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Chemical Control of Anthracnose (*Colletotrichum truncatum)* of Horsegram under Field Conditions

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Abstract: ***A study was conducted on the chemical control of anthracnose (Colletotrichum truncatum) of horsegram (Macrotyloma uniflorum) under field conditions in CSKHP KV, Palampur. Eight fungicides viz., four systemic; Bavistin 50-WP (carbendazim) @ 0.1%, Score (difenoconazole) @ 0.05%, Contaf (hexaconazole) @ 0.05%, Folicur (tebuconazole) @ 0.05%, and four protectant fungicides; Dithane-M-45 (mancozeb) @ 0.25%, Blitox 50-WP (copper oxychloride) @ 0.25%, Kavach 50 WP (chlorothallonil) @ 0.25% and Captan 50 WP (Captaf) @ 0.25% were tested for their efficacy on the HPK4 variety of horse gram as a foliar spray. Bavistin gave maximum disease control (63.62%) followed by Dithane M-45 (56.47%), Contaf (52.13%), Blitox (36.22%), Folicur (35.27%), Kavach (33.48%) and Captan (31.16%) whereas Score gave minimum disease control (25.95%). Maximum increase in grain yield was also recorded in Bavistin (94.6%) and minimum in Score (16.2%).***
Keyword: Horse gram, HPK4, anthracnose, Colletotrichum truncatum,, chemical control, field conditions.

I. INTRODUCTION

Horse gram is an underutilized and food legume. It is considered as a good source of protein, carbohydrates, energy. It is tolerant to drought [3], salinity and heavy metal stresses. In India, it is generally sown late in the rainy season in marginal and drought-prone condition. Horsegram (*Macrotyloma uniflorum)* belongs to the family Fabaceae and subfamily Faboidae. It is the cheapest of pulses and is hence the poor man's pulse. It is a day neutral and short day plant, matures in 120–180 days after planting. The protein content of 18- 28 per cent puts the crop in equivalence to the other pulse crops grown in tropics. The grains are consumed like other pulses for protein requirement. It is also a cheap valuable source of calcium, iron and vitamins [7]. The crop is generally not invaded by many pests leading to yield loss. Besides nutritional importance, it has been linked to reduced risk of various diseases due tompresence of non-nutritive bioactive substances. The genus *Colletotrichum* includes more than 900 species responsible for anthracnose disease. In India more than hundred species have been reported [8]. Horse gram is infected by *C.truncatum*. Lenne and Sonoda [4] also reported that *C. truncatum* is a highly unspecialized pathogen which attacks many seed and forage legumes eg. soybean, cowpea, horse gram, mungbean, cowpea, limabean and fababean.

II. MATERIALS AND METHODS

To identify the suitable chemical(s) which could provide protection to the crop, eight fungicides *viz.*, four systemic; Bavistin 50-WP (carbendazim) @ 0.1%, Score (difenoconazole) @ 0.05%, Contaf (hexaconazole) @ 0.05%, Folicur (tebuconazole) @ 0.05%, and four protectant fungicides; Dithane-M-45 (mancozeb) @ 0.25%, Blitox 50-WP (copper oxychloride) @ 0.25%, Kavach 50 WP (chlorothallonil) @ 0.25% and Captan 50 WP (Captaf) @ 0.25%were tested for their efficacy under field conditions. The effectiveness of these fungicides as foliar sprays was conducted using horse gram cultivar HPK4 in RBD with plot size of 2 X 2 m^2. Spray of the fungicides was done three times after ten days of interval. Unsprayed check was kept for comparison. Three replications of each treatment were maintained.

A. Recording Of Data

Data on disease severity were recorded at 10 day intervals, starting with the appearance of disease. The disease was scored on 0-9 point scale described by Mayee and Dattar [1] as under:

Grade	Disease severity (%)	Reaction type
0	0	Highly resistant
1	<1	Resistant
3	1-10	Moderately resistant
5	10-25	Moderately susceptible
7	25-50	Susceptible
9	>50	Highly susceptible

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The disease was quantified by counting number of lesions per disease plant, on at least ten plants for each observation. Data were pooled at the end of the experiment to ascertain the effectiveness of each treatment against the disease. Per cent disease severity was determined by using McKinney's [2] following formula:

$$\text{Disease severity} = \frac{\text{Sum of all disease ratings}}{\text{Total number of disease ratings X Maximum disease grade}} \times 100$$

III. RESULTS

The results are presented in Table-1 and Figure-1. Among all the fungicides, Bavistin recorded minimum disease severity (23.7%) followed by Dithane M-45 (28.34%) and Contaf (33.33 %) whereas, Blitox and Folicur resulted 41.48 per cent and 42.04 per cent disease severity, respectively. Maximum disease severity was recorded in Score (48.15%) followed by Captan (44.3%) and Kavach (43.15%).

