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Insect Pests of Potato, *Solanum tuberosum* (Family: Solanaceae)

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Potato is an annual plant in the nightshade family (Solanaceae), grown for its starchy edible tubers. It is native to the Peruvian-Bolivian Andes and is one of the world's main food crops. Potatoes are frequently served whole or mashed as a cooked vegetable and are also ground into potato flour, used in baking, and as a thickener for sauces. The tubers are highly digestible and provide vitamin C, protein, thiamine, and niacin. Insect pest damage is one of the important factors limiting potato crop production. Therefore the following article covers information regarding them along with the practices that could be followed to manage them

Insect pests of Potato

Sr. No.	Common Name	Scientific Name	Family	Order
1)	Potato tuber moth	*Phthorimaea operculella*	Gelechiidae	Lepidoptera
2)	White grubs	*Holotrichia spp.*	Scarabaeidae	Coleoptera
3).	Tobacco caterpillar	*Spodoptera litura*	Noctuidae	Lepidoptera
4).	Cut worm	*Agrotis ipsilon*	Noctuidae	Lepidoptera
5).	Whitefly	*Bemisia tabaci*	Aleyrodidae	Hemiptera
6).	Green peach aphid	*Myzus persicae*	Aphididae	Hemiptera
7).	Green Leaf Hopper	*Empoasca kerri*	Cicadellidae	Hemiptera

1) Potato tuber moth, *Phthorimaea operculella* (Gelechiidae: Lepidoptera)

Distribution: It is cosmopolitan in distribution, but is more common in the United States of America, Mediterranean and India

Host range: Potato is the principal host for Potato tuber moth, but other Solanaceae are also attacked, especially tomato, tobacco, chilli, aubergine and cape gooseberry.

Damage symptoms: It is a pest of field and storage. Larva tunnels into foliage, stem and tubers. Galleries are formed near tuber eyes

Life cycle: Female moth lay about 100-150 eggs at dusk on the surface of the potato near the eye or in the cracks on the exposed skin of the tuber. In the field, the female laid eggs singly on the undersurface of the potato leaves. Within 3-6 days larvae hatch out from the eggs. The larva bores deep into the potato tuber and feeds upon its content. The larval period lasts for 5-16 days. The fully grown larva comes out of the tuber and pupates inside a silken cocoon. In the field, the cocoons are formed among the dried leaves or thrash on the ground or in the soil. In storage, the cocoons are formed in the cracks on the floor and wall of the storehouse or on the seams of storage bags. Pupal period lasts for about a week. The pest remains active throughout the year or till the food is available. Low rainfall and moderately high temperature are favorable conditions for the growth and multiplication of this pest. The life cycle is completed in about a month. There are about eight or nine generations in a year. In colder parts of the country, the larvae & pupae are reported to hibernate during winter.

Management:

1. Select healthy tubers
2. Avoid shallow planting of tubers. Plant the tubers to a depth at 10 - 15 cm deep
3. Install pheromone traps at 15/ha.
4. Collect and destroy all the infested tubers from the field
5. Do not leave the harvested tubers in the field overnight
6. Adopt intercropping with chilies, onion or peas
7. Do earthing up at 60 days after planting to avoid female moths laying eggs on the exposed tubers
8. Release egg larval parasitoid: *Chelonus blackburnii* @30,000/ha twice at 40 and 70 day after planting
9. Spray NSKE @5% or quinalphos 25 EC @2ml/lit of water to manage foliar damage
10. Spray *Bacillus thuringiensis* @1 kg/ha at 10 days interval

2) White grub, *Holotrichia spp.* (Scarabaeidae: Coleoptera)

Distribution: More than 200 species of white grubs are found throughout North America. Common species include May beetles and green June beetles.

Host range: White grubs feed on the roots of corn, timothy, Kentucky bluegrass, sorghum, soybean, strawberry, potato, barley, oat, wheat, rye, bean, turnip, and to a lesser degree, other cultivated crops. They also infest various pasture grasses, lawns, and nursery plantings. The adults, which are strongly attracted to fragrant flowers and ripe fruits, feed on the foliage of forest, shade and fruit trees.

Damage symptoms: Grubs feed on roots and tubers and grubs feed voraciously during night time

Life cycle: They complete their growth in one year. The adults mate in the evening and, at dawn, females return to the ground to deposit 15 to 20 eggs, 1 to 8 inches deep in the soil. Since the adults are attracted to trees to feed, they tend to lay most eggs in the higher portions of sod near wooded areas. Eggs hatch about three weeks later into young larvae that feed upon roots and decaying vegetation throughout the summer and, in the autumn, they migrate downward (to a depth of up to 1.5 meters) and remain inactive until the following spring. At this point in the insect's life cycle, the greatest amount of damage occurs as the larvae return near the soil surface to feed on the roots of the plants. The next autumn the larvae again migrate deep into the soil to overwinter, returning near the soil surface the following spring (the third spring) to feed on plant roots until they are fully grown in late spring. These grubs then form oval earthen cells and pupation follows. The adult beetles emerge from the pupal stage a few weeks later, but they do not leave the ground. The beetles over winter, emerging the following year in May or June when feeding, mating, and egg-laying take place.

