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Efficacy of taqat against Alternaria leaf spot disease of cotton

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ABSTRACT : A field trial was carried out at Cotton Research Station, Junagadh Agricultural University, Junagadh during 2007-2008, 2008-2009 and 2010-2011 to know the efficacy of taqat (75 % WP) a combined fungicide product of captan (70%) and hexaconazole (5%). It was tested at 2 doses *viz.,* 500 g/ha and 750 g/ha compared with propiconazole (0.1%) against Alternaria leaf spot on cotton through application of 3 sprays at fortnight interval starting on 10th September 2007, 1 September 2008 and 12 August 2011. Significantly minimum Alternaria leaf spot disease of 9.43 PDI and higher seed cotton yield of 1523 kg/ha was recorded in taqat 0.113 per cent followed by fungicide propiconazole 0.1 per cent with 9.71 PDI and 1326 kg/ha seed cotton yield. Maximum (34.19%) Alternaria leaf spot per cent disease over control was recorded in taqat higher dose 750 g/ha followed by propiconazole 0.1 per cent (31.92%). Former treatments also improve quality parameters like, span length (28.55%), uniformity ratio (50.73 %), micronaire value (4.56) and maturity ratio (0.84) as compared to propiconazole and control.

Key words: Efficacy, fungal leaf spot, fungicides, taqat

Cotton is an important commercial cash crop of Gujarat. Foliar diseases account upto 20 to 30 per cent losses in cotton (Mayee and Mukewar, 2007). Alternaria leaf spot, bacterial leaf blight, Cercospora leaf spot and grey mildew are major diseases which occur more or less in all the cotton growing countries of the world and affects yield and fibre quality (Hussain and Tahir, 1993). Among the leaf spot diseases, Alternaria leaf spot is most common appearing wherever cotton is grown. Foliar spray with 0.3 per cent copper oxychloride or mencozeb is recommended to manage leaf spot diseases. In order to explore the possibility of the use of new chemicals against fungal foliar disease in cotton, taqat a combination fungicide product of captan (contact) and hexaconazole (systemic) was tested against fungal foliar disease of cotton.

MATERIALS AND METHODS

The field experiment was carried out at Cotton Research Station, Junagadh Agricultural University, Junagadh from 2007-2008, to 2010-2011. The susceptible cotton variety G. Cot Hy 10 was sown on 28 June 2007, 9 July 2008 and 18 June 2010 during *kharif* seasons adopting a spacing of 120 x 45 cm in 6.30 x 6.00 m. plot with 5 replications in randomized block design. Four treatments *viz.*, captan (70%) + hexaconazole (5%) (taqat 75% WP) at 2 doses of 500 (0.075 %) and 750 (0.113%) g/ha, Propiconazole (0.1%) and untreated control were imposed. The crop was managed by applying recommended dose of fertilizers (160-0-0 NPK kg/ha). Three sprays of fungicide were given at fortnightly interval with first spray starting on 10th September 2007, 1st September 2008 and 12th August 2011 for respective years against Alternaria leaf spot disease. Five plants were randomly selected in each treatment; 10 leaves were observed *i.e.* 4 from bottom, 3 each from middle and top. Disease observation of Alternaria leaf spot cause by *Alternaria macrospora* Zimm, were recorded. Disease grading was done using 0-4 scale : (0=No disease, 1=<5%, 2=6-20%, 3=20-40% and 4=>40%) leaf area were diseased. Per cent disease intensity (PDI) was calculated. Observations were recorded from net plot area and statistical analysis was carried out.

RESULTS AND DISCUSSION

Alternaria leaf spot: Results presented in Table 1 revealed that, the significantly minimum Alternaria leaf spot disease of 6.13 per cent was recorded in treatment propiconazole 0.1 per cent followed by taqat 0.113 per cent and taqat 0.075 per cent during the year, 2007-2008. However, they were statistically *at par*. Maximum (9.18 % PDI) of Alternaria disease was recorded in untreated control.

