

B.Sc. Horti. VIth Sem

**Insect pests of Vegetable, Ornamental, and
spice crops (PPH-322)**

Topic name: Major insect pest of solanaceous crop (potato & tomato) and their management



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INTRODUCTION

POTATO (*Solanum tuberosum*)

TOMATO (*Lycopersicon esculentum*)


- Potato is introduced in India from Europe in 17th century.
- It is largely grown in **cool** regions, the optimum temperature required is about **15-25^o C**.
- Tomato is **warm season** crop, is grown extensively in cool season also.
- Optimum temperature is about **15-27^o C**.

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- Potato is cultivated in India mainly in **UP, WB, Bihar and Punjab**
 - **UP is largest producer of potato in India** and contributes about **41%** India's Production of **Potato**
 - Major tomato growing states in India are **UP, MH, Bihar and Orissa.**

PEST OF TOMATO

COMMON NAME	SCIENTIFIC NAME	FAMILY	ORDER
Fruit borer	<i>Hilicoverpa armigera</i>	Noctuidae	Lepidoptera
Serpentine leaf minor	<i>Liriomyza trifolii</i>	Agromyzidae	Diptera
White flies	<i>Bemisia tabaci</i>	Aleyrodidae	Hemiptera
Mealy bug	<i>Ferrisia virgata</i>	Pseudococcidae	Hemiptera
Fruit sucking Moth	<i>Otheris fullonica</i> <i>O. Meterna</i> <i>O. ancilla</i>	Noctuidae	Lepidoptera
Hadda beetle	<i>Henosepilachna vigintipunctata</i>	coccinellidae	Coleoptera

Conti....



