

ASSESSMENT OF YIELD LOSSES DUE TO LEAF BLOTCH OF TURMERIC CAUSED BY *TAPHRINA MACULANS* BUTLER

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ABSTRACT

Field experiment was carried out at two different locations of South Gujarat viz; Tarkani village of Surat district and at Navsari district during 2014-15 to study yield loss caused by leaf blotch disease in turmeric crop. Result reveals that the avoidable yield loss due to leaf blotch (*Taphrina maculans* Butler) was estimated to be 36.95% at Navsari and 36.36% at Tarkani village of Surat district and 71.70% and 72.97% disease was controlled by protecting the turmeric plots at Navsari and Tarkani respectively by two foliar sprays of propiconazole (0.025%). Leaf blotch may cause loss up to 36 % in turmeric crop and around 72 % control of disease may achieve by giving two foliar sprays of propiconazole (0.025%) first spray at initiation of disease and second spray after fifteen days of first spray.

INTRODUCTION

Turmeric (*Curcuma longa* L.) (Family: Zingiberaceae) is one of the major spices cultivated for its underground rhizome, which is also called as "hidden Lilly" or "turmeric of commerce" (Chawda *et al.*, 2012). Underground rhizomes of turmeric are rich in curcumin and used for medicinal, religious and culinary purposes. These are also as a cosmetic and dye (Shah, 1997). Essential oil of turmeric is antiseptic and is used in treating gall stones (Pruthi, 1976). Curcumin and oleoresin help lower total cholesterol in blood serum (Manjunatha and Srinivasa, 2008). India is considered as the largest producer, consumer and exporter of turmeric in the globe. During 2012-13, 80,050 tonnes of turmeric was exported earning Rs. 53, 985 .40 lakhs (Anon., 2013a). In Gujarat, turmeric is grown under 2.98 thousand ha area with a 50.49 thousand MT production and 16.94 MT/ha productivity (Anon., 2013b).

Leaf blotch of turmeric is a serious disease caused by *Taphrina maculans* Butler, was known to report from Gujarat, Saharanpur (UP) and Rangapur in 1911. Leaf blotch disease is commonly occurring in almost all turmeric growing areas of India (Velayudhan *et al.*, 1999). Leaf blotch creates severe problem during storage and in the field, thereby causing shortage of healthy planting materials (Sarma *et al.*, 2011). Yield losses in turmeric were observed between 37.6% to 52.9% due to this fungus (Panja *et al.*, 2000). Losses caused by *T. maculans* may vary from 20% to more than 60% in some cases (Nair and Ramakrishnan, 1973). This disease infects plant leaves as well as leaf sheath. It reduces total photosynthetic area of the plant leaves under severe infection

(Maurya *et al.*, 2011). The foliar destruction due to leaf blotch reduces the yield considerably when the disease starts in its early stages of crop growth. The farmers are growing local clones for their desirable aroma, colour and palatability. These clones are highly susceptible to the leaf blotch disease. Following experiment was carried out with objective to know how much yield loss in can be caused by *T. maculans* in turmeric crop.

MATERIALS AND METHODS

Loss assessment

The trial for loss assessment due to leaf blotch (*T. maculans*) disease in turmeric was carried out at College Farm N. M. College of Agriculture, NAU, Navsari, and farmer's field at Tarkani village Ta.: Mahuva, Dist.: Surat during 2014-15. Susceptible turmeric variety (NVST-2) was grown in two separate plots each of 20m × 10 m for the study. Ten spots per strip were formed of 8.40 m × 1.65 m size. One plot was sprayed with propiconazole (Tilt 25% EC, 1ml/lit) to keep the plot free from the disease infection and the second unprotected plot served as control. Both the plots were periodically observed for the assessment of the disease.

