

## Efficacy of kresoxim methyl against foliar diseases of cotton

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**ABSTRACT :** Efficacy of kresoxim methyl (Ergon 44.3%), a strobilurin fungicide was tested at 3 doses of 300, 400 and 500 ml/ha in comparison with propiconazole (0.1%), carbendazim (0.1%) and copper oxy chloride (COC) (0.3%) + streptocycline (100ppm) at Regional Agricultural Research Station, Lam, Guntur, during *khari*, 2010 and 2011 against foliar diseases of cotton. Kresoxim methyl at 500 ml/ha was sprayed with 0.1 per cent propiconazole in controlling *Alternaria* leaf spot and also *at par* with COC 0.3 per cent + streptocycline 100ppm in reducing bacterial blight while it is comparable to propiconazole 0.1 per cent and carbendazim 0.1 per cent against rust diseases. Among the doses, kresoxim methyl at 500 ml/ha gave better control of foliar diseases in cotton. Both kresoxim methyl and propiconazole significantly increased the yield to the tune of 59.66 and 56.99 per cent, respectively. Kresoxim methyl at 500 ml/ha is economical with benefit cost ratio of 1.93 followed by propiconazole 0.1 per cent (1.91) and can be alternated with other group of fungicides recommended in cotton.

**Key words:** Cotton, efficacy, kresoxim methyl

Cotton, an important commercial crop in Andhra Pradesh is affected by a number of diseases throughout the season. Foliar diseases, in cotton, caused yield losses to the tune of 20 to 30 per cent. Spraying copper fungicides (0.25%) mixed with streptocycline (0.01%) control foliar diseases (Mayee and Mukewar, 2007). Propiconazole 0.1 per cent is effective in preventing losses caused by *Alternaria* leaf spot (Bhattiprolu and Prasada Rao, 2009) as well as cotton rust disease. Carbendazim 0.1 per cent protected *Bt* cotton from grey mildew disease (Bhattiprolu, 2012). In order to explore the possibility of the use of new chemicals with broad spectrum activity against foliar diseases in cotton, kresoxim methyl (Ergon 44.3%), a strobilurin fungicide was evaluated.

### MATERIALS AND METHODS

A field trial was laid out at Regional Agricultural Research Station, Lam, Guntur during *Khari*, 2010-2011 and 2011-2012. Cotton hybrid RCH 2 BG II was sown in plots of 31.5 sq m adopting a spacing of 105 x 60 cm. Seven treatments *viz.*, kresoxim methyl (Ergon 44.3%) at three doses of 300 ml/ha, 400 ml/ha and 500 ml/ha, propiconazole 0.1 per cent, carbendazim

0.1 per cent, copper oxychloride 0.3 per cent + streptocycline 100 ppm and untreated control were imposed with 3 replications in randomized block design. Three sprays were given at fortnightly interval with first spray starting immediately after the appearance of the leaf spot diseases. Data on foliar diseases including bacterial blight, *Alternaria* leaf spot and rust were recorded using 0 to 4 scale given by Sheoraj (1988). Depending on the scores collected per cent disease intensity (PDI) was calculated by using the formula :

$$\text{PDI} = \frac{\text{Sum of all numerical ratings}}{\frac{\text{Total number of leaves observed} \times \text{Maximum grade}}{100}} \times 100$$

Per cent disease control in each treatment was calculated. Yield data from three replications of each treatment was recorded and per cent yield loss was estimated. Decrease / increase in the disease/ yield over control were calculated using the formula:

$$\frac{T - C}{C} \times 100 \text{ where;}$$

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

Treatmentwise net returns and benefit cost ratio was calculated.

