% of fruits or more.

Host range

Brinjal, potato, other wild plants belonging to solanaceae, peas.

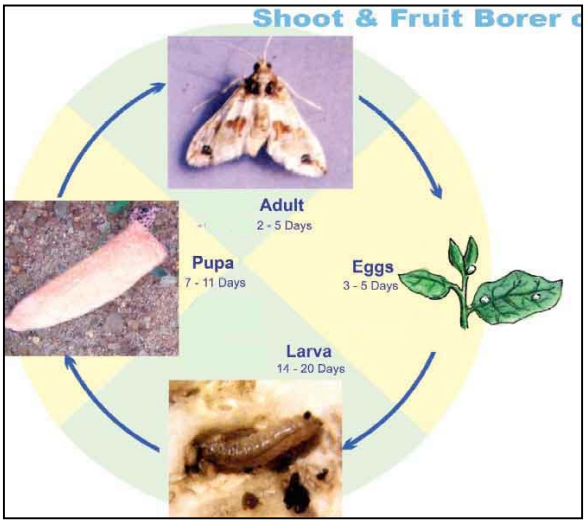
Damage symptoms

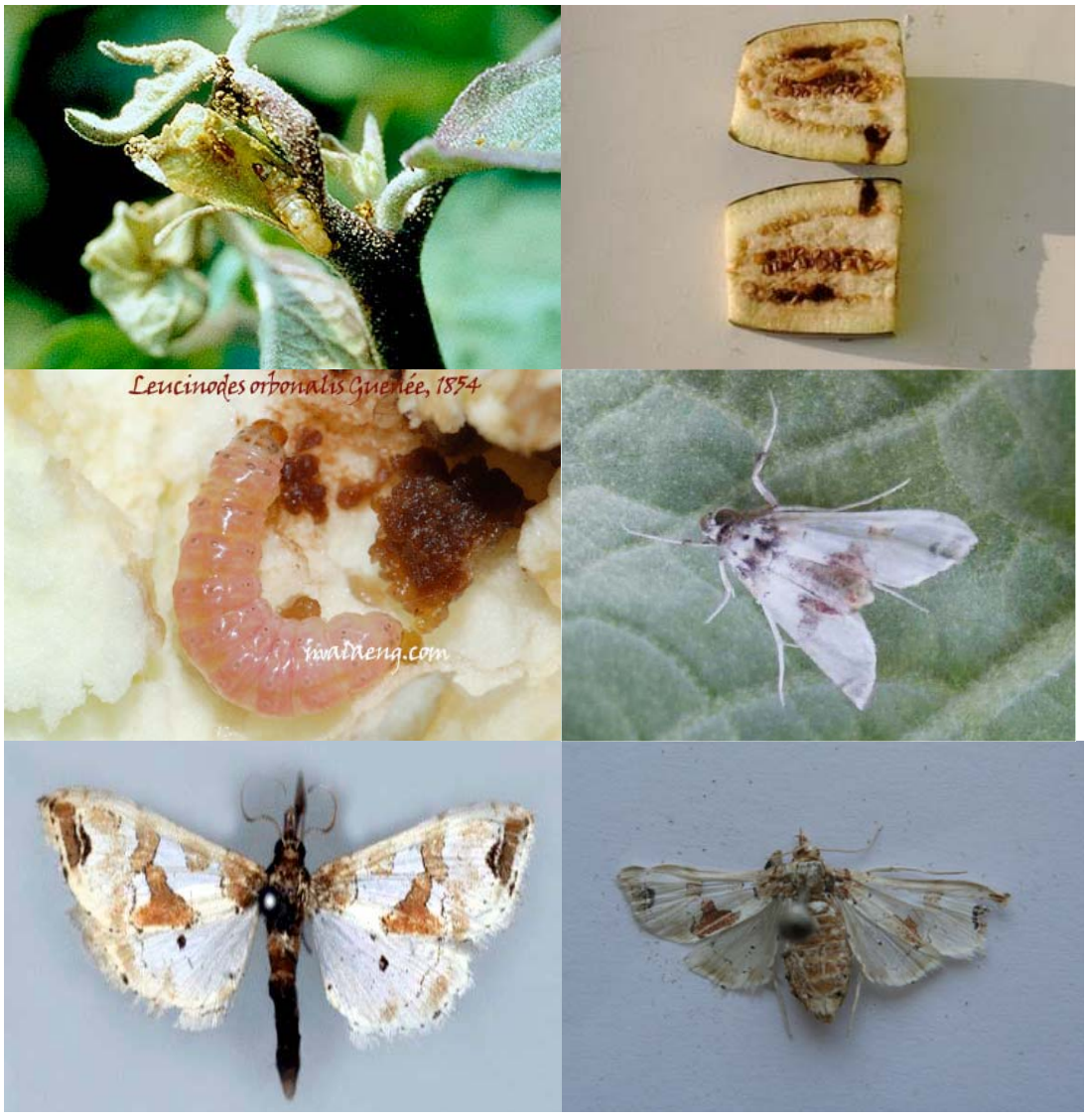
Larva bores into tender shoots and causes withering of terminal shoots / dead hearts - also bores petioles of leaves, flower buds and developing buds, causes withering of leaves, shedding of buds and make fruits unfit for consumption. Attacked fruits are with boreholes plugged with excreta. Fruits become out of shape also.

