Course – M. Sc. Botany Part 1 Paper III

Topic – Plant Disease: Red rot of sugarcane

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Red Rot of Sugarcane:

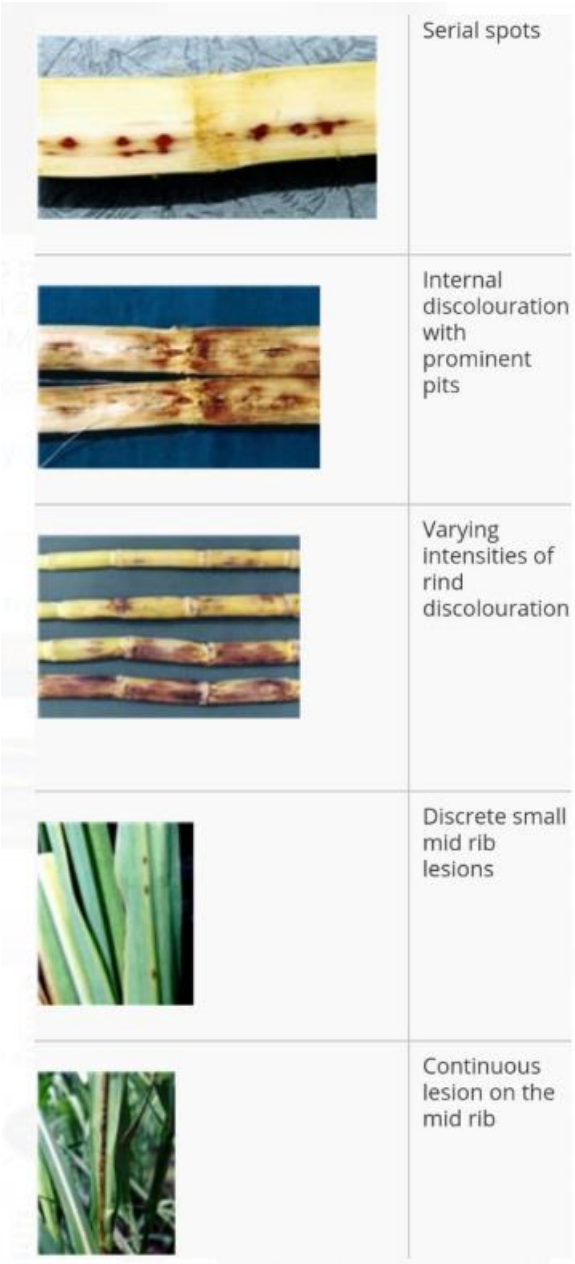
- It is a serious and destructive disease of sugarcane
- First reported in 1893 from Java (Indonesia)
- In India first reported in1901 in Andhra Pradesh.
- Disease epidemic occurred in 1939-1940 in UP and Bihar.
- Disease is soil and seed borne.

Distribution:

- occurs in tropical and subtropical regions of the world.
- In India, it occurs in most of the sugarcane growing states particularly Bihar, Uttar Pradesh, Madhya Pradesh, Haryana and Punjab.

Symptoms of Red Rot Disease:

- Appear after rainy season when plant growth stop & sugar formation start
- The earliest symptoms are the yellowing and drooping of the upper leaves (near the tip).
- Later the infected stems shrivel.
- The rind looses the bright colour and become wrinkled
- Cane becomes light weight and can be easily broken.
- Longitudinal reddening of the normally white internal tissue with intermingled transverse white spots of the internodes.
- A discoloration, that may extend through many joints of the stalk.
- Disease blood red lesions with dark margins develop on the leaves(acervuli).
- In late season, dark dot like structure, velvety in texture appear in the shriveled areas near the nodes and on the internodes.



Effect of Disease:

- Induces conversion of sucrose into glucose and alcohol in mature cane sugar plant, due to enzymatic action of pathogen.
- Loss in sucrose content may be as high as 33%.
- Juice of bad odour& not set well on boiling due to conversion of sucrose into glucose.
- Low quality sugar as well as reduction in production.
- Even threatens to destruct the entire crop of the field leading to enormous loss.

