

PLANT PROTECTION

INTEGRATED MANAGEMENT OF IMPORTANT DISEASES AND PESTS OF POTATO

Potato is affected by a large number of fungi, bacteria and viral pathogens depending upon the region. Late blight is the most important disease followed by mosaic/leaf roll viruses and bacterial wilt. The Central Potato Research Institute (CPRI), Shimla has developed technology of integrated management of important pests and diseases.

VIRAL DISEASES

Depending upon the type and extent of viral diseases, yield losses vary from 10 to 80%. The viruses show a wide range of overlapping symptoms individually and/or in various combinations, such as super-mild, transient, typical green or yellow, mild/severe mosaics mottle and to generate chlorosis of plants, coupled with various types of foliage discolouration/distortion. Due to differences in the nature of spread and growth of viruses, a number of indirect and direct measures need to be adopted. The indirect measures can help in maintaining better health of the crop for a longer period by selecting the seeds with the following measures:

- Aphid free location
- Use of certified healthy seed
- Tissue cultured virus eliminated tubers

FUNGAL DISEASES

Among the fungal diseases, late blight, early blight and phoma leaf spots are important. Late blight (*Phytophthora infestans*) is one of the most devastating diseases of potato, the losses may go as high as 85% in hilly regions, if crop remains unprotected. Late blight affects all plant parts -leaves, stems and tubers. The early blight (*Alternaria solani*) infects leaves and tubers. The symptoms include brown, circular to irregular depressed lesions. The symptoms of leaf spots (*Phoma exigua*) are alternate



Late blight attack on potato

light and dark concentric zones of 1 to 2.5 cm in diameter and those with (*Phoma sorghina*) numerous pinhead size spots appear.

To control late blight, the following measures should be adopted:

- In late blight endemic areas of plains, grow resistant varieties like Kufri Badshah, Kufri Jyoti, Kufri Sutlej, Kufri Jawahar, Kufri Anand, Kufri Chipsona-I, Kufri Chipsona-II and Kufri Pukhraj. For hills, Kufri Megha (Khasi hills), Kufri Giriraj (HP hills), Kufri Swarna, Kufri Thanamalai (Nilgiri hills) and Kufri Kanchan (Darjeeling and Sikkim hills) are recommended.
- Use disease free seed and follow proper earthing up.
- Spray the crop with Mancozeb (0.2%) 2–3 times during the crop season.
- In hills, two additional sprays of Ridomil (0.25%) + Sticker (0.1%) may also be given.
- Stop irrigation under cloudy conditions.
- Remove the haulms and bury them in pits at 75% disease severity.

In case of other leaf spot diseases, apply balanced dose of fertilizers, especially Nitrogen. Spray 1% Urea at 45 days and give subsequent sprays after 8–10 days. Discourage collateral solanaceous hosts near potato fields to reduce disease inoculum.

To control tuber born diseases, use healthy seed, adopt crop rotation with cereals, millets and non-solanaceous crops. Follow hot weather cultivation or soil solarization in plains and plateau, and cold weather cultivation in hills. Harvest crop before soil temperature rises above 28°C, thereafter, cure tubers for 8–10 days at 10–15°C and store them in cool, ventilated places.

BACTERIAL DISEASES

The bacterial wilt (*Ralstonia solanacearum*) is characterized by wilting of the plant, vascular rot and pitted lesions in tubers occurring in patches in the field causing losses upto 30–70%. The disease is present in Northeastern hills, Eastern plains, Northwest mid hills (upto 2,000 m), Deccan plateau and the Nilgiri hills. Though bacterial wilt is difficult to control, yet, it is recommended to adopt the following measures:

- Grow disease free seed in disease free areas.
- Include in the crop rotation non-solanaceous crops like, cereals onion, garlic, cabbage, knolkhol, horse gram, etc.
- Drench the infested areas with stable bleaching powder @ 12 kg/ha.

- Undertake blind earthing up.
- Cold weather/hot weather cultivation also reduces disease incidence.

INSECT-PESTS

In each region, there are certain key pests that must be specifically targeted for control.

Aphids (*Myzus persicae*) can injure potato plant directly by sap feeding and are capable of transmitting several important potato viruses. The primary concern with aphids is usually their role as vectors in transmitting viruses. This aphid has different summer and winter hosts (peach). The eggs are laid on the winter hosts in the autumn and in the spring; the young aphids fly from these plants to their diverse summer hosts, one of which is the potato. They may be winged or wingless and under favourable conditions, aphids can propagate very rapidly. Dimethoate and Metasystox @ 0.03% are recommended as remedial control measures.

White flies

These insects act as a vector mainly for potato gemini viruses in plains. To prevent population build up of this pest, give prophylactic sprays of Dimethoate, Methyldemeton or Imidacloprid.

Potato tuber moth

The caterpillars of potato tuber moth can cause damage to potato, in particular to the tubers, in warm areas, both before harvest and during storage. The caterpillars first make mines in the leaves, leaf veins and stems. This pest can cause 100% damage to the stored tubers. Most damage in the field occurs just prior to harvest, especially when vines dying naturally are left over the rows. To prevent tuber injury, the following measures should be adopted:

- Ensure adequate hilling without cracks in the soil.
- Spray crop with synthetic Pyrethroids or Monocrotophos to kill the moths and caterpillars.
- Spray storage areas, too, if potatoes are to be stored at temperature above 10°C.
- Remove infested tubers before storage.

- Protect stored potatoes from egg laying females by wire mesh screens placed over any potential entry point into storage facilities.
- In stores, save tubers by covering them with dry leaves of *Ageratum*, *Eucalyptus* or *Lantana*.

White grubs

These are polyphagous pests both in grub and adult stages and inflict heavy damage on various fruit/forest trees, their nurseries, vegetables, potato, lawns and field crops in hilly areas. The preventive measures are as follows

- Collection of beetles on flight trees on community basis during May-June.
- As soon as attack is noticed, spray @ 0.05% Methyl parathion or Carbaryl 0.1% or Monocrotophos 0.05% on flight trees.
- In growing crop, white grub damage can be minimized by applying Phorate or Chlorpyrifos at the time of earthing up during mid June.

Cutworms

It damages potato during dry seasons in hills (by *Agrotis ipsilon*) and in plains (by *A. segetum*). The larvae are active at night and rest in the soil during the day close to the stem of plants. The stems are injured underground or just above the soil line. Treat the soil with Chlorpyrifos 20 EC (2.5 liters/ha) when there is likelihood of damage.

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