During the year 2008-2009 significantly lowest (11.17 %) Alternaria leaf spot disease intensity were recorded in treatment taqat 0.113 per cent followed by propiconazole 0.1 per cent(12.07%) and taqat 0.075 per cent (13.35%). It remained *at par* with each other. The highest Alternaria leaf spot disease was recorded in untreated control *i.e.* 16.92 per cent.

In the year, 2010-2011, significantly minimum Alternaria leaf spot disease intensity was recorded in all the tested fungicides as compared to control. Significantly minimum Alternaria leaf spot of 10.5 per cent disease intensity was recorded in taqat 0.113 per cent followed by treatment propiconazole 0.1 per cent (11.56%). Highest disease intensity of 17.74 per cent was recorded in control treatment.

The 3 years pooled data of Alternaria leaf spot disease revealed that, all the tested fungicides recorded significantly minimum PDI as compared to control. Significantly minimum Alternaria leaf spot of 9.43 PDI was recorded in taqat 0.113 per cent followed by propiconazole 0.1 per cent with 9.71 PDI. Highest (14.33 %) per cent disease intensity was recorded in control. Maximum (34.19%) Alternaria leaf spot per cent disease over control (PDC) was recorded in taqat higher dose 750 g/ha followed by propiconazole 0.1 per cent (31.92%). These results are in conformity with the reports of Chattannavar *et al.,* (2006). These results are also found similar to the findings of Bhattiprolu (2010).

Seed cotton yield: So far as the seed cotton yield is concerned, the yield was found significant in all the individual tested experiment years, as well as the three years pooled analysis (Table 2). The significantly higher seed cotton yield of 1577 kg/ha was obtained in the treatment taqat 0.113 per cent followed by treatment of taqat 0.075 per cent (1536

Table 1. Effect of different doses of taqat and chemical against alternaria leaf spot disease of cotton and seed cotton yield

Treatments, doses and concentration	Alternaria leaf spot PDI				Per cent disease control (PDC)	Seed cotton yield (kg/ha)			
	2007-2008	2008-2009	2010-2011	**Pooled**		2007-2008	2008-2009	2010-2011	**Pooled**
Taqat 500 g/ha (0.075 %)	2.78* (7.71)	3.65 (13.35)	3.68 (13.54)	**3.37 (11.36)**	20.73	1536	1241	1161	**1313**
Taqat 750 g/ha (0.113 %)	2.63 (6.91)	3.34 (11.17)	3.24 (10.50)	**3.07 (9.43)**	34.19	1577	1545	1446	**1523**
Propiconazole (0.1%)	2.48 (6.13)	3.47 (12.07)	3.40 (11.56)	**3.12 (9.71)**	32.24	1438	1243	1296	**1326**
Control	3.03 (9.18)	4.11 (16.92)	4.21 (17.74)	**3.79 (14.33)**	-	1235	1188	1017	**1147**
S.Em.±	0.08	0.11	0.10	**0.049**	-	78.37	72.69	98.02	**48.34**
P=0.05	0.26	0.34	0.30	**0.14**	-	241.51	223.98	302.04	**138.77**
C.V. (%)	6.81	6.79	6.00	**5.71**	-	12.12	12.47	17.81	**14.11**
Y S.Em.±	-	-	-	**0.04**	-	-	-	-	**41.87**
Y P=0.05	-	-	-	**0.12**	-	-	-	-	**120.18**
Y X T S.Em.±	-	-	-	**0.09**	-	-	-	-	**83.73**
Y X T P=0.05	-	-	-	**NS**	-	-	-	-	**NS**

* Transform square root Value, Data given in parentheses are retransform square root values, PDI- Per cent disease intensity

Table 2. Effect of different doses of taqat and chemical on quality parameter of seed cotton (Mean of 3 years)

Treatments, doses and concentration	G. P.	2.5 per cent SL (mm)	U.R. (%)	MIC MV	Tenacity (g/t) (3.2 mm)	Elg	Maturity ratio	SFI (W)
Taqat 500 g/ha (0.075 %)	32.25	28.63	50.20	4.56	24.26	5.83	0.84	7.80
Taqat 750 g/ha (0.113 %)	31.94	28.55	50.73	4.56	24.01	5.85	0.84	7.79
Ropiconazole (0.1%)	31.88	28.42	49.80	4.63	22.31	5.70	0.83	8.79
Control	32.27	28.44	49.00	4.46	24.12	5.86	0.83	8.61

G.P = Ginning percentage, SL = Span Length Elg. = Elongation,
MV = Fiber fineness (Micronaire Value), Tenacity = Fiber strength (g/tex), SFI = Short Fiber Index
U. R. = Uniformity Ratio(Fiber)

kg/ha) as against 1235 kg/ha in control treatment (2007-2008).

