

## Evaluation of fungicides for the management of *Taphrina* leaf blotch of turmeric (*Curcuma longa* L.)

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Received 16 August 1999; Revised 18 January 2000; Accepted 28 January 2000.

### Abstract

Evaluation of six fungicides for the management of leaf blotch disease of turmeric (*Curcuma longa*), caused by *Taphrina maculans*, at Madhya Pradesh, India, indicated that all the fungicides reduced the disease severity significantly over control. Lowest disease severity and highest fresh rhizome yield was recorded in Ridomil (500 ppm) which was on par with thiophanate methyl (0.1%), carbendazim (0.1%), Blitox (0.3%) and Antracol (0.3%). Apparent rate of infection was lowest in thiophanate methyl spray followed by Ridomil spray.

**Key words:** *Curcuma longa*, disease management, leaf blotch, *Taphrina maculans*, turmeric.

Turmeric (*Curcuma longa* L.) is grown to a large extent in Chattisgarh region of Madhya Pradesh, India. Two fungal diseases, namely leaf spot caused by *Colletotrichum capsici* (Syd.) and leaf blotch caused by *Taphrina maculans* (Butler) are main constraints in turmeric cultivation (Philip & Nair 1977; Rao *et al.* 1993). In Chattisgarh, leaf blotch is more important resulting in severe blighting of leaves at all stages (Sarma & Krishnamurthy 1962; Reddy *et al.* 1963). Spraying of Dithane Z-78 (0.2%) followed by Dithane M-45 (0.3%) was effective in controlling the disease (Srivastava & Gupta 1977). An attempt was made to screen other fungicides against this disease and the results are reported here.

The experiment was conducted at Regional Agricultural Research Station, Raigarh (Madhya Pradesh, India) during *kharif* 1997 and 1998 cropping season in a randomized block design with three replications. Sowing of local variety of turmeric was done in a plot of 3 m x 1 m at a spacing of 20 cm x 30 cm. All the recommended package of practices were adopted to raise the crop. All the fungicide (Blitox-50 (0.3%), Ridomil (500 ppm), thiophanate methyl (0.1%),

carbendazim (0.1%), Mancozeb (0.3%) and Antracol (0.3%) sprays were initiated when the first symptom of the disease appeared in the plot followed by two more sprays at monthly intervals @ 600 l solution of each fungicide per spray per ha. Disease severity (on 1-9 point scale : 1 = 0 to 1% leaf area affected, 3 = 1.1 to 10% leaf area affected, 5 = 10.1 to 20% leaf area affected, 7 = 20.1 to 50% leaf area affected and 9 = more than 50% leaf area affected) was recorded on 20 randomly selected leaves from each plot just before each spraying and 1 month after last spraying. Per cent disease index was calculated by using the formula:

$$\text{Percent Disease Index} = \frac{\text{Sum of all disease ratings}}{\text{Total no. of ratings} \times \text{max. disease grade}} \times 100$$

Apparent infection rate (r) was computed by the following formula:

1. When disease severity was less than 5% (logarithmic infection rate)

$$r = \frac{2.3}{t_2 - t_1} \log_{10} \frac{X_2}{X_1}$$

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**Table 1.** Effect of fungicides on leaf blotch disease of turmeric

Treatment	Per cent disease index	Yield (kg/3m <sup>2</sup> )	Yield (t/ha)	Fungicidal cost (Rs/ha)
Control	70.90	5.10	17.00	-
Blitox-50 (0.3%)	40.30	7.00	23.33	1296.00
Ridomil (500 ppm)	31.50	8.30	27.67	1854.00
Thiophanate methyl (0.1%)	35.90	8.00	26.67	1123.0
Carbendazim (0.1%)	36.80	7.30	24.33	1413.00
Mancozeb (0.3%)	48.00	7.20	24.00	1350.00
Antracol (0.3%)	44.30	7.60	25.33	1370.00
CD (5%)	13.85	1.61	-	-
SE±m	3.27	0.38	-	-
CV (%)	29.86	20.33	-	-

2. When disease severity was more than 5% (non-logarithmic infection rate)

$$r = \frac{2.3}{t_2 - t_1} \log_{10} \frac{X_2 (1 - X_1)}{X_1 (1 - X_2)}$$

where  $r$  = Apparent infection rate,  $X_1$  = Disease severity at first observation ( $t_1$ ),  $X_2$  = Disease severity at second observation ( $t_2$ ),  $t_1$  = Time of first observation and  $t_2$  = Time of second observation.

The disease appeared in the field 62 and 58 days after sowing (DAS) (average 60 DAS) during 1997 and 1998, respectively. All the fungicides tested reduced the disease severity significantly when compared to control. The lowest disease index was achieved with Ridomil (31.5%) followed by thiophanate methyl (35.9%), carbendazim (36.8%), Blitox-50 (40.3%) and Antracol (44.3%) which were on par. Srivastava & Gupta (1977) reported that Dithane Z-78 was the most effective among

**Table 2.** Apparent infection rate ( $r$ ) in various fungicides, sprayed for the management of leaf blotch disease of turmeric

Treatment	Apparent infection rate			
	60-90 DAS	90-120 DAS	120-150 DAS	Mean
Control	0.104 (0.322)	0.028 (0.176)	0.031 (0.176)	0.054 (0.221)
Blitox-50 (0.3%)	0.113 (0.336)	0.030 (0.173)	0.011 (0.105)	0.051 (0.205)
Ridomil (500 ppm)	0.088 (0.297)	0.028 (0.167)	0.011 (0.105)	0.042 (0.190)
Thiophanate methyl (0.1%)	0.084 (0.290)	0.013 (0.114)	0.021 (0.145)	0.039 (0.183)
Carbendazim (0.1%)	0.101 (0.318)	0.019 (0.138)	0.012 (0.109)	0.044 (0.188)
Mancozeb (0.3%)	0.083 (0.288)	0.041 (0.202)	0.016 (0.126)	0.047 (0.205)
Antracol (0.3%)	0.094 (0.306)	0.020 (0.141)	0.013 (0.114)	0.042 (0.187)
CD (5%)	-	-	-	NS

Figures in parentheses are square root transformed values

DAS = Days after sowing; NS = Not significant

the fungicides tested for the control of leaf blotch disease followed by Dithane M-45 and Blitox-50. The results obtained in respect of disease index and yield were non significant among different fungicides. The highest fresh rhizome yield was recorded in Ridomil (27.67 t/ha) followed by thiophanate methyl (26.67 t/ha) and Antracol (25.33 t/ha). Cost of fungicidal application was lowest in thiophanate methyl (0.1%) closely followed by Blitox-50 (0.3%). Mean apparent rate of infection was lowest in thiophanate methyl (0.039 unit per day) followed by Ridomil and Antracol (0.042 unit per day). Considering all the parameters namely, reduction in disease severity, yield obtained and fungicidal cost, thiophanate methyl (0.1%) can be sprayed to effectively manage leaf blotch disease of turmeric.

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