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Efficacy of Fungicides and Reaction of Turmeric Cultivars to Leaf Blight Incited by *Colletetrichum gloeosporioides* (Penz. and Sacc.)

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ABSTARCT

Among the different fungicides tested for their efficacy against *Colletotrichum* leaf blight, Hexaconazole, Propiconazole, Tricyclazole, Thiophenate methyl and Carbendazim + Mancozeb each @ 0.1 % completely inhibited growth and sporulation of the pathogen *in vitro*. Out of twenty different cultivars of turmeric screened for their reaction to the disease, Allampuram, Allepey supreme, Cochber, Kuchipuri, Prabha, SB 10723, SB 10735, SB 10746, SB 10843, Tekurpeta found resistant to disease while Arunachal local, Pratibha and Salem were moderately resistant. Jalpalguri local, RH 5, SB 10757 Sikandarabad local, Sudarshana, Suguna, Suranjana showed susceptible reaction to the leaf blight.

Key words: *Colletotrichum,* Turmeric *blight, cultivar, fungicide*

Abbreviations:
LSI: Location Severity Index.
PDI: Percent Disease Intensity

1. INTRODUCTION

Blight
A disease characterized by general and rapid killing of leaves, flowers, and stems.

Turmeric is an important spice crop cultivated in India belongs to family Zinziberaceae. It has medicinal properties like blood purifier, carnivative, tonic, antiseptic etc. However, the crop is suffering from many fungal and bacterial diseases. *Colletotrichum* leaf blight of turmeric incited by *Colletotrichum gloeosporioides* is prevalent in majority of turmeric growing areas of the Konkan region of Maharashtra. It was found increasing and occurring regularly every year. It has become a major constraint in successful cultivation of turmeric in the Konkan region of Maharashtra. Management of *Colletotrichum* leaf spot is difficult because of rapid disease development. Keeping in view economic importance and yield losses caused by blight, the present investigations were under taken.

2. MATERIALS AND METHODS

2.1. *In vitro* evaluation of fungicides against *Colletotrichum gloeosporioides*

Seven fungicides belonging to different fungicidal groups were screened for their efficacy against *Colletotrichum gloeosporioides* by using 'Poisoned food technique'. Potato dextrose agar medium (PDA) was used as basal medium and distributed 100 ml aliquots in 250 ml Erlenmeyer conical flask, which were sterilized at 15 lbs/inch^2 pressure for 20 minutes. The quantity of fungicide for each concentration was calculated for 100 ml medium separately. The weighed quantity of the respective fungicide was added in molten PDA at 45^{0}C, mixed thoroughly, poured into sterilized plates and allowed to solidify. The mycelial discs of 5 mm diameter were cut from the advancing 7 days old culture of the test pathogen with the help of sterile cork borer. Each disc was transferred aseptically to the center of the fungicide amended PDA poured plates. The PDA plates without fungicide served as control. The plates were incubated at room temperature (27 ± 1^{0}C). Four replications per treatment were maintained. The observations on colony diameter were recorded when Petri plates in control treatment were fully covered with mycelial growth.

Per cent inhibition of growth of the test fungus was calculated by following formula (Horsfall, 1956).

$$X = \frac{Y - Z}{Y} \times 100$$

Where, X = Per cent inhibition
Y = Growth of fungus in control (mm)
Z = Growth of fungus in treatment (mm)

Cultivar
The plant variety that has been produced in cultivation by selective breeding.

2.2. Varietal screening

A field experiment was conducted at Asond Block, Central Experiment Station, Wakawali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoi to know the reaction of 20 cultivars of turmeric against disease during *kharif,* 2010-11 and 2011-12. The experiment was conducted in randomized block design with two replications. Per cent disease incidence was recorded at an interval of 7 days using a disease rating 0 to 9 scale given by Mayee and Datar (1986). The varieties were classified on the basis of their reaction to disease.