Causal Organism: Etiology.

- Colletotrichum falcatum(I.P)
- Glomerella tucumanensis(P.S)

Systemic Position:

Kingdom: Mycota/ Fungi

Division: Eumycota

Sub division: Deuteromycotina

Class: Coelomycetes

Order: Melanconiales

Family: Melanconaceae

Genus: Colletotrichum

Species: Falcatum

Pathogen character:

- The causal agent, Colletotrichum falcatum is of form-class Fungi Imperfecti.
- The perfect or sexual stage of the fungus has also been described Glomerella tucumanensis.
- Asexual fruit bodies are called acervuli.
- Acervuli are black velvety bodies which develop in clusters.
- Pathogen survive in setts/seed canes, infected stubbles/debries and soil as chlamydospore.
- Chlamydospores are terminal or intercalary.
- Disease is seed and soil borne.

Mycelium of Red Rot Disease:

- The fungus mycelium is found within and in the intercellular spaces between the pith cells of the host.
- The hyphae constituting the mycelium are thus both inter- and intracellular.
- They are slender, colourless, branched and septate.
- The hyphae produce a large number of chlamydospores in the pith parenchyma.

Epidmiology: Mode of spread.

- In rainy season the disease spread is very fast and the whole crop dries up.
- Primary transmission through the soil and diseased setts.
- Primary inoculums: old fragments of stalk and leaves on which the fungus grow saprophytically.
- Ratoon crops are also a source of primary inoculum.
- Secondary inoculums: conidia produced in the acervuli developed along the midrib of the diseased leaves.
- These are disseminated by wind, rain, irrigation water and also by insects.
- In winter air current helps in the spread of disease.
- Occurrence of disease in the upper part of the canes indicates aerial mode of dispersal of the inoculums.

Mode of infection:

- Infection occurs through the nodes.
- Main entry points are leaf scar, growth rings, root primordial and buds.
- Pathogen can also enter the stalk through root lets, growth cracks and cut ends of setts.