Bionomics

Egg period: 3-4 days. About 150-350 creamy white eggs laid singly on leaves,

tender shoots, flowers and developing fruits. Larva is stout, pink coloured with sparsely distributed hairs on warts on the body and brownish head. Larval period 15 days - 5 instars. Pupa: 6-8 days in tough greyish cocoon on plant itself, boat shaped cocoon. Medium sized adult with white wings, flashed with triangular brown and red markings on forewing. Total life cycle: 17-50 days.





ETL: 1-5% of fruit damage.

Management

- Avoid continuous cropping of brinjal and ratooning.
- Grow resistance varieties like Annamalai, Pusa purple round, Arka Kusumakar, Doli - 5. Chaklasi Doli, Pusa purple Long, Pusa Purple Round, SM 67, SM 68, Pant Samrat
- Collect and destroy the damaged tender shoots, fallen fruits and fruits with bore holes to prevent population buildup
- Use light traps @ 1/ha to attract and kill the moths.
- Release egg parasitoids *Trichogramma chilonis* @1.0 lakh/ha.
- Spray Bt formulations of *B. thuringiensis* var. *kurstaki* such as Dipel @ 1.5 to 2 ml /L of water.
- Spray any one of the insecticide starting from one month after planting at 15 days interval. Carbaryl 50 WP 2 kg + wettable sulphur 50 WP 2 kg, endosulfan 35 EC 1.5 L + Neem oil 1.5 L, Quinalphos 25 EC 1.5 L + Neem oil 1.0 L, NSKE 5%, Azadirachtin 1.0% 1.0-1.5 L or Fenpropathrin 30 EC 250-340 ml or Thiodicarb 75 WP 625-1000 g Flubendiamide 20 WG, 375 g with 500 – 750 L water/ha
- Avoid using synthetic pyrethroids as they cause resurgence of sucking pests.
- Avoid using insecticide at the time of fruit maturation and harvest.
- Uproot and burn old plants before planting new plants since they harbour pest and carry over infestation

Remove infested shoots by hand

Remove and bury infested fruits

Light traps

2. Hadda / spotted beetle: *Henosepilachna dodecastigma* (7-14 spots on each elytra), *H. vigintioctopunctata*; *H. demurille*, *H. implicata* (Coccinellidae

[Epilachna = Henosepilachna]: Coleoptera)

Distribution and status: South Canada, USA, Mexico, Guatemala, Africa and South East Asia.

Host range: Brinjal, potato, tomato, cucurbitaceous plants, wild solanaceous plants.

