



Field efficacy of Myclobutanil (10% WP) against major diseases of cotton

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ABSTRACT: Field Efficacy of Myclobutanil (10% WP) was tested @ 0.03, 0.04 and 0.05 per cent in comparison with carbendazim (50% WP) (250g/ha), kresoxim methyl (44.0% SC) (500ml/ha) and propiconazole (25% EC) (500ml/ha) at Regional Agricultural Research Station, Lam, Guntur, during *kharif* 2018 and 2019 against major diseases of cotton. Highest reduction in Alternaria blight was recorded with Myclobutanil (10% WP @ 0.05%) (80.21%) followed by propiconazole (25% EC @ 500ml/ha) (75.75%). Myclobutanil (10% WP @ 0.05%) showed highest decrease in anthracnose (76.45%) followed by Myclobutanil (10% WP @ 0.04%) (75.15%) and carbendazim (50% WP @ 250g/ha) (73.24%). Kresoxim methyl (44.0% SC @ 500ml/ha) followed by Myclobutanil (10% WP @ 0.05%) and propiconazole (25% EC @ 500ml/ha) recorded 92.16, 90.82 and 89.21 per cent control of grey mildew, respectively. Rust was reduced to 67.93 per cent with carbendazim (50% WP @ 250g/ha) followed by propiconazole (25% EC @ 500ml/ha) (64.5%) and kresoxim methyl (44.0% SC @ 500ml/ha) (64.13%). Highest yield increase of 38.98 per cent was obtained with Myclobutanil (10% WP @ 0.05%) followed by Myclobutanil (10% WP @ 0.04%) (31.85%).

Key words: Cotton, efficacy, fungal diseases, Myclobutanil (10% WP)

Cotton is an important commercial crop in India with a production of 371 lakh bales of 170 kg lint from an area of 129.57 lakh ha and a productivity of 487 kg/ha in 2020-2021, which is far behind the leading countries. Andhra Pradesh stood 8th in area (5.24 lakh ha) and production (18.0 lakh bales) but 3rd in productivity (584 kg/ha) during 2020-21 (ICAR-AICRP on Cotton, 2021). Cotton crop is affected by a number of foliar diseases throughout the season. Among the fungal diseases, Alternaria leaf spot/blight, grey mildew and rust cause economic losses under congenial conditions (Monga *et al.*, 2013). Foliar sprays with carbendazim (0.1%) at 15 days interval prevented yield losses due to grey mildew (Bhattiprolu, 2012). Propineb (0.21-0.28%) was superior in managing Alternaria leaf spot and increasing cotton yields (Bhattiprolu and Prasada Rao, 2014). Both kresoxim methyl at 500 ml/ha and propiconazole (0.1%) were effective against important foliar diseases and protect the crop against Alternaria leaf spot, bacterial blight and rust (Bhattiprolu, 2015). In order to explore

the possibility of use of alternative chemicals, Myclobutanil (10%) WP was tested against fungal diseases in cotton.

MATERIALS AND METHODS

A field trial was laid out at Regional Agricultural Research Station, Lam, Guntur during *kharif* 2018 and 2019. Cotton hybrid Jaadoo BG II was sown in plots of 25 sq. m. adopting a spacing of 105 x 60 cm. Seven treatments *viz.*, Myclobutanil (10% WP) @ 0.03, 0.04, and 0.05 per cent in comparison with carbendazim (50% WP) (125g/ha), kresoxim methyl (44% SC) (500ml/ha) and propiconazole (25% EC) (500ml/ha) along with untreated control were imposed with three replications in randomized block design. Treatments were imposed at 21 days interval with first spray starting immediately after the appearance of Alternaria leaf spot. Grey mildew and rust appeared at later stage of the crop growth. Data on Alternaria leaf spot, anthracnose, *Corynespora*

leaf spot, grey mildew and rust was recorded using 0 to 4 scale given by Sheo Raj (1988):

- 0 = No disease
- 1 = 0 to 5 per cent
- 2 = 5.1 to 20 per cent
- 3 = 20.1 - 40 per cent
- 4 = >40 per cent leaf area are diseased.

