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Prevalence of Sigatoka disease of banana in Maharashtra

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ABSTRACT

In the survey conducted in seven major banana growing districts of Maharashtra viz Akola, Ahmednagar, Hingoli, Jalgaon, Nanded, Nandurbar and Solapur it was found that there was occurrence of Sigatoka disease in all banana growing areas. However intensity of disease varied among the districts, cultivars used and also climatic conditions prevailing. Of the seven districts Jalgaon district recorded maximum disease incidence (28.30 and 31.55%) followed by Nandurbar district (27.77 and 31.50%) and least in Akola district (19.66 and 20.88%) in tissue and sucker plantation respectively. Survey gave an insight that occurrence of the disease in these areas was in line with the prevailing rainfall and humidity pattern in the area. It was also found that cv Grand Naine (G-9) was highly susceptible to leaf spot disease.

Keywords: Sigatoka disease; banana; tissue culture; sucker; plantation

INTRODUCTION

Banana (*Musa* sp L) is one of the most fascinating and important fruit crops. It is a large monocotyledonous herb that originated in southeast Asia. After rice, wheat and milk it is the fourth most valuable food. In export it ranks fourth among all agricultural commodities and is the most significant of all fruits with world trade of 2.5 billion annually. Diseases are among the most important limiting factors in banana production worldwide (Simmonds 1966). Among various diseases of banana leaf spot or yellow Sigatoka caused by *Pseudocercospora musae* is a very serious in tropical banana growing areas (Stover 1980). Sigatoka leaf spot affects not only the banana leaves but also bunch weight and fruit quality. Leaf spot when severe reduces yield when less than six viable leaves remain at harvest. Sigatoka leaf spot may also cause early maturity and premature ripening of fruits of banana. Fruits from leaf spot infected plants can ripen in the field itself. These field ripened bunches harbour fruit fly and are thus unmarketable. Even unripe fruits from the affected bunches are unsalable because they are likely to ripen in transit to the market (Mourichon et al 1997).

Of the many diseases of banana Sigatoka leaf spot disease caused by *P musae* (Plate 1) is a serious threat to world banana production (Mourichon and Fullerton 1990, Selvarajan et al 2000). Many workers have reported the yield reduction of varying dimensions from different parts of the world due to this disease. Burt et al (1997) reported more than 50 per cent of economic losses due to this disease across the world. Marin et al (2003) opined that the disease induces significant reduction in yield. It also leads to premature ripening of fruits which can occur in the field and during transport and storage (Martin and Romero 1992). In the recent past cultivation of banana in the parts of Maharashtra is gaining momentum with increase in the adoption of drip irrigation system. This situation has virtually lead to the congenial microclimate for perpetuation and spread of the pathogen of Sigatoka (Elangovan et al 1990).

Vast area under banana in Maharashtra is occupied by Grand Naine which is unfortunately highly susceptible to Sigatoka disease (Romero and Sutton 1997). Hence survey in the major banana growing regions of Maharashtra was conducted to know the pattern of distribution, severity and prevalence of Sigatoka disease in the region.

Plate 1. A banana orchard damaged due to Sigatoka disease (Insat: Leaf spots caused by the disease)

METHODOLOGY

Survey area

Major banana growing areas of Maharashtra having seven districts viz Akola, Ahemadnagar, Hingoli, Jalgaon, Nanded, Nandurbar and Solapur were selected under the Horticulture Crop Pest Surveliance and Advisory Project (HORTSAP) implemented during 2014-15. The survey was conducted for one season in the month of August to September in the years 2014-15, 2015-16 and 2016-17. An intensive roving survey method was adopted. The fields were selected at random. In each district four banana growing Talukas, in each Taluka four villages, in each village four orchards and in each orchard five plants were selected to determine the incidence of Sigatoka disease by using 0-6 scale (0: No symptoms, 1: Less than 10 spots, 2: 1 to 5% of lamina with symptoms, 3: 6 to 15% of lamina with symptoms, 4: 16 to 33% of lamina with symptoms, 5: 34 to 50% of lamina with symptoms, 6: 51 to 100% of lamina with symptoms). Per cent disease index (PID) was worked out as per Gauhl et al (1993):

$$\text{Per cent disease index (PDI)} = \frac{\Sigma nb}{(N - 1)\,T} \times 100$$

where n= Number of leaves in each grade, b= Grade, N= Number of grades used in the scale, T= Total number of leaves scored

RESULTS and DISCUSSION

The survey conducted to assess the distribution pattern of Sigatoka disease revealed the varied nature of incidence as well as severity (Table 1). The severity of disease varied from 19.66 to 31.55 per cent with an average of 26.35 per cent. The separate observations were recorded under the survey for tissue culture plantation and sucker plantations. There was much difference in the incidence of disease in tissue culture and sucker plantation. In sucker plantation average disease intensity ranged between 20.88 to 31.55 per cent whereas under tissue culture plantation it ranged between 19.66 to 28.30 per cent. Of the seven districts Jalgaon district recorded maximum disease incidence (28.30 and 31.55%) followed by Nandurbar district (27.77 and 31.50%) in tissue and sucker plantation respectively.

Least disease incidence was recorded in Akola district under tissue culture (19.66%) and sucker (20.88%) plantation.

The higher disease incidence was observed in Jalgaon and Nandurbar which could be attributed to year round plantation, high rainfall, large area under cultivation and high input practices followed by the growers. Consistent humid atmosphere in these regions may also have contributed to the disease development.

Table 1. Incidence of Sigatoka disease of banana in different districts of Maharashtra

District	Incidence of Sigatoka (%)			
	2014-2015	2015- 2016	2016- 2017	Average
Akola				
Tissue culture	18.23	19.56	21.21	19.66
Sucker	19.36	20.15	23.12	20.88
Ahemadnagar				
Tissue culture	18.66	23.19	27.12	22.99
Sucker	20.56	26.35	27.27	24.73
Hingoli				
Tissue culture	21.39	27.63	31.29	26.77
Sucker	23.58	30.12	33.66	29.12
Jalgaon				
Tissue culture	24.43	28.33	32.15	28.30
Sucker	28.33	32.55	33.76	31.55
Nanded				
Tissue culture	20.35	26.45	30.02	26.61
Sucker	22.56	29.63	32.76	28.32
Nandurbar				
Tissue culture	23.55	29.38	30.37	27.77
Sucker	27.36	31.45	35.69	31.50
Solapur				
Tissue culture	19.33	24.99	28.49	24.27
Sucker	21.58	27.83	29.98	26.46
Average (tissue culture + sucker)				26.35

There existed a perfect correlation of disease incidence with humidity. According to Stover (1980) conidia and ascospores both play an important role in the spread of the disease and these are produced and cause successful infection under conditions of high humidity especially where there is a film of free water on the leaves. Elangovan et al (1990) reported severe incidence of Sigatoka disease in high rainfall areas of Tamil Nadu. Simmonds (1966) opined that conidia are produced continuously throughout the rainy season and are disseminated through the film of free water resulting from either rainwater or dew dripping on the nearby healthy leaves. The ascospores spread disease more rapidly as compared to conidia. The spores flow with wind and rain water to long distances.

It was also found that disease incidence was severe in the orchards which were at harvesting stage than those at vegetative stage. Selvarajan et al (2000) reported similar results from banana growing regions of Tamil Nadu and Kerala states.

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