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Management of diseases of cotton under high density planting system

R.VIMALA*

Tamil Nadu Agricultural University, Cotton Research Station, Srivilliputtur - 626 135

****E-mail: ramesh_vimal@yahoo.co.in***

ABSTRACT: Field experiments were carried out to study the effect of bio control agents and fungicides on diseases and productivity of cotton under high density planting system during 2017 and 2018 at Cotton Research Station,Srivilliputtur.The experiment was laid out in randomized block design with nine treatments and three replications. Pooled data indicated that the highest seed cotton yield (1730 kg/ha) as compared to other treatments was primarily due to reduced infection by root rot was associated with carbendazim seed treatment @4g/kg+ soil drenching ((0.1%)).*Bacillus subtilis*1 seed treatment (10g/kg) and foliar spray ((0.5%)) registered lowestMyrothecium leaf spot incidence (9.79 PDI).*Pseudomonas fluorescens-1* seed treatment (10g/kg) and foliar spray ((0.5%)) registered lowest bacterial leaf blight incidence (8.55 PDI).

Key words : Bacterial blight cotton, Myrothecium leaf spot, root rot

Root rot of cotton caused by *Macrophomina phaseolina* (Tassi) Goid, is an important and widely prevalent disease of cotton. Cotton cultivation in India has tremendous scope as its consumption rises by 3 percent per annum. There is a wide gap in its consumption and production among developing countries. Due to insect and disease infestation, both quality and the quantity are greatly reduced in various ways e.g. premature boll opening resulting in lint damage and discoloration and immature fiber. Since the cotton crop remains in the field for nearly six months or more, it is affected by various diseases caused by organism such as fungi, bacteria and viruses that grow on and within the plant tissues. These organisms often cause stunting of the plants, defoliation, reduced vigor and yield and sometimes death. Seeds and seedlings attacked by these pathogens often die, while older plants usually survive but perform poorly. The crop suffers from various diseases *i.e.,* bacterial blight, grey mildew, Alternaria leaf spot, Myrothecium leaf spot, root rot and wilt etc. Cotton seed borne diseases affect germination and cause seedling mortality (Bhattiprolu, 2017). Cotton is grown in about 18 countries all over the world. Cotton plays a vital role in Indian economy. The diseases of cotton which are more prevalent in Tamil Nadu have been identified as root rot, bacterial blight and Myrotheciumleaf spot. India produces around 377 lakh bales of cotton from an area of 1225.35 lakh ha with productivity of 524 kg/ha (Anonymous 2018). In Tamil Nadu the area under cotton crop is 1.48 lakh ha with production of 6 lakh bales with average productivity of 689 kg/ ha (Anonymous 2018). However the production potential of the crop has not been fully exploited due to numerous biotic and abiotic factors. The crop is affected by numerous pests, diseases and weeds etc.

causing serious economic losses (Prashant*et al.*, 2017).

MATERIALS AND METHODS

Field experiment was conducted at Cotton Research Station, Srivilliputtur during winter 2017 and 2018 for the management of diseases of cotton under high density planting system. The culture TCH 1819 was sown in randomized block design with the following nine treatments and three replicationsunder natural epiphytotic condition.

T_1 : Seed treatmentwith *Bacillus subtilis*1 (10 g/ kg) and drenching with *B. subtilis* (0.5%) at fortnight interval upto 60 DAS

T_2 : Seed treatmentwith *Bacillus subtilis*1and foliar spray with *B. subtilis*1 @ (0.5%) at fortnight interval upto 60 DAS

T_3 Seed treatment with *Pseudomonas fluorescens-1* (10 g/ kg) and drenching with*P. fluorescens*1(0.5%) at fortnight interval upto 60 DAS

T_4 : Seed treatment with *P. fluorescens-1*(10 g/ kg) and foliar spray with*P. fluorescens* 1 on at fort night interval upto 60 DAS

T_5 Seed treatmentwith carbendazim (4g/ kg)+ foliar spray with carbendazim @ (0.1%) at initiation of foliar disease + 15 days after first spray

T_6 : Seed treatment with carbendazim (4g/ kg)+ foliar spray with copper oxy chloride @ (0.3%) at initiation of foliar disease + 15 days after first spray

T_7 : Seed treatment with carbendazim (4g/ kg) + drenching withcarbendazim @ (0.1%) at fortnight interval upto 60 DAS

T_8 : Seed treatment with carbendazim (4g/ kg) + drenching with copper oxy chloride @ (0.3%) at fort night interval upto 60 DAS

T_9 : Control

Bacterial leaf blight, myrothecium leaf spot and root rot incidence were recorded on randomly selected plants based on 0-4 scale and PDI was calculated. At the end of season yield was recorded in each plot.