Depending on the scores collected, per cent disease index (PDI) was calculated by using the formula of Wheeler (1969):

$$\text{PDI} = \frac{\text{Sum of numerical ratings}}{\text{Total number of leaves scored} \times \text{maximum rating}} \times 100$$

Per cent disease control in each treatment was calculated. Treatment wise yield data was recorded. Decrease/increase in the disease/ yield over control was calculated using the formula:

$$\text{Per cent disease control} = \frac{C - T}{C} \times 100$$

where

C = PDI or yield of control;

T = PDI or yield (kg/ha) of respective treatment

RESULTS AND DISCUSSION

All the treatments were found significantly superior to control during 2018-2019. The PDI of Alternaria blight varied from 4.67 to 5.67 as against 17.67 in the control (Table 1). Lowest PDI of 4.67 was recorded with propiconazole (25% EC) @ 500ml/ha followed by Myclobutanil (10% WP) @ 0.05 per cent (4.83PDI), carbendazim (50% WP) @ 250g/ha (5 PDI), Myclobutanil (10% WP) @ 0.04 per cent (5.17PDI), kresoxim methyl (44 % SC) @ 500ml/ha (5.33PDI) and Myclobutanil (10% WP) @ 0.03% (5.67PDI). During 2019-2020 different treatments recorded Alternaria leaf spot, in the range of 1.83 to 3.67 PDI as against control (15.67PDI). Myclobutanil (10% WP) @ 0.05 per cent recorded the lowest PDI of 1.83 followed by Myclobutanil (10% WP) @ 0.04 per cent (2.50PDI), propiconazole (25% EC) @ 500ml/ha (3.50PDI),

kresoxim methyl (44 % SC) @ 500ml/ha (3.50PDI) and were statistically *on par*. Myclobutanil (10% WP) @ 0.04 per cent and carbendazim (50% WP) @ 250g/ha with 3.67 and 3.83PDI, respectively, were statistically *on par* as against control (15.67PDI). Pooled data revealed that Myclobutanil (10% WP) @ 0.05 per cent (3.33PDI), @ 0.04 per cent (3.83PDI) and propiconazole (25% EC) @ 500ml/ha (4.08PDI) were statistically *on par* and superior to other treatments. Kresoxim methyl (44.0% SC) @ 500ml/ha (4.42PDI) and carbendazim (50% WP) @ 250g/ha (4.42PDI) were *on par*, Myclobutanil (10% WP) @ 0.03 per cent showed (4.67PDI) as against control (16.83PDI). Alternaria blight disease was controlled to the tune of 72.25 to 80.21 per cent in different treatments (Fig.1). Highest reduction in Alternaria blight was recorded with Myclobutanil (10% WP) @ 0.05 per cent (80.21%) followed by propiconazole (25% EC) @ 500ml/ha (75.75%). Propiconazole at 0.1 per cent was earlier reported effective in preventing losses due to Alternaria leaf spot in cotton (Bhattiprolu and Prasada Rao, 2009). Kresoxim methyl at 500 ml/ha was *on par* with 0.1 per cent propiconazole in controlling Alternaria leaf spot (Bhattiprolu 2015). Hexaconazole followed by propiconazole and tebuconazole were found superior to trifloxystrobin against Alternaria blight (Sangeetha *et al.*, 2018).

With respect to anthracnose, all the treatments reduced the disease during 2018-2019. The PDI of anthracnose varied from 4.83 to 7.00 as against 14.0 in the control (Table 1). Lowest PDI of 4.83 was obtained with Myclobutanil (10% WP) @ 0.05 per cent followed by Myclobutanil (10% WP) @ 0.04 per cent (5.17PDI), propiconazole (25% EC) @ 500ml/ha (5.33PDI), Myclobutanil (10% WP) @ 0.03 per cent (5.67PDI) and carbendazim (50% WP) @ 250g/ha (5.83PDI) and all were statistically *on par*. Kresoxim methyl (44 % SC) @ 500ml/ha recorded 7 PDI as against 14.0 in control. During 2019-2020 all treatments significantly reduced anthracnose (1.17 to 1.83PDI), as against 13.08 in control. Lowest PDI

