Lecture 01 - Diseases of Citrus

Gummosis: ***Phytophthora parasitica, P. palmivora,P. citrophthora***

Symptoms

The symptoms appear as yellowing of leaves, followed by cracking of bark and profuse gumming on the surface. The main source of infection is infected planting material. As a result of severe gumming, the bark becomes completely rotten and the tree dries owing to girdling effect. Prior to death, the plant usually blossoms heavily and dies before the fruits mature. In such cases, the disease is called foot rot or collar-rot.

Pathogen

Aseptate, intercellular & intracellular hypha. Sporangia are ovoid or ellipsoid. Sporangium attached with the sporangium at the right angles sporangia germinate to release zoospore.

Favourable conditions

Prolonged contact of trunk with water as in flood irrigation; water logged areas and heavy soils.

Mode of spread and survival

Soil inhabitants, Sporangia spread by splashing rain water, irrigation water and wind.

Management

Preventive measures like selection of proper site with adequate drainage, use of resistant rootstocks and avoiding contact of water with the tree trunk by adopting ring method of irrigation are effective. Alternatively the disease portions are scraped-out with a sharp knife and the cut surface is disinfected with Mercuric chloride (0.1%) or Potassium permanganate solution (1%) using a swab of cotton. Painting 1 m of the stem above the ground level with Bordeaux helps in controlling the disease. Also spraying and drenching with Ridomil MZ 72@ 2.75 g/l or Aliette (2.5 g/l) is effective in controlling the disease.

Scab/Verucosis : ***Elsinoe fawcetti***

Symptoms

The lesions in early stages appear on the underside of the leaves as small semi-translucent dots, which finally become sharply defined pustular elevations. In later stages, leaves often become distorted, wrinkled, stunted and deformed. On the fruit, lesions consist of corky projections, which often break into scabs. The opposite surface corresponding to the warty growth shows a circular depression with a pink to red center.

Pathogen

Ascostroma are simple, innate, intra or sub epidermal, partially erumpent at maturity, small pulvinate to crustose. Asci are ovoid. Ascospares are 1-3 septate oblong to elliptical and hyaline to yellowing conidia are produced in acervuli. Conidia are hyaline, ablong, elliptical with two minute droplets of their ends.

Mode of Spread and Survival

The pathogen survive in off season as ascospores and spreads through Conidia.

Management

The diseased leaves, twigs and fruits should be collected and destroyed. Spraying of Carbendazim 0.1% is quite effective

Canker : *Xanthomonas campestris* pv *citri*

Symptoms

Acid lime, lemon and grapefruit are affected. Rare on sweet oranges and mandarins. Affects leaf, twig and fruits. In canker, leaves are not distorted.Lesions are typically circular with yellow halo; appear on both sides of leaf, severe in acid lime (difference from scab) When lesions are produced on twigs, they are girdled and die. On fruits, canker lesions reduce market value.

Pathogen

It is Gram negative, non spore forming, aerobic bacteria. It is rod shaped, forms chains and capsules and is motile by one polar flagellum.