RESULTS AND DISCUSSION

Field trials conducted for the management of diseases of cotton under high density planting system revealed that different treatments made significant influence on the diseases of cotton during 2017 and 2018.The pooled data of two years indicated that, among the different treatments evaluated for the control of *Myrothecium* leaf spot, reduced infection level (9.79 PDI) was noticed in seed treatment with *Bacillus subtilis*1(10 g/ kg) and foliar spray with *B. subtilis*1@ (0.5%) at for night interval upto 60 DAS followed by seed treatment with carbendazim (4g/kg) + foliar spray with carbendazim @ (0.1%) at initiation of disease + 15 days after first spray by recording PDI of 12.29 as against the maximum of 25.84 PDI in control (Table1).*Bacillus* spp. has been used to control a number of leaf spot and post-harvest diseases. Foliar application of mixture of *Pseudomonas fluorescens* and *Bacillus subtilis* reduced the bacterial blight of cotton (Salaheddin *et al.*, 2010).

Seed treatment with *Pseudomonas fluorescens*-1(10 g/ kg) and foliar spray with *P. fluorescens* 1 @ (0.5%) at fortnight interval upto

Table 1. Effect of bio control agents and fungicides on the management of major diseases of cotton under high density planting system

Treatment	2017				2018				**Pooled**			
	Myroth-ecium Leaf spot (PDI)	Bact-erial Leaf blight (PDI)	Root rot (%)	Yield (kg/ ha)	Myroth-ecium Leaf spot (PDI)	Bact-erial Leaf blight (PDI)	Root rot (%)	Yield (kg/ ha)	**Myroth-ecium Leaf spot (PDI)**	**Bact-erial Leaf blight (PDI)**	**Root rot (%)**	**Yield (kg/ ha)**
T_1	15.83	19.17	24.98(30.08)	1346	13.75	17.92	19.75(26.23)	1453	**14.79**	**18.55**	**22.36(28.15)**	**1400**
T_2	10.42	15.83	26.16(30.74)	1235	9.16	15.00	23.47(28.97)	1438	**9.79**	**15.42**	**24.82(29.85)**	**1337**
T_3	17.50	20.42	17.83(24.96)	1488	15.42	19.17	13.82(21.81)	1750	**16.46**	**19.80**	**15.83(23.38)**	**1619**
T_4	17.50	9.17	29.13(32.65)	1253	15.42	7.92	25.80(30.51)	1317	**16.46**	**8.55**	**27.46(31.58)**	**1285**
T_5	12.92	21.67	27.50(31.62)	1255	11.66	20.42	23.30(28.85)	1133	**12.29**	**21.05**	**25.40(30.24)**	**1194**
T_6	16.66	11.67	25.37(30.23)	1246	14.58	10.42	21.09(27.33)	1283	**15.62**	**11.05**	**23.23(24.33)**	**1265**
T_7	15.42	22.50	13.25(21.34)	1560	13.33	21.25	11.66(19.89)	1900	**14.37**	**21.88**	**12.45(20.61)**	**1730**
T_8	17.08	21.67	24.66(29.77)	1348	15.00	20.42	18.03(25.12)	1583	**16.04**	**21.05**	**21.35(27.44)**	**1466**
T_9	26.25	29.17	39.54(38.87)	1063	25.42	27.92	30.04(33.23)	1067	**25.84**	**28.55**	**34.79(36.05)**	**1065**
CD (p=0.05)	1.52	1.30	1.48	43.17	2.12	1.52	2.94	176	**1.82**	**2.01**	**2.53**	**97**

60 DAS was most effective in reducing the incidence of bacterial leaf blight to 8.55 PDI as against 28.55 PDI in the control. This was followed by seed treatmentwith carbendazim (4g/ kg) + foliar spray with copper oxy chloride @ (0.3%) at initiation of disease + 15 days after first spray, which recorded bacterial leaf blight incidence of 11.05 PDI(Table1) .These results are in conformity with the reports of Salaheddin *et al.*, 2010, seed treatment followed by foliar application of Pf 32, Pf 93 and B 49 significantly reduced the incidence of bacterial leaf blight of cotton.

Regarding root rot of cotton, reduced infection level (12.45%) was noticed in seed treatment with carbendazim (4g/kg) + drenching with carbendazim @ (0.1%) at fort night interval up to 60 DAS followed by (15.83%) root rot incidence in seed treatment with *P. fluorescens-1*(10 g/ kg) and drenching with *P. fluorescens*1 (0.5%)) at fortnight interval upto 60 DAS as against maximum of (34.79%) in control. Parmer *et al.* (2018) observed that seed treatment with carbendazim was most effective in controlling root rot of castor incited by *Macrophomina phaseolina*.

In case of yield, the treatment comprising of seed treatment with carbendazim (4g/kg) + drenching withcarbendazim@ (0.1%) at fortnight, interval upto 60 DAS registered the maximum seed cotton yield of 1730 kg/ha as against 1065 kg/ha in control. This was followed by seed treatment with*P. fluorescens-1*(10 g/ kg) and drenching with*P. fluorescens*1((0.5%)) at fort night interval upto 60 DAS which recorded the yield of 1619 kg/ha (Table1).Similarly, the effectiveness of carbendazim towards *Macrophomina phaseolina*in mung bean has been recorded by Rekha *et al.,* (2012).

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