Table 1. Efficacy of Myclobutanil (10% WP against major diseases of cotton

| Treatment | Alternaria leaf spot (PDI)* | | | Anthracnose (PDI)* | | | Corynespra leaf spot (PDI)* |
|--|-----------------------------|------------------|---------------------------------|--------------------|------------------|---------------------------------|--------------------------------|
| | 2018-2019 | 2019-2020 | Pooled Mean | 2018-2019 | 2019-2020 | Pooled Mean | 2019-2020 |
| T1 - Myclobutanil 10% WP @ 0.03% | 5.67 (13.75)a | 3.67 (11.02)b | 4.67 (12.46)c | 5.67 (13.75)a | 1.83 (7.71)a | 3.75 (11.13)a | 10.83 (19.19)a |
| T2 - Myclobutanil 10% WP @ 0.04% | 5.17 (13.12)a | 2.50 (9.10)a | 3.83 (11.24)a | 5.17 (13.12)a | 1.33 (6.55)a | 3.25 (10.39)a | 9.67 (18.10)a |
| T3 - Myclobutanil 10% WP @ 0.05% | 4.83 (12.66)a | 1.83 (7.71)a | 3.33 (10.47)a | 4.83 (12.66)a | 1.33 (6.55)a | 3.08 (10.07)a | 7.83 (16.22)a |
| T4 - Carbendazim 50% WP @ 250g/ha | 5.00 (12.92)a | 3.83 (11.24)b | 4.42 (12.11)b | 5.83 (13.94)a | 1.17 (6.16)a | 3.50 (10.78)a | 11.33 (19.64)a |
| T5 - Kresoxim methyl 44.0% SC @ 500ml/ha | 5.33 (13.31)a | 3.50 (10.78)a | 4.42 (12.11)b | 7.00 (15.34)b | 1.33 (6.55)a | 4.17 (11.76)b | 8.17 (16.59)a |
| T6 - Propiconazole 25% EC @ 500ml/ | 4.67 (12.46)a | 3.50 (10.78)a | 4.08 (11.61)a | 5.33 (13.31)a | 1.83 (7.71)a | 3.58 (10.86)a | 8.33 (16.74)a |
| T7 - Untreated control | 17.67 (24.84)b | 15.67 (23.3)c | 16.83 (24.20)d | 14.0 (21.97)c | 12.17 (20.4)a | 13.08 (21.18)c | 19.00 (25.84)b |
| SEM + | 0.69 | 0.56 | 0.31 | 0.66 | 0.33 | 0.33 | 1.19 |
| SED + | 0.98 | 0.79 | 0.44 | 0.93 | 0.47 | 0.46 | 1.68 |
| CD (p= 0.05) | 2.13 | 1.71 | 0.96 | 2.02 | 1.02 | 1.01 | 3.66 |
| CV (%) | 17.2 | 19.5 | 9.0 | 16.6 | 19.1 | 11.6 | 19.2 |

*Figures in the parentheses are arcsine transformed values. The figures indicated with same alphabet are not significantly different.

of 1.17 was recorded with carbendazim (50% WP) @ 250g/ha followed by 1.33PDI in Myclobutanil (10% WP) @ 0.04, 0.05 per cent and kresoxim methyl (44.0% SC @ 500ml/ha; 1.83PDI in Myclobutanil (10% WP) @ 0.03 per cent and propiconazole (25% EC) @ 500ml/ha treatments. Pooled data revealed that Myclobutanil (10% WP) @ 0.05 per cent with lowest PDI of 3.08 followed by Myclobutanil (10% WP) @ 0.04 per cent (3.25PDI), carbendazim (50% WP) @ 250g/ha (3.50PDI), propiconazole (25% EC) @ 500ml/ha (3.58PDI), Myclobutanil (10% WP) @ 0.03% (3.75PDI) and were statistically *on par*. Kresoxim methyl (44 % SC) @ 500ml/ha recorded 4.17 PDI as against 13.08 PDI in control. Anthracnose was controlled to the tune of 68.12 to 76.45 per cent in different treatments (Fig.1). Highest reduction in anthracnose was recorded with Myclobutanil (10% WP) @ 0.05 per cent (76.45%) followed by Myclobutanil (10% WP) @ 0.04 per cent (75.15%) carbendazim (50% WP) @ 250g/ha (73.24%). Carbendazim @ 100ppm was found most effective against anthracnose in bottle gourd (Ankit Kumar *et al.*, 2018).

During *kharif* 2019, newly emerging leaf spot caused by *Corynespora* was also observed in the range of 7.83 to 11.33PDI after first spray as against 19.00PDI in the control (Table 1). Lowest PDI of 7.83 was recorded with Myclobutanil (10% WP) @ 0.05 per cent followed by kresoxim methyl (44.3% SC) @ 500ml/ha (8.17PDI), propiconazole (25% EC) @ 0.1 per cent (8.33PDI), Myclobutanil (10% WP) @ 0.04 per cent (9.67PDI), Myclobutanil (10% WP) @ 0.03 per cent (10.83PDI) and carbendazim (50% WP) @ 0.05 per cent (11.33PDI). All the treatments were found significantly superior to control (Table 1). *Corynespora* leaf spot was controlled to the tune of 40.37 to 58.79 per cent. Highest reduction of 58.79 per cent was recorded in Myclobutanil (10% WP) @ 0.05 per cent followed by kresoxim methyl (44.3% SC) @ 500ml/ha (57.00%), propiconazole (25% EC) @ 0.1 per cent (56.16%), Myclobutanil (10% WP) @ 0.04 per cent (49.32%), Myclobutanil (10% WP) @ 0.03 per cent (43.00%) and carbendazim (50% WP) @ 0.05 per cent (40.37%). Pyraclostrobin + metiram (0.2% dosage), thiophanate methyl (0.1%), pyraclostrobin+

