

# EFFICACY OF DIFFERENT FUNGICIDES IN CONTROLLING SIGATOKA DISEASE OF BANANA

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## ABSTRACT

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The experiment was conducted in the farmer field at Sagordighi and Garobazar of Tangail district during 2014-2015 cropping season to evaluate the efficacy of nine different fungicides including Tilt 250EC as a standard check and a Control against Sigatoka disease caused by *Cercospora musae* of banana. Eight foliar fungicides were Avance 25 EC (Propiconazole), G-Force 5 EC (Hexaconazole), Kashatin 50 WP (Carbendazim), Care-2 300 EC (Difeconazole + Propiconazole), Opal 7.5 EC (Epoxiiconazole), Lilivo 75 WP (Trifloxostrobin +Tebuconazole), Suzala 10

EC (Hexaconazole) and Zole plus 25 EC (Difeconazole + Propiconazole). Mehersagar cultivar of banana was transplanted and the fungicides were sprayed 4 times at 20 days interval. All the fungicides significantly controlled the disease except control (no fungicide). Among the fungicides Lilivo 75 WP (5.02%), Opal 7.5 EC (5.35%), Kashatin 50 WP (5.57%) and Tilt 250 EC (5.57%) showed the better performance in reduction of disease severity as well as increasing yield of banana where Kashatin and Tilt are statistically similar in these respects.

**Keyword:** Sigatoka, banana, fungicide

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## INTRODUCTION

Banana (*Musa sapientum* L) is a popular year round nutritious fruit in the world as well as in Bangladesh belongs to the family *musaceae*. At present, it is grown in more than 120 countries throughout tropical and subtropical regions and it is the staple fruit for more than 400 million people (Molina and Valmayor 1999). Banana is cultivated globally on an area of 5.6 million hectares of land with total production of 114 million tonnes (FAO 2017). In Bangladesh it is cultivated in 120203 acre of land (BBS 2017) and produces nearly 1.00 million tones of banana annually (Hossain 2014). In Bangladesh, it is grown throughout the year but production is still low compared to other banana producing country of the world. The lower yield of banana in the country is due to various diseases. Among the diseases, sigatoka or leaf spot caused by *Cercospora musae* and or *Mycosphaerella musicola*, is a threat for commercial banana production in Bangladesh and also an important limiting factor in banana production worldwide (Simmonds 1966). Sigatoka leaf spot affects not only the banana leaves, but also bunch weight and fruit quality. Leaf spot incurr severe yield reduction when

less than six viable leaves remain at harvest. Leaf spot may also cause early maturity and premature ripening of fruits. Banana of leaf spot infected plants sometimes ripen in the field. These field ripen bunches harbor fruit fly and are unmarketable. Even unripe fruits from affected bunches are not saleable, because they are likely to ripen in transit to market (Mourichon 1997). Fungicide has still become the main tool in mitigating the development and reducing the effect of the diseases as source of disease resistance is rare in banana. Considering the above facts, the present work was conducted to find out the effectiveness of some new fungicides for controlling sigatoka disease of banana.

## MATERIALS AND METHODS

Nine foliar fungicides (Table 1) were sprayed at two locations (Sagordighi and Garobazar) of the famous banana growing district Tangail during 2014-15 cropping season for controlling sigatoka disease of banana. Farmer's fields were selected where commercially popular and tasty banana cv. Mehersagar has been under cultivation, which is reported to be highly susceptible to sigatoka disease (Hoque and Hossain 2001). The experiments were laid out in Randomized Complete Block design with four replications. Mehersagar cultivar of banana was