Damage symptoms

Both adult and grubs scrap the lower epidermis of leaves in characteristic manner leaving behind stripes of uneaten areas. The leaves give a stifled appearance. In severe infestation all leaves may be eaten off leaving only the veins intact (Skeletonization) and plants may wither.

Bionomics

Egg period: 2-4 days: Cigar shaped, laid in clusters on lower leaf surface, yellow; 120-460 eggs/female. Grub: 10-35 days. Yellowish bearing six rows of longitudinal spines. Pupa: 5-6 days. Yellowish with spines on posterior part; anterior portion being devoid of spines. Pupates on the stem or leaves. Adult *E. dodecastigma*: Copper-coloured, 6 spots / elytra *E. demurille*: Dull appearance, light copper coloured and six black spots surrounded by yellowish area on each elytra. *E. vigintioctopunctata*: 14 spots on each elytra, deep red. Total life period: 20-50 days. 7 generations / year.

Management

- Collect and destroy adult beetles, grubs and pupae.
- Shake plants to dislodge grubs, pupae and adults in a pail of kerosenated water early in the morning or collect them mechanically and destroy.
- Spray carbaryl 50% WP 2 kg + wettable sulphur 2 kg or endosulfan 35 EC 1.5 L or malathion 50 EC 1.5L or Azadirachtin 0.03% 2.5-5.0 L in 500 - 750 L of water
- Emulsify 1 lit of Neem oil with 60 g of soap dissolved in ½ L. of water, dilute emulsion by adding 20 lit of water, then mix about 400 g of well crushed garlic and spray.
- Mix diflubenzuron invariably with endosulfan 1.5 L or chlorpyriphos 1.0 L /ha and spray on the crop which reduces the population by nearly 95% in field.

3. Stemborer: *Euzophera perticella* (Phycitidae: Lepidoptera)

Distribution and status: Indian sub-continent

Host range: Chilli, tomato, brinjal and potato

Damage symptoms

Larva bores into main stem of young and old plants and move downwards. Top shoots of young plants crump and wither. Older plants become stunted. Fruit bearing capacity is adversely affected. There is a distinct thickening of stem at the entry point.

Bionomics

Egg period: 10 days. Creamy and scale-like, laid singly / in batches on young leaves, petioles and branches. Larva: 26-58 days. Fully grown larva is creamy white with few bristle-like hairs, 20 mm. Pupa: Pupates within cocoon inside larval tunnel, 9-16 days. Adult: Greyish brown, forewings with transverse line and white hindwings. Life cycle is completed in 35-76 days.

Management

Collect and destroy the damaged and dead plants

- Use light traps @ 1/ha to attract and kill the moths.
- Conserve larval parasitoids *Pristomerus testaceus, P. euzopherae*
- Spray any one of the insecticide starting from one month after planting at 15 days interval. Carbaryl 50 WP 2 kg + wettable sulphur 50 WP 2 kg, endosulfan 35 EC 1.5 L + Neem oil 1.5 L, Quinalphos 25 EC 1.5 L + Neem oil 1.0 L, NSKE 5%, Azadirachtin 1.0% 1.0-1.5 L or Fenpropathrin 30 EC 250-340 ml or Thiodicarb 75 WP 625-1000 g
- Avoid using synthetic pyrethroids as they cause resurgence of sucking pests.

4. Ash weevils: *Myllocerus subfasciatus*, *M. discolor*, *M. viridanus*, *M. maculosus* (*Curculionidae*: Coleoptera)

Damage symptoms

Notching of leaf margins by adults. Grubs feeds on roots resulting in wilting and death of plants.

Bionomics

500 eggs in soil, 6-7 days.Grub: 30-45 days; Pupa: Pupates in soil in earthern cocoons; Adult: 10-12 days. *M. subfasciatus*: Brown; M. *discolor*: Brown and white spots *M. viridanus*: Small light green weevil



Management

- Collect and destroy adult weevil.
- Apply lindane 1.3 D before planting @ 25 kg/ha
- In endemic areas apply carbofuran 3G @ 15 kg/ha, 15 days after planting.
- Spray carbaryl 50 WP 2 kg + wettable sulphur 2 kg or endosulfan 35 EC 1.5 L or malathion 50 EC 1.5 L

Carry to pearl millet ?