## RESULTS AND DISCUSSION

Data on foliar diseases including *Alternaria* leaf spot, bacterial blight and rust showed disease reduction in all the treatments. During 2010 lowest PDI of 12.66 was recorded for *Alternaria* leaf spot with 0.1 per cent propiconazole followed by kresoxim methyl at 500 ml/ha (16.67). While kresoxim methyl at 500 ml/ha recorded lowest PDI of 15.93 in *kharif*, 2011, both propiconazole 0.1 per cent and kresoxim methyl at 400 ml/ha were *on par* with highest dose of kresoxim methyl with 18.33 and 18.66 PDI, respectively. Pooled mean revealed that both propiconazole 0.1 per cent and kresoxim methyl at 500 ml/ha significantly superior against *Alternaria* leaf spot with 47.72 and 46.04 per cent disease control.

Efficacy of kresoxim methyl at 500 ml/ha against rust disease was recorded during *kharif*, 2010 where the control plots showed highest PDI of 46.45. Lowest PDI of 18.0 was recorded with kresoxim methyl at 500 ml/ha followed by 19.13 PDI in propiconazole 0.1 per cent as well as carbendazim 0.1 per cent treated plots. 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 per cent and carbendazim 0.1 per cent. Efficacy of kresoxim methyl against rust disease was recorded in another independent trial at RARS, Lam (Anonymous, 2011).

During two consecutive years reduction in bacterial blight disease was recorded in kresoxim methyl at 500 ml/ha treated plots. Kresoxim methyl at 500 ml/ha was significantly *on par* (PDI 12.5) with copper oxychloride 0.3 per cent + streptomycin 100 ppm (PDI 12.0) in controlling bacterial blight disease during 2010. The superiority of these 2 treatments extended to 2011. Pooled data showed that both copper oxychloride (0.3%) + streptomycin (100 ppm) and kresoxim methyl (500 ml/ha) were effective against bacterial blight of cotton with 53.23 per

cent and 51.02 per cent disease control, respectively (Table 1). This result is in agreement with supplemental label claim regarding increased tolerance to bacterial infections using another strobilurin, pyraclostrobin.

With respect to yield, highest yield of 2076 kg/ha was obtained with kresoxim methyl at 500 ml/ha during *kharif*, 2010 - 2011 followed by 2043 kg/ha in propiconazole treated plots. During 2011-2012 kresoxim methyl at 500 ml/ha recorded maximum of 915 kg/ha and copper oxychloride (0.3%) + streptomycin (100 ppm) was next best with 910 kg/ha while propiconazole 0.1 per cent and carbendazim 0.1 per cent were *on par* with 899 kg/ha and 808 kg/ha, respectively. Pooled yield data revealed that both kresoxim methyl at (500 ml/ha) and propiconazole 0.1 per cent were significantly superior to other treatments with 1496 kg/ha and 1471 kg/ha, respectively. An increase in the yield to the tune of 59.66 per cent and 56.99 per cent was achieved in respective treatments as given in Table 2. The lower yields during *kharif*, 2011 were due to the deficient rainfall affecting crop growth and development.

Highest gross expenditure on kresoxim methyl at 500 ml/ha (Rs41722/-) resulted in maximum gross returns of Rs80475/-. Maximum net returns of Rs38753/- was obtained with highest dose of kresoxim methyl followed by Rs37676/- with 0.1 per cent propiconazole. Kresoxim methyl at 500 ml/ha gave highest benefit cost ratio (BCR) of 1.93 while propiconazole 0.1 per cent was *on par* with 1.91. Hence, it is concluded that 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. It is recommended that in view of possible chances of resistance development to strobilurins like kresoxim methyl with single site of mode of action, it is better to alternate it with other groups of recommended chemicals like copper oxychloride (0.3%) + streptomycin (100 ppm) against bacterial blight, propiconazole 0.1 per cent for *Alternaria* leaf spot and rust diseases.

