

Plant Protection Practices in Temperate Root Vegetable Crops

Black Rot (*Alternaria radicina*)

Shiny black decay at the crown area and a greenish-black mold on the taproot. The infected tissue is greenish black to jet black due presence of masses of black spores

Remedy:

- Proper field sanitation and practicing rotation.

Carrot fly (*Psil rosae*)

Larva mines into the roots and causes holes, which rots and leads to secondary infection. Drooping and discolouration of foliage from green to rusty brown

Remedy:

- Carrot rust fly adults can be monitored with orange/yellow sticky traps placed in the carrot field
- Application of Carbofuran at 1 kg a.i./ha at a depth of 10-15 cm during land preparation

Carrot Weevil (*Listronotus oregonensis*)

Larvae feed for two to four weeks and tunnel extensively throughout the upper third of the roots, damaging 80% or more of the carrots. They destroy the plant tissue

Remedy:

- Crop rotation is effective

Beetroot

Beet mosaic virus

It causes flecking and mosaic patterns on beet leaves, and eventually major leaf abnormalities.

Curly top virus

Warty leaf veins and rolled brittle and twisted foliage. Plants become stunted and the root system is reduced in size.

Beet Leaf Miner (*Pegomyia hyocymyi*)

It attacks tender leaves and feed in the epidermal layers of the leaf by making serpentine mines in which air gets trapped and gives them silvery appearance.

Remedy:

- Spraying the underside of the leaf with Methyl Demeton (0.03%) and Phosphamidon (0.035%) at the emergence of new leaves is highly beneficial.



Cercospora leaf blight



Alternaria leaf blight of carrot



Alternaria leaf blight or radish



Alternaria leaf blight



Downy mildew



White Rust



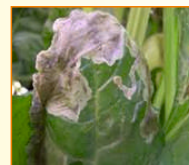
Carrot fly



Carrot weevil affected root



Cabbage borer



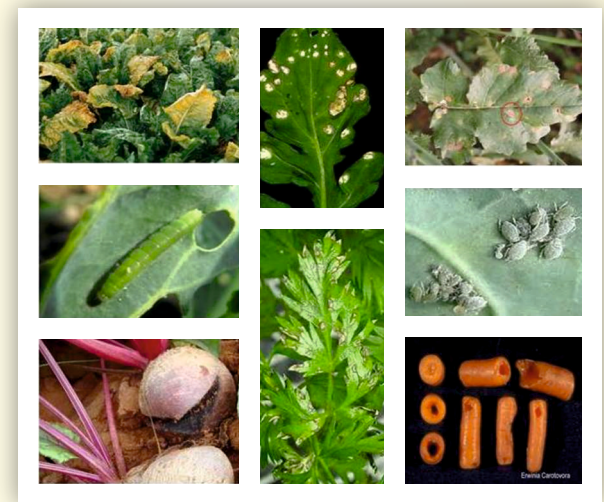
Beet leaf miner



Beet mosaic virus



Beet curly top



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Radish

Alternaria Blight (*Alternaria raphani*)

First appear on the leaves of seed stem in the form of small, yellowish, slightly raised lesions. Lesions appear later on the stems and seed pods.

Remedies:

- Hot water treatment of the seed
- Regular spraying with Difolatan (0.3%) or Dithane M 45 (0.2%) or Ridomil (0.1%)

White rust (*Albugo candida*)

Chalk-white, cheesy, raised spore masses which occur mostly on the under leaf surfaces

Remedy:

- Spraying with Dithane Z 78 (0.2%)

Root rot (*Erwinia rhapontici*)

Rotting of pith tissues resulting in cavity formation and wilting of plants

Remedy:

- Dipping of the seeds in a solution of Agrimycin-100 (100ppm) at the time of sowing.

Cabbage Borer (*Hellula undalis Fabr.*)

It nibbles the leaf and later feeds within root of turnip. In severe attack, the plants become weak and produce deformed heads.

Remedy:

- *Bacillus thuringiensis var. kurstaki* widely used at a weekly interval and a rate of 0.5/ha.
- Dusting 4% Carbaryl

Turnip

Downy mildew (*Peronospora parasitica*)

Cotyledons and primary leaves are invaded resulting in fungal growth visible on the underside of the leaf. Later a slight yellowing develops opposite the fungal growth on the upper side of the leaf.

Remedies:

- Use a crop rotation plan that excludes production of any type of cruciferous crop for at least 2 out of every 3 years.
- Spray of Ridomil MZ 72 @0.025% before the onset of favourable conditions followed by Dithane M 45 @0.2% at 10 days

Alternaria Leaf Spot (*Alternaria spp.*)

First appear on the leaves of seed stem in the form of small, yellowish, slightly raised lesions. Lesions appear later on the stems and seed pods.

Remedy:

- Hot water treatment of the seed
- Spraying with Difolatan (0.3%) or Dithane M 45 (0.2%) or Ridomil (0.1%)

Turnip Phyllody

Dull grey to light violet colouration on the leaves. The sepals and petals become green thick knob headed leaves.

Remedy:

- Soil application of Thimet 10-G (1.5 kg a.i./ha)
- One or two sprays of Phosphamidon (0.05%) or Oxydemetan Methyl (0.02%) is done to eradicate the jassid

Turnip aphids (*Lipaphis erysimi*)

Large colonies cause the plants to become deformed and the leaves curled, shriveled and yellowed.

Remedies

- Treat the seeds with Imidacloprid or Thiamethoxam @ 5g/kg seed.
- Application of Phosphamidon dust 0.5 ml/l
- Spray neem oil at 1.25%.

Turnip root maggot (*Delia floralis*)

Larvae generally confine their feeding to roots, but sometimes work their way up into petioles of the lower leaves.

Remedies

- Deep ploughing the field just after harvesting to minimize the maggots.
- Apply Carbofuron at 1.5kg a.i./ha at sowing stage.

Carrot

Alternaria Leaf Blight (*Alternaria dauci*)

First appear at the margin of the leaflets and are dark brown to black and irregular in shape. Lesions produced on the petioles and stems are dark brown and often coalesce and girdle the stems.

Remedy:

- Seed treatment with Thiram (3g/kg of seed) before sowing
- Fungicidal applications with Foltaf (0.2%), Copper Oxychloride (0.3%)

Cercospora Leaf Blight (*Cercospora carotae*)

First appear along the margins of the leaves, often causing the leaves to curl. Spots inside the leaf edges are small, roughly circular, and tan or gray to brown with a dead center. As the lesions increase in number and size, the entire leaflet withers and dies.

Remedy:

- Early applications of Foltaf (0.2%), Copper Oxychloride (0.3%)

Powdery mildew (*Erysiphe cichoracearum*)

White powdery growth on the leaves and petioles causing the leaves to turn brown and wilt

Remedy:

- Spraying Bavistin (0.1%) or Benlate (0.1%) at an interval of 8-10 days

Watery soft Rot (*Sclerotinia sclerotiorum*)

Characteristic white mold with black sclerotia present on the crown of infected carrots

Remedy:

- Crop rotation, weed control (to improve air circulation), planting on raised beds, winter flooding, rapid cooling prior to storage