

## Effect of Fungicides on Growth and Spore Germination of *Alternaria Porri*

**Key words :** *Alternaria Porri*, Fungicides, Spore germination

Onion (*Allium cepa* L.) is an important bulb crop of India belonging to the family Alliaceae. In India, the onion crop occupies an area of 0.4546 million hectares with a total production of 6034.25 million tonnes. In Andhra Pradesh, it is grown over an area of about 0.022 million hectares with an annual production of 197 million tonnes (Anonymous, 2005-06). In Guntur district of Andhra Pradesh it is cultivated in an area of 0.001239 million hectares with an annual production of 0.019680 million tonnes (Anonymous, 2006). Several factors contribute to the low productivity of onion. Diseases like purple blotch, downy mildew, *Stemphylium* blight, basal rot and storage rot are known to be more significant in reducing the production of the crop. Of these, purple blotch is the most destructive disease, prevalent in almost all onion growing areas of the world causing heavy losses under field conditions. In Guntur district the disease has become prevalent causing heavy losses to onion farmers in recent times. The present investigations carried out to assess four commonly used fungicides for their efficacy on mycelial growth and spore germination.

The efficacy of four fungicides viz., mancozeb, copper oxychloride, difenconazole and chlorothalonil each at concentrations of 50 ppm, 100 ppm, 200 ppm, 500 ppm and 1000 ppm was evaluated by following poisoned food technique suggested by Nene and Thapliyal (1982). Plates were incubated at room temperature of  $28 \pm 1^\circ\text{C}$  for nine days when the growth was complete in control plates. The efficacy of the fungicides was expressed as per cent growth inhibition over control which was calculated using the following formula as suggested by Nene and Thapliyal (1982).

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

I – Per cent growth inhibition  
C – Radial growth in control  
T – Radial growth in treatment

The effect of four test fungicides at different concentrations on spore germination of *Alternaria porri* was studied by using cavity slides. In the well of a cavity slide, 0.2 to 0.5 ml of each fungicide at each concentration was placed and dried at room temperature. The same amount of conidial suspension ( $2.8 \times 10^2$  spores  $\text{ml}^{-1}$ ), prepared in sterile water was added over dried fungicidal solution and the slides were incubated in a humid chamber at  $28 \pm 1^\circ\text{C}$ . Cavity slide having only conidial suspension without fungicides was taken as control. After 24 h, observation on the number of spores germinated was recorded and per cent inhibition of spore germination was calculated by using the following formula as suggested by Nene and Thapliyal (1982) and described earlier.

The results revealed that all the fungicides were significantly effective in inhibiting the growth and spore germination of *A. porri*. Irrespective of the concentration, difenconazole was observed to be the most effective and recorded the highest reduction of mycelium growth (90.40%) followed by mancozeb (89.54%). These were followed by copperoxychloride (71.56%) and chlorothalonil (62.59%).

When assessed against concentrations (irrespective of the chemical) highest reduction of mycelial growth (89.45%) was observed at 1000 ppm. This was followed by 86.27% reduction at 500 ppm and 83.62% at 200 ppm concentration. Relatively low reduction in mycelial growth was recorded at 100 ppm (78.6%) and 50 ppm (54.65%).

The interaction between fungicides and concentrations was significant. All the fungicides were found effective in reducing the mycelial growth with increase in concentrations. Maximum reduction of mycelial growth (100%) was observed with difenconazole at 200 ppm and mancozeb at 100 ppm, which were significantly superior to all other treatments. The next best treatments were copperoxychloride (87.10%) and chlorothalonil (70.70%) at 1000 ppm concentrations. Low growth inhibition was observed in the case of

Table 1. Effect of fungicides on mycelial growth of *Alternaria porri* on potato dextrose agar medium

