RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

DISEASES OF FIELD CROPS PPA - 301

LECTURE 15

1.Red rot - *Colletotrichum falcatum* (Perfect stage: *Physalospora tucumanensis)*

Symptoms

The first external symptom appears mostly on third or fourth leaf which withers away at the tips along the margins. Typical symptoms of red rot are observed in the internodes of a stalk by splitting it longitudinally. These include the reddening of the internal tissues which are usually elongated at right angles to the long axis of the stalk. The presence of cross-wise white patches are the important diagnostic character of the disease. The diseased cane also emits acidic-sour smell. As the disease advances, the stalk becomes hollow and covered with white mycelial growth.

Later the rind shrinks longitudinally with minute black, velvetty fruiting bodies protruding out of it. The pathogen also produces tiny reddish lesions on the upper surface of leaves with dark dots in the centre. The lesions are initially blood red with dark margins and later on with straw coloured centres. Often the infected leaves may break at the lesions and hang down, with large number of minute black dots.

Pathogen

The fungus produces thin, hyaline, septate, profusely branched hyphae containing oil droplets. The fungus produces black, minute velvetty acervuli with long, rigid bristle-like, septate setae. Conidiophores are closely packed inside the acervulus, which are short, hyaline and single celled. The conidia are single celled, hyaline, falcate, granular and guttulate. FungusAsci are clavate, unitunicate and eight-spored. Large number of hyaline, septate, filiform paraphyses is also present among asci. Ascospores are ellipsoid or fusoid, hyaline, straight or slightly curved and unicellular which measure 18-22 □m x 7-8□m.

Favourable Conditions

- □ Monoculturing of sugarcane.
- □ Successive ratoon cropping.
- □ Water logged conditions and injuries caused by insects.

Disease cycle

The fungus is sett-borne and also persists in the soil on the diseased clumps and stubbles as chlamydospores and dormant mycelium. The primary infection is mainly from infected setts. Secondary spread in the field is through irrigation water and cultivation tools. The rain splash, air currents and dew drops also help in the spread of conidia from the diseased to healthy plants in the field. The fungus also survives on collateral hosts *Sorghum vulgare, S. halepense* and *Saccharum spontaneum.* If the conidia settle on the leaves they may germinate and invade the leaves through various types of wounds. Stem infection may take place through insect bores and root primordia. The soil-borne fungus may also enter the healthy setts through cut-ends, and

cause early infection of the shoots. Though the perfect stage of the fungus has been observed in nature, the role of ascospores in the disease cycle is not understood.

Management

- Adopt crop rotation by including rice and green manure crops.
- Select the setts from the disease free fields or disease free areas.
- Aviod ratooning of the diseased crop.
- Soak the setts in 0.1% Carbendazim or Triademefon 0.05% solution for 15 minutes before planting.
- Grow resistant varieties CO 62198, CO 7704 and moderately resistant varieties CO 8001, CO8201.
- Setts can be treated with aerated steam at 52 °C for 4 to 5 hours and by moist hot air at 54°C for 2 hours.

2.Smut - *Ustilago scitaminea*

Symptoms

It is a culmiculous smut. The affected plants are stunted and the central shoot is converted into a long whip-like, dusty black structure. The length of the whip varies from few inches to several feet. In early stages, this structure is covered by a thin, white papery membrane. The whip may be straight or slightly curved.

On maturity it ruptures and millions of tiny black smut spores (teliospores) are liberated and disseminated by the wind. Affected plants are usually thin, stiff and remain at acute angle. The whip like structure, representing the central shoot with its various leaves, may be produced by each one of the shoots/tillers arising from the clump.

The smutted clumps also produce mummified arrows in which lower portion consisted of a normal inflorescence with typical flowers and the upper portion of the rachis is converted into a typical smut whip. Occasionally smut sori may develop on the leaves and stem.

Pathogen

The fungal hyphae are primarily intercellular and collect as a dense mass between the vascular bundles of host cell and produce tiny black spores. The thin membrane which covers the smut whip represents the host epidermis. The smut spores are light brown in colour, spherical, echinulated and measuring 6.5- 8.5 m in diameter. Smut spores germinate to produce 3-4 celled, hyaline promycelium and produce 3-4 sporidia which are hyaline and oval shaped with pointed ends.

Favourable Conditions

 Monoculturing of sugarcane.

 Continuous ratooning and dry weather during tillering stage.

Disease cycle

Teliospores may survive in the soil for long periods, upto 10 years. The spores and sporidia are also present in the infected plant materials in the soil. The smut spores and dormant mycelium also present in or on the infected setts. The primary spread of the disease is through diseased seed-pieces (setts). In addition, sporidia and spores present in the soil also spread through rain and irrigation water and cause soil-borne infection. The secondary spread in the field is mainly through the smut spores developed in the whips, aided by air currents. The fungus also survives on collateral hosts like *Saccharum spontaneum, S. robustum, Sorghum vulgare, Imperata arundinacea* and *Cyperus dilatatus.*

Management

 Plant healthy setts taken from disease free area.

 Remove and destory the smutted clump (collect the whips in a thick cloth bag/polythene bag and immerse in boiling water for 1 hr to kill the spores).

 Discourage ratooning of the diseased crops having more than 10 per cent infection.

 Follow crop rotation with green manure crops or dry fallowing.

 Grow redgram as a companion crop between 2 rows of sugarcane.

 Grow resistant varieties like Co 7704 and moderately resistant varieties COC 85061 and COC 8201.