

Study of *Cercospora musae zimm* On Banana, at Aurangabad (MS), India

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Abstract

The paper deals with the aerial dissemination of *Cercospora muse zimm* spores on banana at Kaigaontoka Aurangabad. *Cercospora* spores causes Leaf spot diseases of banana (*Musa paradisiaca* L.). Basrai variety was studied by using "Tilak air sampler" for the period of three year (From 1st June 2012 to 31st May 2015). During present investigations spores of *Cercospora* were observed on 29th July 2012. Severity of disease incidence and spread of disease was maximum in the field from 09 Sept. 2012. Spores appeared initially at 390th day of plantation. The highest concentration of spores were recorded in the period of 28th Sept 2012 to 14th Jan 2013. Temperature, Relative humidity and Rainfall plays an important roles in multiplication of inoculums and subsequent spread. Present studies provide a basis for obtaining a probable forecasting in future.

Keywords: Dissemination, *Cercospora*, Banana Field.

Introduction

Banana is a very popular fruit due to its low price and high nutritive value. Banana is a rich source of carbohydrate, vitamins particularly vitamin B, potassium, phosphorus, calcium and magnesium. The fruit is easy to digest, free from fat and cholesterol. It is also recommended for patients. Banana fiber is used for making number of items. Banana, basically a tropical crop, grows well in a temperature range of 15°C - 35°C with relative humidity of 75-85%. Four months of monsoon (June to September) with an average 650-750 mm rainfall are most important for vigorous vegetative growth of banana.

Deep, rich loamy and well drain soil with pH between 6.5–7.5 is most preferred for banana cultivation. Soil which is normal, rich in organic material with high nitrogen content, adequate phosphorus level and plenty of potash is good for banana. In Maharashtra Jalgaon, Ahmednagar, Buldhana, Wardha, Dhule, Nanded, Parbani, Nandurbar, Satara, Sangli, Akola, Amravati, Thane, Kulaba, Alibag these regions are under the cultivation of banana. Dwarf Cavendish, Basrai, Robusta, Lal Velchi, Safed Velchi, Rajeli Nendran, Grand Naine, Shreemanti are major banana varieties taken in both season. In Maharashtra area under the cultivation of Banana is (59.7Ha) and produces 3924.1 thousand tones production (National Horticulture Board, Ministry of Agriculture Govt. of India.). Leaf spot of Banana (*Musa paradisiaca*, L.) caused by *Cercospora musae* was wide spread and distractive. In most of the species sexual stage is not identified. In very few cases it is identified as genus *Mycosphaerella*. It is a relatively well-studied genus of fungus. Leaf spot of Banana are often referred to as sigatoka diseases and are characterized by defoliation and discoloration. Aurangabad is one of the major Bananas growing districts. Plantation is increasing because of the irrigation facilities created largely due to Jaikawadi, project. *Cercospora musae* infection appeared in late spring, when average temperature (29°C) and high humidity (65%) is observed which is favorable to developed symptoms on mature leaf of variety Basrai. The disease incidence was higher during plant maturation up till harvesting. Present Investigation concerning to the "Epidemiology of *Cercospora musae*" have been under taken and studies were conducted on some of the aspects of plantation method and environmental factors.

Methodology

Present study was carried out from 1st July 2012 to 30th June 2015) by three methods first method by operating continues Tilak air sampler [1] over Banana field, located at Kaigaon Aurangabad 30 Kilometer away from Aurangabad. Sampler was placed at a constant high of 1 meter above ground level in the center of the

field. (Photo Plate A). The area of the field about one hector under Banana cultivation and variety selected for the studies was 'Basraie'. Second method was Petri plates Exposer method (containing Corm Meal Agar) (Plate B) and third method was collection of diseased plant material from field. (Plate C).

Results and Discussions

In the present investigations Leaf spot caused by *Cercospora musae*[2,3] were observed from 29th July 2012. But severity of diseases incidence and spread of diseases was maximum in the field during the month of September (3.84%), October (14.04%) and November (9.62%) as compared to other months (Table I). The spores of *Cercospora* were found on the slides after 310 days of plantation of Banana. It also appeared first on young leaves of plants in the month of August. It reveals that the presence of *Cercospora* spores in the atmosphere. The highest spores catches were noted in the month of October (14.4%) (Table I) which coincided with the metrological conditions on 21st October. These are rainfall (7.0 mm), moderate temperature (26.5°C) and relative humidity (72.5%) (Fig. 1) playing an important role in the productivity and release of inoculums. *Cercospora* spores contributed 37% to the total airspors (Fig-II). *Cercospora* spores were shown on leaf samples but not perceived on exposed petri plates.