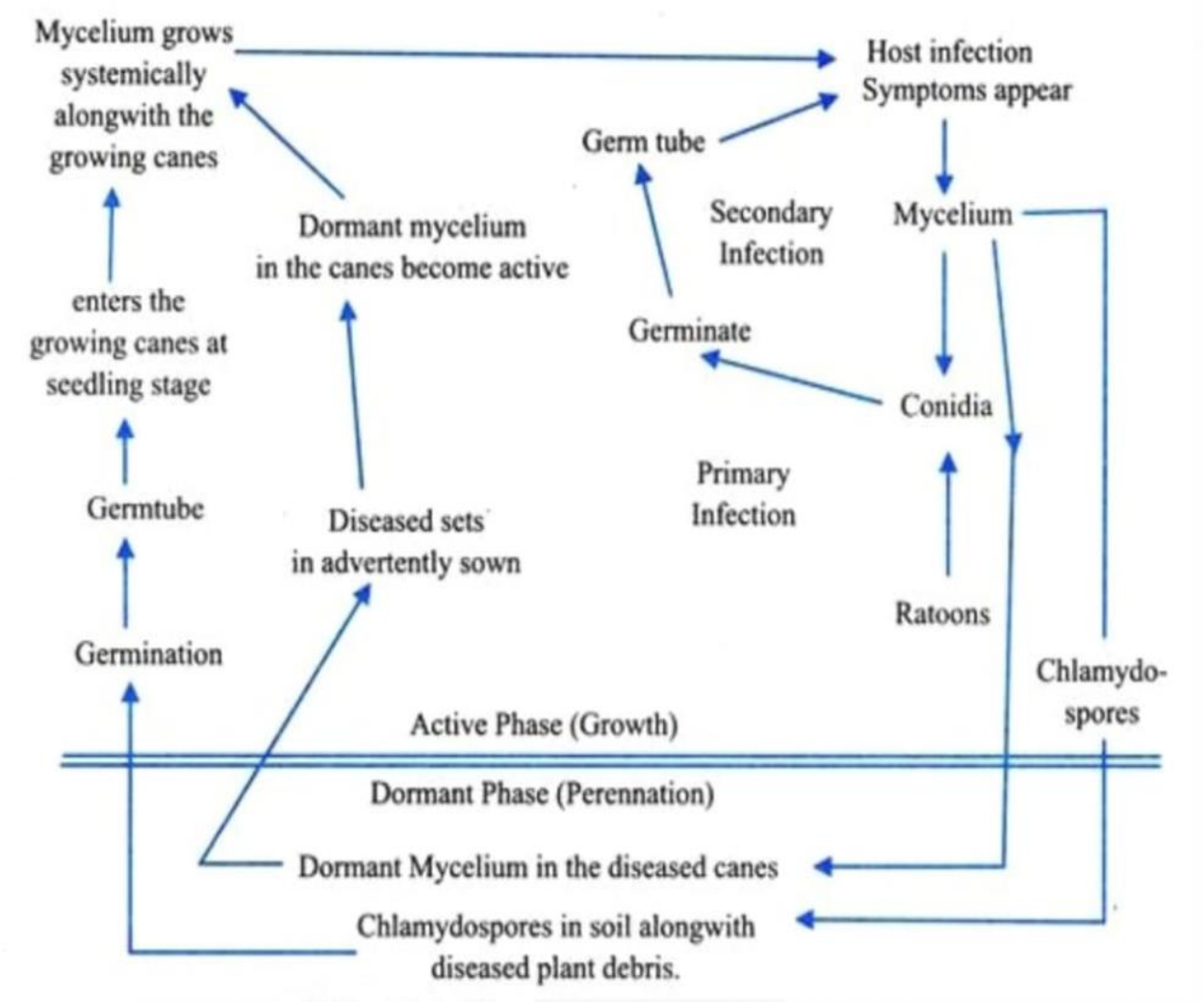
Favourable condition for disease development:

- Mean temperature range from 29.4 to 31 degree C for disease development.
- pH 5-6
- Drought condition during the initial growth is favourable.
- High humidity.
- Water logged condition of the soil.

Disease Cycle:

- The inoculum lives from one growing season to the next on the debris of the diseased plants.
- The conidia are short-lived and thus play no role in the perennation of the pathogen,
- The thick-walled chlamydospores and perithecia are considered as probable means of survival
- Acervuli survives in the active stage for 3 or 4 months in the soil.

