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## *In vitro* evaluation of fungicides against purple blotch of onion caused by *Alternaria porri*

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### Abstract

The onion (*Allium cepa* L.) “Princess of vegetables”, is one of the important cultivated crops belonging to the genus *Allium* and family *Alliaceae*. Among the major diseases of onion, purple blotch caused by *Alternaria porri* is especially most destructive pathogen causing leaf blight of onion in Karnataka. The diseases cause yield loss up to 60 to 70 per cent under favourable weather condition. Hence, the present investigation was taken on for evaluation of effective fungicides under *in vitro* condition. The results revealed that out of twelve fungicide tested tebuconazole + trifloxystrobin and propiconazole were found to be most effective in inhibiting the mycelial growth of *A. porri* and completely inhibited the pathogen at 0.15% per cent.

**Keywords:** onion, fungicides, *Alternaria porri*, *Allium cepa*

### Introduction

The onion (*Allium cepa* L.) (2n=16) which is also called as “bulb onion”, “Queen of kitchen” or “Princess of vegetables”, is one of the important cultivated crops belonging to the genus *Allium* and family *Alliaceae*. Among the major diseases of onion, purple blotch caused by *Alternaria porri* is especially most destructive pathogen causing leaf blight of onion in Karnataka (Patil, 1999) [1]. The diseases cause yield loss up to 60 to 70 per cent under favorable weather condition. Hence, the present study was taken on testing of fungicides under *in vitro* condition.

### Material and Methods

The efficacy of 12 selective fungicides with concentrations of 0.05, 0.1, 0.15 per cent wastested by following “poison food technique” suggested by Sharvelle (1961) [2]. Required quantities of individual fungicides were incorporated in sterile distilled water and later into sterile molten potato dextrose agar to get the required concentration of different fungicides on the basis of their weight. Twenty ml of the test poisoned medium was poured into each sterile petriplate. Three replications were maintained for each treatment following completely randomized design. Appropriate control was also maintained without adding any fungicide to compare the treatments. Mycelial discs of five mm size from seven day old culture of the fungus were cut out by a sterile cork borer and one such disc was placed at the centre of each agar plate. Plates were then incubated at 28 °C for fourteen days and an observation on radial colony growth was recorded at fourteen days and when maximum growth in control plates was recorded. The data was statistically analyzed.

The efficacy of fungicides was expressed as per cent inhibition of radial growth over the control which was calculated by using the formula given by Vincent (1947) [3].

$$I = \frac{C - T}{C} \times 100$$

Where,

I = Per cent inhibition

C = Radial growth in control

T = Radial growth in treatment

**Results**

Twelve fungicides were evaluated *in vitro* by following poison food technique as described in material and methods and per cent inhibition of radial growth of *A. porri* by fungicides was recorded. The data is presented in the Table 1 and Plate 1. The Table 1 revealed that there was significant difference between the fungicides, concentration and interaction. The per cent inhibition was increased as the concentration of fungicide increased from 0.05 per cent to 0.15 per cent.

Among the fungicides tebuconazole + trifloxystrobin gave maximum inhibition (92.47%) of radial mycelial growth followed by propiconazole (90.37%) and tebuconazole

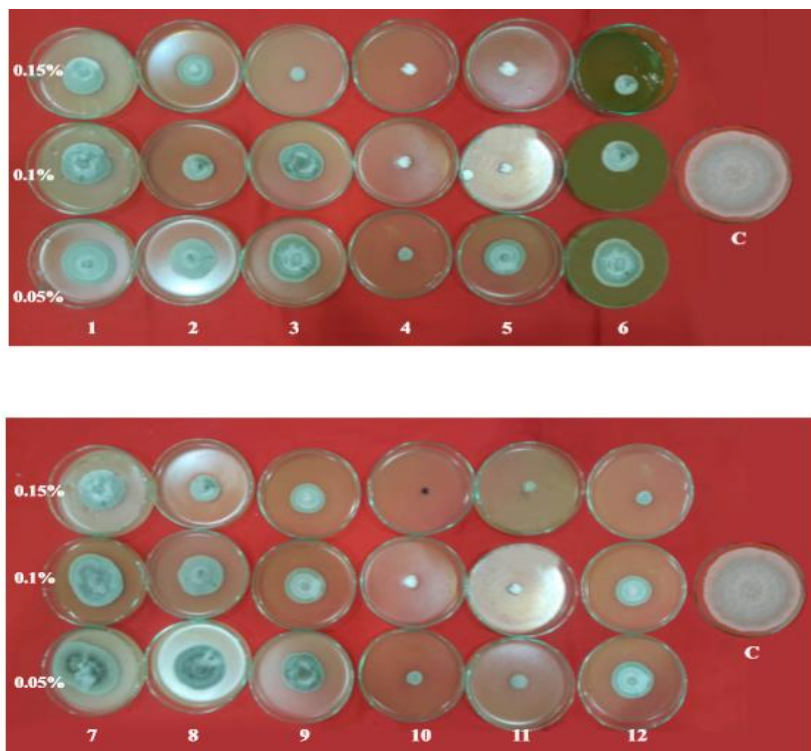
(89.75%) while the lowest inhibition was recorded in carbendazim (42.22%)

