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Important Diseases of Sugarcane and their Management for Better Yield

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ARTICLE ID: 27

Sugarcane is a significant cash crop in most tropical and sub-tropical regions worldwide. In India, sugarcane occupied about 5.20 million hectares of land, with an annual production of 400.37 million tonnes and a productivity of 76.99 tonnes/ha. In Bihar, it is cultivated over an area of 3.04 lakh hectares with a production of 182.85 lakh tonnes, and its productivity is 60.15 tonnes/ha (GOB, 2019). However, in Bihar, the production and productivity of sugarcane are notably low, attributed to various biotic and abiotic factors. Among the biotic factors, diseases caused by fungi, bacteria and viruses are significant contributors. More than 100 diseases in sugarcane have been reported from various parts of the country, leading to a 10-15% reduction in sugar content **(**Viswanathan and Rao, 2011).The management of sugarcane diseases is increasingly challenging due to the impacts of climate change, continuous monoculture, improper farming practices, and a lack of proper knowledge. This article addresses important diseases of sugarcane and outlines their management, as follows.

1. Red rot (Causal Organism: *Colletotrichum falcatum*)

Symptoms:

The initial external symptoms of red rot manifest on the third or fourth leaf, leading to withering along the margins. Internodes in the stalk exhibit typical red rot symptoms upon longitudinal splitting, characterized by reddening of internal tissues elongated at right angles. Crucial diagnostic features include cross-wise white patches. The diseased cane emits an acidic-sour smell. Disease

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progression results in hollow stalks covered with white mycelial growth. Additionally, the pathogen causes tiny reddish lesions on leaves with dark dots, initially blood red and later developing straw-coloured centres. **Management:**

- Adopt crop rotation by including rice and green manure crops.
- Select the setts from fields or areas free from diseases to ensure a healthy planting stock.
- Avoid the practice of ratooning of the diseased crop to prevent the spread of disease.
- Treat the Setts with aerated steam at 52 ˚C for 4 to 5 hours and by moist hot air at 54˚C for 2 hours to ensure pathogen-free planting material.
- Treat the setts with 0.1% Carbendazim 50WP solution for 15 minutes, before planting.
- Grow resistant varieties

2. Pokkah Boeng (Causal Organism: *Fusarium moniliformae*)

Symptom:

The general symptoms of Pokkah boeng disease are mainly of three types:

I. Chlorotic phage:

The initial symptoms of Pokkah boeng disease is chlorosis near the base of young leaves, resulting in leaf wrinkling, twisting, shortening, and deformation. In mature leaves, one can observe irregular reddish stripes and spots within the chlorotic region.

II. Acute Phase or Top-Rot Phase:

Red discoloration appears, and a stipe begins to form on the young spindle. The entire base of the young spindle rapidly deteriorates and dries up. Ultimately, this process results in the formation of apex rot, affecting the delicate tissue at the apical part of the cane.

III. Knife cut phage:

This phage is linked to acute infection and is identified by one, two, or even multiple transverse incisions in the rind of the stalk or stem. These cuts are made so uniformly that it appears as if tissues have been precisely removed with a sharp knife.

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Chlorotic phage	**Acute Phase or Top-Rot Phase**	**Knife cut phage**

Management:

- The most effective method of controlling pokkah boeng is to cultivate resistant varieties.
- Apply Carbendazim at a rate of 1 gm per liter of water or Mancozeb 75 WP at 3 gm per liter of water, with two to three sprays at intervals of 15 days.
- Canes exhibiting 'top rot' or 'knife cut' should be removed through rouging.

2. Smut (Causal Organism: *Ustilago scitaminea*)

Symptoms:

The central shoot of the infected plants transforms into elongated whip-like structures, characterized by a dusty black appearance. The length of these whips can vary from a few inches to several feet. During the early stages, a delicate, white papery membrane envelops this structure. The whip may exhibit a straight or slightly curved form. Upon reaching maturity, it ruptures, releasing millions of minuscule black smut spores (teliospores) that are carried and dispersed by the wind. The affected plants typically appear slender, rigid, and often remain at acute angles. Each shoot or tiller emerging from the clump may produce a whip-like structure representing the central shoot along with its associated leaves.

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Management:

- Planting of disease-free setts taken from disease free area.
- Remove and destroy the smutted clump.
- Discourage ratooning of the diseased crops having more than 10 per cent infection.
- Follow crop rotation with green manure crops or dry fallowing.
- Sett treatment with fungicides *viz*., Triadimefon @ 1g/1 litre of water or Carbendazim 50WP @ 1g/1 litre of water for 10 minutes.

3. Wilt (Causal Organism: *Cephalosporium sacchari*)

Symptoms:

The initial symptoms of the disease appear in 4-5-month-old canes, where affected plants exhibit stunted growth, yellowing, and wilting of crown leaves. The midribs of all leaves typically turn yellow, while the leaf lamina may remain green. Leaves eventually dry up, and the stem develops hollowness in the core. The core displays reddish discoloration with longitudinal red streaks between internodes. Severe cases lead to spindle-shaped cavities tapering towards the nodes, emitting a disagreeable odor. These cavities are covered with mycelial threads of the fungus.

Management:

- Avoid the practice of ratooning in diseased fields.
- Grow coriander or mustard as a companion crop in the early stages of crop.
- Sett treatment with fungicides with Carbendazim 50WP @1g/lit. of water for 15 minutes.

4. Sugarcane Mosaic (Causal Organism: Sugarcane mosaic poty virus)

Symptoms:

The disease symptoms primarily appear on the basal proton of young foliage, characterized by alternating chlorotic (yellowish) stripes alongside normal green regions of the leaf. As the infection worsens, yellow stripes become evident on leaf sheaths and stalks. Stalks develop elongated necrotic lesions,

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leading to stem splitting. Necrotic lesions also emerge on internodes, causing a stunted and chlorotic appearance throughout the entire plant.

Management:

- Uproot the infected plants.
- Spray insecticides to manage the vector of this disease.
- Avoid multiple ratooning of the affected crop.

5. Ratoon stunting (Causal Organism: *Clavibacter xyli* sub sp. xyli)

Symptoms:

The affected plants show stunted growth, reduced tillering, thin stalks with shortened internodes, and yellowish foliage. In infected stocks, there are pinhead-like orange-colored dots of bacteria present on the internal soft tissue in the nodal region. The setts taken from diseased plants germinate poorly, and the few shoots that emerge grow very slowly.

Management:

- Select healthy setts for planting.
- Treat the setts by immersing them in hot water at 50°C for approximately 2 hours; this ensures 100 percent control. Using a temperature higher than this would be detrimental to the cane, while a lower temperature than specified allows the pathogen to survive

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