

Major Pests of Winter Vegetable Crops

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India is growing 12 per cent of the world's vegetable. The different vegetable crops are grown in different seasons (spring, summer, autumn, winter) of the year. Among the winter vegetables, cruciferous crops (potato, pea, broccoli, brussels sprouts, cabbage, cauliflower, collards, mustard, turnip, radish, kale, bok-choy and kohlrabi) are most important. These vegetable crops are mostly cultivated at mild temperature with relative humidity (50-70 %). These climatic conditions are very conducive for development and survival of insect-pests and diseases. Since winter vegetable crops are highly remunerative, intensive plant protection measures involving a number of pesticides are very common. In spite of large scale and indiscriminate use of insecticides, the pests have been found to occur in severe form in all vegetable crops. In recent years, there is a lot of awareness and preference for organically produced foodstuff in the country. Therefore, ecofriendly pest management has gained worldwide attention. This technology is not only effective against vegetable pests but also safer to human health, beneficial insects and environment

Insect-pests

Butterflies: *Pieris brassicae nepalensis* (large cabbage white) and *Pieris canidia indica* (common cabbage white) are found everywhere in our country. The butterflies are small to medium size and numerous available especially during winter and spring seasons. The body is decorated with short hairs. The wings pale white, with black patch on apical angle of each forewing and black spot on the costal margin of each hind wing. These butterflies are responsible for severe destruction of cole crops, at plantlets stage and in mature crop. The butterflies larvae making the conditions hell for vegetable crops by making the holes in greens leaves and shoots of the plants. The larvae excrete their faecal matters on leaves and flowers, which also reduced market price of vegetables.

Diamond back moth (*Plutella xylostella*): The moth is small-medium in size with wing-spans 7 - 55 mm. The wings are prolonged and hind wings bear black frills at the margins. The fore-wings often emerge to be sickle-shaped because positioning of the frills. The adults are mostly dusky in color and night-loving in habit. The larvae feed on upper layering of leaves, which they make like bare bones. The insect feed and shelter on all winter vegetable crops.

Aphid (*Brevicoryne brassicae*): It damages all vegetable crops by sucking cell sap from tender leaves/shoots. The infested plants have stunted growth and poor head formation. Under severe infestation, the entire plant may dry up. If damage occurred in nursery the infested seedlings lose their vigour, gets distorted and become unfit for transplanting. Aphids also excrete honeydew on leaves, which attracts sooty moulds fungus and reduces the photosynthetic activities of plants. The aphids cause heavy losses both in yield and in quality of crop produce. The nymphs are 1-1.5 mm long and yellow green with light ash grey tin, however adults are about 2 mm in length and ash grey in colour. The aphids are active from October to April and have many generations.

Cabbage semilooper (*Thysanoplusia orichalcea*): This pest feed and multiplies in all cole crops. The larva is plump and pale green having three pairs of prolegs generally resembled with the caterpillars of *P brassicae*. Adults are light brown with a golden patch on each forewing and measures about 42 mm with wingspan and very active at dusk. The insect larvae cause the damage by biting round holes into the leaves and the biting holes of varying size depending on the larval instars.

Cabbage head borer (*Hellula undalis*): It is also a serious pest of all cruciferous crops. The caterpillars are creamy yellow with a pinkish tinge and have seven purplish brown longitudinal stripes. The caterpillars first mine into leaves and feed on the chlorophyll.

Later on feed on the leaf surface sheltered within the silken passage. As the caterpillars grow in size, they bore into the heads of cabbage and cauliflower. In heavy infestation, the plants are riddled with caterpillars. Moths are slender, pale yellowish-brown, having grey wavy lines on the fore wings and hind wings are pale dusky.

Tobacco caterpillar (*Spodoptera litura*): It is polyphagous in nature and caterpillar feeds on younger leaves (new growth). The young larvae feed gregariously initially and make holes on leaves. The older larvae defoliate entire foliage. The full-grown larva is about 35-40 mm in length with velvety black, yellowish green dorsal strips and lateral white bands. The moths are about 22 mm in length and 40 mm across the wings.

Cutworms (*Agrotis ipsilon*): The larvae may cut off the stems of young plants during stand establishment. Later in the season, they feed on foliage. Tubers that are exposed on the soil, or by cracks, or are set very shallow may be damaged. Cutworm damage to tubers appears as a gouged-out cavity.

Diseases

Potato Late blight (*Phytophthora infestans*): The Infected tubers from cold stores serve as primary source of disease. The sprouts and leaves are infected. The water-soaked spots appear on margins of leaves which later turn into black patches with whitish fungus growth visible on lower surface in the morning hours. Black patches may extend and kill the foliage in a few days if moist weather prevails. Decaying leaves emit an offensive odour.

Black scurf of potato: (*Rhizoctonia solani*). The disease is easily recognised by raised hard, black patches, irregular in size or shape on the surface of the tuber. The infested tubers have black rough incrustations. The crop grown from diseased tubers show wilting.

Pea powdery mildew (*Erysiphe polygoni*): The white floury patches covering large areas appear on stem, branches, leaves and pods.

