MANAGEMENT OF BACTERIAL LEAF BLIGHT AND ALGAL RUST OF GUAVA IN THE NURSERY

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ABSTRACT

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An experiment was conducted to find out the suitable management practices for controlling nursery diseases of guava by applying seven treatments viz. i)T_1=BAU-Biofungicide applied in the soil @ 2%, ii) T_2=BAU-Biofungicide applied as foliar spray @ 2%, iii) T_3=BAU-Biofungicide applied in the soil as well as foliar spray @ 2%, iv) T_4= Bavistin applied as foliar spray@ 0.2%, v) T_5=Dithane M-45 applied as foliar spray@ 0.2 %, vi) T_6=BAU-Biofungicide applied in the soil @ 2% and Bavistin applied as foliar spray@ 0.2% and vii) T_7=Control. The results showed that the incidence and severity of bacterial leaf blight of guava (Kazi payara) ranged from 2.78 to 16.67 % and 0.02% to 0.26%, respectively, where BAU-Biofungicide as foliar spray was found superior to control the bacterial blight of guava. In guava, the incidence and severity of algal rust ranged from 5.55% to 27.78% and 0.018% to 0.126%, respectively. BAU-Biofungicide found superior to control the algal rust of guava when Bio-fungicide was applied in the soil as well as foliar spray. The findings revealed that BAU-Biofungicide came out as a superior means of disease control.

Keywords: Guava, Nursery disease, Management

INTRODUCTION

Guava (*Psidium guajava* L.) is an important fruit growing in Bangladesh. Bangladesh produces 182 thousand metric tons of Guava annually (BBS 2010).Quantity and quality of guava in this country is far below the world standard. There are several factors responsible for low yield and poor quality of guava in Bangladesh, where disease attack is most important of them (Mirsa 2004). Guava is popular to the rich and the poor people of Bangladesh due to its comparative low price than some other fruits, nourishing values and good taste. The fruit is rich in Vitamin-C content. It is also rich in protein, which has industrial use for jelly production (Bose and Mitra 1990). It contains appreciable amount of Vitamin-A, Calcium, Phosphorus, Pantothenic acid, Riboflavin, Thiamin and Niacin (Singh 1995). The leaves of the plant have medicinal values, which aid in curing diarrhoea, swelling and bleeding of gums. Nursery diseases are an important consideration for guava production. Healthy seedlings are prime need and basic raw material for cultivation of fruit crops. But seedling diseases are one of the important problems in the tropics. Although a huge number of nurseries are engaged in producing seedlings, but they fail to produce quality seedlings due to lack of their knowledge about diseases and their management (Chowdhury 2009). Seeds after germination, it could be attacked by different diseases which may produce distinct symptoms in the nursery bed or it may carry the organisms when it is transplanted in the orchard or any selected place. Thus, production of healthy seedlings ensures good plantation and save money, labour and energy. It is necessary to determine the seedling diseases and management of the diseases in the nurseries through sound and economic way (Sarker *et al*. 2015). Guava subjected to attack by a number of diseases at all stages of its growth and development but bacterial leaf blight resulting significant loss in case of nursery seedlings. Bacterial leaf blight and algal rust are two important diseases of guava. For the first time in Bangladesh bacterial leaf blight disease has been reported by Hossain in 2011 and it has been found to be caused by *Pseudomonas syringae* pv. *syringae* (Hossain 2012). Bacterial diseases are explosive; by the time symptoms are recognized, the pathogen often well on its way to destroying the crop and lead to devastating financial losses to farmers (Mcmanus and Stockwell 2000). Biological agent namely BAU-Biofungicide in controlling disease against Bacterial leaf blight and rust of some nursery diseases have been reported by Yasmin and Hossain (2014), Sarker *et al* (2016) and Basak *et al.* (2013).Considering the above points, the present study was undertaken to evaluate comparative efficacies of fungicides and BAU-biofungicide in controlling nursery diseases of guava.