**Table 1.** Efficacy of kresoxim methyl against foliar diseases of cotton

Treatment	Alternaria leaf spot disease Intensity (%)			Disease control (%)	Rust disease intensity (%)	Disease control (%)	Bacterial blight disease Intensity (%)			Disease control (%)
	2010-2011	2011-2012	Mean		2010-2011		2010-2011	2011-2012	Mean	
Kresoxim methyl (300 ml/ha)	21.82 (27.83)c	21 (27.28)b	<b>21.41</b> <b>(27.58)b</b>	27.79	29.91 (33.15) b	35.61	17 (24.35)b	36.15 (36.96)c	<b>26.58</b> <b>-31.02</b>	28.39
Kresoxim methyl (400 ml/ha)	19.25 (26.03)b	18.66 (25.59)a	<b>18.96</b> <b>(25.81)b</b>	36.05	25.88 (30.56)b	44.28	16.25 (23.77)b	31.62 (34.20)b	<b>23.89</b> <b>(29.24)b</b>	35.64
Kresoxim methyl (500 ml/ha)	16.67 (24.08)b	15.93 (23.50)a	<b>16</b> <b>(23.58)a</b>	46.04	18.0 (25.10)a	61.25	12.5 (20.70)a	23.86 (29.24)a	<b>18.18</b> <b>(25.22)a</b>	51.02
Propiconazole (0.1%)	12.66 (20.84)a	18.33 (25.33)a	<b>15.5</b> <b>(23.19)a</b>	47.72	19.13 (25.92)a	58.82	18.92 (25.77)c	31.66 (34.24)b	<b>25.29</b> <b>(30.17)b</b>	31.87
Carbendazim (0.1%)	27.78 (31.79)d	24.67 (29.77)c	<b>26.23</b> <b>(30.73)c</b>	11.53	19.13 (25.92)a	58.12	16.07 (23.62)b	30.42 (33.46)b	<b>23.3</b> <b>(28.86)b</b>	37.23
COC (0.3%) + streptocycline (0.01%)	21.34 (28.18)c	21.06 (27.32)b	<b>21.27</b> <b>(27.46)b</b>	28.26	31.75 (34.3)c	31.65	12 (20.27)a	22.69 (28.42)a	<b>17.36</b> <b>(24.62)a</b>	53.23
Water spray	31.97 (34.42)e	27.33 (31.50)c	<b>29.65</b> <b>(32.99)d</b>		46.45 (42.97)d		27.94 (31.88)d	46.28 (42.85)d	<b>37.12</b> <b>(37.52)c</b>	
CD (p=0.05)	3.27	2.973	<b>2.631</b>		4.317		2.84	4.656	<b>3.527</b>	
CV (%)	8.5	8	<b>7</b>		8.9		9.3	8.2	<b>8.1</b>	

\* Figures in parentheses are transformed values. Figures marked with same letters are not significantly different.

**Table 2.** Economics of efficacy of kresoxim methyl against foliar diseases of cotton

Treatment	Yield (kg/ha)			Increase in yield (%)	Gross expenditure (Rs)	Gross returns (Rs)	Net returns (Rs)	Benefit cost ratio
	2010-2011	2011-2012	Mean					
Kresoxim methyl (300ml/ha)	1676c	799b	<b>1238c</b>	32.12	41390	66100	24710	1.60
Kresoxim methyl (400ml/ha)	1918b	875a	<b>1397b</b>	49.09	41556	74906	33350	1.80
Kresoxim methyl (500ml/ha)	2076a	915a	<b>1496a</b>	59.66	41722	80475	38753	1.93
Propiconazole (0.1%)	2043a	899a	<b>1471a</b>	56.99	41492	79168	37676	1.91
Carbendazim (0.1%)	1706c	808a	<b>1257c</b>	34.15	41042	67183	26141	1.64
COC (0.3%)+ streptocycline (0.01%)	1627c	910a	<b>1269c</b>	35.43	41702	66686	24984	1.60
Water spray	1272d	601c	<b>937d</b>		40442	50065	9623	1.24
CD (p=0.05)	140.4	112	<b>80.6</b>					
CV (%)	4.5	7.6	<b>3.5</b>					

\* Figures marked with same letters are not significantly different

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