The source of the primary inoculums is affected crops in the surrounding areas. Spores were carried by wind to the healthy crop and initiated inferior. Total 145 samples of leaf tissue were examined, and most had typical symptoms. (Plate C, D). Total 09 fungal types' and 145 colonies were found on corn meal agar plate. (Table II). The disease incidence was higher on mature leaves. Symptoms start as small, light yellow spots parallel to the side veins of leaves. A few days later, the spots become enlarge in size and turn brown with light gray centers. Such spots soon enlarge further, the tissue around them turns yellow and dies, and adjacent spots coalesce to form large, dead areas on the leaf. Spots can easily recognized by naked eyes. Rapid drying and defoliation of mature leaves is the

characteristic feature of this disease. These results in reduction of photosynthetic area [4]. It causes losses by reducing the functional leaf surface of the plant, which results in small, unevenly sized bananas that fail to ripen and fall [5] the severity of symptoms among the cultivars indicated their level of susceptibility to the fungal attack. T.S study showed intensity of infection inside the leaves was totally depends on size, stage of crop and spread of inoculums (photoplate F)

The fungus is reported earlier from Jamaica, Central America, South America, Africa and Australia [6]. However its pathogenic role and severity is rarely recorded under Indian condition [7,8]. Higher percentage of spores (37%) after rainy conditions is also alarming which needs serious consideration by the pathologist and Agriculturists.

Table I: Average Concentration of spore by Air sampling. (From 1st June 2012 to 31st May 2015).

Types of Spores	June	July	Aug	Sept.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
<i>Alternaria alternata</i>	1.19	1.62	2.12	2.98	1.72	2.28	0.76	0.11	0.37	2.91	---	1.00
<i>Aspergillus flavus</i>	1.02	1.00	1.92	1.82	1.62	1.94	2.04	2.08	2.74	0.57	0.83	
<i>Curvularia clavata</i>		1.24	1.38	1.51	0.10	0.12	1.42	0.99	0.42	---	0.12	---
<i>Cercospora musae</i>	1.81	1.05	1.19	3.84	14.04	9.62	2.07	1.20	1.16	0.89	---	---
<i>Drechslera sp</i>			1.69	0.89	0.55	0.24	0.59	0.37		---	---	0.93
<i>Fusarium oxysporum</i>		0.47	0.20	0.46	0.05	0.57	0.58	0.58	0.12	---	---	---
<i>Nigrospora sp</i>			0.90	0.21	---	3.08	0.74		0.29	---	---	0.31
<i>Peyronellaea musae</i>	---	---	1.14	0.97	0.60	0.16	0.79	0.58	0.99			0.06
<i>Mucor circinelloides</i>			1.24		1.73	1.32		0.62				

Table No. II: Leaf Samples cultured on Corn Meal Agar Plate

Type of spore	Total	percentage
<i>Alternaria alternata</i>	20	11.42
<i>Aspergillus flavus</i>	68	38.85
<i>Curvularia clavata</i>	12	6.85
<i>Drechslera sps</i>	04	2.28
<i>Fusarium Oxysporum</i>	15	8.57
<i>Cercospora musae</i>	02	1.14
<i>Peironellaea musae</i>	14	8.0
<i>Mucor circinelloides</i>	08	4.57
<i>Phoma mulirostrata</i>	02	1.14