Management:

1. Summer ploughing to expose pupae
2. Dust Quinalphos 5% @25 kg/ha at 10 days after first summer rain
3. Set up light trap @1/ha between 7 PM and 9 PM
4. Handpick adult beetles in the morning

3). Tobacco caterpillar, *Spodoptera litura* (Noctuidae: Lepidoptera)

Damage symptoms: The young larvae first feed gregariously and scrape the leaves. Older larvae spread out and may completely devour the leaves resulting in poor growth of plants

Management:

1. Plough the soil to expose and kill the pupae
2. Grow castor along border and irrigation channel as trap crop
3. Flood the field to drive out the hibernating larvae
4. Set up light trap @1/ha

5. Pheromone traps **(Pherodin SL)** @ 15/ ha to attract male moths
6. Hand pick grown-up larvae and kill them
7. Spray Sl NPV @ 1.5X1012 POBs/ha + 2.5 Kg crude sugar + 0.1 % teepol

4). Cut worm, *Agrotis ipsilon* (Noctuidae: Lepidoptera)

Distribution: The origin of black cutworm is uncertain, though it is now found in many regions of the world, being absent principally from some tropical regions and cold areas. It is more widespread and damaging, in the northern hemisphere than in the southern hemisphere

Host range: It has a wide host range. Nearly all vegetables can be consumed, and this species also feeds on alfalfa, clover, cotton, rice, sorghum, strawberry, sugar beet, tobacco, and sometimes grains and grasses.

Damage symptoms: Young larvae feed on the epidermis of the leaves. Older larvae come out at night and feed young plants by cutting their stems. They also damage the tubers by eating away part of them

Life cycle: Female black cutworm moths usually deposit eggs singly or a few (as many as 30) together. The eggs are firmly attached to a substrate. Preferred substrates are densely growing plants relatively low to the ground and fine-textured plant debris in untilled fields. Egg placement varies with the plant species and may be on the petioles, lower leaf surface, or stem. The eggs hatch in 3-6 days and the larvae move into the soil where they remain during the day. There are six or seven instars, depending on temperature and adequacy of diet. Depending on the temperature, larvae begin to pupate in 25-35 days. Pupation occurs in the soil at a depth of 2.0 cm to 10.0 cm and the pupal stage lasts about 12-15 days. There may be several generations a year, but the spring generation is usually the most damaging because of the young vulnerable plants available at this time. When mature, spring-generation adults may stay in the same area, depositing eggs on weeds and grasses in crop lands, pastures, fence rows, vegetable fields, gardens, etc. Depending on geographical location, the mature spring generation may also move farther north on persistent low-level wind jets. Summer-generation adults will again deposit eggs on weeds, grasses, and turf grasses. The succeeding generation (autumn) can be found in habitats similar to those of the previous generations.

Management:

1. Flood the infested fields
2. Handpick and destroy the larvae in the morning and evening hours on cracks and crevices in the field
3. Plough the soil during the summer months to expose larvae and pupae to avian predators
4. Set up light trap @1/ha
5. Pheromone traps @12/ha to attract male moths
6. Spray insecticides like chlorpyriphos 20 EC @1 lit/ha or neem oil @ 3%

5). Whitefly, *Bemisia tabaci* (Aleyrodidae: Hemiptera)

Damage symptoms: Nymphs suck sap from the leaves and lower their vitality. Yellowing and curling of leaf. Sooty mould develops on affected leaves due to honeydew secretion.

Management:

1. Well timed irrigation
2. Avoid common solanaceous crops in the endemic areas
3. Spray dimethoate 0.3%

6). Green peach aphid, *Myzus persicae* (Aphididae: Hemiptera)

Distribution: Green peach aphid is found throughout the world

Host range: It feeds on hundreds of host plants in over 40 plant families

Damage symptoms: Aphids suck the sap of plants, as a result of which leaves turn pale and dry up. This pest also transmits various viruses to potato plants

Life cycle: Adults are about 2 mm long, greenish-yellow, sometimes with a brown tinge. Adults may be winged or wingless. If winged, then the head and thorax - i.e., the segment that bears the first pair of legs - are black. The nymphs are similar to the wingless adults, except in size. There are about 20 generations of the aphid per year. The average life cycle is about 18 days. Spread occurs by the winged forms of the aphid and long distance in wind and storms. Spread also occurs with the international movement of plants and plant parts for food and propagation**.**

Management:

1. Spray dimethoate 0.3%

7). Green Leaf Hopper, *Empoasca kerri* (Cicadellidae: Hemiptera)

Damage symptoms: Tips of affected leaves become brown, turn upwards and get dried up

Management: Spray dimethoate 30 EC or phosphomidon (Dimecron) 2ml/lit

Conclusion

Because of damage inflicted by insect pests on potato, their management become of utmost importance. Insect pests are generally managed by a number of strategies as mentioned above. To avoid the heavy losses caused by insects, study on their distribution, host preference, life cycle, damage symptoms, and management is essential. Hence the above article covers all the necessary information about their effective control.