In the year 2008-2009 significantly highest seed cotton yield of 1545 kg/ha was recorded in the treatment of taqat 0.113 per cent. Next best treatments were propiconazole 0.1 per cent (1243 kg/ha) and taqat 0.075 per cent (1241 kg/ha). Minimum (1188 kg/ha) yield was recorded in control.

All the tested fungicides significantly gave higher seed cotton yield as compared to control during the year 2010-2011. Significantly higher yield of 1446 kg/ha was noted in treatment taqat 0.113 per cent followed by treatment propiconazole 0.1 per cent and taqat 0.075 per cent with 1296 and 1161 kg/ha seed cotton yield, respectively. Minimum seed cotton yield of 1017 kg/ha was recorded in control treatment.

Looking to the 3 years pooled data revealed that seed cotton yield was found significant as compared to the untreated control. Treatment taqat 0.113 per cent was found significantly supper with highest seed cotton yield of 1523 kg/ha. Next best fungicides were found propiconazole 0.1 per cent and taqat 0.075 per cent with 1326 and 1313 kg/ha seed cotton yield, respectively. It was found *at par* with each other. Minimum (1147 kg/ha) seed cotton yield was recorded in control treatment. These findings also corroborate the results of Chattannavar *et al.*, (2013).

Tested fungicide showed higher quality parameter of uniformity ratio and fibre fineness (Micronaire value) as compared to control, while taqat both doses (500 and 750 g/ha) recorded higher span length (28.55 and 28.63) and maturity ratio (0.84 in both doses) as compared to the control and propiconazole 0.1 per cent (Table 3).

Table 3. Economics of various doses and chemical sprays treatment against alternaria leaf spot disease of cotton

Treatments, doses and concentration	Seed cotton yield (kg/ha)	Seed cotton yield (Pooled) over control	Addition income Rs. inc.	Fungicide require (kg/ha)	Quantity of water (Rs.)	Expenditure		Total expend-iture (Rs/ha)	Net return (Rs)	CBR
						Fung-icide (kg/ha)	Labour charges (lit)			
Taqat 500 g/ha (0.075 %)	1313	166	8300	1.500	1500	1350	400	1750	6550	1:4.74
Taqat 750 g/ha (0.113 %)	1523	376	18800	2.250	1500	2025	400	2425	16375	1:7.75
Propiconazole (0.1%)	1326	179	8950	1.500	1500	1500	400	1900	7050	1:4.71
Control	1147	-	-	-	-	-	-	-	-	-

1. Taqat Rs. 900/kg
2. Propiconazole Rs. 1000/kg
3. Labour charge, Trained- Rs. 150, Untrained-Rs- 100
4. Harvesting charge Rs. 50/20 kg.
5 Seed cotton rate Rs. 50/kg,
6 Spray schedule 3 (400+500+700=1500), lit/ha
7 *Additional yield harvesting charges deducted from gross income

Looking to the cost benefits ratio (CBR) treatment taqat 0.113 per cent recorded higher net income *i.e.* 16375 Rs. with maximum (7.75) CBR. Next best fungicide was treatment propiconazole 0.1 per cent with 7050 Rs. net realization and 4.71 CBR.

It is concluded that, the significantly minimum Alternaria leaf spot (9.43%) and higher seed cotton yield (1523 kg/ha) were recorded with maximum (7.75) CBR, in 3 foliar application at fortnight interval of taqat 0.113 per cent starting on 10th September, 1 September and 12 August in years 2007, 2008 and 2011, respectively against Alternaria leaf spot disease under field conditions.

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