

## FIELD EFFICACY OF FUNGICIDES, BOTANICALS AND BIOCONTROL AGENT FOR MANAGEMENT OF BROWN LEAF SPOT OF TOBACCO CAUSED BY

### *Alternaria alternata* (Fr.) Kiessler

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## ABSTRACT

A field experiment was laid out at the Agricultural Research Station (ARS), Nipani, University of Agricultural Sciences, Dharwad, Karnataka. Ten fungicides, one bio-agent (*Trichoderma harzianum*) and two botanicals (Parthenium leaf extract and Prosopis leaf extract) were evaluated under field condition against brown leaf spot of tobacco caused by *Alternaria alternata* (Fr.) Kiessler. Among all the treatments, Hexaconazole (0.1%) was effective in minimizing the disease severity and providing higher yield. The botanicals and bioagent tested found ineffective in managing the disease.

(Key words: Brown leaf spot, bioagent, fungicide and botanicals)

## INTRODUCTION

The brown leaf spot of tobacco caused by *Alternaria alternata* (Fr.) Kiessler is a very important disease of the crop, which causes both qualitative and quantitative loss in the leaf yield. Several epidemics of the disease on the crop in different tobacco growing areas have been observed. The lower and matured leaves are affected first by the disease. The disease is characterized by circular spots, ranging from 0.25 inch to 1.25 inches in diameter on the leaves. The spots are found primarily on the lower leaves of the plant. It produces target-like spots having a yellow or yellowish-green halo around them. The fungus causes the leaf tissue in the area of the spot to age prematurely. Each of the dark rings in the target spots are made of thousands of tiny spores (seed-like structures). The spots enlarge and coalesce and the dead tissues often tear and fall out of the leaf making the entire leaf ragged and worthless. When stalks and suckers are infected, girdling of the plant can occur and the plant dies. Brown leaf spot is one of the most destructive leaf spot diseases of tobacco. The disease occurs commonly in bidi tobacco in the nursery as well as in the field. Humid and warm weather during August – September is highly congenial for development of the disease. The heavy and continuous rains after one month of crop growth including high atmospheric relative humidity for longer periods resulted in leaf spot and increases to epiphytotic proportions (Mandelson, 1933). Epidemiology and management of bidi tobacco diseases has been reviewed by Kulkarni *et al.* (2005). Not only it reduces yield, the produce prepared from infected leaf is of poor quality. Keeping in view the hazardous effect

of this disease, the present investigation was made on Evaluation of fungicides, botanicals and bioagent for management of brown leaf spot of tobacco caused by *Alternaria alternata* (Fr.) Kiessler.

## MATERIALS AND METHODS

A field experiment was laid out at the Agricultural Research Station (ARS), Nipani, University of Agricultural Sciences, Dharwad, Karnataka during 2013. Ten fungicides, two botanicals and one bio agent, were tested against the disease in the field condition, by taking fourteen treatments (including one treatment as untreated check) and three replications in the RBD-design. The plot size was 4m × 10 m. A-119 variety was grown and transplanting was done on 25.08.2013. The PDI and leaf yield were considered as two parameters to find out the best treatment. Fourteen treatments included in the experiment were T<sub>1</sub>- Hexaconazole 5% EC (Contaf) @ 0.1%, T<sub>2</sub>- Propiconazole 25% EC (Tilt) @ 0.1%, T<sub>3</sub>- Difenconazole 25% EC (Score) @ 0.1%, T<sub>4</sub>- Tebuconazole 25% EC (Folicur) @ 0.1%, T<sub>5</sub>- Hexaconazole 5% + Captan 70% (Taqat 75% WP) @ 0.2%, T<sub>6</sub>- Hexaconazole 4% + Zineb 68% (Avatar 72% WP) @ 0.2%, T<sub>7</sub>- Mancozeb 63% + Carbendazim 12% (Saaf) @ 0.2%, T<sub>8</sub>- Azoxystrobin 23% SC (Amistar) @ 0.1%, T<sub>9</sub>- Trifloxystrobin 25% + Tebuconazole 50% WG (Nativo 75% WG) @ 0.05%, T<sub>10</sub>- Mancozeb 75% WP @ 0.2%, T<sub>11</sub>- *Trichoderma harzianum* @ 1%, T<sub>12</sub>- Parthenium leaf extract spray @ 10%, T<sub>13</sub>- *Prosopis juliflora* leaf extract spray @ 10%, T<sub>14</sub>- Untreated check.

First spray was taken up immediately after disease appearance followed by another spray at 10-12 days interval.

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The PDI was calculated by using the following formula

$$\text{PDI} = \frac{\text{Sum of all disease rating}}{\text{No. of leaves plant}^{-1} \text{ observed}} \times \frac{100}{\text{Maximum grade}}$$

The yields plot<sup>-1</sup> and quality parameters were recorded at the time of harvest. The economic analysis was made and B:C ratio was worked out for each treatment to ascertain economic feasibility of treatments. The data was statistically analyzed by following statistical procedures of Panse and Sukhatme (1985).

## RESULTS AND DISCUSSION

Fourteen treatments including the untreated check were evaluated against brown leaf spot disease and data are presented in Table 1 and Plate 1.