Tebuconazole + trifloxystrobin (92.47%) at 0.15% revealed 100 per cent inhibition of the growth of *A. porri* Propiconazole @ 0.15% (94.44 %) was next best fungicide which is on par with tebuconazole @ 0.15% (92.59%) followed by 0.1% (90.00%) and hexaconazole @ 0.15% (91.85%). Tricyclozole + mancozeb @ 0.15% (87.41%) and difenoconazole @ 0.15% (80.74%) were next in order. Mancozeb, kresoxim-methyl, azoxystrobin, chlorothalonil and carbendazim were least effective as the recorded 77.41, 76.30, 67.01, 57.41 and 51.11 per cent inhibition of radial growth at 0.15% concentration.

**Table 1:** Efficacy of fungicides against *Alternaria porri* under *in vitro*

Sl. No.	Fungicide's	Per cent inhibition of mycelial growth (mm)			Mean
		Concentration			
		0.05 %	0.10 %	0.15 %	
1	Azoxystrobin	59.63(50.55)*	60.74(51.20)	67.01(54.95)	62.46(52.23)
2	Carbendazim	37.78(37.92)	37.78(37.92)	51.11(45.64)	42.22(40.49)
3	Chlorothalonil	38.89(38.57)	48.15(43.94)	57.41(49.26)	48.15(43.92)
4	Copper hydroxide	59.63(50.44)	76.30(60.93)	86.30(68.49)	74.07(59.99)
5	Hexaconazole	83.70(66.34)	88.52(70.60)	91.85(73.57)	88.02(70.17)
6	Kresoxim-methyl	61.11(51.42)	66.30(54.54)	76.30(60.89)	67.90(55.61)
7	Mancozeb	67.78(55.43)	75.19(60.27)	77.41(61.81)	73.46(59.17)
8	Propiconazole	82.22(65.08)	94.44(76.16)	94.44(76.37)	90.37(72.60)
9	Difenaconazole	72.96(58.67)	72.96(58.67)	80.74(63.97)	75.56(60.43)
10	Tebuconazole	86.67(68.66)	90.00(72.16)	92.59(74.24)	89.75(71.68)
11	Tebuconazole + Trifloxystrobin	87.04(68.90)	90.37(72.03)	100.00(90.00)	92.47(76.97)
12	Tricyclozole + Mancozeb	82.59(65.35)	84.81(67.08)	87.41(69.22)	84.94(67.21)
	Mean	68.33(56.45)	73.80(60.47)	80.21(65.70)	74.11(60.87)
	Source			SEm ±	CD @ 1%
	Fungicide (F)			0.73	3.04
	Concentration (C)			0.40	1.52
	F x C			1.40	5.27

\*Figures in parenthesis are arcsine transformed values



1.Azoxystrobin, 2. Kresoxim-methyl, 3.Tebuconazole, 4.Propiconazole, 5. Hexaconazole, 6. Copper hydroxide, 7. Carbendazim , 8. Chlorothalonil, 9. Mancozeb, 10. Tebuconazole + Trifloxystrobin, 11. Difenaconazole, 12. Tricyclozole+Mancozeb, C. Control

**Plate 1:** Efficacy of fungicides against *Alternaria porri* under *in vitro*

### Discussion

All the fungicides significantly inhibited mycelial growth of the pathogen. Out of these and tebuconazole + trifloxystrobin and propiconazole were found to be most effective in inhibiting the mycelial growth of *A. porri* and completely inhibited the pathogen at 0.15% per cent. Tebuconazole is dimethyl inhibitor and interfere in the process building the structure of fungal cell wall and finally it inhibit and fungal germination, trifloxystrobin interfere with mitochondrial respiration by blocking electron transfer in the electron transfer chain, propiconazole helps in the dimethylation C-14 methyl sterol. The biosynthesis, leading and accumulation of C-14 methyl sterol hinder the ergo sterol formation in fungal cell wall and leads to stop the fungi growth, prevent invasion of host (pmep.cce.edu). Carbendazim and Chlorothalonil fungicides were found to be least effective. These results are in agreement with the findings of Aujla *et al.* (2013) <sup>[4]</sup>.

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