MATERIALS AND METHODS

The experiment was carried out in the field laboratory of Department of Plant Pathology, Bangladesh Agricultural University, Mymensingh during October 2010 to September 2011. For the control of nursery diseases of guava seven different treatments were employed on guava variety Kazi payara. The treatments were: T_1= BAU-Biofungicide applied in the soil @ 2%, T_2= BAU-Biofungicide applied as foliar spray @ 2%., T_3= BAU-Biofungicide applied in the soil as well as foliar spray @ 2%, T_4= Bavistin applied as foliar spray @ 0.2%, T_5= Dithane M-45 was applied as foliar spray @ 0.2 %, T_6= BAU-Biofungicide applied in the soil @ 2% and Bavistin applied as foliar spray@ 0.2% and T_7= Control. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The data were recorded on incidence and severity of bacterial leaf blight and algal rust of guava at 30 days interval. The bacterial strains isolated and collected from guava leaf samples were used for potassium hydroxide solubility test, potato soft rotting test and bacterial inoculation in healthy leaves (Fig. 1).

Fig.1. (a) Streaking of *Pseudomonas* sp. (b) inoculation of bacteria in healthy guava leaves, inoculated leaf showing bacterial leaf blight, where control is without symptom

Collection of diseased plant samples and identification of diseases

Samples were collected from the diseased seedlings of Guava. The infected leaves were collected and taken in the Eco-friendly Plant Disease Management Laboratory, Department of Plant Pathology, BAU, Mymensingh for the isolation and identification of the pathogens. The diseases were identified following the key notes used by Hossain (2011). The bacteria *Pseudomonas* sp. was identified by following the method of Yasmin and Hossain (2014).

RESULTS AND DISCUSSION

Bacterial leaf blight

Disease symptoms of Bacterial leaf blight of guava were studied (Fig.2)

Disease symptoms of the collected samples were recorded as Minute water soaked lesions appeared in groups towards the tip of the blade that turned brown to black in color and surrounded by chlorotic halos. They were surrounded by the veins and hence angular in shape. Large necrotic patches were formed by coalescing of several lesions. The patches sometimes dried up, often rough and raised due to heavy bacterial exudates (Fig.2). Petioles and tender stems were also infected and longitudinal cracks developed on the petiole. In the potassium hydroxide solubility test, a strand of viscid material was found that indicated that the bacteria were gram-negative. The isolated bacteria from the blighted leaf were *Pseudomonas* sp. Hossain (2011) studied the nursery diseases of guava in Bangladesh during the period of 2010-2011. He recorded leaf blight in different guava growing areas of Bangladesh. Islam *et al*. (2013) and Hossain (2011) studied the nursery diseases of Mango in Bangladesh and identified *Pseudomonas syringae pv. Syringae* as causal organism of leaf blight of Mango.

Fig. 2. Symptoms of bacterial leaf blight of guava

Algal rust

Initially the spots were greenish-grey in color and velvety in texture, but later the surface turned reddish-brown in appearance (Fig.3). Algal spot was circular to irregular in shape, slightly elevated. The causal agent was a green alga, *Cephaleuros virescens* Kunze. The orange tuft observed on affected hosts was the thallus of the algae. Hossain (2011) studied the nursery diseases of guava in Bangladesh during the period of 2010-2011. He recorded algal rust in different guava growing areas of Bangladesh. Sarker *et al*. (2016) also studied nursery diseases of some fruits and recorded rust disease.

Fig.3. Symptom of algal rust of guava

Effect of different management practices on incidence and severity of bacterial leaf blight disease of guava var. Kazi payara

Significant variation of incidence and severity of bacterial leaf blight disease of guava var. Kazi payara was observed under different management practices. All the treatments decrease the incidence and severity of bacterial leaf blight disease of guava var. Kazi payara over control. Bacterial leaf blight infected plant was not found in December, January March, May June and November. All treatments show incidence Viz. T_1= 5.55 % T_2=2.78%, T_3= 5.55%, T_4= 8.33%, T_5= 5.55%, T_6= 5.55% T_7 = 16.6%. The incidence of bacterial leaf blight disease of guava ranged from 2.78 to16.67%, where the lowest count was made in T_2 (BAU-Biofungicide was applied as foliar spray @ 2 % and highest in T_7 (Untreated control) (Fig. 4).

All treatments show severity Viz. T_1= 0.008 % T_2=0.002%, T_3= 0.11%, T_4= 0.027%, T_5= 0.003%, T_6= 0.013% T_7 = 0.26%. The severity of bacterial leaf blight varied from 0.002 to 0.26%. Out of all the treatments applied, the lowest (0.002%) severity was observed in T_2 (BAU-Biofungicide was applied as foliar spray @ 2%. and the highest (0.26%) in T_7 (Untreated control) (Fig. 5).