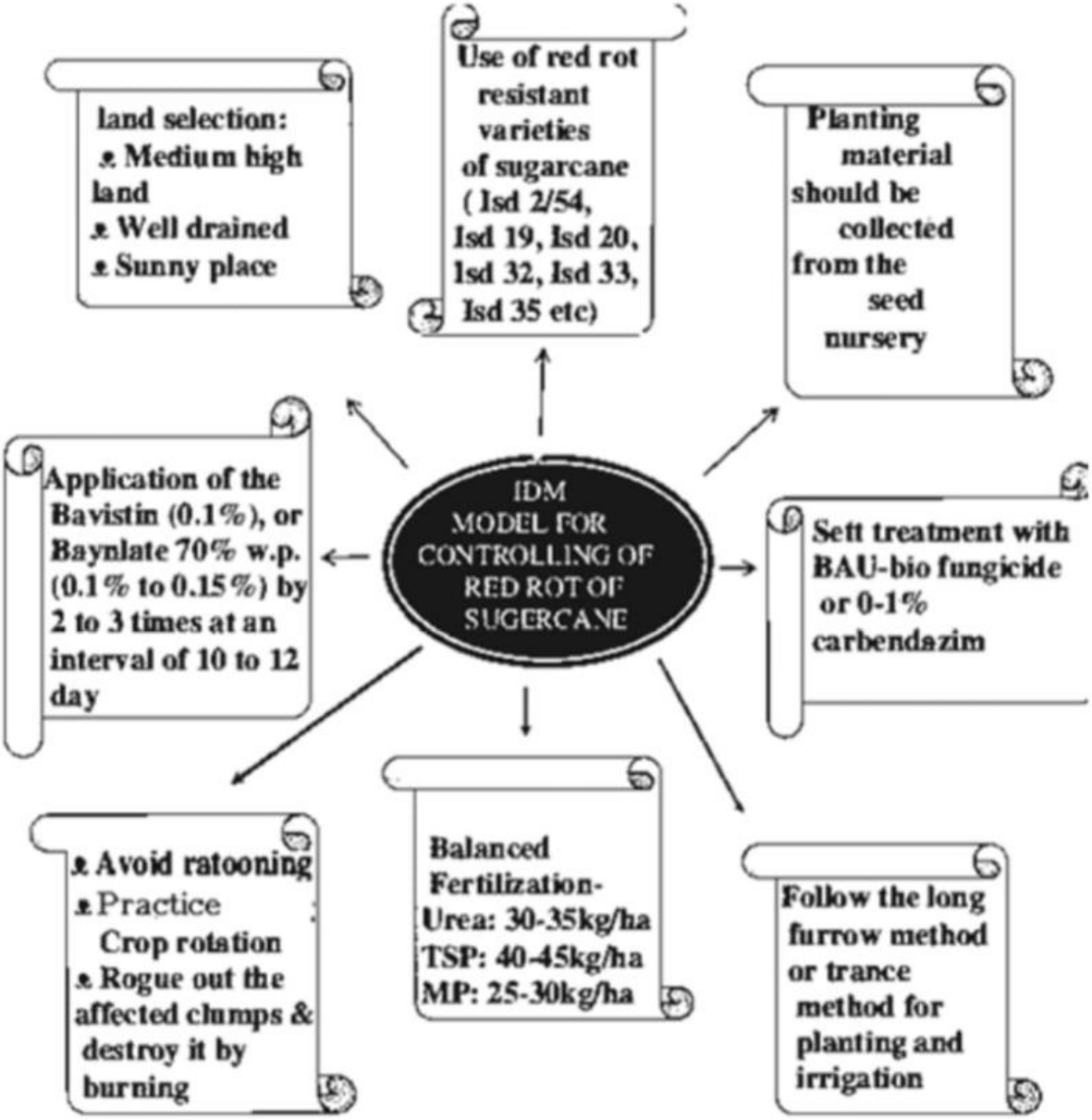
- The survival of the mycelium for this limited period is sufficient to provide easy catching of the succeeding crop because sugarcane practically has no dead season.
- the disease is borne in the seed sets which serve as chief means of survival and spread of the disease.
- The diseased sets sown in the soil, sprout into infected shoots which soon produce conidia in the acervuli.
- The conidia serve as a secondary means of infection and spread of the disease.
- They get detached and are dispersed through the agency of wind, water and insects.
- On reaching the surface of the healthy sugarcane plants, they germinate immediately in the moisture retained in the enclosing sheaths.



Disease cycle of Red rot of sugarcane

Control Measures /Disease control:

- Field sanitation is an important measure to prevent the build source of primary inoculum.
- It consists in the collection and burning of sugarcane trash in the field.
- Plantation of resistant cultivars, like, Co. 846, Co. 951, Co. 1148, Co. 561, B.O.3, B.0. 7 and B.O. 32 is most effective method.
- The use of sound and healthy seed sets.
- Long rotation of crops minimizes soil borne infection, Crop rotation 2-3 yrs
- Setts treatment - Carbendazim @ 2.5 gm/lit. of water for 30 minutes
- Hot water treatment -52° C for 8 hrs., 54° C for 2 hrs.
- Hot air treatment - 54° C for 6 hrs
- Removal of infected stool.
- Plant the crop when conditions are optimal for rapid germination and maintain proper soil moisture.
- Harvest susceptible cultivars before they have passed the peak of maturity.
- Practice crop rotation, with an alternate crop at the end of the planting and rotooning cycle.



Integrate disease management for controlling of red rot of sugarcane.