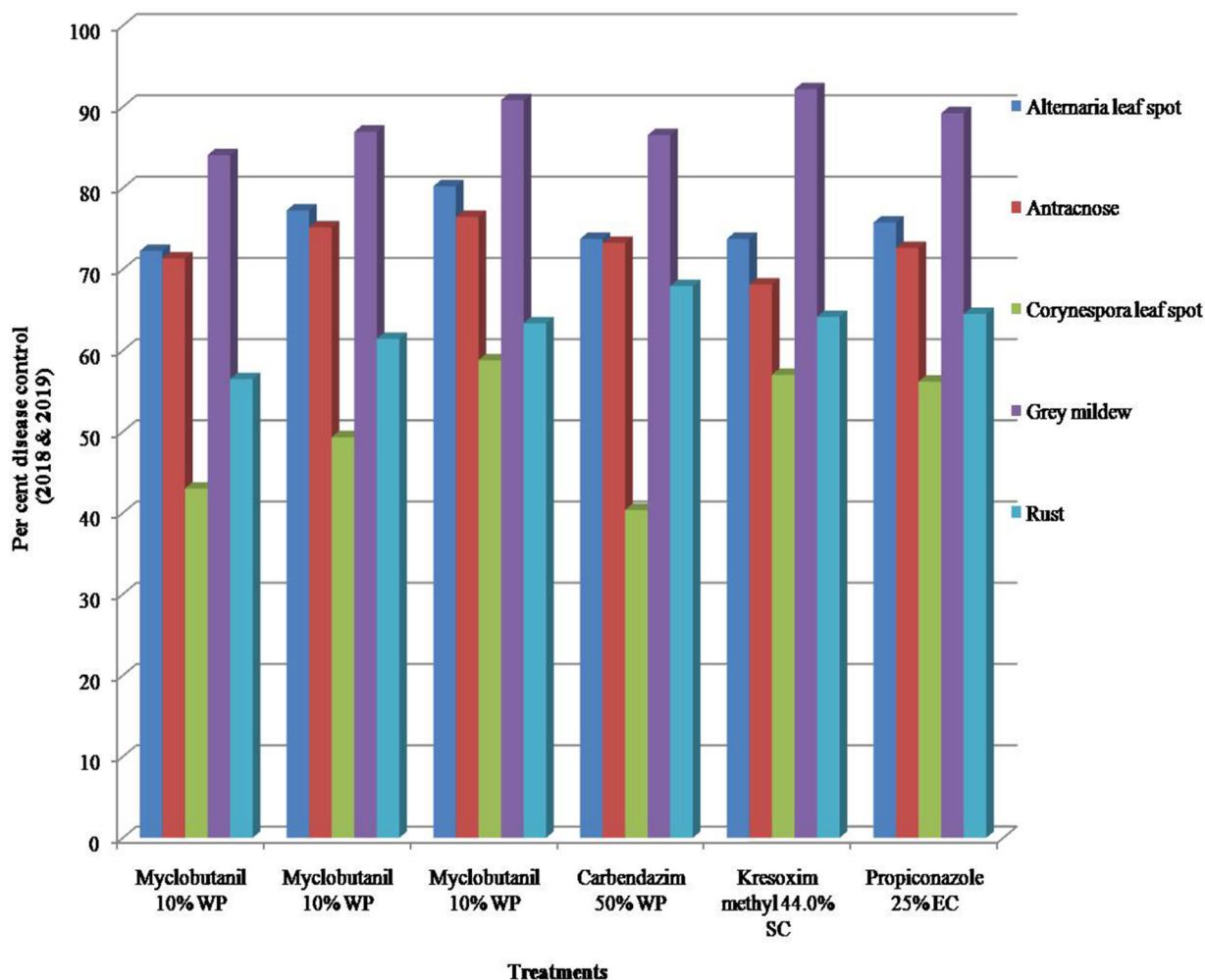


Fig. 1. Efficacy of Myclobutanil (10% WP) against cotton diseases

metiram (0.1% dosage), iprodione + carbendazim (0.1% dosage) and mancozeb (0.27%) with PDI of 8.43, 8.44, 9.18, 9.56 and 10.34, respectively were *on par* against *Corynespora cassicola* causing *Corynespora* leaf fall disease of rubber (Mushrif *et al.*, 2020).

