Lecture 03 - Diseases of Banana (2 Lectures)

Panama disease :*Fusarium oxysporum* f. sp*cubense*

Economic Importance

The first major disease which attacked banana was called Panama disease from the area where it first became serious. Banana wilt is a soil-borne fungal disease and gets entry in the plant body through roots and wounds caused by nematodes. It is most serious in poorly drained soil. Disease spreads through infected suckers.

Symptoms

Yellowing of the lower most leaves starting from margin to midrib of the leaves. Yellowing extends upwards and finally heart leaf alone remains green for some time and it is also affected. The leaves break near the base and hang down around pseudostem. Longitudinal splitting of pseudostem. Discolouration of vascular vessels as red or brown streaks. The fungus spreads through use of infected rhizomes Continuous cultivation results in build up of inoculum.

Pathogen

Mycelium is septate, hyaline and branched. Fungus produces micro, macro conidia and also chlamydospores. Micro conidia - Single celled or rarely one septate hyaline elliptical or oval. Macro conidia - Sickle shaped hyaline, 3-5 septate and tapering at both ends. Chalamydospores - Thick walled, spherical to oval, hyaline to slightly yellowish in colour.

Mode of spread and survival

The pathogen is soil borne. It survives in soil as chlamydospores for longer periods. The primary spread of the disease is through infected rhizomes and secondary spread is through irrigation water. Continuous cultivation results in build up of inoculum.

Management

Avoid growing of susceptible cultivars *viz.*, Rasthali, Monthan, Red banana and Virupakshi. Grow resistant cultivar Poovan. Since nematode predispose the disease pairing and prolinage wit Carbofuran granules. Corm injection of 3 ml of 2% Carbendezim injected in the corm by making a hole to a depth of 10cm with 45 0 angle on 5 th and 7 th month as mentioned earlier.

Moko disease : *Pseudomonas solanacearum / Burkholderia solanacearum*

Symptoms

Leaves become yellow and progress upwards. The petiole breaks and leaves hang. When it is cut open discolouration in vascular region with pale yellow to dark brown colour. The discolouration is in the central portion of the corm. Internal rot of fruits with dark brown discoloration. When the pseudostem is cut transversely bacterial ooze can be seen.

Pathogen

It is rod shaped, gram negative bacterium with one polar flagellum.

Mode of spread and survival

The pathogen is soil borne, it survives in susceptible hosts like banana and Heliconia spp.

Management

Eradicate infected plant. Expose soil to direct sunlight. Use of clean planting material. Fallowing and crop rotation is advisable.Disinfection of pruning of tools. Providing good drainage.

Tip over or Heart rot: *Erwinia carotovora* subsp. *carotovora*

Symptoms

The base of the pseudostem and upper portion of the corm are affected and leads to rotting. Young 1-3 month old plantation susceptible during summer months.

Management

Plant disease free suckers. Remove infected plants and destroy. Drench with Methoxy ethyl mercuric chloride (Emisan-6) 0.1 / or Sodium hypohlorite 10% or Bleaching powder 20g /litre/tree.

Sigatoka disease : *Mycosphaerella musicola (Cercospora musae*)

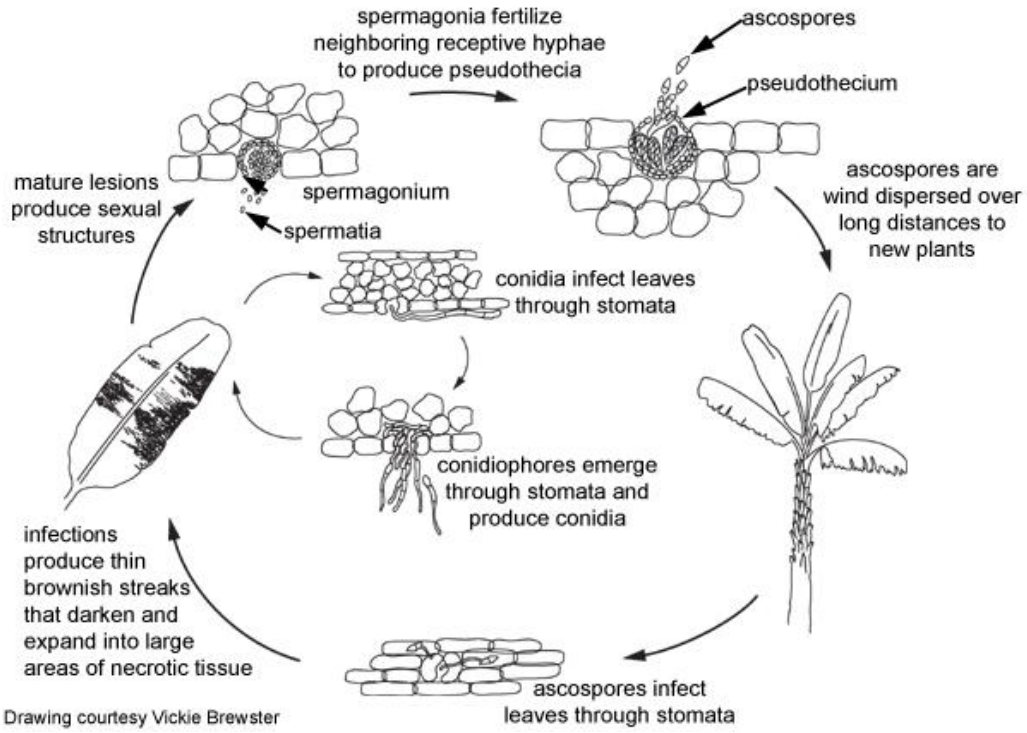
Symptoms

On leaves small light yellow or brownish green narrow streaks appear. They enlarge in size becomes linear, oblong, brown to black spots with dark brown brand and yellow halo. Black specks of fungal fruitification appear in the affected leaves. Rapid drying and defoliation of the leaves.