Leaf eating
caterpillar

Green bugs

Thrips

Mite

Spodoptera litura
S. exigua

Noctuidae

Lepidoptera

Nezara viridula

Pentatomidae

Hemiptera

Thrips tabaci
Calliothrips
indicus

Thripidae

Thysanoptera

Tetranychus
cinnabarinus

PEST OF POTATO

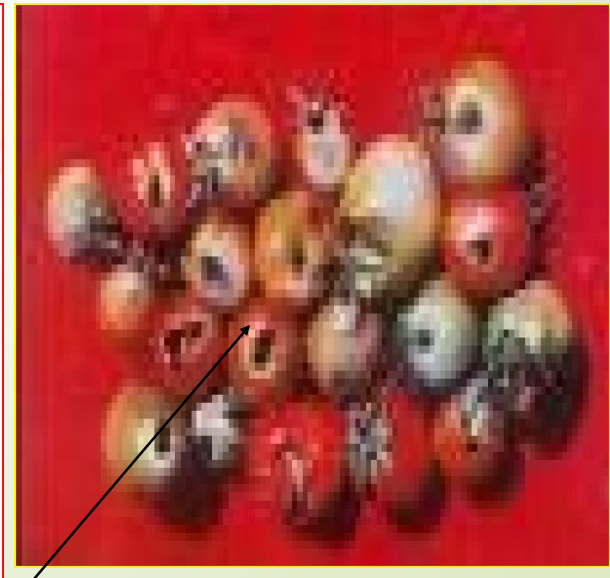
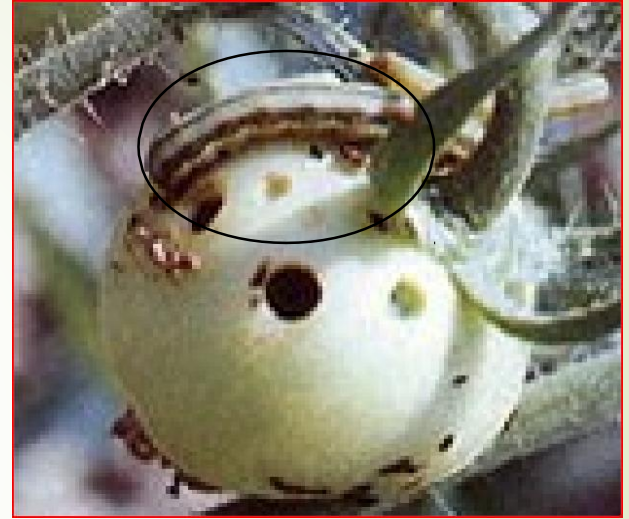
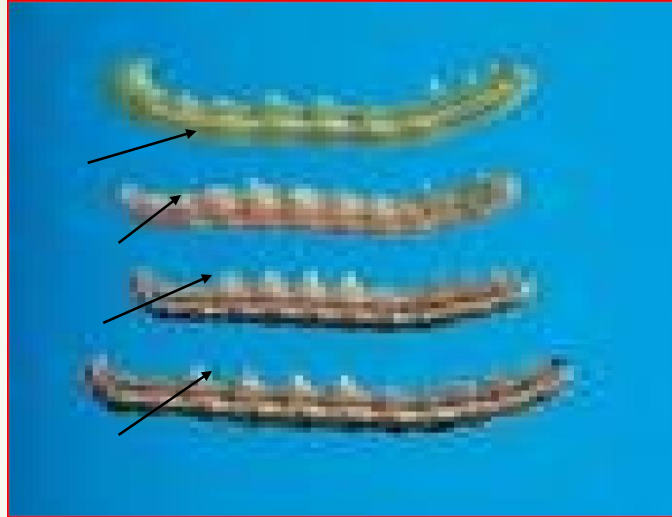
COMMON NAME	SCIENTIFIC NAME	FAMILY	ORDER
Aphids	<i>Myzus persicae</i> <i>Aphis gossypii</i>	Aphididae	Hemiptera
Tuber Moth	<i>Pthorimaea opercullela</i>	Gelechiidae	Lepidoptera
Cut worms	<i>Agrotis segetum</i> <i>A. ipsilon</i>	Noctuidae	Lepidoptera
White fly	<i>Bemisia tabaci</i>	Aleurodidae	Homoptera
Leaf hopper	<i>Amrasca biguttua</i> <i>biguttula</i>	Cicadellidae	Homoptera
Tobacco caterpillar	<i>Spodoptera litura</i>	Noctuidae	Lepidoptera

Fruit borer

Helicoverpa armigera

- ▶ Damage starts from flowering.
- ▶ Eggs are laid on young leaves which are damaged by young larvae.
- ▶ Later they migrate to developing fruits.
- ▶ They bore the fruits with half of the body outside fruit.
- ▶ One larva feeds on many fruits, causing 5 - 50% losses.

Fruit borer



Serpentine leaf miner

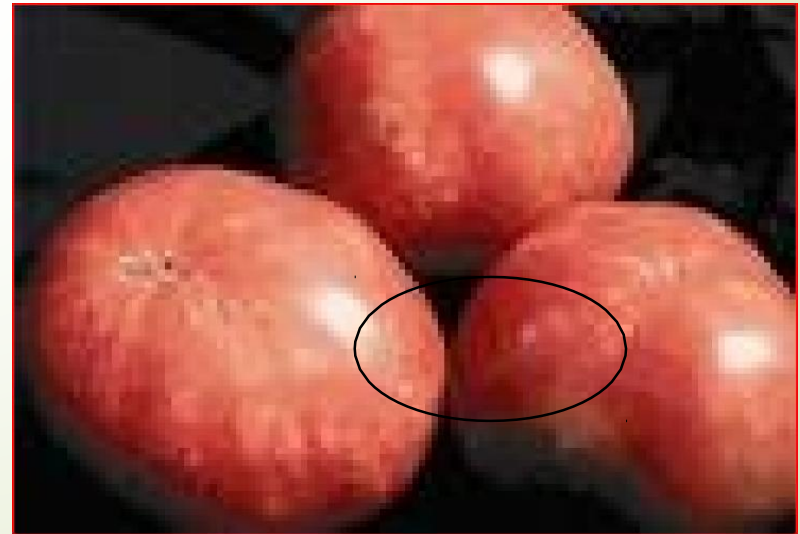
Liriomyza trifolii

- ◆ An recent introduction, and attacks several crops.
- ◆ The larvae mine into leaves particularly basal leaves 10- 15% loss, causing in severe cases.
- ◆ Application of granular insecticide increases incidence.