Maximum disease control (63.62%) was recorded in Bavistin followed by Dithane M-45 (56.47%), Contaf (49.85%), Blitox (36.22%), Folicur (35.27%), Kavach (33.48%) and Captan (31.16%) whereas Score was least effective (25.95%). Maximum increase in grain yield was also recorded in Bavistin (94.6%) and minimum in Score (16.2%). All the fungicides were effective in reducing anthracnose disease severity significantly, but spraying with Bavistin was found most effective.

Table -1 Evaluation of fungicides for the control of anthracnose ofhorse gram under field conditions
*Mean of three replications

Treatment (dose)	Disease severity (%)			Control (%)			Grain yield	
	1st year *	2nd year*	Mean	1st year	2nd year	Mean	q/ha	%Increase
Bavistin(0.1%)	22.22 (28.09)	25.18 (30.08)	23.7	63.41	63.83	63.62	7.2	94.6
Score (0.05%)	46.67 (43.07)	49.63 (44.77)	48.15	23.17	28.72	25.945	4.3	16.2
Contaf (0.05%)	31.85 (34.33)	33.33 (35.29)	32.59	47.56	52.13	49.845	6.3	70.3
Folicur (0.05%)	41.48 (40.40)	42.59 (40.72)	42.04	31.71	38.83	35.27	5.3	43.2
Dithane-M-45 (0.25%)	27.03 (31.30)	29.63 (32.94)	28.34	55.49	57.45	56.47	7	89.2
Blitox (0.25%)	40.00 (39.20)	42.96 (40.96)	41.48	34.14	38.3	36.22	5.8	56.8
Kavach (0.25%)	43.33 (41.14)	42.96 (40.89)	43.15	28.66	38.29	33.475	4.7	27
Captan (0.25%)	45.18 (42.22)	44.07 (41.58)	44.63	25.61	36.7	31.155	4.5	21.6
Control (0.25%)	60.74 (51.18)	69.63 (56.56)	65.19	-	-	-	3.7	-
CD (P=0.05)	3.56	4.44					0.24	

Figures in parentheses are arc sine transformed values

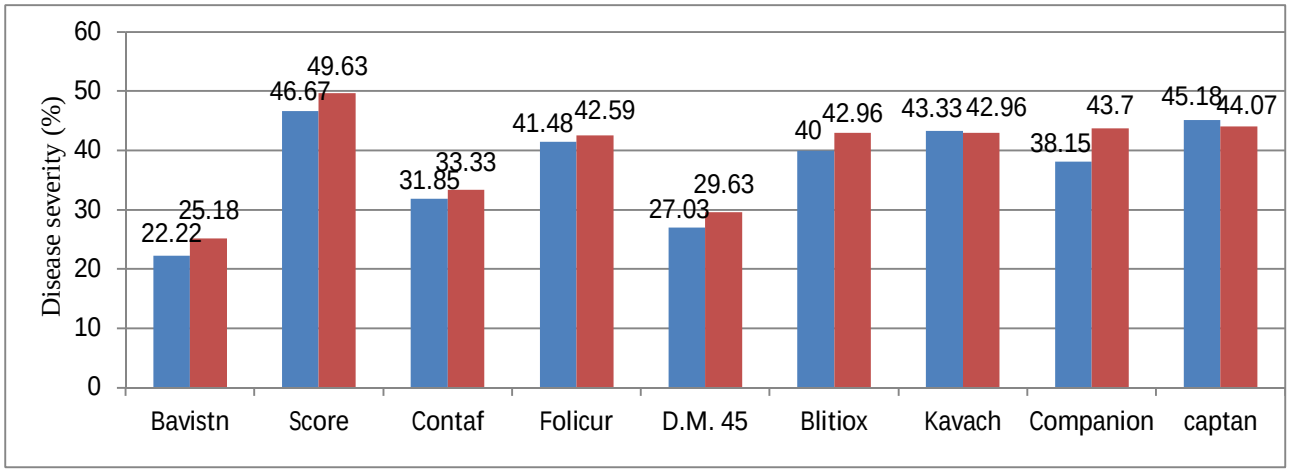

Fig. 1 Evaluation of fungicides for the control of anthracnose of horse gram under field conditions

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IV. DISCUSSION AND CONCLUSION

Results on the effectiveness of Bavistin and Dithane M-45 as foliar spray in the present study are in agreement with the findings of Malhotra and Chaturvedi [6], who tested the efficacy of five fungicides viz., Dithane-M-45 (0.2%), Cumin, Benlate (0.1%), Bordeaux mixture(0.1%) and Aureofungin (250ppm) against pod blight of soybean caused by *C. truncatum.* Dithane M-45 (0.25%) and Aureofungin 200 ppm were significantly superior to Cumin in reducing the disease under field conditions. Singh and Singh [5] found Bavistin as the best followed by Benlate and Tropsin M against *C. truncatum* in mungbean.