5. Brown leafhopper: *Cestius phycitis* (Cicadellidae, Hemiptera)

It is a vector of little leaf of brinjal. Nymphs and adults suck cell sap from ventral side of leaf and inject toxins into the plant tissues and cause reduction in size of leaves, shortened petioles, excessive growth of branches general stunting of plants, conversion of floral parts into leafy structures and give the plants a bushy appearance. Fruiting is rare. The adults are small light brown leafhoppers having bright yellow marks on its thorax.

Management

- Rogue out infested plants as soon as they appear in the field and completely destroy them.
- Before transplantation dip the seedlings in 0.2% carbosulfan 25 DS solution to control the insect vectors.
- Spray 3-4 times at 10 days interval with methyl parathion 750 ml or dimethoate 500 ml or monocrotophos 500 ml or endosulfan 1.0 L or imidacloprid 125 ml in 500 -750 L of water /ha

6. Aphid: *Aphis gossypii* (Aphidiae: Hemiptera)

It can be occasionally serious and can be managed by release of first instar grubs of Ch*rysoperla carnea* @ 10,000/ha or by spraying methyl demeton 25 EC or dimethoate 30 EC 500 ml or Fenvalerate 20 EC 375-500 ml or Phosphamidon 40 SL 625-750 ml or Thiometon 25 EC 1000 ml

Minor pests

7. Leafhopper: *Amrasca devastans* (Cicadellidae: Hemiptera)
8. Mealy bug: *Coccidohystrix insolitus* / *Urentius ectinus* / *U. hystricellus* (Pseudococcidae : Hemiptera)
9. Pod bug: *Anoplecnemis phasiana* (Coreidae: Hemiptera)
10. Cow bug: *Tricentrus bicolor* (Membracidae: Hemiptera)
11. Thrips: *Thrips tabaci*, *Frankliniella schultzei*, *Scirtothrips dorsalis* (Thripidae: Thysanoptera)
12. Hard Scales : *Aonidiella aurantii*, *Aspidiotus destructor* (Diaspidiae: Hemiptera)
13. Soft scales: *Parasaissetia nigr* (Coccidae: Hemiptera)
14. Spider mite: *Tetranychus cinnabarinus* (Tetranychidae: Acari)
15. Whitefly : *Bemisia tabaci*, *Aleurodicus disperses* (Aleyrodidae:Hemiptera)
16. Budworm : *Scrobipalpa blapsigona* (Gelechiidae: Lepidoptera)
17. Leaf roller : *Antoba olivacea* (Noctuidae: Lepidoptera)
18. Leaf webber : *Psara bipunctalis* (Pyralidae: Lepidoptera)
19. Sphingid : *Acherontia styx* (Sphingidae: Lepidoptera)
20. Leaf Miner : *Scrobipalpa blapsigona* (Gelechiidae: Lepidoptera)

21. Hairy caterpillar : *Selepa celtis, S. docilis* (Noctuidae:Lepidoptera)


22. Grasshoppers: *Atractomorpha crenulata*, *Oxya japonica*, *Poicilocerus pictus* (Acrididae: Orthoptera)
23. Termite : *Trinervitermes biformis*, *Microtermes* sp. (Termitidae: Isoptera)

PEST OF TOMATO

More than 80 % of the fruit get damaged under severe infestation of fruit borer and fruit sucking moth. Whitefly and thrips act as vector for certain viral diseases, which cause considerale yield reduction.

