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Use of Fungicides for the Management of Alternaria Blight of Ashwagandha

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Abstract The management of Alternaria blight of Ashwagandha through fungicides. An experiment was conducted under laboratory and field condition during the year 2008-09 and 2009-10. *In vitro* maximum growth was inhibition occurred in Carbendazim and Chlorothalonil after eight days (0.0 mm) at 500ppm concentration. *In vivo* minimum PDI of 5.0 and 5.4 was observed in Vitavax Power and Mancozeb. Maximum yield was recorded in Vitavax Power (7.48 q/ha) and Mancozeb (6.77 q/ha) followed by Chlorothalonil (5.75 q/ha) out of seven fungicides.

Keywords Ashwagandha, *Alternaria alternata,* Management, Fungicides.

Introduction

Withania, Ashwagandha [*Withania somnifera* (L.) Dunal] is an important tropical medicinal plant of India that belongs to family Solanaceae.

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It is native of Mediterranean region in North Africa and found naturally in forests particularly in drier regions of India including Madhya Pradesh, Foot hills of Punjab, Himachal Pradesh, Western Uttar Pradesh and Himalayas.

Ashwagandha is cultivated in an area of about 4000 ha in India [1]. In Madhya Pradesh, it is cultivated in Neemuch, Chhindwara, Mandsaur, Seoni, Katni, Shahdol, Dewas, Dindori, Hoshangabad and Jabalpur districts with an average production of 15.46 q/ha [2]. The roots are used in preparing medicine against Liccup, gynecological disorders, cough, rheumatism and dropsy. A decrease in total content of reducing sugars (20%) and chlorophyll (26.5%) was observed in diseased leaves whereas an increase was noticed in proline (25%), free amino acids (3%) and proteins (74.3%).

The leaf blight of Ashwagandha caused by *A. alternata* revealed that a little information is available more particularly on disease prediction module in Madhya Pradesh leading to its management. Therefore, an attempt is being for its management through fungicides.

Materials and Methods

In vitro poisoned food technique was employed to test the efficacy of six recommended fungicides were tested against *A. alternata* by using three concentration (100, 250 and 500 ppm) of formulated products of Copper oxychloride 50 WP (Blue copper 50), Carboxin, Vitavax Power, Chlorothalonil, Carbendazim (Bavistin 50 WP BASF) and Mancozeb 75 WP (Manzate). Ob-

servation on mean radial growth of the pathogen was recorded on alternate days and percent inhibition over control was calculated as follows.

In vivo an experiment was conducted under field condition following randomized block design with three replications having plot size 6 × 3 m^2 during the year 2008-09 and 2009-10. Seven fungicides along with recommended dose were tested against leaf blight. The solution / suspension of each fungicide was prepared and sprayed on 90 days old Ashwagandha plants. The sprayer was washed and cleaned thoroughly with water to remove the traces of chemical first used. The plot sprayed with sterilized water served as control. The data was recorded at an interval of 15 days upto initiation of disease and was subjected to statistical analysis.

Results and Discussion

In vitro efficacy of fungicides against *Alter\tnaria alternata* evaluated under *in vitro* condition presented in (Table 1) indicated that all the fungicides significantly decreased the mycelial growth as compared to the control. Higher concentration (500 ppm) of each fungicide was more effective in inhibition of the growth as compared to lower concentration (100 ppm). Rate of growth among treatment ranged from 0.7 to 8.9 mm/day as compared to growth on control which ranged from 5.1 to 9.4 mm/day. Maximum growth inhibition occurred in Carbendazim and Chlorothalonil after eight days (0.0 mm) at 500 ppm concentration followed by Copper oxychloride (22.2 mm) at 500 ppm concentration and minimum was recorded in Carbendazim (79.9 mm) at 100 ppm concentration.

Table 1 indicates that as the days of incubation increased the mycelial growth was also increased. However, the percent inhibition zone over control varied from 12.2% to 100%. Hundred percent inhibition zones was observed in Carbendazim and Chlorothalonil followed by 75.1% in Copper oxychloride at 500 ppm concentration and minimum percent zone inhibition 10.4% in Carbendazim at 100 ppm concentration.

It is evident from the data that there was a significant increase in mycelial growth of *A. alternata* with increase incubation period. Rate of growth among treatment ranged from 2.4 to 8.1 mm/day as compared to growth on control which ranged from 5.1 to 9.4 mm/day.

The interaction between fungicides and incubation period showed significantly minimum mycelial growth of *A. alternata* in Copper oxychloride (25.2

Table 1. Radial growth of *Alternaria alternata* on PDA medium amncded with five fungicides at three concentrations.