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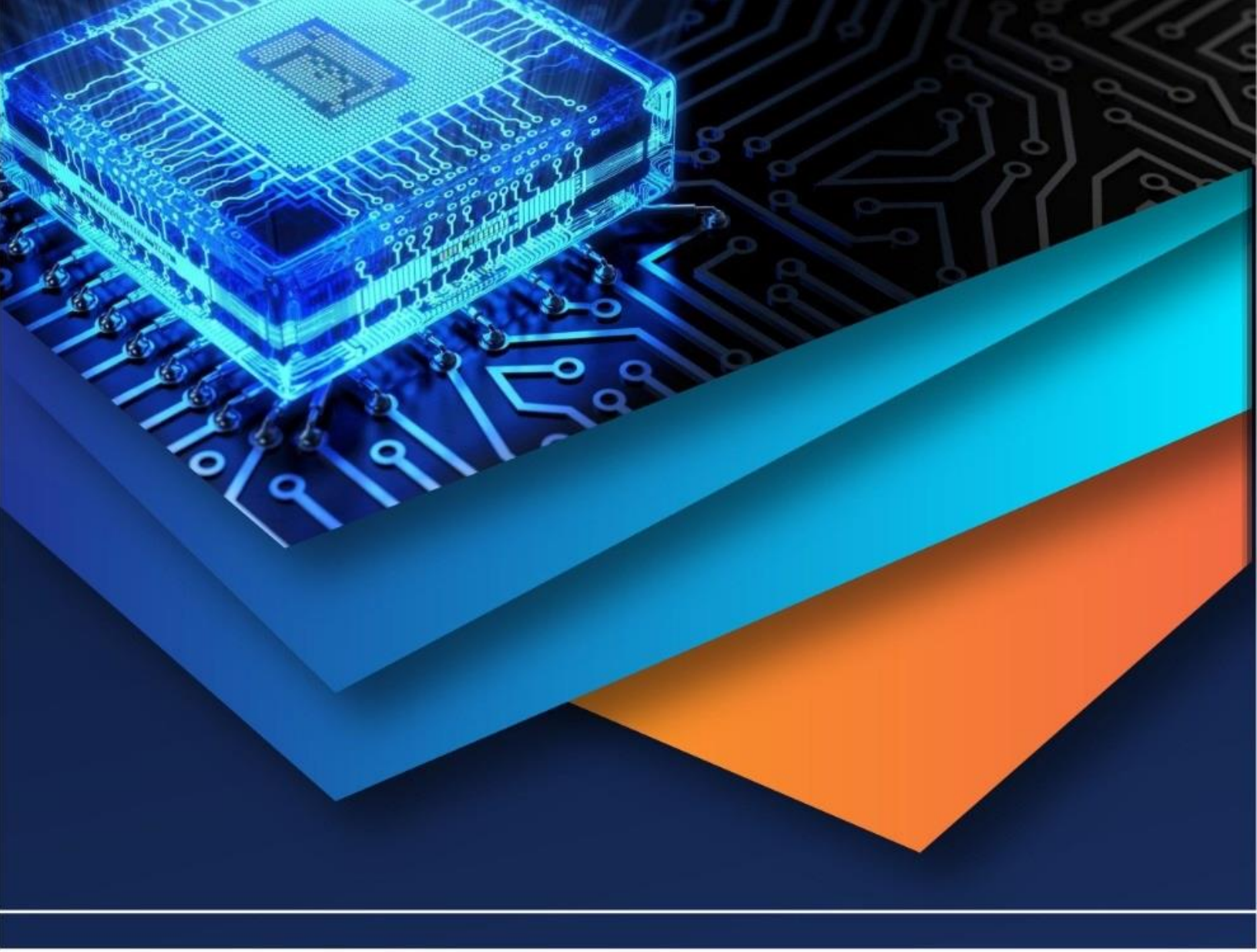

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