3. RESULTS

3.1. *In vitro* evaluation of fungicides against *Colletotrichum gloeosporioide*

Seven fungicides belonging to different groups were testedagainst *Colletotrichum gloeosporioides* by using Poisoned food technique. All the fungicides tested significantly inhibited growth and sporulation of *Colletotrichum gloeosporioides.* Hexaconazole, Propiconazole, Tricyclazole, Thiophenate methyl and Carbendazim + Mancozeb each at 0.1% concentration completely inhibited growth and sporulation of the test pathogen. Though, Copper oxychloride (0.1%) completely inhibited sporulation of the pathogen, it was less effective, suppressing the vegetative growth to the extent of 74.44 per cent.

Location severity index
Average incidence of disease at particular location is known as location severity index

3.2. Varietal screening

It was found that location severity index (L.S.I.) was high during the year 2011-12 and was low during 2012-13. Reactions of different cultivars of turmeric were categorized on the basis of per cent disease index during the year 2011-12. Out of 20 cultivars tested against *Colletotrichum* leaf blight disease, Allampuram, Allepey supreme, Cochber, Kuchipuri, Prabha, SB 10723, SB 10735, SB 10746, SB 10843, Tekurpeta (PDI 0.70 to 7.52 %) were resistant to disease while Arunachal local, Pratibha and Salem (PDI 12.67 to 24.44%) found moderately resistant. Cultivars *viz*., Jalpalguri

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local, RH 5, SB 10757 Sikandarabad local, Sudarshana, Suguna, Suranjana (PDI 58.07 to 90.70 %) showed susceptible reaction to the leaf blight.

Percent Disease Incidence
Frequency of prevalence of disease propagule over unit area of plant and expressed in percentage. Unit area can be whole plant, leaves, twigs, stem etc.

4. DISCUSSION

Among the various fungicides belonging to different group tested under laboratory condition, Hexaconazole, Propiconazole, Tricyclazole, Thiophanate methyl and Carbendazim + Mancozeb each at 0.1 per cent concentration were significantly superior giving 100 per cent inhibition of the growth and sporulation of the test fungus over the Copper oxychloride (0.1%) which inhibited the growth of the fungus to 74.44 per cent but supported no sporulation. Anil kumar (2007) reported that Carbendazim, Difenconazole and Propineb gave maximum disease control in of fruit drop of kinnow caused by *Colletotrichum gloeosporioides*. Jadhav (2008) suggested Propiconazole, Carbendazim + Mancozeb for complete inhibition of *Colletotrichum gloeosporioides* causing leaf spot of clove. G. Uma devi (2008) reported Thiophanate methyl, Carbendezim were effective fungicides against the leaf blight of turmeric. Rao (2012) also suggested Propiconazole, Hexaconazole, Tricyclazole, and Carbendezim + Mancozeb against the leaf spot of turmeric caused by *Colletotrichum*. Patel (2010) reported that Propiconazle, Mancozeb + Carbendezim were effectively used for controlling colletotrichum leaf spot of turmeric 20 promising cultivars of turmeric were evaluated to know their reaction against the leaf blight disease. Out of 20 varieties tested Allampuram, Allepey supreme, Cochber, Kuchipuri, Prabha, SB 10723, SB 10735, SB 10746, SB 10843, Tekurpeta (PDI 0.70 to 7.52 %) were resistant to disease while Arunachal local, Pratibha and Salem (PDI 12.67 to 24.44%) found moderately resistant, Jalpalguri local, RH 5, SB 10757 Sikandarabad local, Sudarshana, Suguna, Suranjana (PDI 58.07 to 90.70 %) shows susceptible reaction to the leaf blight disease. These findings are in line with the Tarafdar (2003) who tested seven cultivar of turmeric against leaf spot disease and concluded that CLS 20, Ranga, Roma, BSRI, Armoor, Kasturi, PTS 43 showed low disease incidence ranging between 2.4 and 11.3 %. Similarly, Ajit kumar singh (2007) also screened varieties of turmeric against leaf spot disease caused by *Colletotrichum capsici* reported that Roma, Rashmi, Suguna, Suroma, Sudarshana, TCP- 56, Pratibha, TCP-11 found resistant.