Rust (*Uromyces viciae fabae*): The late sown crop is more infested. The yellowish, reddish-brown, spherical, raised pustules appear mainly on the lower side of leaves during December-January.

Damping off (*Pythium sp.*, *Rhizoctonia sp.* and *Fusarium sp.*): The pre and post emergence death of seedlings occurs

Alternaria blight (*Alternaria brassicae* and *A. brassicicola*): The concentric spots appears on the lower leaves. The curd also gets infected and rots. Brown spots are formed on pods in the seed crop.

Downy mildew (*Peronospora parasitica*): The disease develops on leaves and curds. On leaves, the lesions are yellowish, irregular to angular with white 'downy' growth. The curd tops turn brown. The stems develop dark brown depressed irregular lesions/streaks with whitish 'downy' growth. The severely infected curds rot and fail to produce seeds.

Integrated Management:








- 1) Do clean cultivation deep ploughing in summer months for exposure of larvae/pupae to sun and predatory bird.
- 2) Remove and destroy the crop debris, stubbles etc.
- 3) Use healthy disease free seed/tubers.
- 4) Do intercropping of cole crops with tomato, lavender, marigold and mint crops to distract the insect-pests from infesting main crops.
- 5) Grow African bold seeded mustard as capture crop, 22 cabbage plants for 2 mustard plants to attract diamond back moth for spawning at least 12-10 days ahead of planting of main crop.
- 6) Monitoring of pest population at seedling or early growth stage.
- 7) Hand picking and mechanical destruction of eggs and larvae in early stage of damage can reduce pest infestation. For aphids: cut and destroy the infested leaves/shoots mechanically as soon as the aphid attack appears.

- 8) Predators like coccinellids, syrphids and chrysopids; and parasitoids like *Aphidius* spp also reduce the aphid population. Therefore, need to enhance the population of natural enemies of pests.
- 9) Apply pheromone traps to predict egg laying of lepidopterous pests.
- 10) Application of homemade neem extract @ 2.0 litres in 100 litres of water per acre may also reduce the incidence of sucking pests of vegetable crops. (Preparation of homemade neem extract: boil 4 kg leaves/tendrils shoots of neem trees in 10 litres of water for 30 minutes, cool this solution then filtered with muslin cloth). Potato blight
- 11) Use selected healthy tubers for planting and follow high ridge culture to avoid tuber infection of late blight. Spray the crop with 500-700 g Antracol/Indofil M-45/Mass M-45/Markzeb/Kavach or 750-1000 g Copper oxychloride 50 WP/Mark copper per acre in 250-350 litres of water in the first week of November before the appearance of disease followed by 5 more sprays at 7 days interval. Under heavy disease risk situation instead of 3rd and 4th spray of Indofil M-45/Mass M-45/Markzeb/Kavach/Antracol, give two sprays of 700 g Melody Duo 66.75 WP or Ridomil Gold or Sectin 60 WG or Curzate M-8 or 250 ml Revus 250 SC or 200 ml Equation Pro per acre at 10 days interval. Subsequently give one spray of Indofil M-45/Kavach/Antracol for late blight of potato. In late/spring sown crop if the previous crop is infected and disease risk is heavy due to humid weather, give first spray of 500 g Melody Duo 66.75 WP or Ridomil Gold/Sectin 60 WG/Curzate M-8 or 250 ml Revus 250 SC or 200 ml Equation Pro per acre followed by three sprays of 700 g Indofil M-45/Mass M-45/Markzeb/Kavach/Antracol per acre at 7 days interval.
- 12) Disinfect the tubers with 83 ml Emesto Prime 22.43 FS or 250 ml Moncoren 250 SL in 100 litres water for ten minutes or Dip potato seed tubers in 10 g wet *Trichoderma* formulation and 20 g molasses per litre water for 10 minutes. Keep treated seed in shade for 24 hours before sowing against potato scurf.
- 13) Spray the crop with 200g Sulfex in combination with 400 g Indofil M-45 per acre for pea diseases.
- 14) Treat the seed before sowing with 3g of Captan per kg seed and drench the soil around the seedlings with 200g of Captan per 100 litres of water twice, viz. on the 7th & 15th days after sowing against damping off and spray the crop with 500g Indofil M-45 in 200 litres of water per acre at 7day intervals for alternaria blight disease.
- 15) Spray the crop with 500 g Indofil M-45 in 200 litres of water per acre at 7-day intervals for cole crops downy mildew.

Conclusion

It has been observed that the vegetables producers use indiscriminate pesticides for pest management that may create residue as a problem, health hazards and environmental contamination. Therefore, this article will create awareness among vegetable growers for identification of different pests, their timely management and restriction of pesticide use.

Table 1: Major pests of vegetable crops

Pest	Symptoms	Pest	Symptoms
Cabbage butterfly		Late blight of potato	
Cabbage semilooper		Potato black scurf	
Cabbage head borer		Powdery mildew of pea	
Tobacco caterpillar		Downey mildew of cauliflower	