transplanted in 2mx2m spacing. The fungicides Avance 25 EC (Propiconazole), G-Force 5 EC (Hexaconazole), Kasathin 50 WP (Carbendazim), Care-2 300 EC (Difeconazole +Propiconazole), Opal 7.5 EC (Epoxiiconazole), Lilivo 75 WP (Trifloxostrobin +Tebuconazole), Suzala 10 EC (Hexaconazole), Tilt 250EC (Propiconazole) and Zole plus 25 EC (Difeconazole +Propiconazole) were used in this experiment. All these fungicides were sprayed 4 times at 20 days interval. The spray schedule was started when the plants were at four months old with disease appearance. Tilt 250EC that was recommended earlier for controlling sigatoka disease of banana remained as standard check (Hossin *et al.* 1994). Disease data were collected after 15 days of the final spray from all leaves of a plant, following a 0-6 standard scale derived by INIBAP (Anon. 1988). The scale was as 0= no symptom; 1= less than 1% of lamina with symptom (only streaks and /or upto 10% spots); 2= 1-5% lamina with symptoms; 3= 6-15% lamina with symptoms; 4= 16-33% lamina with symptoms; 5= 34-50% lamina with symptoms; 6=51-100% lamina with symptoms (Gauhl *et al.* 1993).

Infection index was computed as Percent Disease Index (PDI) =  $\frac{\sum nb}{(N-1) T} \times 100$  where n= number of

leaves in each grade; b= grade; N= number of grades used in the scale(7); T= total number of leaves scored. Yield and yield contributing characters like number of fruits/bunch, length, and breadth of fruits and their weight were recorded from randomly selected samples. Statistical analysis was done in MSTAT C package.

## RESULTS AND DISCUSSION

All the fungicides significantly reduced the PDI value in two locations over the control treatment (Table 1). Maximum disease severity was observed in control plot of both areas. The ranges of PDI were 5.02-89.50% in Sagardighi and 5.25-90.25% in Garobazar location of Tangail district. Minimum disease severity was found in Lilivo (5.02%) followed by Opal (5.35%), Kasathin (5.57 %) and Tilt (5.57%) where Kasathin and Tilt showed the statistically same result. It also revealed that all the chemicals reduced disease severity over 80% except Avance in Sagardighi location. Effectiveness of all fungicides showed similar trend in controlling sigatoka of banana in two locations.

**Table1. Efficacy of fungicides in controlling sigatoka disease of banana in farmer's fields of Tangail district**

| Fungicides                                    | Dose (%) | Location-wise disease severity (PDI) and disease reduction (%) of banana |               |           |               | Average reduction (%) |
|-----------------------------------------------|----------|--------------------------------------------------------------------------|---------------|-----------|---------------|-----------------------|
|                                               |          | Sagardighi                                                               |               | Garobazar |               |                       |
|                                               |          | PDI                                                                      | Reduction (%) | PDI       | Reduction (%) |                       |
| Avance 25 EC (Propiconazole)                  | 0.05%    | 9.58b                                                                    | 79.92         | 9.30b     | 80.95         | 80.46                 |
| G - Force 5 EC (Hexaconazole)                 | 1%       | 6.20d                                                                    | 83.30         | 6.02d     | 84.23         | 83.76                 |
| Kasathin 50 WP (Carbendazim)                  | 2%       | 5.57de                                                                   | 83.93         | 5.77de    | 84.48         | 84.20                 |
| Care -2 300 EC (Difeconazole +Propiconazole)  | 1%       | 7.36c                                                                    | 82.14         | 7.50c     | 82.75         | 82.51                 |
| Opal 7.5 EC (Epoxiiconazole)                  | 2%       | 5.35de                                                                   | 84.15         | 5.07e     | 85.18         | 84.66                 |
| Lilivo 75 WP (Trifloxostrobin +Tebuconazole)  | 0.05%    | 5.02e                                                                    | 84.48         | 5.25e     | 85.20         | 84.84                 |
| Sujala 10 EC (Hexaconazole)                   | 1%       | 7.42c                                                                    | 82.08         | 7.39c     | 82.86         | 82.47                 |
| Zole Plus 25 EC (Difeconazole +Propiconazole) | 1%       | 7.95c                                                                    | 81.55         | 8.15c     | 82.10         | 81.82                 |
| Tilt 250 EC (Propiconazole)                   | 0.05%    | 5.57de                                                                   | 83.93         | 6.15d     | 84.10         | 84.01                 |
| Control                                       |          | 89.50a                                                                   | -             | 90.25a    | -             |                       |

Means within the same column having the common letter do not differ significantly (p=0.05)

Results also revealed that yield and yield attributes characters of banana from treated plants differed significantly over untreated control (Table 2). The highest number of fruit per plant (120.8), length of finger (8.8cm), breadth of finger (6.15cm), weight of individual fruit (183.3g) and yield (55.4 t/ha) recorded from Lilivo 75 WP and the lowest from control.