The observations on disease intensity were recorded and to know the disease intensity, twenty plants were selected randomly from each field. Three leaves each from top, middle and bottom portion of the plants were observed critically. The disease rating was recorded by adopting the methodology suggested by Palarpawar and Ghurde (1989),

Table 1: Loss due to leaf blotch (*T. maculans*) of turmeric during 2014-15

Sr.No.	Places	Observations	Protectedstrips	Unprotected strips	Two sample t value	Result	% Loss in yield	% Disease control
1	Navsari	Per cent disease intensity	11.35	40.11	11.33	**	36.95	71.70
2		Yield (kg/ha)	14419.40	9091.05	4.12	**		
3	Tarkani	Per cent disease intensity	9.50	35.14	14.59	**	36.36	72.97
4		Yield (kg/ha)	15698.80	9990.94	4.86	**		

** Highly significant

Scale**Per cent area infection**

0	No infection
1	0.1 to 10.0 per cent necrotic leaf area
2	10.1 to 20 per cent necrotic leaf area
3	20.1 to 30 per cent necrotic leaf area
4	30.1 to 40 per cent necrotic leaf area
5	40.1 to 50 per cent necrotic leaf area
6	More than 50 per cent necrotic leaf area

The Per cent Disease Intensity (PDI) was calculated according to the formula suggested by Datar and Mayee (1981),

$$\text{PDI} = \frac{\text{rating of infected leaves on plant}}{\text{No. of leaves observed} \times \text{Maximum disease score}} \times 100$$

The yield per plot was also recorded. The loss of yield due to leaf blotch was calculated on the basis of following formula suggested by Bankole and Adebajo (1987),

$$\text{Yield loss (\%)} = \frac{\text{Yield in treated strip (kg/spot)} - \text{Yield in control strip (kg/spot)}}{\text{Yield in treated strip (kg/spot)}} \times 100$$

RESULTS AND DISCUSSION

The loss in green rhizome yield due to leaf blotch disease of turmeric caused by *T. maculans* was assessed during the year 2014-15 at College Farm N.M. College of Agriculture, NAU, Navsari, and farmer's field at Tarkani village Ta.: Mahuva, Dist.: Surat. The results presented in Table 1 indicated that green rhizome yield in protected plot at Navsari was 14419.40 kg/ha, while in unprotected plot, it was 9091.05 kg/ha. Thus, the loss occurred in green rhizome yield due to the leaf blotch in turmeric at Navsari was 36.95 per cent. In protected plot, 11.35 per cent leaf blotch intensity was recorded as against 40.11 per cent in unprotected plot. Thus, 71.70 per cent disease was controlled by protecting the plot with two sprays of propiconazole (0.025%) after appearance of disease symptoms at fifteen days interval (Table 1).

The green rhizome yield in protected plot at filed of Tarkani village was 15698.80 kg/ha, while in unprotected plot it was 9990.94 kg/ha. Thus, the loss occurred due to the leaf blotch at field of Tarkani village was 36.36%. In protected plot, 9.50% leaf blotch intensity was recorded as against 35.14% in unprotected plot. Thus, 72.97% disease was controlled by protecting the plot with two sprays of propiconazole (0.025%) after appearance of disease symptoms at fifteen days interval. The result was found highly significant over control indicating effectiveness of propiconazole (0.025%) over control (Table 1). The difference in disease intensity and yield at both the place may be due to difference in soil and environmental condition and varietal performance over changed

environmental conditions. Panja *et al.* (2000) revealed that turmeric losses are up to 37.6% to 52.9% due to *T. maculans*. They also reported that per cent disease index (PDI) of leaf blotch disease, dry biomass yield and fresh rhizome yield of nine turmeric genotypes differed significantly under both control and treated conditions. Highly susceptible cultivar to the leaf blotch disease exhibited not only a loss in dry bio mass and fresh rhizome yield but a higher rate of loss in dry bio mass and fresh rhizome yield than other genotypes. Loss caused by leaf blotch and leaf spot diseases in turmeric is varying from 20% to more than 60% in some cases (Nair and Ramakrishnan, 1973). Butler (1918) noted that though precise crop loss figure are not available, the foliar destruction due to *T. maculans* in turmeric would reduce the yields considerably especially when the disease occurs in early stages of crop growth.

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