EFFICACY OF CERTAIN FUNGICIDES AND BIOAGENTS AGAINST ANGULAR LEAF SPOT OF COTTON (*GOSSYPIUM HIRSUTUM* L.) UNDER FIELD CONDITIONS

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Received-17.02.2015, Revised-04.03.2015

Abstract : An experiment was conducted during *kharif* season of 2011-12 central research plot of SHIATS. To find out the efficacy of certain fungicides and bio-agents against *Xanthomonas campestris pv malvaciarum* of cotton different treatment of Bordeax mixture, Neem cake, *Pseudomonas fluorescens*, Streptomycin, *Bacillus subtilis*, Mancozeb, Carbendazim was used as foliar spray. Result that the foliar spray of Streptomycin @ 0.025% was found most effective in reducing the disease severity (17.03%) at 120 DAS, (18.67%) 150 DAS, (20.59%) at 180 DAS and increased yield (29.10 q/ha) at harvest.

Keyword : *Xanthomonas campestris pv. malvaciarum*, Fungicides, Bio-agents

INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is the "White Gold" or the "King of Fibres" enjoys a predominant position amongest all cash crop in India. (Chattannavar, *et al.* 2010). Cotton is one of the most important crops in several part in the world. The primary necesscities of human beings is food, secondary cloth for cover his body. Cotton is full fills the secondary necessities. For the manufacturing of cloths, silk, wood, synthetic fibre etc. cropped fiber are used, but 70% total production of cloths are produced by fiber of cotton. After destruction of fiber in cotton, the cotton seed are also used for foods of animals. After destruction the oil other part khali are used for the burning process with dry wood. Its levies can also be used for mannuar 1 kg cotton stalks which is complete by cellulose helps for growing 500g. mushroom which is full the protein in the food. The cotton is also known as "white cotton." (Ahlawat and Omprakash, 2003). Angular leaf spot or black arm of cotton is the most serious bacterial disease of this crop. The disease was first reported from Alabama State of USA in 1891. In India the disease was first observed in Tamil Nadu in 1918. Several epidemics of the disease were reported during 1948-1952 in Tamil Nadu which resulted in rejection of very promising cotton varieties of all the four species of *Gossypium*. (Singh, 2005). The spread of disease depends much upon climatic condition. In rainy weather, the leaves and stems are attacked, especially when the rains are heavy and accompanied by strong winds. The pathogen is carried by wind-driven rain on to the plants. The most important factors favourable to the pathogen are high relative humidity and high air temperature. (Pandey, 2011). Biological agents has promising results in cotton chemical prove to be more effective but with the growing awareness of chemicals, integrated use of bioagent and chemical seens to be the best method of management. "Efficacy of certain fungicides and bio-agents against angular leaf spot of cotton (*Gossypium hirsutum* L.) under field conditions."

MATERIAL AND METHOD

A field trial was conducted to check the efficacy of foliar spray with fungicides and bio-agents on Angular leaf spot of cotton at the research plot of the Department of Plant Protection, Sam Higginbottom Institute of Agriculture, Technology & Sciences (deemed to be university) Allahabad. The selected field area was well prepared and plot marked as per the lay out plan. The field was dug up, weeds cleaned and the soil was pulverized and the total area was divided into 24 plots. The experiment was analysed by using RBD (randomized block design) with three replication in a plot size $3x2m^2$. T_1- Bordeax mixture @, T_2- Neem cake @, T_3-*Pseudomonas fluorescens* @, T_4- Streptomycin @, T_5- *Bacillus subtilis* @, T_6- Mancozeb @, T_7- Carbendazim @ and the untreated control was used as foliar spray. Observation recorded were disease intensity on leaf at 90, 120, 150, 180 DAS and yield (q/ha).

Disease intensity (%) was calculated by using the following formula

$$\text{Disease intensity (\%)} = \frac{\text{Sum of all individual rating}}{\text{Total no. of rating x maximum disease grade}} \times 100$$

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RESULT AND DISCUSSION

In the present study, the result of experiment conducted to evaluate the "Efficacy of certain fungicides and bio-agents against angular leaf spot of cotton (*Gossypium hirsutum* L.) under field conditions. Under the appropriate heading carried out in *kharif* season 2011-2012 to assess the plant height, number of branches, number ofleaf, disease intensity and cost benefit ratio of crop under field condition. The table comprising of data recorded during the experimental period and suitable figures illustrates the noted variation.

Table 1. Effect of different fungicides and bio-agents against angular leaf spot of Cotton (*Gossypium hirsutum* L.) on disease intensity (%) at different intervals

Treatment No.	Fungicides and bioagents	Concentration	Disease intensity (%)			
			Before spray	After I spray	After II spray	After III spray
			90 DAS	120 DAS	150 DAS	180 DAS
T_1	Bordeaux mixture	0.25%	14.37	17.77	20.29	23.26
T_2	Neem Cake	0.50%	15.55	21.03	25.48	30.67
T_3	*Pseudomonas fluorescens*	20 g/l.	14.37	17.77	20.44	23.85
T_4	Streptomycin	0.025%	13.77	17.03	18.67	20.59
T_5	*Bacillus subtilis*	0.01%	15.40	20.14	25.18	29.18
T_6	Mancozeb	0.20%	15.25	20.14	24.59	28.74
T_7	Carbendazim	0.20 to 0.30%	14.74	19.40	23.40	26.96
T_0	Control (untreated)	-	16.59	21.47	28.44	38.74
		F-test	NS	S	S	S
		S. Ed. (±)	-	0.34	0.13	0.27
		C. D. (P = 0.05)	-	0.73	0.29	0.58