All the parameter showed best performance in case of Lilivo 75 WP followed by Opal 7.5 EC, Kasathin 50 WP and Tilt 250 EC treated plot. All the treatments gave additional yield that ranged from 8.7-25.4 t/ha over control.

**Table 2. Yield and yield contributing characters of banana in fungicide sprayed fields in Tangail district.**

| Fungicides      | Fruit number/plant | Fruit length (cm) | Fruit breath (cm) | Fruit weight (g) | Wt. of bunch(kg) | Yield (t/ha) | Additional yield (t/ha) |
|-----------------|--------------------|-------------------|-------------------|------------------|------------------|--------------|-------------------------|
| Avance 25 EC    | 108.0e             | 6.850b            | 5.225ef           | 143.0e           | 15.44            | 38.7         | 8.7                     |
| G - Force 5 EC  | 110.8d             | 7.275b            | 5.425d            | 158.0c           | 17.50            | 43.8         | 13.8                    |
| Kasathin 50 WP  | 113.3c             | 8.225a            | 5.700c            | 174.3b           | 19.74            | 49.4         | 19.4                    |
| Care -2 300 EC  | 105.8f             | 6.125c            | 5.325de           | 146.8de          | 15.53            | 38.9         | 8.9                     |
| Opal 7.5 EC     | 118.8b             | 8.475a            | 5.950b            | 180.8a           | 21.47            | 53.7         | 23.7                    |
| Lilivo 75 WP    | 120.8a             | 8.800a            | 6.150a            | 183.3a           | 22.14            | 55.4         | 25.4                    |
| Sujala 10 EC    | 106.8ef            | 7.200b            | 5.125f            | 149.5d           | 15.96            | 39.9         | 9.9                     |
| Zole Plus 25 EC | 105.3f             | 6.150c            | 4.850g            | 146.8de          | 15.45            | 38.7         | 8.7                     |
| Tilt 250 EC     | 117.3b             | 8.325a            | 5.850bc           | 180.0a           | 21.11            | 52.8         | 22.8                    |
| Control         | 100.8g             | 5.575c            | 4.225h            | 119.0f           | 11.99            | 30.0         | -                       |
| LSD             | 1.832              | 0.6712            | 0.1589            | 4.553            | -                | -            | -                       |

Average of means from two locations; Means within the same column having the common letter do not differ significantly (p=0.05)

Disease incidences were similar in two locations with moderate to severe leaf damage occurring in the guard rows. The fungicides trifloxystrobin, propiconazole, carbendazim and pyroclostrabin proved effective in controlling Sigatoka disease of banana. A similar level of effectiveness has been previously demonstrated in the control of black Sigatoka caused by *Mycosphaerella fijiensis* in field experiments conducted in Central America (Perez *et al.* 2002). In Karnataka at Munavalli and Ramadurga two sprays of propiconazole @ 0.05% effectively controlled the disease and recorded the lowest percent disease index (Tammaiah *et al.* 2008). Patel (2009) concluded that propiconazole, hexaconazole, tridemorph and carbendazim remained significantly at par with each other and recorded least leaf spots followed by tebuconazole and companion (combination of mancozeb and carbendazim). Ganry *et al.* (2008) found that chemical control with fungicides such as triazoles, benzimidazoles and strobilurines can be very efficient at suppressing the development of these diseases, especially with the use of aerial application and forecasting strategies. Chemical control by spraying fungicides on a preventive or curative basis is the only acceptable strategy adopted in the management of this disease (Duvert *et al.* 2002).

The findings of the present study clearly figure out that banana plant infected by sigatoka leaf spot disease may be successfully managed with Lilivo 75 WP, Opal 7.5 EC, Kasathin 50WP and Tilt 250EC that can be suggested to the farmers for addressing sigatoka leaf spot disease of banana.

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