PANAMA AND SIGATOKA DISEASES OF BANANA IN SELECTED LOCATIONS OF BANGLADESH

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ABSTRACTS

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The survey was conducted to assess the prevalence and severity of Sigatoka and Panama disease of banana during April to September 2015. Fifty four locations were visited in eighteen upazillas of Narsingdhi, Tangail, Bogra, Gaibandha, Rangpur and Jessore districts with the objectives to confirm the documentation of the status of Panama and Sigatoka diseases and their isolation, identification, purification and preservation. Prevalence of Panama and Sigatoka diseases were found in the every area surveyed. Incidence and Severity of Panama and Sigatoka diseases were found different percentages at different areas of Bangladesh. In Narsingdi, the highest incidence for Sigatoka (52.93%) disease was found at Monohordi whereas the highest severity for Sigatoka (59.00%) disease was recorded from Polash upazila. In Bogra district, the highest incidence (32.33%) and severity (62.67%) of Sigatoka disease of banana were observed at Gabtoli upazila. In Gaibandha, the highest incidence (27.00 %) of Sigatoka disease was found at Shadullapur whereas the highest severity (61.00%) was observed at Gobindhagonj. The highest incidence (28.27%) and severity (68.67%) of Sigatoka disease of banana were found at Taragonj upazila of Rangpur. In Jessore, the highest incidence and severity for both the diseases were found at Kaligonj, while the lowest incidence and severity for both the diseases were found at Jhikorgacha. Incidence of Panama disease ranged from 10.33-32.67%. The highest rate found at Modhupur, Tangail and the lowest at Taragonj, Rangpur. The highest severity of Panama was found at Shibgonj, Bogra and lowest at Jhikorgacha, Jessore that range from (26.00-63.67%).

Key words: Panama, Sigatoka, Banana, Survey.

INTRODUCTION

Banana (*Musa* spp.) is the fourth most important global food commodity after rice, wheat and maize in terms of gross value production. At present, it is grown in more than 120 countries throughout tropical and subtropical regions and it is the staple food for more than 400 million people (Molina and Valmayor 1999). In Bangladesh it cultivated 130589 acre of land (BBS 2012) and produce nearly 1.00 million tones of banana annually (Hossain 2014). Diseases are the major constraints for banana production globally including Bangladesh. The most common and widely damaging diseases of banana in Bangladesh are Panama caused by *Fusarium oxysporum* f. sp. *cubense* (FOC), Sigatoka (*Mycosphaerella musicola*), burrowing nematode (*Rodopholus similis*) (Meah and Khan 1987), Mosaic and Streaks virus. Among the diseases panama/*fusarium* wilt disease caused by the fungus *Fusarium oxysporum*f.sp *cubense* (FOC) is the most devastating disease which affecting commercial and subsistence banana production throughout the banana producing areas of the world (Ploetz 2005). The disease is ranked as one of the top 6 important plant diseases in the world (Ploetz and Pegg 1997). In terms of crop destruction, it ranks with the few most devastating diseases such as wheat rust and potato blight (Carefoot and Sprott 1969). The disease almost destroyed the banana export industry in Central America during the 1950's (Stover 1962). Presently, Fusarium wilt has been reported in all banana growing regions of the world (Asia, Africa, Australia and the tropical Americas) except some islands in the South Pacific, the Mediterranean, Melanesia, and Somalia (Stover 1962; Anonymous 1977; Ploetz and Pegg 2000). The characteristics symptoms includes yellowing begins along the leaf margins and advances towards the midribs; finally the whole dropping leaf turns dark brown. Yellowing and buckling progress from older to younger leaves and the entire plant dies (Su *et al.* 1986).

In Bangladesh, 24.0% disease incidence was recorded from Jessore in Sabri variety (Hossain and Rashid 1999). Higher incidence of fusarium wilt ranging

from 7.51 to 43.11% was reported by Alam (1995) in "Sabri" and "Sagar", who also observed that both the variety be susceptible to FOC except "Grande Naine"- a exotic banana variety was found resistant, but it has less popularity due to greenish color at ripening.

Sigatoka of banana caused drastic reduction in yield in terms of weight and quality of the fruits (Ramsey *et al.* 1987) due to blighted of affected leave and reduction of normal photosynthesis of the plant. The present research work was aiming to assess the incidence and severity of sigatoka and panama disease of banana in selected banana growing areas of Bangladesh.

MATERIALS AND METHODS

Survey of panama and sigatoka diseases of Banana

A comprehensive survey was covered by two team of BARI Plant Pathologist to identify the incidence and severity of panama and sigatoka diseases of banana in the major banana growing areas of Bangladesh. The survey conducted at eighteen selected upazillas of six major banana growing districts of Bangladesh viz. Polash, Monohordi, Sadar upazillas of Narsingdi; Modhupur, Sagordhighi, Sadar upazillas of Tangail; Gobindhagonj, Polashbari, Shadullapur upazillas of Gaibandha; Mithapukur, Taragonj, Sadar upazillas of Rangpur; Gobtoli, Shibgonj, Sadar upazillas of Bogra and Jhikorgacha, Kaligonj Sadar upazillas of Jessore. In each location 5 banana gardens were surveyed and 30 plants selected for the observation. Mass group of farmer's were interviewed to know the detail information about disease and production of banana by using questionnaire on disease problem, quality of planting material, age of garden, crop rotation, and management option.