Fruit sucking moth: *Othreis fullonica*

- ❖ Adult moths puncture ripening fruit and suck juice.
- ❖ Damaged area becomes soft and rots & close examination reveals pin hole.



Leaf eating caterpillars

Spodoptera litura

Spodoptera exigua

- ❖ **Eggs are laid in clusters. Young larvae gregariously feed and skeletonize the leaves.**
- ❖ **Large larvae bore into fruits.**
- ❖ **Caterpillar act as defoliator and once fruits are formed fruits, borers in to fruits**

Leaf eating caterpillars



Bugs : *Nezara viridula*

➤ Sometimes green flat bugs gregariously feed on tomato leaves.



Thrips: *Thrips tabaci*

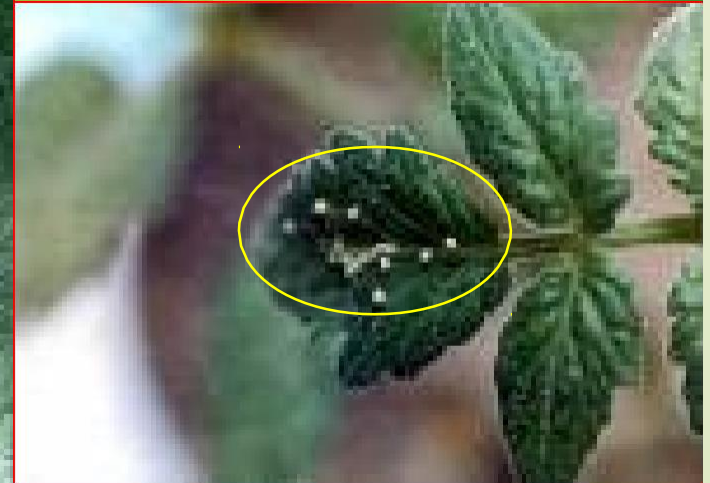
Calliothrips indicus

- Nymphs and adults lacerate leaves. Leaves may become pale and silver shins appear on affected leaves.



White flies : *Bemisia tabaci*

- ☀ Suck sap from leaves and transmit leaf curl virus, particularly during summer.
- ☀ Loss may be even 80-90%.



Mealy bugs : *Ferrisia virgata*

➤ White mealy patches are seen on plants.

➤ Stunt plant growth by sucking sap.



Cut worms *Agrotis ipsilon*

Agrotis segetum

- The larvae damage the crop at initial stages by cutting young plants at ground level and feeding on shoot resulting in stunted plant growth.
- After tuberization, they feed by boring and nibbling into tubers.
- About 40% plants are damaged.

Cut worms





Aphids: *Myzus persicae* *Aphis gossypii*

- Aphids suck sap from potato foliage causing leaves to curl downward.
- The leaves become yellow and die.
- These two species are responsible for transmission of potato viruses as a vector.

Potato Aphids



Mites : *Hemitarsonemus latus*

- The leaves roll inward, showing oily spots on upper surfaces.
- The lower surface gets sooty appearance .The leaves ultimately become bronze in colour and wither.
- The plants become stunted and finally die.
- Heavy mite infestation might cause 50% loss in yield.
- The damage starts from the apex leaf and goes downward.