Sl. No.	Fungicides	Inhibition of Mycelial growth concentration (ppm)					Mean
		50	100	200	500	1000	
1	Difenconazole 25 EC	61 (51.35)	91 (72.54)	100 (90.00)	100 (90.00)	100 (90.00)	90.40 (71.95)
2	Mancozeb 75 WP	47.7 (43.68)	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	89.54 (71.09)
3	Copper Oxychloride 50 WP	54.4 (47.52)	66 (54.33)	71.5 (57.73)	78.8 (62.58)	87.1 (68.95)	71.56 (57.73)
4	Chlorothalonil 75 WP	55.5 (48.16)	57.4 (49.26)	63 (52.54)	66.3 (54.51)	70.7 (57.23)	62.59 (52.54)
5	Check ( <i>Alternaria porri</i> alone)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)
	Mean	54.65 (47.64)	78.6 (62.44)	83.62 (66.11)	86.27 (68.19)	89.45 (71.00)	78.51 (62.38)
		Fungicides		Concentration		F x C	
	S.Em ±	0.12		0.14		0.28	
	C.D.at 1% level	0.49		0.55		1.10	

Values in parenthesis are Arc sine are transformed values

Table 2. Effect of fungicides on spore germination of *Alternaria porri*

Sl. No.	Fungicides	Inhibition of spore germination concentration (ppm)					Mean
		50	100	200	500	1000	
1	Difenconazole 25 EC	56.3 (48.62)	80.6 (63.87)	100 (90.00)	100 (90.00)	100 (90.00)	87.38 (69.21)
2	Mancozeb 75 WP	50.7 (45.40)	78.3 (62.24)	96 (78.46)	100 (90.00)	100 (90.00)	85.00 (67.21)
3	Copper Oxychloride 50 WP	48.6 (44.26)	55.6 (48.22)	71.3 (57.61)	82 (64.90)	100 (90.00)	71.50 (57.73)
4	Chlorothalonil 75 WP	41.6 (40.16)	51.3 (45.73)	63 (52.54)	75 (69.00)	92.6 (74.21)	64.70 (53.55)
5	Check ( <i>Alternaria porri</i> alone)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)	00.00 (00.00)
	Mean	49.30 (44.60)	66.45 (54.57)	82.57 (65.27)	89.25 (70.81)	98.15 (82.08)	77.14 (61.41)
		Fungicides		Concentration		F x C	
	S.Em ±	0.09		0.10		0.21	
	C.D.at 1% level	0.37		0.41		0.83	

Values in parenthesis are Arc sine are transformed values

copperoxychloride (54.40%) and chlorothalonil (55.50%) at 50 ppm concentrations.

Similarly, all the fungicides were significantly effective in inhibiting the spore germination of *A. porri*. Irrespective of the concentrations, difenconazole was found most effective fungicide and recorded the highest spore germination inhibition (87.38%), followed by mancozeb (85.00%). The next best treatments were copperoxychloride (71.50%) and chlorothalonil (64.70%).

Irrespective of the chemical used; inhibition of spore germination was observed at all concentrations. The highest spore germination inhibition (98.15%) was observed at 1000 ppm. This was followed by 89.25% reduction at 500 ppm and 82.57% at 200 ppm concentration. Relatively low reduction in spore germination inhibition was recorded at 100 ppm (66.45%) and 50 ppm (49.30%).

The interaction between fungicides and concentrations were significant. All the fungicides were found effective in inhibiting the spore germination with increase in concentrations. Maximum reduction of spore germination (100%) was observed with difenconazole at 200 ppm, mancozeb at 500 ppm and copperoxychloride at 1000 ppm, which was significantly superior to all other treatments. The next best treatments were chlorothalonil (92.60%) at 1000 ppm. Least spore germination inhibition was observed in the case of chlorothalonil (41.60%) and copperoxychloride (48.60%) at 50 ppm concentrations.

The findings of the present study are in conformity with the observations of Ponnappa (1970) who studied the *in vitro* efficacy of fungicides against leaf blight of onion caused by *A. cepulae* and reported that Dithane M-45 showed complete inhibition at 0.2% concentration. Gupta *et al.* (1981) reported Dithane M-45 was the most effective in inhibiting the growth of *A. porri* under *in vitro* conditions. Srivastava *et al.* (1991) evaluated four fungicides, copperoxychloride, mancozeb,

carbendazim and thiram on purple blotch of onion caused by *A. porri*, and found that mancozeb showed the highest efficacy in controlling the disease. Sastrahidayat (1994) found that difenconazole (0.8 ml/liter) inhibited the growth of *A. porri* under laboratory condition. Huq *et al.* (1994) reported that Rovral gave the best inhibition of growth followed by mancozeb.

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