

Pokkah Boeng Disease

Causal organism: *Fusarium moniliforme* Sheldon.

Pokkah Boeng Disease on Sugarcane



Amongst the foliar diseases, the pokkah boeng disease is becoming major disease of sugarcane. Pokkah boeng, a Javanese term, which describe a disease as affecting to sugarcane tops, was first recorded in Java by Walker and Went in 1886 and later reported by Edgerton (1955) and Martin *et.al* (1961). Pokkah boeng, a major sugarcane disease in Java, with the spread of the commercial variety POJ 2878 and was extensively investigated in that country by Bolle during 1927 to 1937. It was observed for the first time in Maharashtra on Co7219 and Coc671 varieties.

Susceptible varieties in Maharashtra: Co419, Co7219, Co7527, CoC 671, Co7527, Co86032, Co8014.

Distribution

The occurrence of the disease has been recorded in almost all the cane growing countries in the world. In India, it is in Punjab, Haryana, Uttar Pradesh, Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka and TamilNadu States on most of the commercial varieties.

Economic Importance

The notable losses from pokkah boeng have occurred in Java, where susceptible varieties have been grown in a climate, in which hot and dry season is followed by a wet season like in India. Three to seven month old crop growing vigorously is more susceptible to infection than the older cane.

Symptomatology

- The general symptoms of pokkah boeng are mainly of three types;
 1. Chlorotic Phase,
 2. Acute Phase or Top-Rot Phase and
 3. Knife-cut Phase (associate with top rot phase).



The details of the symptoms as per the phase are as under,

1. Chlorotic Phase



The earliest symptom of pokkah boeng is a chlorotic condition towards the base of the young leaves and occasionally on the other parts of the leaf blades. Frequently, a pronounced wrinkling, twisting and shortening of the leaves accompanied the malformation or distortion of the young leaves. The base of the affected leaves is seen often narrower than that of the normal leaves.

In affected mature leaves, the irregular reddish stripes and specks are observed within a chlorotic part. The reddish area sometimes develops into the lesions of a rhomboid shaped, which showed no definite arrangement or formed ladder like lesions, with dark edges in longitudinal rows, which turned the dark reddish to brown color, producing a burned appearance. Leaf sheaths are also observed with chlorotic conditions in some cases. Later, irregular necrotic areas of reddish color, similar on the leaf blades are also noticed on leaf sheath and midribs.



2. Acute Phase or Top-Rot Phase

The most advanced and serious stage of pokkah boeng is a top rot phase. The young spindles are killed and the entire top dies. Leaf infection sometimes continued to downward and penetrates in the stalk by way of a growing point. In advanced stage of infection, the entire base of the spindle and even growing point showed a malformation of leaves, pronounced wrinkling, twisting and rotting of spindle leaves. Red specks and stripes also developed, and the whole base of the spindle gets rotten and dries up very fast and finally, it formed a 'Top-Rot' of the tender tissues of the apical part of the cane. Sprouting of the buds are also observed in a severe infection. In such cases, the apical part of the stalk is seriously damaged.



3. Knife-cut Phase

The symptoms of knife-cut stage are observed in association with the acute phase of the disease characterized by one or two or even more transverse cuts in the rind of the stalk /stem in such a uniform manner as if, the tissues are removed with a sharp knife, This is an exaggerated stage of a typical ladder lesion of a pokkah boeng disease. On stripping off the leaves, large horizontal conspicuous cuts are develops on stalks. Previously, the acute phase was considered as the most advanced and serious stage of a pokkah boeng. However, critical observations on symptomatology reveled that the acute phase (top rot) of pokkah boeng is always associated with the Knife-cut infection. In general, the infection occurs uniformly on the cane tops, which are apparently responsible for the spread of the disease.



Previously, the acute phase was considered as the most advanced and serious stage of a pokkah boeng. However, critical observations on symptomatology reveled that the acute phase (top rot) of pokkah boeng is always associated with the Knife-cut infection. In general, the infection occurs uniformly on the cane tops, which are apparently responsible for the spread of the disease. On the basis of symptoms of Pokkah boeng disease, following four stages of infection are identified, PB 1 - Only leaf symptoms, chlorotic with or without red markings (Stripes), wrinkling and splitting of the leaves (chlorotic phase I) . PB 2 - Ladder like shaped lesion on the spindle leaves pronounced yellowing, wrinkling of spindle, twisting or tangling appearance of spindle and marketed red stripes (chlorotic phase II). PB 3 - Top rot phase by rotting of spindle leaves, pronounced red stripes with white spore mass, necrosis and sprouting of buds (Acute phase) PB 4 - Knife-cut stage of infection near the top of the cane. Large horizontal conspicuous angular cuts as made by knife, mainly observed on stalks and rarely on leaf sheath, exhibiting a staggered appearance sprouting of buds (Knife-cut phase).

The severity of symptoms varies with the susceptibility of a variety and with the congenial environmental conditions, governs the development of the causal organism. Aggressive strains resulted in the development of acute phase (PB3 - PB 4), while non-aggressive strains produced chlorotic (PB 1) phase.

Transmission

This is an air-borne disease and primarily transmitted through the air-currents and secondary transmission is through the infected setts, irrigation water, splashed rains and soil.

Viability of the pathogen

The pathogen (*F. moniliforme*) can survive for 12 months in the plant debris under natural conditions. The fungus can remain viable for more than 10 months under laboratory conditions. Fungus could not grow at 50°C but it remained viable for at least six months. It is also reported that the survival of a *F. moniliforme* can observed for 12 months, although incidence is noticed low after nine months. Under natural conditions, maximum survival occurred more than 11 months at 30 cms in soil. Cool and dry conditions favoured the survival of a fungus in plant debris. Effect of Environmental factors

- **Temperature:** Temperature is an important natural factor governing the distribution of a pathogens & it grows and sporulates luxuriantly in a temperature range of 20-30°C. Minimum, optimum and maximum temperature for growth of pathogen are 10-15°C, 30°C and 35-40°C, respectively. The severe incidence of the disease occurred in the range of temperature between 20°C-32°C and therefore, the disease is more severe in rainy season.
 - **pH:** The pathogen could grow in a wider range of acidic to slightly alkaline pH from 6.5 to 7.5 of the soils.
 - **Humidity:** The average relative humidity higher than 70 to 80% with a cloudy weather, drizzling rains favors the growth of pathogen. This situation noticed mostly in a rainy season.
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Control

Spraying of 0.1% Bavistin (1 gm/ lit. of water) or 0.2% Blitox-50 (2gm/ lit. of water) or Copper oxychloride or 0.3% Dithane M-45 (3 gm/ lit. of water) are the most effective fungicides for reducing the pokkah boeng disease. Two to three sprayings with an interval of 15 days interval reduces the multiplication of a pathogen and losses in yield and quality of cane and therefore, paired row or wider spacing planting of sugarcane is necessary to facilitate the plant protection operations. Canes showing 'top rot' or 'knife cut' should be rogued out.