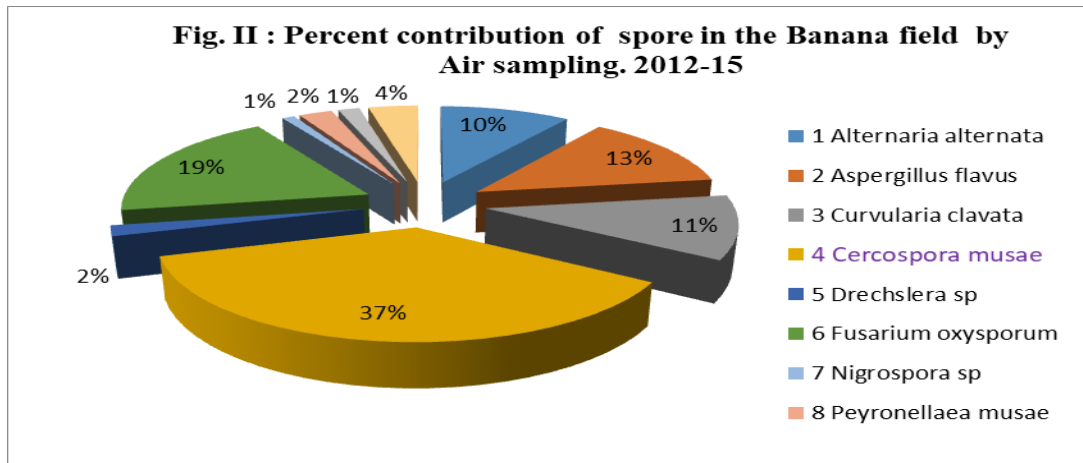
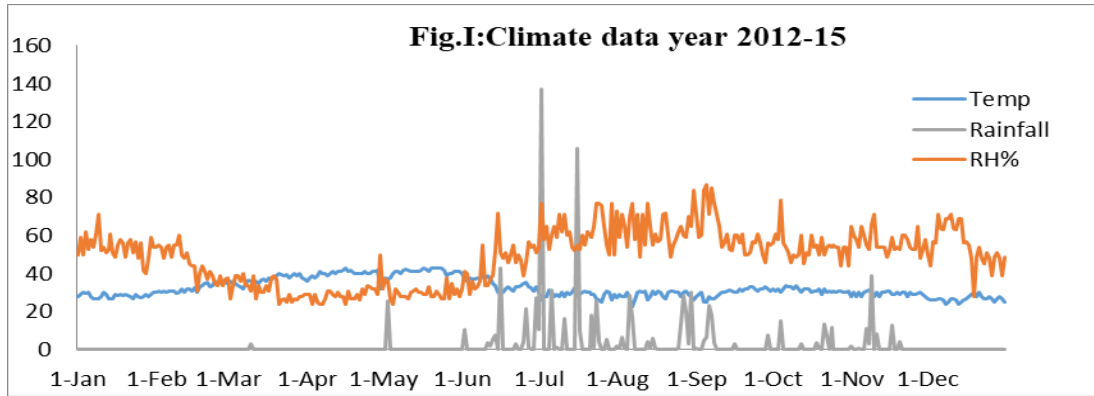
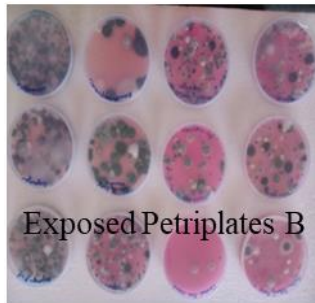
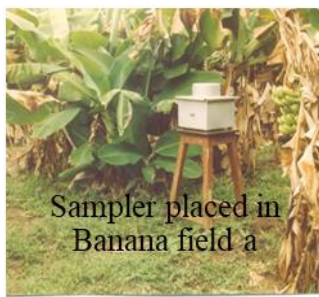


PHOTO PLATE



The pathogen was studied *in vivo* and identified as *Cercospora* the leaf samples were inoculated using corn meal agar where it showed following characters. Colonies not settled well. Colonies are white in color, mycelium spreading in all direction, septet, branched and conidia hyaline, filiform several celled 112 – 480 X 4.2 – 7.3 micrometer. On the basis of comparative morphology, it is identified as *Cercospora*[9]. However, the present investigation reveals that it is a parasitic disease and causes severe losses under change condition of culturing practices. During the present investigations it's observed that the farmers using furrow method for plantation but distance between the plants was not kept proper. Distances between plants are 1.5m x1.5m with high density and crowding with Chanel water system due to all this condition, infection easily spread in the field. Most of the farmers are using suckers and ratoon method, generally suckers may infected with pathogen. Plantation time and meteorological factors are equally important.

It is recommended to the farmers to use improved plantation method, where instead of furrow method, plants should be planted in a pit with proper distance. The irrigation method should be drip irrigation instead of Chanel water system. Since splashing water from an overhead sprinkler can spread the fungus from leaf to leaf and create an ideal environment for disease activity. Basrai variety was very susceptible to *Cercospora* leaf spot, owners should select resistant varieties for new plantings and avoid to use ratoon method. Sanitation is an important tool of disease management. Since the fungus can easily survive in infected leaves that fall and remain on the ground or that remain on the bush, removal of these leaves can help prevent future infections and disease outbreaks. Spotted leaves should be removed anytime during the growing season as soon as observed, especially before new leaves begin to form. Repetitive monitoring for diseases symptoms on leaves is required.

Conflicts of interest: The authors stated that no conflicts of interest.

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