

Citrus Greening Disease (CGD)

Description:

Misshapen and bitter fruits are unsuitable for sale as fresh fruit or juice.

History and Importance:

Major cause of crop and tree loss in Asia and Africa.

Yellow shoot (Huanglongbing) in China

Dieback in India, Leaf Mottle in Philippines,

In Pakistan 60-90% citrus plantation is affected by CGD

Etiology:

Liberobacteras from Asia and Africa (*Candidatus liberobacter asiaticum*) and (*Candidatus liberobacter africanum*)

Symptoms:

1. Yellowing of veins and adjacent tissues.
2. Mottling of entire leaf.
3. Lopsided, bitter, hard fruit with small, dark aborted seeds.
4. Fruit that remains green even when ripe.
5. Asymmetrical blotchy mottling of leaves.

Transmission:

Citrus psylla

(*Diaphorina citri* resistant to heat and *Trioza erytreae* sensitive heat)

Pathogen present in haemolymph and salivary glands).

Management:

Control of vector

Healthy propagating material

Application of growth hormones (NAA)

Quarantine measures

Bacterial Blight of Cotton

History and Importance:

Angular leaf spot

Black vein

Black Arm

1st reported in Alabama USA in 1891. In sub-continent epidemics in 1948-52.

Etiology:

Xanthomonas axonopodis pv *malvacearum*

Symptoms:

1. Bolls may become infected causing boll rot which results in rotted seed and discolored lint.
2. A white waxy crust containing the bacterium may form on old leaf spots or cankers.
3. Black cankers may girdle the stem or branches causing the portions to die above the canker.
4. Spots on infected leaves may spread along the major leaf veins. As disease progresses, leaf petioles and stems may become infected resulting in premature defoliation.
5. The angular appearance is due to restriction of the lesion by fine veins of the cotton leaf.
6. bacterial blight causes small, quarter-inch-diameter lesions that are initially dark green turning to dark brown.

Disease cycle:

In dry leaves 17 years

Fuzz or inside of seed

Infected parts (Primary source)

Secondary (Wind, Rain, Dew and Labor)

Management:

1. Seed treatment with (H₂SO₄) and Streptomycin.
2. Hot water treatment at 56°C for 10 min.
3. Mixture of Agrimycin and Blitox.

Bacterial Blight of Rice

History and Importance:

70s Epidemic in Africa

1884 in Japan

1977 in Pakistan

Severe attack results in 50% yield reduction

Etiology:

Xanthomonas oryzae pv *oryzae*

Symptoms:

1. Water soaked yellowish stripes on leaf blades with wavy margin.
2. Bacterial ooze like a milky drop on young lesions early in the morning.
3. Yellow lesion turn to white as the disease advances.

4. Panicles unfilled.

Disease cycle:

Primary source: Weeds, stubbles and ratoons (cutting most of the above-ground portion but leaving the roots and the growing shoot apices intact so as to allow the plants to recover and produce a fresh crop in the next season.) of infected plants.

Secondary source: Water, rain

Enter through hydathodes and wounds.

Epidemiology:

25-30°C

Management:

1. Seed treatment with bleaching powder @ 100ug/L
2. Zinc sulphate 2%.

Citrus Canker

History and Importance:

Occur in all citrus growing areas.

Originated in China & spread to Europe and USA in 1910.

In 1919 & 1984 all citrus destroyed in Florida, USA.

Etiology:

Xanthomonas axonopodis pv *citri*

Symptoms:

1. First raised watery spots appear on leaves.
2. Later spots become thickened, brown and corky.
3. Infection to midrib and petiole causes premature defoliation.

Disease cycle:

Primary source are old lesions on standing trees.

Wind driven rain helps in secondary infection.

Enter through stomata or wounds.

Bacteria induce surrounding cells to swell up and divide abnormally.

Tissue disruption and enzymes begin to degrade tissues, kill cells.

Plant cell contents leak out to nourish bacteria.

Epidemiology:

Leaf minor, 20-30°C

Management:

1. Streptomycin 100-1000 ppm at 15 days interval.

2. Garlic extract.

Citrus Slow Decline

Description:

Prevalent (Disease present) in all citrus growing areas.

History and Importance:

1st reported from California (USA) in 1912.

5% losses overall.

Etiology:

Tylenchulus semipenetrans

Symptoms:

1. Encrusted root system.
2. Twigs dieback.
3. Yellowing of leaves, defoliation, premature shedding of fruits, reduction in number and size of fruits.

Disease cycle:

Live on alternate host (olive grapevine)

Females lay eggs in gelatinous substance, remain safer for long time.

In soil may occur as deep as 4 meters.

Planting material is secondary source of spread.

Management:

1. Hot water (45°C for 25 min)
2. Treat nursery with nematicide (nemacur).
3. Pre and post plant soil fumigation (Nemagon, D-D mixture, vapam).

Root knot diseases

Description:

Root knot of vegetables

Meloidogyne sp.

Attack more than 200 plant species.

Causes up to 75% losses.

Common in warm and hot areas.

Symptoms:

1. Few, small and pale green leaves.
2. Infected roots swell at the point of invasion giving root knot appearance.

Disease cycle:

- Host range (potato, tomato, eggplant, chili, okra, carrot, reddish etc)
- Female lays 500 eggs in gelatinous substance
- 2nd stage enters, become sedentary & feed with stylet
- Distinguish male & female at 4th stage
- Life cycle complete in 25 days at 27°C

Management:

- Soil treatment with nematicides
- Grow resistant varieties
- Cultural practices
- Crop rotation
- Biological control Bacteria: *Pasteuria penetrans*, Fungi:
Dactylella oviparasitica

Cyst diseases

Description:

Heterodera, Globodera

- Round known golden nematodes severe on potato, eggplant & tomato (*G. rostochiensis*)
- *Hetrodera avenae* on cerials
- Yield reduces 30-75 %

Symptoms

- Soy bean on sandy soils are stunted, leaves turn yellow & fall off early
- Only few flowers & small seeds formed
- Attack on sugar beet give small to large patches of wilted, dead or stunted plants
- Smaller root system with few bacterial nodules or hair like roots
- Cysts attached on roots

Disease cycle:

Nematodes over winter as brown cysts (fully developed 2nd stage juvenile) in upper 90-100 cm of soil

Management:

- Resistant varieties
- Soil fumigation
- Several fungi (*Fusarium*, *Verticillium*) parasitize on nematodes
- Early sowing when nematodes inactive
- Crop rotation with alfalfa or potato