

Pokkah Boeng Diseases a Threat to Sugarcane

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Chlorotic Phase



Top rot Phase



Knife cut Phase

Sugarcane (*Saccharum officinarum* L.) is important well known cash crops because it improves socio-economic standard of many sugarcane farmers. The production of sugarcane is mostly focused in tropical areas, especially in developing countries in Latin America, Africa, and Asia, primarily India, where the annual production is close to 1.80 billion tones. In India, sugarcane ranks third after paddy and wheat. It is grown in the tropical and subtropical regions of India on an area of 5.11 million ha with a production of 400.22 million t and a productivity of 78.30 t/ha. Four major states, namely Bihar, Haryana, Punjab and Uttar Pradesh in the subtropical regions, have 2.64 million ha of sugarcane area with a production of 206.72 million t and productivity of 73.68 t/ha, while seven major states, namely Maharashtra, Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu, Madhya Pradesh and Orissa in the tropical regions, have 2.23 million ha of sugarcane area with production of 178.12 million tones and productivity of 76.30 t/ha.

The differences in state wise cane production, productivity and sugar recovery is being reported because of the varietal scenarios and their susceptibility to biotic and abiotic stresses specially the incidence of diseases and insect pests. Among the incidence of diseases, pokkah boeng is the re-

emerging most widely spreading serious threat to sugarcane cultivation. It is caused by the pathogen FSC (*Fusarium* species complex). However, it is specified with *Fusarium moniliformae* and was first described by Sheldon. The perfect stage of pathogen is *Gibberella fujikuroi* (Sawada). Pokkah boeng, the term of Javanese denotes the malformed top. Initially, it's incidence was reported by Padwick with no causal agent. Pokkah boeng has now become the devastating disease not only in Punjab but also in whole North West zone of India. This disease is well-known since long time but severity of disease incidence in India is being reported since last half decades (2017-18) with wide spread cultivation of Co 0238 in North India and of Co 86032 and Co C671 in South India. This disease reduces the juice quality and cane tonnage of the harvested crop mainly depending upon the kind of variety.

Symptomatology: The initial symptoms of the disease, which is caused by pathogen FSC (*Fusarium* species complex) appear on young leaves during the monsoon season. Many stages of the symptoms have been observed during the disease progression.

Chlorotic Phase: The first sign of pokkah boeng disease is appear as a green condition at the base of young leaves, which rarely occurs on other parts of the leaves. It is often observed that the underside of the affected leaf is narrower than the underside of a normal leaf. The ladder-shaped lesion on the spindle-shaped leaves is obviously yellow, the spindle is wrinkled, twisted or tangled, red streaks appear, the leaves become shorter and the young leaves are deformed. When the leaves mature, irregular reddish streaks and spots appear in the area of chlorosis.

Top-Rot Phase: The pokkah boeng top rot stage is an advanced and severe stage. Sometimes the

infection from the leaf extends downward and enters the stem at the growth point. The spindle blades were clearly wrinkled, twisted, rotten in the late stages of infection and the entire root of the spindle and even the growing point had leaf abnormalities. Also visible were crimson streaks and dots. Decay will start to show up when the condition is advanced. The plants perish as a result of killing the growth points.

Knife-Cut Phase: The symptoms of the knife-cut stage occurred in association with the acute phase of the disease. The knife-cut stage is characterized by one, two, or even more transverse cuts in the bark of the stem or petiole that are so uniform that it appears as if the tissue has been cut with a sharp knife. This is a typical stage of pokkah boeng disease. Usually, the infection occurs uniformly at the top of the cane, which is obviously the cause of the spread of the disease. Rachis infection sometimes continues to the stem, and dark red streaks may be noted extending over several internodes. When the leaves are pulled off, a large horizontal cut appears on the stem. As the name implies, the most obvious function of pokkah boeng is to deform the top of the sugarcane. However, the infection can also spread to the stem where internal and external ladder-like (knife cut) lesions can occur. The most serious damage occurs when the fungus infects the shoot tip, which may die and rot. Infection occurs when spores are propelled from the air between partially unfurled leaves to the roots of the spindle during rapid growth under warm conditions, and by rain. Then the spores germinate and infect the young tissue of the spindle.

Predisposition Factors

The dispersal of pathogen is significantly influenced by the temperature, it develops and sporulates under both in vitro and in vivo conditions in the range of 20-30°C. A temperature of 30°C is

suitable for the pathogen to flourish. The disease is most severe when temperatures are between 20°C and 32°C, humidity is 70-80%, and the weather is cloudy during the rainy season from July to September. Temperatures between 20 and 30°C and humidity between 75 and 85% are the best conditions for the growth of this complex *Fusarium* pathogen. The pathogen survives for a maximum of 11 months under natural conditions in a soil depth of 30 cm. Cool and dry weather conditions favour the survival of the pathogen in plant debris for a long period of time.

Management strategy: Important tips should be followed by the farmers to manage the disease:

1. Use healthy seed material for planting/plant resistant varieties.
2. Integrated Disease Management practices are the best way to prevent the incidence of disease. Canes showing 'top rot' or 'knife cut' should be rouged out from the fields.

Conclusion

The Pokkah boeng disease poses a significant threat to the global sugarcane industry due to its destructive nature and wide prevalence. It causes substantial economic losses by reducing yields and affecting the quality of sugarcane. Effective management of pokkah boeng requires a widespread approach that integrates various strategies, including the use of resistant varieties, sanitation measures, and chemical control methods. By implementing the tips like integrated management practices and adopting preventive measures, sugarcane farmers can minimize the impact of pokkha boeng and safeguard their crops. Collaboration between scientists, farmers, and agricultural organizations is crucial to combat this disease effectively and ensure the long-term sustainability of the sugarcane industry.

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