Grey mildew was recorded to the tune of 0.58 to 1.58PDI in different treatments as against 7.17PDI in control during 2018-2019 (Table 2). Propiconazole (25% EC) @ 500ml/ha recorded the lowest PDI of 0.58 followed by kresoxim methyl (44.0% SC) @ 50ml/ha (0.83PDI), Myclobutanil (10% WP) @ 0.05 per cent (1.17PDI) and carbendazim (50% WP) @ 250g/ha (1.42PDI) and these treatments were statistically *on par*. Myclobutanil (10% WP) @ 0.04 and 0.03 per cent

with 1.50PDI and 1.58PDI were *on par* as against control (7.17PDI). During 2019-2020 different treatments recorded grey mildew, in the range of 1.50 to 3.17 PDI as against control (22.67PDI). Lowest PDI of 1.50PDI was obtained with kresoxim methyl (44 % SC) @ 500ml/ha and found *on par* with Myclobutanil (10% WP) @ 0.05 per cent (1.57PDI), Myclobutanil (10% WP) @ 0.04 per cent (2.40PDI), propiconazole (25% EC) @ 500ml/ha (2.63PDI) and, carbendazim (50% WP) @ 250g/ha (2.83PDI). Myclobutanil (10% WP) @ 0.03 per cent recorded 3.17PDI as against 22.67PDI in control. Pooled data revealed that kresoxim methyl (44 % SC) @ 500ml/ha with 1.17PDI was statistically *on par* with Myclobutanil (10% WP) @ 0.05 per cent

(1.37PDI), propiconazole (25% EC) @ 500ml/ha (1.61PDI), Myclobutanil (10% WP) @ 0.04 per cent (1.95PDI) and carbendazim (50% WP) @ 250g/ha (2.04PDI). Myclobutanil (10% WP) @ 0.03 per cent recorded 2.38PDI as against control (14.92PDI). Grey mildew was controlled to the tune of 84.05 to 92.16 per cent in different treatments (Fig.1). Highest reduction in grey mildew was recorded with kresoxim methyl (44.0% SC) @ 500ml/ha followed by Myclobutanil (10% WP) @ 0.05 per cent (90.82%) and propiconazole (25% EC) @ 500ml/ha (89.21%). Carbendazim (0.1%) was recommended to avoid losses due to grey mildew (Bhattiprolu, 2012).

Rust disease appeared at later stage of the crop growth during 2018-2019 and different treatments significantly reduced rust (4.17 and 5.5.PDI as against 19.50PDI in control (Table 2). Lowest PDI of 4.17PDI was recorded with carbendazim (50% WP) @ 250g/ha and kresoxim methyl (44.0% SC) @ 500ml/ha followed by Myclobutanil (10% WP) @ 0.05 per cent (4.50PDI), Myclobutanil (10% WP) @ 0.04 per cent (4.83PDI), Myclobutanil (10% WP) @ 0.03 per cent (5.33PDI) and propiconazole (25% EC) @ 500ml/ha (5.50PDI). During 2019-2020 different treatments recorded 9.83 to 13.67PDI and were statistically *on par* as against control (24.17PDI). Carbendazim (50% WP) @ 250g/ha recorded the lowest PDI of 9.83 followed by propiconazole (25% EC) @ 500ml/ha (10.00PDI), kresoxim methyl (44% SC) @ 500ml/ha (11.50PDI), Myclobutanil (10% WP) @ 0.05 per cent (11.50PDI), Myclobutanil (10% WP) @ 0.04 per cent (12.0PDI) and Myclobutanil (10% WP) @ 0.03 per cent (13.67PDI). Pooled data revealed that, carbendazim (50% WP) @ 250g/ha (7.0PDI) followed by propiconazole (25% EC) @ 500ml/ha (7.75PDI), kresoxim methyl (44% SC) @ 500ml/ha (7.83PDI), Myclobutanil (10% WP) @ 0.05% (8.0PDI), Myclobutanil (10% WP) @ 0.04 per cent (8.42PDI) were found *on par*. Myclobutanil (10% WP) @ 0.03 per cent recorded 9.50PDI as against control (21.83PDI). Rust was controlled to the tune of 56.48 to 67.93 per cent in different treatments (Fig.1). Highest reduction