Disease intensity (%) at 120 DAS

The minimum disease intensity (%) was recorded at 60 DAS T_4- Streptomycin @ 0.025% (17.03) followed by T_1- Bordeaux mixture @ 0.25% (17.77), T_3- *Pseudomonas fluorescens* @ 20g/l (17.77), T_7- Carbendazim @ 0.20 to 0.30% (19.40), T_6- Mancozeb @ 0.20% (20.14), T_5- *Bacillus subtilis* @ 0.01% (20.14), T_2- Neem cake @ 0.50% (21.03) over T_0- control (21.47).

All the treatment were significant over the control but (T_0, T_2), (T_5, T_6) and (T_3, T_1) were non significant with each other.

Disease intensity (%) at 150 DAS

The minimum disease intensity (%) was recorded at 90 DAS T_4- Streptomycin @ 0.025% (18.67) followed by T_1- Bordeaux mixture @ 0.25% (20.29), T_3- *Pseudomonas fluorescens* @ 20g/l (20.44), T_7- Carbendazim @ 0.20 to 0.30% (23.40), T_6- Mancozeb @ 0.20% (24.59), T_5- *Bacillus subtilis* @ 0.01% (25.18), T_2- Neem cake 0.50% (25.48) over T_0- control (28.44).

All the treatment were significant over the control but (T_3, T_1) were non significant with each other.

Disease intensity (%) at 180 DAS

The minimum disease intensity (%) was recorded at 90 DAS T_4- Streptomycin @ 0.025% (20.59) followed by T_1- Bordeaux mixture @ 0.25% (23.26), T_3- *Pseudomonas fluorescens* @ 20g/l (23.85), T_7- Carbendazim @ 0.20 to 0.030% (26.96), T_6- Mancozeb @ 0.20% (28.74), T_5- *Bacillus subtilis* @ 0.01% (29.18), T_2- Neem cake @ 0.50% (30.67) over T_0- control (38.74).

All the treatment were significant over the control but (T_5, T_6) were non significant with each other.

In the present study the chemicals tested gave better results for minimizing the PDI. A significant variation of PDI was found among the treatments. All fungicides performed significantly better over the control. Lowest PDI was recorded in streptomycin treated plots. It was statistically similar to Bordeaux mixture, *Pseudomonas flurescens* is also reported by (Naik and Hiremath, 2003) to be effective in controlling the angular leaf spot of cotton. Against *Xanthomonas campestris pv. malvacearum* have reported that streptomycin 0.025 % were significantly superior over control and rest of the fungicides in managing angular leaf spot of cotton have reported that efficacy of *Pseudomonas*

flurescens against angular leaf spot of cotton. The reported that it against better results than check in controlling the diseases. The probable reason for such finding may be that these fungicides and bio-agent had inhibitory effect on the *Xanthomonas* growth of the bacteria and may have reduced the inoculum density due to which spread and increase in the disease intensity may have been checked.

Table 2. Effect of different fungicides and bio-agents against angular leaf spot of Cotton (*Gossypium hirsutum* L.) on yield (q ha^{-1})

Treatment No.	Fungicides and bioagents	Concentration	Yield (q ha^{-1})
T_1	Bordeaux mixture	0.25%	26.74
T_2	Neem Cake	0.50%	23.04
T_3	*Pseudomonas fluorescens*	20 g/l.	25.69
T_4	Streptomycin	0.025%	29.10
T_5	*Bacillus subtilis*	0.01%	23.26
T_6	Mancozeb	0.20%	24.44
T_7	Carbendazim	0.20 to 0.30%	24.93
T_0	Control (untreated)	-	15.28
		F-test	S
		S. Ed. (±)	0.22
		C. D. (P = 0.05)	0.47

The maximum yield (q/ha.) was recorded in foliar spray the decreasing order of yield (q/ha) between different treatments is an followes. T_4- Streptomycin @ 0.025% (29.10) followed by T_1- Bordeaux mixture @ 0.25% (26.74), T_3- *Pseudomonas fluorescens* @ 20g/l (25.69), T_7- Carbendazim @ 0.20 to 0.30% (24.93), T_6- Mancozeb @ 0.20% (24.44), T_5- *Bacillus subtilis* @ 0.01% (23.26), T_2- Neem cake @ 0.50% (23.04) and T_0- control (15.28). Are statistically significant over control. All the treatment were significant over the control.

The seed cotton yields among the treatments were significant. The highest grain yield was recorded in T_4 streptomycin 0.025% (29.10 q/ha), followed by T_1 (26.74 q/ha), T_3 (25.69 q/ha), T_7 (24.93 q/ha), T_6 (24.44 q/ha), T_5 (23.26 q/ha) as compared to control T_0 (15.28 q/h).

CONCLUSION

Based on the result it was from that streptomycin as foliar spray was most effective effective against angular leaf spot of cotton. Three spray of streptomycin @ 0.025% were found effective in reducing the disease intencity and increasing the yield. Streptomycin is an important antibiotic for the management of bacterial disease.

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