Pathogen

Conidia are elongated, narrow and multi septate and measure 20 – 80 x 2-6micron meter. Perithecia are dark brown to black and asci are oblong, clavate and measure 28.8- 36.8x8.0-10.8 micron meter. Ascospores are one septate, hyaline, obtuse with upper cell slightly broader.

Disease Cycle



Management

Removal and destruction of the affected leaves. Spray Propiconazole + Carbendazim 0.1% or Chlorothalonil 0.25%. Add wetting agent such as teepol or sandovit added at the rate of 1ml/lit of water.

Cigar end Rot *(Verticillium theobromae, Trachsphaera fructigena* and *Gloeosporium musarum)*

Symptoms

A black necrosis spread from the perianth into the tip of immature fingers**.** The rotted portion of the banana finger is dry and tends to adhere to fruits (appears similar to the ash of a cigar).

Pathogen

Conidiophores are usually solitary or in small groups. Conidia are hyaline, oblong to cylindrical. They are borne at the end of tapering phialides, aggregated into rounded, mucilaginous translucent heads.

Control:

Removal of pistil and perianth by hand 8-10 days after bunch formation and spraying the bunch with Dithane M -45 (0.1%) or Topsin M (0.1%) controls the disease effectively. Minimising bruising; prompt cooling to 14°C; proper sanitation of handling facilities reduce the incidence in the cold storage.

Anthracnose*:* *Gloeosporium gloeosporioides*

Symptoms:

The skin at the distal ends of the fingers turn black shrivels. The fungus produces masses of conidia which form a pinkish coat. The entire fruit and bunch is affected in severe cases. Sometimes main stalk of bunch diseased. The bunch becomes black and rotten. Acervuli produces cylindrical conidiophores, hyaline, septate, branched. Conidia hyaline, non-septate, oval to elliptical.

Pathogen

Acervuli are usually rounded or sometimes elongated, erumpent. Conidiophores are cylindrical, tapered towards the apex, hyaline and septate. Conidia are hyaline, aseptate, oval to ellipitical in shape.

Mode of spread and survival

The spread of the disease is by air borne conidia and numerous insects which frequently visit banana flowers also spread the disease.

Management

Post harvest dipping of fruits in Carbendazim 400 ppm, or Benomyl 1000 ppm, or Aureofunginsol 100 ppm.

Freckle or Black Spot: *Phyllostictina musarum*

Symptoms

Minute raised dark brown spots appear with black dots in the centre on leaves and fruits. On the fruits the pathogen is confined to the skin. The fungus produces pycnidium which are dark. conidiophores simple, short, elongate. Conidia are byline, single celled ovoid. Fungus survives in infected plant debris. Conidia spread by rain water and wind.

Pathogen

The fungus produces pycnidia and pycnidiospores. Pycnidiospores are needle shape, hyaline and multi septate.

Management

Spray Copper oxychloride 0.25%. Add wetting agent such as teepol or sandovit added at the rate of 1ml/lit of water.

Banana bunchy top: *Banana bunchy top virus*

Economic Importance

The disease is covered by domestic quarantine regulations. Losses were estimated to be Rs.4 crores every year and 100% loss occurs if infected suckers are planted.

Symptoms

Subsequent leaving show the same symptoms and are dwarfed. Dark broken bands of green tissues on the veins, leaves and petioles. Plants are extremely stunted. Leaves are reduced in size marginal chlorosis and curling. Leaves upright and become brittle. Many leaves are crowded at the top. Branches size will very small. If infected earlier no bunch will be produced. The disease is transmitted primarily by infected suckers.

Mode of spread

Secondary spread is through the aphid vector *Pentalonia nigronervosa*

Management

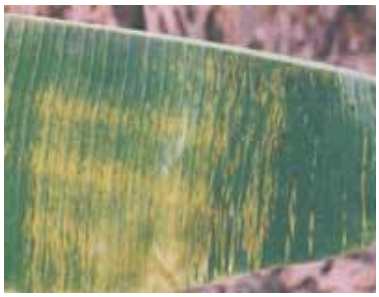
Select suckers from disease free areas. Control vector by spraying methyl demoton 1 ml/l.or Monocrotophos, 2 ml/l.or Phosphomidon 1 ml / lit. or Injection of Monocrotophos 1 ml / plant (1 ml diluted in 4 ml). Infected plants are destroyed using 4ml of 2, 4, D (50g in 400 ml of water).

Infectious chlorosis: *Cucumber mosaic virus*

Economic Importance

Infectious chlorosis or heart rot of banana is caused by Cucumber Mosaic Virus (CMV) has recently become serious, the disease has been recorded from 20 to 80 per cent in Poovan cultivar.

Symptoms



Chlorotic or yellow linear discontinuous streaks on leaves, upward curling of leaves, twisting and bunching of leaves at the crown, erectness of newly emerged leaves. Sometimes heart rot symptom also appear. Diseased plants are dwarf, do not produce bunches. The virus spreads through infected suckers and aphid vectors -*Aphis gossypii*

Management

Destroy infected plants. Use disease free suckers. Control vector by spraying systemic insecticide 0.1%