Fungicides	Conc. (ppm)	Mycelial growth (mm) after days 2	4	6	8	Percentage inhibition over control
T_1Copperoxychloride	100	11.2 (3.4)	19.3 (4.4)	24.2 (4.9)	29.3 (5.4)	67.1
	250	8.2 (2.9)	16.1 (4.0)	21.3 (4.6)	24.2 (4.9)	72.8
	500	6.8 (2.7)	14.2 (3.8)	19.6 (4.4)	22.2 (4.7)	75.1
T_2 Vitavex Power	100	21.8 (4.7)	36.4 (6.0)	50.1 (7.1)	68.6 (8.3)	23.0
	250	18.4 (4.3)	34.3 (5.8)	48.0 (6.9)	66.4 (8.1)	25.5
	500	15.7 (4.0)	30.6 (5.5)	42.3 (6.5)	63.4 (7.9)	28.9
T_3 Chlorothalonil	100	13.1 (3.6)	25.2 (5.0)	32.2 (5.7)	43.2 (6.61)	51.5
	250	9.1 (3.1)	17.8 (4.2)	24.8 (5.0)	35.1 (5.9)	60.6
	500	0.0 (0.7)	0.0 (0.7)	0.0 (0.7)	0.0 (0.7)	100.0
T_4 Carbendazim	100	24.6 (5.0)	45.6 (6.7)	58.9 (7.7)	79.9 (8.9)	10.4
	250	22.7 (4.8)	43.6 (6.6)	57.1 (7.5)	78.3 (8.8)	12.2
	500	0.0 (0.7)	0.0 (0.7)	0.0 (0.7	0.0 (0.7)	100.0
T_5 Mancozeb	100	22.7 (4.8)	40.8 (6.4)	49.9 (7.1)	67.3 (8.2)	24.5
	250	20.9 (4.6)	38.2 (6.2)	47.3 (6.9)	64.7 (8.0)	27.4
	500	18.1 (4.3)	35.8 (6.0)	45.3 (6.7)	62.7 (7.9)	29.7
T_6 Control	100	26.4 (5.1)	47.6 (6.9)	66.2 (8.1)	89.2 (9.4)	
		SEm	CD			
T		0.247	0.691			
C		0.175	0.489			
D		0.202	0.564			
T×C×D		0.857	2.396			

mm) followed by Chlorothalonil (26.1 mm) after eight days of incubation and maximum mycelial growth of *A. alternata* was found in Vitavax Power (66.1 mm).

Minimum mycelial growth of *A. alternata* was found in Carbendazim and Chlorothalonil (0.0 mm) which was significantly superior as compared to other treatments followed by Copper oxychloride (3.9 mm) at 500 ppm concentration. Maximum mycelial growth of *A. alternata* was found in the Carbendazim (52.2 mm) at 100 ppm concentration. Foliar application of fungicide on incidence of Alternaria blight of Ashwagandha presented rate of growth among concentrations range from 2.9 to 7.8 mm/day.

Mesta KR [3] reported that Ziram was most effective followed by Mancozeb and Copper oxychloride. He also reported that Mancozeb was highly effective in inhibiting the mycelial growth of *A. alternata.* Kathal [4] observed that Chlorothalonil was most effective for controlling of mycelial growth of *A. alternata.* The present finding is in close accordance with these finding however slight variation may be due to the difference in isolates and commercial product/concentration used.

In field condition data indicated that during 2008-09 and 2009-10 the percent disease incidence was 30.4 and 32.6% respectively which was near to at par at all treatments. The mean PDI of all the treatments (fungicides) had significantly reduced as compared to control. The maximum PDI among treatment of 13.0 and 10.5 percent was recorded in Thiram and Carboxin respectively. Minimum PDI of 5.0 and 5.4 was observed in Vitavax Power and Mancozeb. Similarly all the treatments significantly increased the yield as compared to control. Maximum increase in yield (kg/ha) was recorded in Vitavax Power (7.48 q/ha) and Mancozeb (6.77 q/ha) followed by Chlorothalonil (5.75 q/ha) and least yield and % disease over control by Thiram followed by Carboxin out of seven fungicides.

Vitavax Power is found effective in checking Alternaria blight of Ashwagandha. Although, spray of Mancozeb was found most effective [3]. However, the spray of Carbendazim gave satisfactory control of Ashwagandha leaf blight [3]. The result is ian contradiction with [4]. This might be due to the reason that Vitavax Power is a new molecule and has not been tested before.

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