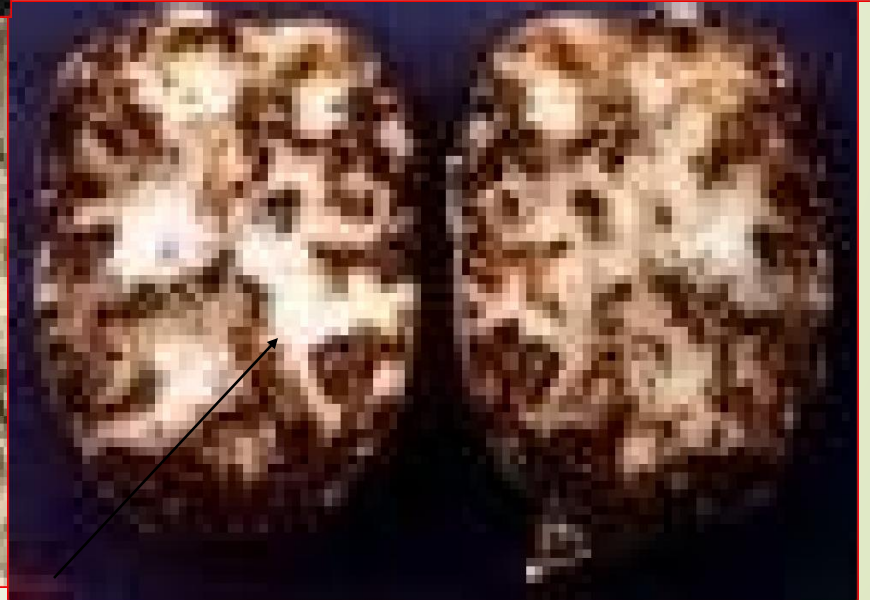
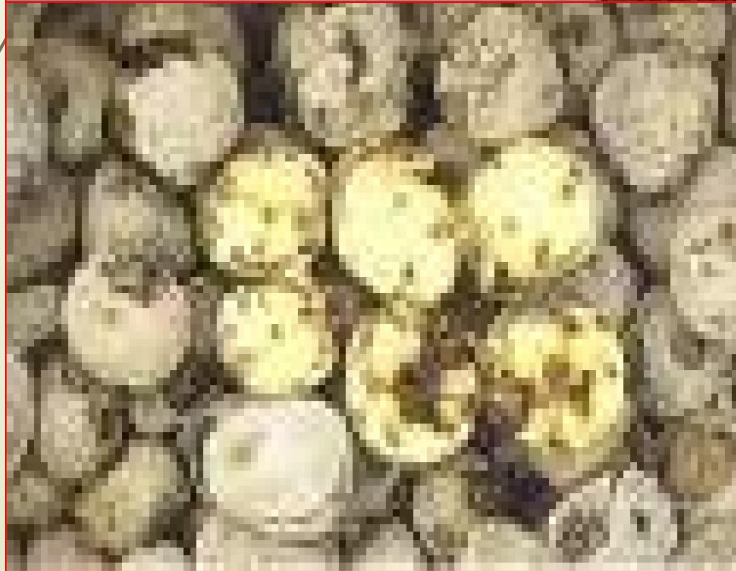
Mite



Tuber moth: *Pthorimaea operculella*

- Larvae of insect make mines in tender leaves, petiole and stem.
- They also mine into tubers and form dirty looking silk lined galleries.
- In stores, saprophytes grow in damaged tubers and rot sets in.
- About 30-70% damage in tubers in storage and 0-45% tuber damage in field.

Tuber moth



MANAGEMENT

IPM TOOLS

“PLANT RESISTANT”

- ❖ Development and use of crop varieties resistant or tolerant to one or more pest species is economically inexpensive and environmentally sound.

“CULTURAL CONTROL”

- ❖ Crop rotation, crop residues destruction, tillage of soil, variation in the time of sowing or planting or harvesting, pruning or thinning, sanitation, water management, trap crops and plant spacing.



“MECHANICAL CONTROL”

- Use of screens, barriers, traps, suction devices, collecting material, hand destruction, crushing and grinding.

“PHYSICAL CONTROL”

- Use of heat, cold, sound, regulating moisture or relative humidity, light trapping, light regulation and using physical toxicant such as activated kaolin.

“BIOLOGICAL CONTROL”


- Protection and encouragement of natural enemies.
- Introduction, artificial increase and colonization of specific parasites and predators.
- Propagation and dissemination specific bacterial, viral, fungal and protozoan diseases.

“CHEMICAL CONTROL”

- Use of chemical pesticides.