	Major Pests			
1.	Fruit borer	*Helicoverpa armigera*	Noctuidae	Lepidoptera
2.	Serpentine leaf miner	*Liriomyza trifolii*	Agromyzidae	Diptera
3.	Leaf eating caterpillar	*Spodoptera litura*	Noctuidae	Lepidoptera
4.	Whitefly	*Bemisia tabaci*	Aleyrodidae	Hemiptera
5.	Thrips	*T. tabaci*, *F. schultzi*	Thripidae	Thysanoptera
6.	Fruit sucking moth	*Othreis fullonica*, *O. materna*, *O. ancilla*	Noctuidae	Lepidoptera
	Minor Pests			
7.	Spotted leaf beetle	*Epilachna vigintioctopunctata*	Coccinellidae	Coleoptera

8.	Cabbage green semilooper	*Trichoplusia ni*	Noctuidae	Lepidoptera
9.	Aphid	*Aphis gossypii*, *Myzus persicae*	Aphididae	Hemiptera
10.	Leaf hopper	*Amrasca devastans*	Cicadellidae	Homoptera
11.	Stem borer	*Euzophera perticella*, *Pthorimaea operculella*	Pyralidae	Lepidoptera
12	Red spider mite	*Tetranychus cinnabarinus*	Acaridae	Acarina

1.Fruit borer: *Helicoverpa armigera* (Noctuidae: Lepidoptera)

For distribution and status, host range, damage symptoms, bionomics refer cotton

Single caterpillar can destroy 2-8 fruits.

Bionomics

Management

- Collect and destroy the infested fruits and grown up larvae.
- Grow less susceptible genotypes Rupali, Roma, Pusa red plum.
- Grow resistant cultivars like BT 1, T 32, T 27, Punjab Kesri, Punjab Chuhashu, Pant Bahar, Azad Pusa Hybrid 4
- Grow simultaneously 40 days old African tall marigold and 25 days old tomato

seedling at 1:10 rows to attract *Helicoverpa* adults for egg laying.

- Set up pheromone trap with Helilure at 15/ha and change the lure once in 15 days.
- Release *T. chilonis* 6 times @ 50,000/ha per week coinciding with flowering time based on ETL.
- Release *Chrysoperla carnea* at weekly interval at 50,000 eggs or grubs / ha from 30 days after planting.
- Spray any of the following insecticides with 500 L water/ha

• Azadirachtin 1.0% 1.0-1.5 L	• NPV of *H. armigera* 0.43% AS 400-600
• Indoxacarb 14.5 SC 400-500 ml	• NPV of H. armigera 2% AS 500
• Lambda cyhalothrin 5 EC 300 ml	• Methomyl 40 SP 750-1125 g
• Novaluron 10 EC 750 ml	• Endosulfan 35 EC 1.0 L
• Carbaryl 50 WP 1 kg	• *B. thuringiensis* 1 g/lit
• Quinalphos 1250 ml	

- Do not spray insecticides after maturity of fruits.
- Encourage activity of parasitoid *Eucelatoria bryani*, *Campoletes*, *Chelonus* etc.,

2. Serpentine leaf miner: *Liriomyza trifolii* (Agromyzidae: Diptera) - An introduced pest becoming serious in the recent years.

Damage symptoms

Maggots mines into leaves and cause serpentine mines drying and drooping of leaves.

Bionomics

Egg: 2-4 days. Female thrusts eggs into the epidermal layer of leaves. Larva:

7-10 days. Minute orange yellowish apodous maggots. Pupa: 5-7 days. Pupates within mines. Adult: Pale yellow in colour.

Management

I. Collect and destroy mined leaves
II. Spray NSKE 5%

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

For distribution and status, host range, damage symptoms, bionomics and management

