

Integrated Insect Pest Management of Potato Crop

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Potato is the most useful and important member of the family *Solanaceae* and it belongs to the genus *Solanum*. Genus *Solanum* consists of 7 cultivated and about 154 wild species but the commercially viable potato has only two species: *Solanum andigenum* and *S. tuberosum*. The latter is the most commonly cultivated species. The edible portion of potato is its tuber which is morphologically an underground stem.

Pests

Potato crop is attacked by several insect pests and mites, both in field as well as in storage. Some of these such as aphids, cutworms, white grubs, defoliating caterpillars, tuber moth and mites are great enemies of the crop and cause 10-20% loss. Besides, some of the pests act as transmitters of viruses and also affect the quality of seed tubers.

It is, therefore, essential to take timely plant protection measures against these pests. As soon as the symptoms appear in the potato, field spray of the crop with recommended insecticides is done. Description of some important pests and their control is given below.



1. Aphids: In some seasons, aphids pose serious limitations in the successful cultivation of potatoes. These are small insects either pale yellow or dark in colour. Both nymphs and adults damage the plant by sucking the cell sap from the leaves, tender shoots and stem. The leaves of attacked plant become yellowish and curved. If the population is very high, the affected plant may die. Besides this, the aphid secretes honey dew on leaves on which black mould develops. This interferes in the photosynthesis. The winged aphids also transmit serious viral diseases in this crop.

Control: Spray Neem seed kernel extract @ 1500 ml in 400 litres of water per hectare. If there is danger of spreading of viral diseases, it is desirable that the haulms should be cut at the time when the population of aphid. is below the critical level.

2. Leaf hoppers: Leaf hoppers are tiny insects having slender bodies usually tapering posteriorly and rest in a position ready for jumping. When disturbed, they leap often several

feet. Several species of leaf hoppers cause damage to potato crop by sucking sap from the leaves. The infested leaves turn pale; and die. Some of them are also responsible for transmitting the mycoplasma diseases.

Control: Soil application of *Beuveria bassiana* @ 2.5 kg per hectare in furrows at the time of planting of potatoes. If found necessary, half of this dose may be applied again at the time of earthing up. Foliar spray of Neem seed kernel extract @ 1500 ml in 400 litres of water per hectare is effective.

3. Cutworms: The damage is caused by the caterpillars. They cut the stems or leaves of potato plants just above ground level and thus affect their growth, vigour and yield. They also feed '!' on tubers by boring and nibbling into them and affecting their market value. In badly infested fields, as high as about 40% tubers are damaged by this pest. The full grown caterpillars are about 5 cm long. During day time they remain hiding in the soil and in the night they come out to damage the crop.

Control: Flooding of the field reduces the activity of the caterpillar. Soil application of *Beuveria bassiana* @ 2.5 kg per hectare at the time of planting gives effective, control of cutworms. If the infestation is noticed after germination, *Bacillus thuringiensis* @ 2.0 litres per hectare should be sprayed on ridges.

4. Potato tuber moth: Potato tuber moth is an important pest of potato in the country. Though the infestation generally starts in the field, it does not usually become serious in most places; but it causes heavy damage to the potatoes in stores in the plains. Sometimes the entire stores of potato have been reported to be lost due to attack of this .pest.

The tuber moth is a small insect of dull grey colour having dark brown or black marking on the wings. The pest is active throughout the year in the plains. The caterpillar of this pest feed inside the tuber pulp. The tunnels made by the caterpillars are filled by the excreta. Such tubers generally become unfit for human consumption and seed purposes.

Control

1. Only healthy tubers should be kept in the store.
2. Potatoes should be stored in cold stores. In case they are to be kept in ordinary stores, a sand layer of about 2.5 to 5 cm thickness should be kept below and above the heap of the potato.
3. Seed potato treatment with *Bacillus thuringiensis* on and around the heap.

5. White grub: The white grubs are the larvae of cockchafer beetles. They are usually present in all types of soils throughout the year in hilly areas to a depth of. 10 cm to 1 cm. The grubs are fleshy white or light grey in colour with curved bodies. They damage the plant by feeding on the underground portion viz. root, stems and tubers. The grub in early stage feed on the roots with the result the plants-dry up. Later on when tubers are developed, the grubs cut holes in the tubers. The market value of such tubers is very much reduced.

Control

1. Fields having a history of whitegrub attack should be tilled several times in April–May or in September.
2. Crop rotation in potato with crops like clover and alfalfa reduce the *B. coriacea* population because of the fact that adults do not deposit eggs in clover and alfalfa
3. Entomopathogenic fungi include *M. anisopliae* and *B. bassiana*, and usually, the fungi are used in combination with farm yard manure.

6. Mites: The trasonemid mite has recently assumed the status of a pest of potato in the Deccan plateau. The mites lay eggs on the under surface of the leaves. The eggs hatch within 2-3 days. The young nymphs prepare web like structures on the lower surface of the leaves and settle down and develop under these web.

The nymph and adult mites feed by sucking the sap from leaves which roll inwards exhibiting characteristic oily spots on the upper surface while the lower surface gets sooty appearance. Subsequently the leaves become bronze coloured, wither and ultimately the whole plant dies.

Control

1. Cultural controls for spider mites involve reducing plant stress and ensuring the plant's environment is not conducive for spider mite development.
2. bigeyed bugs and minute pirate bugs, *Feltiella* spp. (predatory cecidomyiid fly larvae), sixspotted thrips, *Stethorus picipes* (spider mite destroyer lady beetle).

7. Nematodes: Plant nematodes are microscopic organisms present in the soil and have a protrusible spear-like structure called stylet. With stylet they puncture root tissues on which they feed. Though as many as 27 different plant parasitic nematodes have been observed around the root zone of potato, only two namely cyst forming nematodes and root knot nematode are most serious known nematodes problem of potato.

Control

1. Use of *Pseudomonas fluorescens* and *Bacillus subtilis* in seed treatment. However, this treatment can also be given to the standing crop.
2. Keeping the land fallow and giving 3-4 ploughings during summer months improves the crop performance.
3. Vegetable nurseries and other plants meant for transplanting should not be grown in the infested field.
4. Potatoes grown in the infested field should not be used for seed purposes.