



P-ISSN: 2349-8528

E-ISSN: 2321-4902

IJCS 2019; 7(6): 1253-1256

© 2019 IJCS

Received: 01-09-2019

Accepted: 03-10-2019

**P Mareeswari**Regional Research Station,  
Tamil Nadu Agricultural,  
University, Aruppukottai,  
Tamil Nadu, India**VK Paulpandi**Regional Research Station,  
Tamil Nadu Agricultural,  
University, Aruppukottai,  
Tamil Nadu, India**DS Rajavel**Regional Research Station,  
Tamil Nadu Agricultural,  
University, Aruppukottai,  
Tamil Nadu, India

## Management of *Alternaria* leaf spot and grey mildew in cotton through newer molecule

**P Mareeswari, VK Paulpandi and DS Rajavel**

### Abstract

The bioefficacy and phytotoxicity of newer molecule, Tetraconazole 11.6% w/w ME was tested against *Alternaria* leaf spot and grey mildew caused by *Ramularia areola* diseases in cotton. Two foliar sprays of Tetraconazole 11.6% w/w ME at 0.90 lit./ha at 15 days interval was found to be effective against *Alternaria* leaf spot showed per cent disease index of 5.7 PDI and grey mildew (2.5 PDI) which recorded the higher yield of 1252.4 kg/ha. There was no phytotoxic effect of Tetraconazole 11.6% w/w ME observed in cotton plants.

**Keywords:** Bioefficacy, tetraconazole, cotton, leaf spot, grey mildew

### Introduction

Cotton is one of the most important commercial cash crops cultivated in India which accounts for around 25% of the total global fibre production. India also has the distinction of having the largest area under cotton cultivation in the world i.e. about 11 million hectares. Cotton plays a major role in sustaining the livelihood of an estimated 5.8 million cotton farmers and 40-50 million people engaged in related activities such as cotton processing and trade. Among the diseases of cotton, *Alternaria* leaf spot caused by *Alternaria alternata* and grey mildew caused by *Ramularia areola* are the most important diseases which cause heavy yield loss to the crop. As there is no resistant variety available against this disease, it has become inevitable to go for the use of fungicides for the management of the disease. In the present study, the newer chemical viz., Tetraconazole 11.6% w/w ME was tested at different doses and it was compared with other chemicals under field conditions to find out its efficacy against *Alternaria alternata* and *Ramularia areola*. It is a systemic fungicide belongs to demethylation inhibitors (DMI's) fungicidal group that blocks the production of sterols, which are essential for fungal cell wall growth. It acts mainly on the vegetative stages of fungi by blocking the mycelial growth either inside or on the surface of the host plant. Avoidable losses due to important diseases like cotton leaf curl virus, (53.6%), bacterial leaf blight (20.6%), *Alternaria* leaf spot (26.6%), grey mildew (29.2%) and *Myrothecium* leaf spot (29.1%) have been documented (Monga *et. al.*, 2013) [3].

### Materials and Methods

The experimental trial was conducted at Regional Research Station, Aruppukottai as per the approved programme of ICAR-All India Co-ordinated Cotton Improvement Project for the period from 2010 to 2013 to know the bioefficacy of Tetraconazole 11.6% w/w ME against *Alternaria* leaf spot in cotton. The experiment was designed with six treatments replicated thrice in a randomized block design by maintaining a plot size of 5.0x4.0m<sup>2</sup>. Sowing of SVPR 2, the most susceptible variety was taken with the receipt of North East monsoon rainfall. The package of practices for cotton were followed as per the crop production guide and the treatments are as follows,

- T1- Tetraconazole 11.6% w/w ME – 0.65 L/Hac.
- T2 – Tetraconazole 11.6% w/w ME – 0.80 L/Hac.
- T3 – Tetraconazole 11.6% w/w ME – 0.90 L/Hac.
- T4 – Carbendazim 50% WP – 250 g / Hac.
- T5 – Propiconazole 0.1%
- T6 – Untreated control

**Corresponding Author:****P Mareeswari**Regional Research Station,  
Tamil Nadu Agricultural,  
University, Aruppukottai,  
Tamil Nadu, India

The first spray of Tetraconazole 11.6% w/w ME at three different doses viz., 0.65, 0.80 and 0.90 litres per hectare, carbendazim 50% WP at 250 g per hectare and propiconazole at 0.1 per cent was given immediately after noticing the symptoms of *Alternaria* leaf spot and grey mildew (45<sup>th</sup> day after sowing). The second spray was given on 15<sup>th</sup> day after

the first spray. The intensity and frequency of leaf spot and grey mildew were observed at regular intervals viz., 1, 7, 15 and 21<sup>st</sup> day after spray to assess the bioefficacy of Tetraconazole 11.6% w/w ME and the results are furnished in table 1 and table 2.