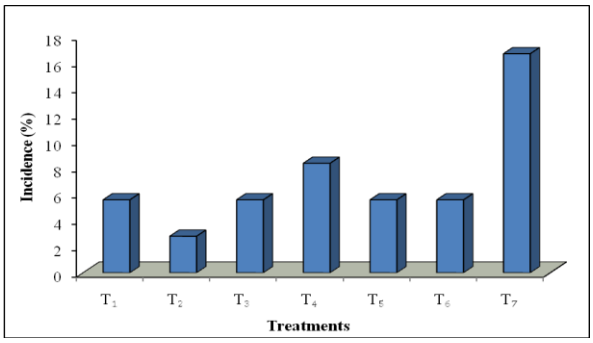

Figure 4: Bacterial leaf blight incidence of guava (Kazi payara)

T_1= BAU-Biofungicide was applied in the soil @ 2%, T_2= BAU-Biofungicide was applied as foliar spray @ 2%., T_3= BAU-Biofungicide was applied in the soil as well as foliar spray @ 2%, T_4= Bavistin was applied as foliar spray @ 0.2%, T_5= Dithane M-45 was applied as foliar spray @ 0.2 %, T_6= BAU-Biofungicide was applied in the soil @ 2% and Bavistin was applied as foliar spray@ 0.2% and T_7= Control.

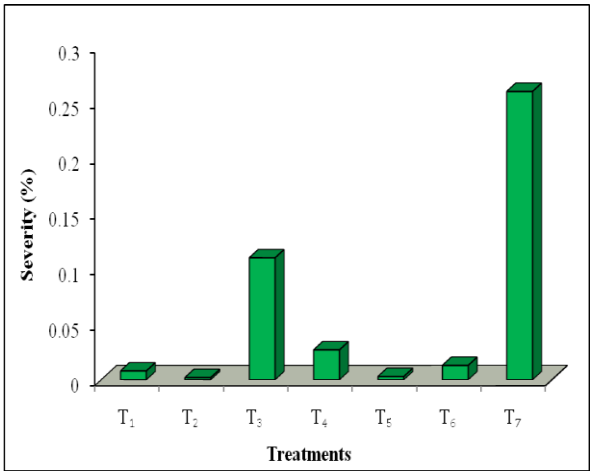

Figure 5: Bacterial leaf blight severity of guava (Kazi payara)

T_1= BAU-Biofungicide was applied in the soil @ 2%, T_2= BAU-Biofungicide was applied as foliar spray @ 2%., T_3= BAU-Biofungicide was applied in the soil as well as foliar spray @ 2%, T_4= Bavistin was applied as foliar spray @ 0.2%, T_5= Dithane M-45 was applied as foliar spray @ 0.2 %, T_6= BAU-Biofungicide was applied in the soil @ 2% and Bavistin was applied as foliar spray@ 0.2% and T_7= Control.

Effect of different management practices on incidence and severity of algal rust disease of guava (Kazi payara)

Significant variation of incidence and severity of algal rust disease of guava var. Kazi payara was observed

under different management practices. Algal rust infected plant was not found in March, April, May, June and July. All treatments show incidence Viz. T_1= 11.11% T_2=13.89%, T_3= 5.55%, T_4= 11.11%, T_5= 13.89%, T_6= 13.89% T_7 = 27.78%. The incidence of algal rust disease of guava ranged from 5.55 to27.78%, where the lowest count was made in T_3 (BAU-Biofungicide was applied in the soil as well as foliar spray @ 2% and highest in T_7 (Untreated control) (Fig.6). All treatments show severity Viz. T_1= 0.034% T_2=0.045%, T_3= 0.018%, T_4= 0.029%, T_5= 0.027%, T_6= 0.045% T_7 = 0.126%. The severity of algal rust varied from 0.018 to 1.26 %. Out of all the treatments applied, the lowest (0.018%) percent of total leaf area diseased per plant was observed in T_3 (BAU-Biofungicide was applied in the soil as well as foliar spray @ 2%). and the highest (0.126%) in T_7 (Untreated control) (Fig. 7).