Refer cotton

4. Whitefly: *Bemisia tabaci* (Aleyrodidae: Hemiptera) - It is a vector of Leaf curl virus

. Refer cotton

5. Thrips: *T. tabaci*, *F. schultzi* (Thripidae: Thysanoptera)

Damage symptoms

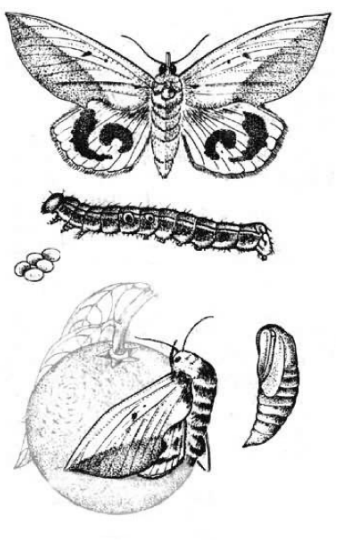
Vector of tomato spotted wilt virus. Lacerate leaf tissues and leaves become spotted and pale (Silvery streaks). Feeds on flowers resulting in pre-mature dropping of flowers and also cause bud necrosis.

For Bionomics and management refer cotton

6. Fruit sucking moth: *Othreis fullonica*, *O. materna*, *O. ancilla* (Noctuidae: Lepidoptera)

Damage symtpoms

Adults suck the juice of fruits by piercing. Infested fruits will shrink, shrivel, rot and ultimately drop down, causing direct loss to harvestable produce.



Bionomics

Larva: Semilooper with orange blue and yellow spots on velvetty dark speckled body. Moth: Stout built; with grey and

orange coloured wings. *O. materna*: Three black spots on forewings. *O. fullonica*: Tripod black mark on forewings and curved marking on hind wing. Larva feeds on the leaves of the creeper weed *Tinospora cardifolia* and *Cocculus* sp.

Othreis fullonica

O. materna

Minor pests

- Spotted leaf beetle: *Epilachna vigintioctopunctata* (Coccinellidae: Coleoptera)
- Cabbage green semilooper: *Trichoplusia ni* (Noctuidae: Lepidoptera)
- Aphid : *Aphis gossypii*, *Myzus persicae* (Aphididae: Hemiptera)
- Leaf hopper : *Amrasca devastans* (Cicadellidae: Homoptera)
- Stem borer: *Euzophera perticella*, *Pthorimaea operculella* (Pyralidae: Lepidoptera)
- Red spider mite: *Tetranychus cinnabarinus* (Acaridae: Acarina)

Questions - Brinjal and Tomato

1.	Skeletonization of brinjal leaves is caused by---------- **Hadda beetle**	
2.	Attacked brinjal fruits with boreholes plugged with excreta is indication of presence of ---------- **Shoot and fruit borer**	
3.	Continuous planting of brinjal and ratooning is favourable for multiplication of ---------- **Shoot and fruit borer**	
4.	Little leaf of brinjal is transmitted by ---------- **Leaf hopper**	
5.	Site of pupation for ash weevil is ---------- **Soil**	
6.	Presence of circular holes and larva feeding by thrusting only a part of its body into tomato fruit is symptom of Fruit borer *Helicoverpa armigera* -Say **true** or false	
7.	Give the name of an introduced pest in tomato ---------- **Serpentine leafminer**	
8.	Tomato leaf curl is transmitted by ---------- **Whitefly**	
9.	---- feed on chili flowers resulting in pre-mature dropping of flowers and also cause bud necrosis -**Thrips**	
10.	---------- is the pest where only the adult cause the damage to fruits **Fruit sucking moth**	
11.	Name the predatory thrips feeding on thrips	
	a. *Thrips tabaci*	b. *Scirtothrips dorsals*
	c. *Thrips florum*	d. ***Scolothrips indicus***
12.	Muranai disease is caused by ---------- on chillies- ***Polyphagodorsonemous latus***	
13.	Name the predatory mite feeding on mite	
	a. *Aceria cajani*	b. *Aceria sorghi*
	c. *Aceria oryzae*	d. ***Amblyseius ovalis***
14.	_____are resistant to shoot and fruit borer **Pusa purple round, Arka Kusumakar, Doli – 5**	
15.	Notching of brinjal leaf margins by adults is the damage symptom by _____- **Ash weevil**	
16.	Pea mosaic virus is transmitted by _____ pea aphid ***Acyrthosiphon pisum***	