5. CONCLUSION

Out of six fungicides tested against the *Colletotrichum gloeosporioides in vitro* Hexaconazole, Propiconazole, Tricyclazole, Thiophanate methyl and Carbendazim + Mancozeb completely inhibited growth and sporulation of the pathogen at 0.1 per cent concentration. Out of 20 promising cultivars of turmeric screened for their reaction against leaf blight disease, Allampuram, Allepey supreme, Cochber, Kuchipuri, Prabha, SB 10723, SB 10735, SB 10746, SB 10843, Tekurpeta were resistant to disease while Arunachal local, Pratibha and Salem found moderately resistant, Jalpalguri local, RH 5, SB 10757 Sikandarabad local, Sudarshana, Suguna, Suranjana showed susceptible reaction to the leaf blight disease.

SUMMARY OF RESEARCH

1. The seasonal incidence of disease was recorded from 32nd meteorological week at 7 days interval up to 44th meteorological week *i.e.* 4th November 2012.
2. Fungicide like Hexaconazole, Propiconazole, Tricyclazole, Thiophanate methyl and Carbendazim + Mancozeb at 0.1 per cent concentration can be used for the management of pathogen.
3. Screening of the cultivars was done by classifying them as resistant (1-10% PDI), moderately resistant (11-30% PDI), moderately susceptible (31-50% PDI) and susceptible (more than 50% PDI).
4. Out of 20 promising cultivars of turmeric screened for their reaction against leaf blight disease, 10 cultivars found to be resistant, while three found moderately resistant and seven showed susceptible reaction.

DISCLOSURE STATEMENT

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Table 1

Classification of varieties

Sr. no.	Per cent disease index (%)	Reaction of variety
1.	1-10 %	Resistant
2.	11-30%	Moderately resistant
3.	31-50%	Moderately susceptible
4.	More than 50%	Susceptible

Table 2

Effect of fungicides on the growth and sporulation of pathogen

Sr. no	Treatment	Conc. (%)	Mean colony diameter (cm.)*	Per cent Inhibition (%)	Sporulation
1.	Copper oxychloride	0.1	2.30 b	74.44	-
2.	Hexaconazole	0.1	0.00 a	100	-
3.	Propiconazole	0.1	0.00 a	100	-
4.	Tricyclazole	0.1	0.00 a	100	-
5.	Thiophanate methyl	0.1	0.00 a	100	-
6.	Carbendazim+Mancozeb	0.1	0.00 a	100	-
7.	Control	-	9.00 c	-	++++
S.Em ±		0.03			
C.D at 1%		0.11			

S.Em. - Standard Error per Mean; CD- Critical Difference

Mean of four replications; Means with common letter are at par.

- No sporulation, + Poor, ++ Moderate, +++ Good, ++++ Excellent

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Table 3

Reaction of different cultivars against leaf blight

Sr.no.	Variety	Per cent disease index			Reaction (based on 2011-12)
		2011-12	2012-13	Average	
1.	Allampuram	7.52	3.81	5.67	Resistant
2.	Allepey supreme	1.07	1.10	1.09	Resistant
3.	Arunachal local	12.61	2.45	7.53	Moderately resistant
4.	Cochber	2.17	2.17	2.44	Resistant
5.	Jalpalguri local	70.43	3.14	36.79	susceptible
6.	Kuchipuri	0.70	1.53	1.12	Resistant
7.	Prabha	4.42	1.89	3.16	Resistant
8.	Pratibha	24.44	3.13	13.79	Moderately resistant
9.	RH 5	67.68	2.94	35.31	susceptible
10.	SB 10723	2.53	1.47	2.00	Resistant
11.	SB 10735	2.00	2.19	2.10	Resistant
12.	SB 10746	6.93	2.67	4.80	Resistant
13.	SB 10757	90.70	2.07	46.39	susceptible
14.	SB 10843	0.91	4.39	2.65	Resistant
15.	Salem	23.50	1.06	12.28	Moderately resistant
16.	Sikandarabad local	78.89	2.05	40.47	susceptible
17.	Sudarshana	58.07	7.31	32.69	susceptible
18.	Suguna	77.96	2.81	40.39	susceptible
19.	Suranjana	76.09	2.92	39.51	susceptible
20.	Tekurpeta	6.40	1.88	4.14	Resistant
	L.S.I.	34.77	2.65	16.72	

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