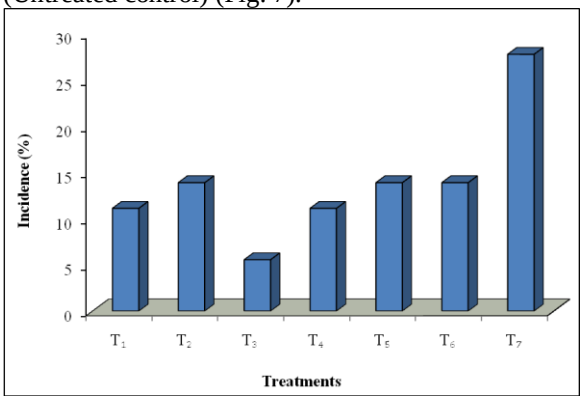

Figure 6: Incidence of algal rust disease of guava (Kazi payara)

T_1= BAU-Biofungicide was applied in the soil @ 2%, T_2= BAU-Biofungicide was applied as foliar spray @ 2%., T_3= BAU-Biofungicide was applied in the soil as well as foliar spray @ 2%, T_4= Bavistin was applied as foliar spray @ 0.2%, T_5= Dithane M-45 was applied as foliar spray @ 0.2 %, T_6= BAU-Biofungicide was applied in the soil @ 2% and Bavistin was applied as foliar spray@ 0.2% and T_7= Control.

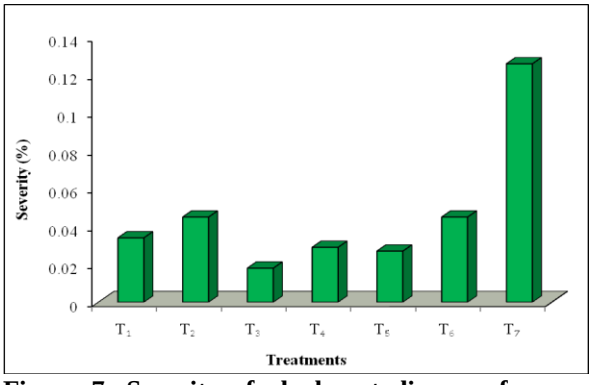

Figure 7: Severity of algal rust disease of guava (Kazi payara)

T_1= BAU-Biofungicide was applied in the soil @ 2%, T_2= BAU-Biofungicide was applied as foliar spray @ 2%., T_3= BAU-Biofungicide was applied in the soil as well as foliar spray @ 2%, T_4= Bavistin was applied as foliar spray @ 0.2%, T_5= Dithane M-45 was applied as foliar spray @ 0.2 %, T_6= BAU-Biofungicide was applied in the soil @ 2% and Bavistin was applied as foliar spray@ 0.2% and T_7= Control.

Altogether two different diseases of guava viz. bacterial leaf blight and algal rust were recorded in the field. Other researchers also recorded two diseases (Pathok 1989, Marques *et al.* 2007, Hossain 2011). BAU-Biofungicide and two different fungicides viz. Bavistin and Dithane M-45 were applied in the field of one guava variety (Kazi Payara) for controlling the nursery diseases. It had been observed that the percent diseased leaf per plant had been increased under control treatment, while the treated plants were found to have reduced number of diseased leaf per plant.

In case of incidence and severity of Bacterial leaf blight of guava, the lowest count was made in T_2 (BAU-Biofungicide was applied as foliar spray @ 2 % and highest in T_7 (Untreated control). Out of the control measures employed, BAU-Biofungicide was found superior to control the bacterial blight of guava when BAU-Biofungicide was applied as foliar spray.The findings of the study corroborate with the findings of Basak *et al.* (2014) and Hossain *et al.* (2011). They also found BAU-Biofungicide an effective control measure against bacterial leaf blight disease of litchi. In case of algal rust of guava (Kazi payara), it had been found that the highest incidence and severity of algal rust was found in T_7 (Untreated control) and the lowest was observed in T_3 (BAU-Biofungicide was applied in the soil as well as foliar spray @ 2%). Among the control measures employed, BAU-Biofungicide was found superior to control the algal rust of guava when BAU-Biofungicide was applied in the soil as well as foliar spray. Management of nursery diseases of guava has not been reported earlier in Bangladesh. This is the first time report on it. BAU- Biofungicide is a *Trichoderma* based preparation (Hossain, 2011). This is in accordance with the findings of Dwivedi and Shukla (2002). Under the study, it had been observed that leaf blight of guava was completely absent from December 2010 to June 2011. The incidence of leaf blight was lesser in amount in other months of the study period. On the other hand, incidence and severity of leaf rust of guava were not found in March to July 2011.The fluctuation of disease incidence and severity might be due to environmental factors. This has been supported

by Chowdhury (2009). The study had been carried out for only a year. Therefore, the study needs to be continued to another 2-3 years in order to draw a final conclusion.

CONCLUSION

The findings revealed that BAU- Biofungicide came out as a superior means of disease control.

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