Determination of disease incidence and disease severity

For calculation of disease incidence every plants was counted in the field and also counted the infected plants and then expressed in percentage. The disease incidence of banana plants was determined by the following formula (Rai and Mamatha 2005):

$$\text{Percent plant infection} = \frac{\text{Number of diseased plants}}{\text{Number of total plants observed}} \text{ x } 100$$

Percent disease incidence (PDI) of foliar diseases was determined by the following formula (Rai and Mamatha, 2005):

$$\text{Percent diseases incidence (leaves)} = \frac{\text{Number of diseased leaves on each plant}}{\text{Number of total leaves on each plant}} \text{ x } 100$$

Percent Disease Severity (PDS) was determined by the following formula (Rai and Mamatha 2005):

$$\text{Percent disease severity (leaves)} = \frac{\text{Area of leaf tissue infected by disease}}{\text{Total leaf area of the plant}} \text{ x } 100$$

RESULTS AND DISCUSSIONS

Every garden that is visited was found infected with panama and sigatoka diseases. Most of the farmer's (82.00%) considers panama disease as cancer of banana plant.

Table 1: Outcome of the questionnaire

Parameters	Survey results
Major diseases of banana	Panama and Sigatoka
Quality of planting materials	More or less infected
Age of garden	Most of the gardens are 2-3 years old
Crop rotation	Most of the farmers not practice
Management option	Most of the farmers practice agrochemicals for disease and insect pest management.

In Narsingdi, the highest incidence for both the panama (15.50%) and sigatoka (52.93%) diseases were found at Monohordi whereas the highest severity for both the panama (32.33%) and sigatoka (59.00%) diseases were recorded from Polash upazilla. The incidence and severity for both the diseases were found highest at Modhupur upazilla of Tangail. In Bogra district, the highest incidence and severity of panama disease were recorded 28.30% and 63.67%, respectively from Shibgonj while the highest incidence (32.33%) and severity (62.67%) of sigatoka disease of banana were observed at Gabtoli upazilla. In Gaibandha, the highest incidence (25.17%) and severity (52.33%) of panama disease were recorded from Shadullapur upazilla. On the other hand, the highest incidence (27.00 %) of sigatoka disesase was found at Shadullapur whereas the highest severity (61.00%) was observed at Gobindhagonj. The highest incidence and severity of panama disease i.e., 16.17% and 41.43%were recorded from Sadar upazilla, respectively whereas the highest incidence (28.27%) and severity (68.67%) of sigatoka disease of banana were found at Taragonj upazilla of Rangpur. In Jessore, the highest incidence and severity for both the diseases were found at Kaligonj, while the lowest incidence and severity for both the diseases were found at Jhikorgacha (Table 2).

The incidence of panama disease ranged from (10.33-32.67%) and the severity ranged from (26.00-63.67%). The highest incidence found at Modhupur, Tangail and the lowest at Taragonj, Rangpur. On the other hand, the highest severity of panama disease was found at Shibgonj, Bogra while lowest at Jhikorgacha, Jessore. The highest sigatoka disease incidence and severity were found 54.33% and 85.67% respectively at Modhupur upazila of Tangail. The lowest incidence of sigatoka disease was found 21.90% at Polashbari, Gaibandha whereas the lowest severity of sigatoka was recorded 42.67% at Jhikorgacha, Jessore (Table2).

Table 2. Incidence and severity of panama and sigatoka diseases of banana at different upazillas of Narsingdhi, Tangail, Bogra, Gaibandha, Rangpur and Jessore districts of Bangladesh

Districts	Upazillas	Panama		Sigatoka	
		Incidence (%)	Severity (%)	Incidence (%)	Severity (%)
Narsingdi	Sadar	10.67 gh	28.00 h	43.67 c	55.67 hi
	Polash	14.50 ef	32.33 fg	48.00 b	59.00 fg
	Monohordi	15.50 e	26.17 h	52.93 a	53.67 ij
Tangail	Modhupur	32.67 a	56.67 b	54.33 a	85.67 a
	Sadar	19.83 d	43.33 de	47.33 b	77.33 b
	Sagordhighi	25.33 bc	46.60 d	42.00 c	72.33 c
Bogra	Sadar	13.17 efgh	32.67 fg	26.33 f	46.33 k
	Gabtoli	23.00 cd	53.33 bc	32.33 e	62.67 e
	Shibgonj	28.30 b	63.67 a	31.60 e	48.00 k
Gaibandha	Gobindhagonj	20.83 d	43.93 de	25.83 fg	61.00 ef
	Polashbari	19.83 d	35.97 f	21.90 h	46.67 k
	Shadullapur	25.17 bc	52.33 c	27.00 f	57.67 gh
Rangpur	Mithapukur	13.67 efg	32.67 fg	23.40 gh	48.33 k
	Sadar	16.17 e	41.33 e	27.67 f	53.33 j
	Taragonj	10.33 h	28.83 gh	28.27 f	58.67 g
Jessore	Jhikorgacha	11.33 fgh	26.00 h	22.50 h	42.67 l
	Kaligonj	21.60 d	33.00 fg	42.27 c	72.33 c
	Sadar	16.50 e	40.33 e	36.67 d	68.00 d
	CV (%)	9.57	6.15	4.41	2.24