**Table 1:** Bioefficacy of Tetraconazole 11.6% w/w ME against *Alternaria* leaf spot in cotton (2010-2011)

Treatments	Dose	Per cent Disease Index*				Yield (kgs /ha)	CB ratio
		Days after Application					
		1	7	15	21		
Tetraconazole	0.65 lit. /ha	37.0	17.7	13.3	7.7	1298.3	1: 1.17
Tetraconazole	0.80 lit. /ha	38.0	15.3	10.6	4.6	1309.6	1: 1.18
Tetraconazole	0.90 lit. /ha	35.7	11.7	8.6	2.7	1323.0	1: 1.20
Carbendazim	250 g. /ha	34.3	29.5	27.3	22.0	1143.0	1: 1.03
Propiconazole	0.1%	33.1	19.3	15.6	9.3	1159.5	1: 1.05
Untreated control	-	32.6	36.7	40.3	45.3	1106.7	-
SED		0.30	0.24	0.15	0.11	1.26	-
CD (0.05)		0.71	0.50	0.30	0.20	2.81	-

\*Mean of three replications

### Results

The results revealed that Tetraconazole at 0.90 lit. per hectare registered the least per cent disease index against *Alternaria* leaf spot in cotton (2.7 PDI) compared to 45.3 PDI in

untreated control, 22.0 PDI in carbendazim (250 g/ha). The same treatment recorded the maximum yield of 1323 kgs per hectare compared to 1106.7 kgs per hectare in untreated control.

**Table 2:** Bioefficacy of Tetraconazole 11.6% w/w ME against grey mildew in cotton (2010-2011)

Treatments	Dose	Per cent Disease Index*			
		Days after Application			
		1	7	15	21
Tetraconazole	0.65 lit. /ha	15.6	12.7	9.3	5.7
Tetraconazole	0.80 lit. /ha	15.6	11.0	8.0	3.6
Tetraconazole	0.90 lit. /ha	16.7	8.3	6.6	2.3
Carbendazim	250 g. /ha	15.3	9.0	7.3	4.0
Propiconazole	0.1%	16.6	11.6	7.6	5.0
Untreated control	-	17.3	19.3	27.7	32.6
SED		0.20	0.15	0.12	0.11
CD (0.05)		0.51	0.36	0.27	0.20

\*Mean of three replications

The results revealed that Tetraconazole at 0.90 lit. per hectare registered the least per cent disease index against grey mildew disease in cotton (2.3 PDI) followed by 0.80 litres per hectare

(3.6 PDI), carbendazim at 250 g per hectare (4.0 PDI) and 0.1 per cent propiconazole (5.0 PDI) compared to 32.6 PDI in untreated control.

**Table 3:** Bioefficacy of Tetraconazole 11.6% w/w ME against *Alternaria* leaf spot in cotton (2011-2012)

Treatments	Dose	Per cent Disease Index*				Yield kgs /ha
		Days after Application				
		1	7	15	21	
Tetraconazole	0.65 lit. /ha	35.5	27.4	16.3	10.4	1321.2
Tetraconazole	0.80 lit. /ha	37.1	28.1	13.3	8.9	1411.2
Tetraconazole	0.90 lit. /ha	40.2	26.1	11.6	7.8	1520.5
Carbendazim	250 g. /ha	39.0	34.9	34.1	40.6	1214.5
Propiconazole	0.1%	35.8	28.5	17.4	11.7	1274.0
Untreated control	-	36.0	43.1	46.0	49.1	977.8
SED		0.64	0.81	0.68	0.91	11.26
CD (0.05)		1.42	1.81	1.53	2.03	25.08

\*Mean of three replications

The results revealed that Tetraconazole at 0.90 lit. per hectare registered the least per cent disease index against *Alternaria* leaf spot in cotton (7.8 PDI) compared to 49.1 PDI in

untreated control. The same treatment recorded the maximum yield of 1520.5 kgs per hectare compared to 977.8 kgs per hectare in untreated control.

**Table 4:** Bioefficacy of Tetraconazole 11.6% w/w ME against grey mildew in cotton (2011-2012)

Treatments	Dose	Per cent Disease Index*			
		Days after Application			
		1	7	15	21
Tetraconazole	0.65 lit. /ha	11.8	9.8	7.5	4.5
Tetraconazole	0.80 lit. /ha	13.1	9.2	6.5	3.7
Tetraconazole	0.90 lit. /ha	15.5	8.5	5.1	2.7
Carbendazim	250 g. /ha	16.1	9.3	7.5	4.3
Propiconazole	0.1%	17.4	12.0	7.8	5.1
Untreated control	-	15.8	26.1	32.0	43.0
SED		0.26	0.52	0.55	0.79
CD (0.05)		0.58	1.17	1.24	1.77

\*Mean of three replications

The results revealed that Tetraconazole at 0.90 lit. per hectare registered the least per cent disease index against grey mildew disease in cotton (2.7 PDI) followed by 0.80 litres per hectare (3.7 PDI). Tetraconazole at 0.65 lit. per hectare and

Carbendazim at 250 g per hectare were on par in controlling the grey mildew disease respectively recording 4.5 and 4.3 PDI followed by 0.1 per cent propiconazole (5.1 PDI) compared to 43.0 PDI in untreated control.