in rust was recorded with carbendazim (50% WP) @ 250g/ha (67.93%) followed by propiconazole (25% EC) @ 500ml/ha (64.5%), kresoxim methyl (44% SC) @ 500ml/ha (64.13%). Preez and Caldwell (2004) reported control of soybean rust caused by *Phakopsora pachyrhizi* using carbendazim, triazoles and strobilurins. Azoxystrobin 50g a.i./ha, tebuconazole 100g a.i./ha, pyraclostrobin + metiram 50 + 550g a.i./ha, ciproconazole 100g a.i./ha, presented excellent preventive activity against grapevine rust (*Phakopsora euvitis*) and significantly reduced the germination of urediniospore produced on sprayed leaves. However, tebuconazole and ciproconazole provided better curative activity than azoxystrobin and pyraclostrobin + metiram (Francislene Angelotti *et al.*, 2014). Kresoxim methyl at 500 ml/ha provided 61.25 per cent disease control followed by 58.82 per cent and 58.12 per cent with propiconazole (0.1%) and carbendazim (0.1%). Kresoxim methyl at 500 ml/ha, propiconazole (0.1%) and carbendazim (0.1%) were statistically *on par* against cotton rust (Bhattiprolu, 2015).

All treatments increased seed cotton yield during 2018-2019. Highest seed cotton yield of 30.70q/ha was recorded with Myclobutanil (10% WP) @ 0.05 per cent followed by 27.87q/ha with Myclobutanil (10% WP) @ 0.04 per cent and were *on par*. Myclobutanil (10% WP) @ 0.03 per cent (26.66q/ha), propiconazole (25% EC) @ 500ml/ha (26.60q/ha), carbendazim (50% WP) @ 250g/ha (24.55q/ha) and kresoxim methyl (44.0% SC) @ 500ml/ha (23.90q/ha) were found *on par* as against control (21.97q/ha). During 2019-2020, all treatments increased seed cotton yield. Highest yield of 31.33q/ha was recorded with Myclobutanil (10% WP) @ 0.05 per cent and carbendazim (50% WP) @ 250g/ha followed by Myclobutanil (10% WP) @ 0.04 per cent (31.0q/ha), Myclobutanil (10% WP) @ 0.03 per cent (29.43q/ha), kresoxim methyl (44.0% SC) @ 500ml/ha (29.23q/ha) and propiconazole (25% EC) @ 500ml/ha (28.83q/ha) as against 22.67q/ha in control. Pooled data revealed

highest yield of 31.02q/ha with Myclobutanil (10% WP) @ 0.05 per cent followed by Myclobutanil (10% WP) @ 0.04 per cent (29.43q/ha) and were statistically *on par*. Myclobutanil (10% WP) @ 0.03 per cent (28.05q/ha), carbendazim (50% WP) @ 250g/ha (27.94q/ha), propiconazole (25% EC) @ 500ml/ha (27.72q/ha) and kresoxim methyl (44.0% SC) @ 500ml/ha (26.57q/ha) were on par as against control (22.32q/ha). Increase in seed cotton yield was to the tune of 19.04 to 38.98 per cent in different treatments. Highest yield increase of 38.98 per cent was obtained with Myclobutanil (10% WP) @ 0.05 per cent followed by Myclobutanil (10% WP) @ 0.04 per cent (31.85%). Difenconazole at a rate of 0.125 kg a.i. /ha and tebuconazole at 0.187 kg a.i. /ha suppressed Alternaria leaf spot to a significant extent ($p < 0.05$) relative to untreated plots, and with significant differences in yield (15.6 – 39.0% increase) in cotton (Shtienberg and Dreishpoun, 1991). Maximum yield was recorded with carbendazim (15.03 q/ha) against Alternaria blight in sunflower (Singh 2000). Both Taqat and propiconazole significantly increased the yield to the tune of 22.6 per cent (Bhattiprolu, 2010). Three sprays of hexaconazole and difenconazole produced highest yields with lowest PDI of cotton rust (Shridhar Shetty Pindikur *et al.*, 2012).

The study revealed broadspectrum activity of Myclobutanil (10% WP) @ 0.03 to 0.05 per cent against Alternaria leaf blight, anthracnose, Corynespora leaf spot, grey mildew and rust diseases in cotton with statistically superior yields. Hence it may be alternated with other chemicals for integrated management of cotton diseases.

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