CULTURAL CONTROL

- Grow trap crop African marigold as intercrop with tomato to attract fruit borer.
- Pest free seed material is used to check infestation of tuber moth.
- Earthing up of tuber crop minimizes the attack of potato tuber moth.
- Deep ploughing during summer expose the pupa in the field.
- Flooding the fields to manage cutworms.
- Use of resistant varieties like Parker, Shakti, Jyoti.
- Late planting of potato crop from normal date of sowing will reduced the infestation of whitefly.
(AICRP).

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- Tuber treatment with Imidacloprid (0.004%) for 10 minutes will reduce the whitefly infestation.
 - Potato **intercrop** with Onion (1:1) will reduce the **Aphid population**.
 - Cover the tubers with **Lantana leaves**
 - (2cm thick layer) there will be minimum damage and rotting by **tuber moth** in storage
 - (AICRP)
 - **Sprinkler irrigation** in potato crop will reduce the infestation of **PTM**.

MECHANICAL AND PHYSICAL CONTROL

- ▶ Hand picking caterpillars and kill them, in case of tomato fruit borer.
- ▶ Use of yellow sticky trap coated with castor oil to trap whiteflies.
- ▶ Grow Oat crop as barrier against whitefly.
(AICRP))
- ▶ Use of sticky traps where stick glue is pasted to trap aphids.
- ▶ Cold storage of tubers will control the tuber moth infestation.
- ▶ Use of Light traps in field to attract tomato fruit borer adult and in storage to attract tuber moth.

BIOLOGICAL CONTROL OF APHIDS

- *Aphelinus* sp. Parasitises upto 100% at Simla and *Aphidius colemani* upto 70% at Bangaluru.
- Coccinellids *Coccinella septempunctata* and *cheilomenes sexmaculata* are predominant.



Fruit borer

- *Trichogramma spp.* are capable of providing up to 80% egg parasitism.
- The *Campoletis chlridaeae* parasitizes up to 33% larvae.
- During rainy season *Hexamermis spp.* are capable of parasitizing up to 40% larvae.



Potato tuber moth

- *Bracon gelechia* parasitized 30-33% larvae .
- Predatory mite *Blattisocius keegani* takes heavy toll of eggs.
- Granulosis virus and *Bacillus thuringiensis* var.
- *kurstaki* have been found effective.





Cut worms

- *Cotesia ruficrus*, *Macrogaster similis* and *Steinernema sp.* have frequently been recorded in plains.
- *Enicospilus medarius* is abundant in Gujarat.
- *Macrocentrus collaris* is most common parasitoid in Shimla hills and Kodagu.

Chemical control

PEST

Aphids

CHEMICAL

Phorate @ 10kg/ha or

Dimethoate @ 1.2L/ha or

Monocrotophos 40 EC

Carbaryl 50 WP @ 2kg/ha

or Monocrotophos @ 1.5L/ha

Quinalphos dust @ 250g/q on stored seed.

Carbaryl 50 WP @ 2kg/ha or

Chlorpyrifos 20 EC @ 2.5L/ha.

Tuber moth

Cut-worms



Pest

Fruit borer

Serpentine
leaf-miner

Leaf eating
caterpillars

Fruit sucking
moths

Mites

CHEMICAL

Endosulfan 0.07% or
Dichlorvos 0.1%.

NSKE 4% or neem
formulation 2-3ml/L.

Cypermethrin 0.0125% or
NSKE 4% when larvae are
small.

Quinalphos/chlorpyrifos
0.05% or Monocrotophos
0.05%.

Dicofol/Ethion 0.05% or
neem oil 1%.



PEST

White flies

Mealy bugs

Bugs

Thrips

CHEMICAL

Triazophos 0.05%

Spray fish oil rosin soap.

Monocrotophos/Phosphamidon/Dimethoate/Oxymethyl demeton 0.05%.

Neem formulations
2-3ml/L.

CONCLUSION

- ❖ Use of IPM techniques for control of solanaceous insects pests.
- ❖ Growing of resistant variety and trap cropping.
- ❖ Use of Bio-pesticides or microbial pesticides viz., Ha- NPV, Sl-NPV, Aa -NPV against lepidopteron insects pests.
- ❖ Use of safer insecticides for control of solanaceous insects pests.



THANK YOU