**Table 5:** Bioefficacy of Tetraconazole 11.6% w/w ME against *Alternaria* leaf spot in cotton (2012-2013)

Treatments	Dose	Per cent Disease Index*				Yield kgs /ha
		Days after Application				
		1	7	15	21	
Tetraconazole	0.65 lit. /ha	36.3	25.3	19.0	11.6	885.4
Tetraconazole	0.80 lit. /ha	39.4	22.6	15.1	7.0	904.0
Tetraconazole	0.90 lit. /ha	41.2	21.1	13.6	6.6	913.6
Carbendazim	250 g. /ha	39.0	37.4	36.0	43.0	700.5
Propiconazole	0.1%	36.5	29.7	23.4	13.0	793.7
Untreated control	-	41.5	43.6	47.2	51.3	573.2
SED		0.49	0.50	0.44	0.45	--
CD (0.05)		1.10	1.13	0.98	1.01	--

\*Mean of three replications

The results revealed that Tetraconazole at 0.90 lit. per hectare registered the least per cent disease index against *Alternaria* leaf spot in cotton (6.6 PDI) compared to 51.3 PDI in untreated control. The same treatment recorded the maximum yield of 913.6 kgs per hectare compared to 573.2 kgs per

hectare in untreated control. There was no incidence of grey mildew observed during the period under report.

The mean of three years data (2010 to 2013) on the per cent disease index of *Alternaria* leaf spot and grey mildew were pooled and analyzed statistically and the results are furnished in Table 6.

**Table 6:** Bioefficacy of Tetraconazole 11.6% w/w ME against *Alternaria* leaf spot and grey mildew in cotton (Pooled mean of 2010 to 2013)

Treatments	Dose	<i>Alternaria</i> Leaf spot (PDI)*	Grey mildew (PDI)*	Percent reduction over control	Yield* (Kg /ha)	CB ratio
Tetraconazole	0.65 lit. /ha	9.9	5.1	79.6	1168.3	1.32
Tetraconazole	0.80 lit. /ha	6.8	3.7	86.0	1208.3	1.36
Tetraconazole	0.90 lit. /ha	5.7	2.5	88.2	1252.4	1.41
Carbendazim	250 g. /ha	35.2	4.1	27.4	1019.3	1.15
Propiconazole	0.1%	11.3	5.0	76.7	1075.7	1.21
Untreated control	-	48.6	37.8	-	885.9	-
SED		3.18	3.04	-	0.89	-
CD (0.05)		7.08	7.83	-	1.83	-

\*Pooled mean

The pooled results of 2010 to 2013 revealed that two foliar sprays of Tetraconazole 11.6% w/w ME at 0.90 lit. /ha at 15 days interval was found to be effective in reducing the per cent disease index of *Alternaria* leaf spot (5.7 PDI) and grey mildew (2.5 PDI) compared to control which recorded 48.6 and 37.8 PDI respectively. The same treatment recorded the higher yield of kapas of 1252.4 kg /ha compared to control which recorded 885.9 kgs /ha.

### Phytotoxicity

The phytotoxic effect of Tetraconazole at three different doses viz., 0.65, 0.80 and 0.90 lit. /ha was assessed in the plants after each spray of the chemical. All the leaves in the plants

were regularly examined for injury to leaf tips and leaf surface, wilting, vein clearing, necrosis, epinasty and hyponasty based on the phytotoxicity parameters of 0 to 10 scales.

In all the three doses of Tetraconazole 11.6% w/w ME tested for its phytotoxicity for three consecutive years of 2010 to 2013, no phytotoxic effect of Tetraconazole 11.6% w/w ME observed in cotton plants.

### Discussion

Sharma *et al.*, (2013) <sup>[1]</sup> revealed that foliar spray with propiconazole recorded least incidence of *Alternaria* leaf blight in cumin which was at par with carbendazim +

iprodione, hexaconazole and chlorothalonil. The systemic fungicide tebuconazole was more effective than the protectant fungicide maneb in the suppression of *Alternaria* leaf spot (Shtienberg *et al.*, 1993)<sup>[2]</sup>. Newer chemicals like propiconazole, captan+hexaconazole, tetraconazole and strobilurin compounds (fungicides) and copper hydroxide (bactericides) have been successfully tested for the management of foliar diseases of cotton (Monga *et al.*, 2011).

#### References

1. Sharma YK, Choudappa PC, Anwer MM. Efficacy of fungicides for the management of *Alternaria* blight of cumin. International J Seed Spices. 2013; 3(1):48-49.
2. Shtienberg D, Kremer Y, Dinooor A. Influence of Physiological age of Pima cotton on the need for fungicide treatment to suppress *Alternaria* leaf spot. The American Phytopathological Society. 1993; 83(11):1235-1239.
3. Monga D, Shree Lakshmi B, Prakash AH. Crop losses due to important cotton diseases. Technical Bulletin No.1, published by Head, CICR, Regional Station, Sirsa, Haryana, 2013, 23.
4. Monga, D, Kranthi KR, Gopalakrishnan N, Mayee CD. Changing scenario of cotton diseases in India-The challenge ahead. Lead paper presented at 5th World Cotton Research Conference held at Mumbai 7-11 November, 2011. Paper published in book of papers, 2011, 272-280.