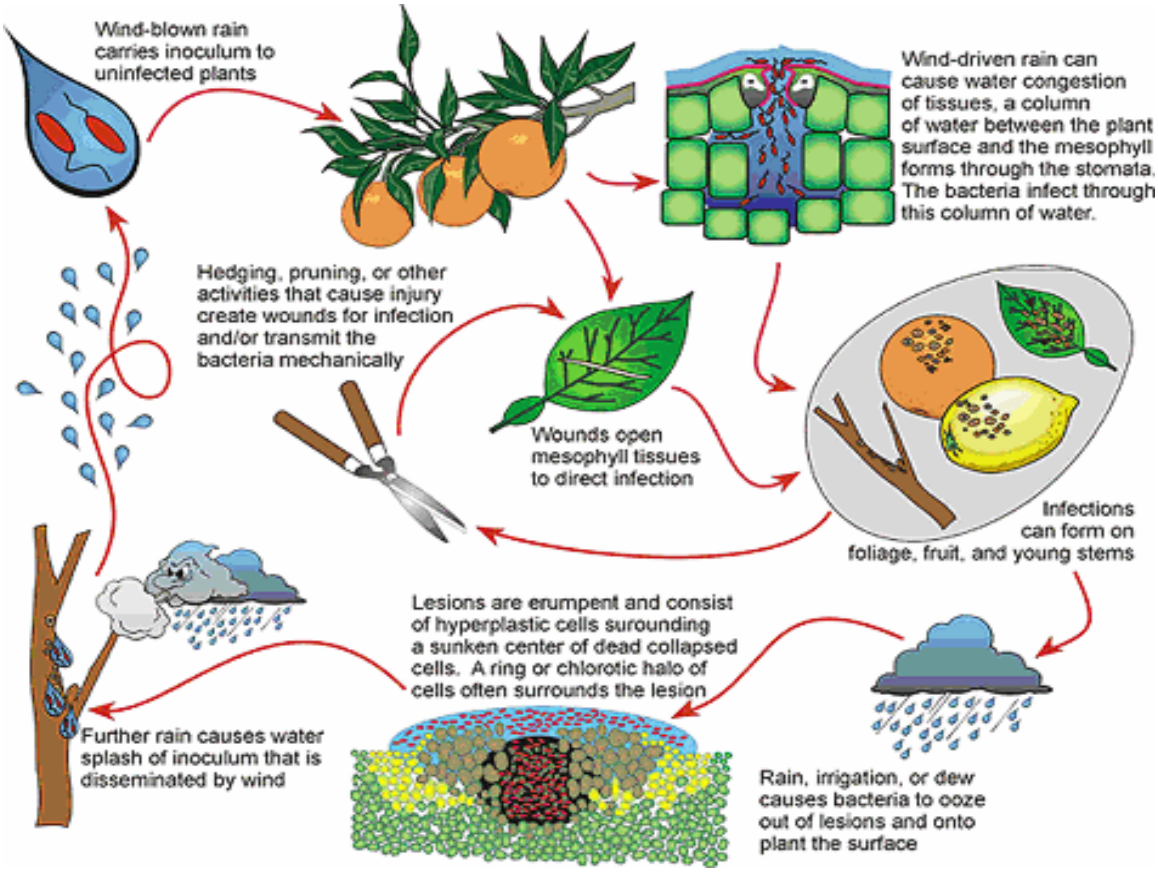
Favourable conditions

Free moisture for 20 minutes, 20-30°C.

Mode of survival and spread

Wind and rain splashes. Survives in infected leaves for 6 months. Injury caused by leaf miner helps the entry of the bacterium.

Disease Cycle



Management

Streptomycin sulphate 500-1000 ppm; or Phytomycin 2500 ppm or Copper oxychloride 0.2% at fortnight intervals. Control leaf miner when young flush is produced. Prune badly infected twigs before the onset of monsoon.

Tristeza or quick decline : *Citrus tristeza virus* **(CTV)**

Symptoms

Lime is susceptible both as seedling or buddling on any root stock. But mandarin and sweet orange seedlings or on rough lemon, trifoliate orange, citrange; Rangpur lime root stocks tolerant; susceptible root stocks are grapefruit and sour orange.

In sweet orange or mandarin on susceptible root stocks, leaves develop deficiency symptoms and absise. Roots

decay, twigs die back. Fruit set diminishes; only skeleton remains. Fine pitting of inner face of bark of sour orange stock. Grapefruit and acid lime are susceptible irrespective of root stock. Acid lime leaves show large number of vein flecks (elongated translucent area). Tree stunted and dies yield very much reduced. Fruits are small in size. Use of infected bud wood and *Toxoptera citricida* (aphid) is the important vector.

Pathogen

Citrus tristeza virus is long, flexuous rod and measure 2000x 12nm in size. Three strains *viz.*, mild, severe and seedling yellow are reported.

Mode of spread

Use of infected bud wood *Toxoptera citricida* (aphid) is the important vector.

Management

For sweet orange and mandarin, avoid susceptible root stocks. For acid lime, use seedling preimmunised with mild strain of tristeza.

Exocortis of scaly butt: *Viroid*

Symptoms

Affects only Rangpur lime, trifoliate orange and citrange root stocks. Vertical cracking and scaling of bark in the entire, root stock. Extreme stunting of plant.

Pathogen

Viroid is free RTVA without protein coat.

Mode of Spread and Survival

Transmission normally occurs through infected bud, wood, and contaminated tools. Not through vector and seed.

Management

Spray with any one of the systemic insecticide to control the aphid vector. Use virus-free certified bud wood; use tolerant stocks like rough lemon Periodically wash budding knife with disodium Phosphate solution.

Greening: *Liberobactor asiaticum* (Phloem limited bacteria)

Symptoms

This disease affects almost all citrus varieties irrespective of root stock. Stunting of leaf, sparse foliation, twig die back, poor crop of predominantly greened, worthless fruits. Sometimes only a portion of tree is affected.A diversity of foliar chlorosis. A type of mottling resembling

zinc deficiency often predominates. Young leaves appear normal but soon assume on outright position, become leathery and develop prominant veins and dull olive green colour.

Green circular dots on leaves. Many twigs become upright and produce smaller leaves. Fruits small, lopsided with curved columella. The side exposed to direct sunlight develops full orange colour but the other side remain dull olive green. Low in juice and soluble solids, high in acid. Worthless either as fresh fruit or for processing. Seeds poorly developed, dark coloured, aborted.

Pathogen

Rickettsia like organisam

Mode of spread

Infected budwood; psyllid vector-*Diaphorina citri*

Management

Control psyllids with insecticides. Use pathogen free bud wood for propagation. 500 ppm tetracycline spray, requires fortnightly application.