Among all the treatments, Hexaconazole (T<sub>1</sub>) @ 0.1% was most effective with least disease severity (27.10 PDI), which was on par with Propiconazole (T<sub>2</sub>) @ 0.1% (28.27 PDI), Difencanazole (T<sub>3</sub>) @ 0.1% (28.50 PDI) and Tebuconazole (T<sub>4</sub>) @ 0.1% (29.10 PDI). Among the three combi-products, Avatar (Hexaconazole + Zineb, T<sub>6</sub>) @ 0.2% (30 PDI) was effective against the disease. *Trichoderma harzianum* (T<sub>11</sub>) @ 0.1% brought down the PDI to 39.80, which was on par with *Prosopis* leaf extract (T<sub>13</sub>) @ 10% (40.50 PDI). Parthenium leaf extract (T<sub>12</sub>) @ 10% recorded

42.80 PDI. Maximum disease severity was noticed in untreated control (60.2 PDI). Hexaconazole (0.1%) was effective in minimizing the disease severity and providing higher yield. Mesta (2006) reported triazoles as effective fungicides against *Alternaria* blight of sunflower. Jahagirdar and Hundekar (2009) reported effectiveness of Carbendazim and Hexaconazole against frog-eye leaf spot and brown leaf spot of bidi tobacco in Karnataka. Among all the treatments, Hexaconazole provided highest yield (1450 kg ha<sup>-1</sup>), followed by Propiconazole (1423 kg ha<sup>-1</sup>) and Difencanazole (1400 kg ha<sup>-1</sup>). The least yield was recorded with Parthenium leaf extract (1157 kg ha<sup>-1</sup>). The Benefit: Cost ratio analysis revealed that the maximum B: C ratio (1:1.50) was obtained with Hexaconazole treatment (T<sub>1</sub>) followed by 1:1.48 in Propiconazole (T<sub>2</sub>) and Difencanazole (T<sub>3</sub>) (1:1.48). There was negative B: C ratio/net loss with respect to application Mancozeb (T<sub>10</sub>), *Trichoderma harzianum* (T<sub>11</sub>), Parthenium leaf. Hexaconazole (T<sub>1</sub>) @ 0.1% was most effective with least disease severity (27.10 PDI), which was on par with Propiconazole (T<sub>2</sub>) @ 0.1% (28.27 PDI), Difencanazole (T<sub>3</sub>) @ 0.1% (28.50 PDI) and Tebuconazole (T<sub>4</sub>) @ 0.1% (29.10 PDI). Hexaconazole provided highest yield (1450 kg ha<sup>-1</sup>), followed by Propiconazole (1423 kg ha<sup>-1</sup>) and Difencanazole (1400 kg ha<sup>-1</sup>). So, Hexaconazole @ 0.1% can be recommended for effective management of brown leaf spot disease.

**Table 1. Field management of brown leaf spot of tobacco**

Treatment No.	Treatment details	PDI	Yield (kg ha <sup>-1</sup> )	B:C ratio
T <sub>1</sub>	Hexaconazole 5% EC (Contaf) @ 0.1%	27.10(31.4) *	1450.00	1:1.50
T <sub>2</sub>	Propiconazole 25% EC (Tilt) @ 0.1%	28.27(32.1)	1423.00	1:1.48
T <sub>3</sub>	Difencanazole 25% EC (Score) @ 0.1%	28.50(32.26)	1400.00	1:1.45
T <sub>4</sub>	Tebuconazole 25% EC (Folicur) @ 0.1%	29.10(32.64)	1384.00	1:1.41
T <sub>5</sub>	Hexaconazole 5% + Captan 70% (Taqat 75% WP) @ 0.2%	32.00(34.44)	1325.00	1:1.30
T <sub>6</sub>	Hexaconazole 4% + Zineb 68% (Avatar 72% WP) @ 0.2%	30.00(33.21)	1342.00	1:1.35
T <sub>7</sub>	Mancozeb 63% + Carbendazim 12% (Saaf) @ 0.2%	33.40(35.30)	1280.00	1:1.17
T <sub>8</sub>	Azoxystrobin 23% SC (Amistar) @ 0.1%	33.60(35.42)	1251.00	1: 1.10
T <sub>9</sub>	Trifloxystrobin 25% + Tebuconazole 50% WG (Nativo 75% WG) @ 0.05%	30.50(33.52)	1288.00	1:1.25
T <sub>10</sub>	Mancozeb 75% WP @ 0.2%	35.40(36.5)	1207.00	1:0.84
T <sub>11</sub>	<i>Trichoderma harzianum</i> @ 0.1%	39.80(39.1)	1210.00	1:0.97
T <sub>12</sub>	Parthenium leaf extract spray @ 10%	42.80(40.86)	1157.00	1:0.66
T <sub>13</sub>	<i>Prosopis juliflora</i> leaf extract spray @ 10%	40.50(39.50)	1162.00	1:0.68
T <sub>14</sub>	Untreated check	60.20(50.88)	1170.00	1:1.15
	SEm±	0.50		
	CD (5%)	1.45		

\* Are sin value





**a) Untreated check (T<sub>1</sub>)**



**b) Treatment proved best with Hexaconazole @ 0.1% (T<sub>2</sub>)**

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