From the Disease assessment in the field, it was found that the incidence of panama disease ranged from (10.33-32.67%) and the severity ranged from (26.00-63.67%) in eighteen upazillas of six districts of Bangladesh. In India, the incidence of panama ranged from 0.5 to 20% in main crop and the maximum of 85.0% in second crop (Thangavelu 1999) whereas 30% infection of panama disease was found in Batticaloa district of Sri Lanka (Shanika and Prasannath 2016). On the other hand, sigatoka disease incidence ranged from (21.90-54.33%) the severity ranged from (42.67-85.67%) in eighteen upazillas of six districts of Bangladesh. In India, Thammaiah (2003) conducted a survey on Sigatoka disease of banana and reported the highest severity in Munavalli village of Sindagi taluk (66.96%) followed by Bijapur (64.56%). Shanika and Prasannath (2016) reported 42% infection of sigatoka disease in Batticaloa district of Sri Lanka.In the field it was observed that Amritosagar or Mehersagar variety is susceptible to

sigatoka disease of banana, but tolerant to panama disease of banana. However, local varieties like, Shobri, Kobri, Chinichampa, Kachkola were found susceptible to panama disease and tolerant to sigatoka disease of banana.

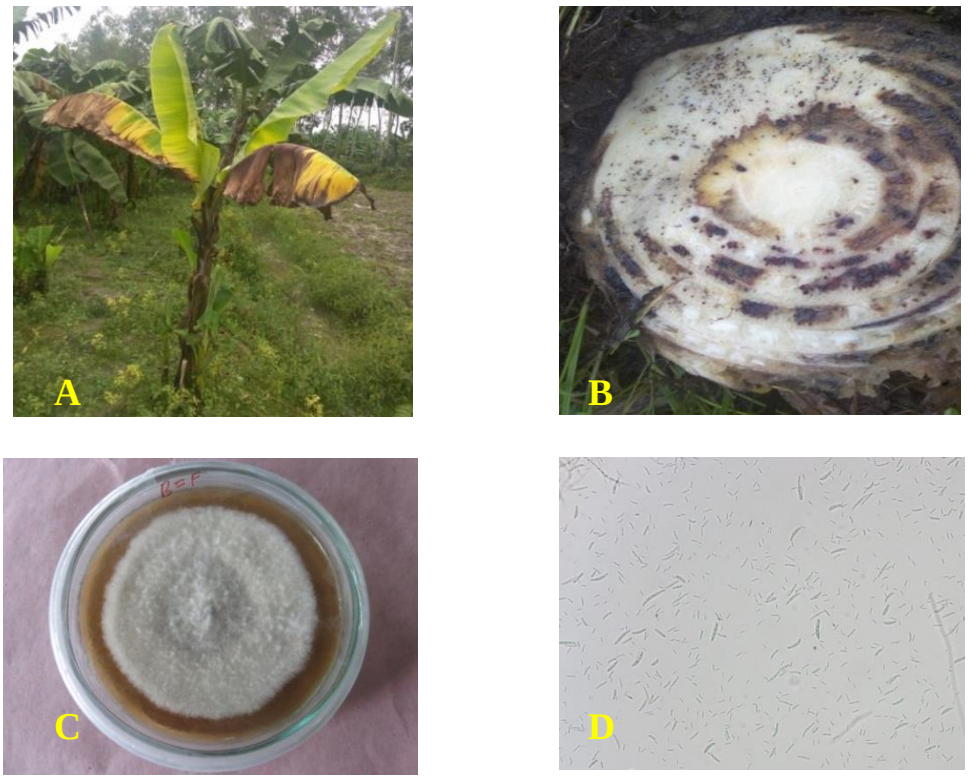

Fig.1. Panama disease of banana, (A) infected banana plant,(B) infected Pseudostem showing black lesion,(C) pure culture of *Fusarium oxysporum* f. sp. *cubense*on PDA and (D) conidia of *Fusarium oxysporum* f. sp. *cubense*.

Fig.2. Sigatoka disease of banana, (A) severe sigatoka infected leaf and (B) typical symptom of sigatoka on leaf.

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