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ECO-FRIENDLY MANAGEMENT OF CERCOSPORA LEAF SPOT (*CERCOSPORA RAUVOLFIA*) OF SARPGANDHA

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Abstract

The crop is damage by a number of fungal diseases, which causes heavy losses. An experiment was disegned to evaluate the efficacy of few chemical fungicides and biofungicides against cercospora leaf spot disease of sarpgandha. Minimum disease incidence 13.56 per cent was recorded in Carbendazim @ 0.1 per cent followed by Mancozeb @ 0.25 per cent, tulsi leaf extract @ 5 per ecnt, neem leaf extract @ 5 per cent and garlic bulb extract @ 5 per cent. Maximum reduction 79.48 per ecnt in disease incidence and Maximum yield 21.57 q/ha were recorded in carbendazim treated plots, while biofungicides (neem leaf extract, tulsi leaf extract and garlic bulb extract) were significantly reduced disease incicidence as well as increase the yield.

Key words : Cercospora leaf spot, chemical fungicides, biofungicides.

Introduction

Sarpagandha (*Rauvolfia serpentina*) belongs to family *Apocynaceae* is an evergreen, perennial shrub, erect of the height upto 0.6-1 meter and has cylindrical stems. Leaves of *Rauvolfia serpentine* are simple and opposite, more commonly arranged in whorls of 3 to 5 and bright green in colour, flowers are in irregular corymbose inflorescences with white and pink colour. The average yield of *Rauvolfia* dry root is approximately 2-3 ton under average management when harvested at 30 months and seedlings are raised through seeds. Plants raised from stem cutting yield about 1-2 tones/ha and the plants from root cutting gives productivity of 3-4 tones/ha (Groenewald *et al*., 2006). Its root contains many important alkaloids, like ajmalicine, ajmaline, isoajmaline, rauvolfinine, reserpine, serpentine, rescinnamine, tetraphylicine, yohimbine and 3 epi-yohimbine (Snimolia *et al*., 1984). Sarpagandha crop suffer from a numberof leaf spot diseases caused by many fungal pathogens such as *Cercospora rauvolfiae*, *Alternaria tenuis*, *Alternaria alternate*, *Macrophomina phaseolina*, *Mycosphaerella rauvolfiae*, *Phoma jolyana*, *Croynespora cassicola* and *Cladosporium oxysporium* (Alam *et al*., 2007). The inflorescence disease caused by *Colletotrichum dematium* cause heavy loss in seed production (Ghosh and Chakraborty, 2012). Top dying disease caused by *Lasiodiplodiatheo bromae* f. sp. *rauvolfai* the fungus infects plant through the roots and invades the water conducting tissues of the plant. These diseases cause much vegetative loss to the important medicinal crop. Among them *Cercospora* leaf spot disease causes much vegetative loss to the crop, chemical and botanical bio fungicides are gaining status and recognization as a possible method for practical control of disease of crop plant. Keeping this view, the present study was undertaken to evaluate the chemical and botanical biofungicides with Cercospora fungal disease under field conditions.

Materials and Methods

The experiment was conducted at Horticultural and Medicinal Farm, N.D. University of Agriculture and Technology, Kumarganj, Faizabad during 2014 and 2015 in Randomized Block Design replicated three times consisting 6 treatments *viz* T_1- carbedazim @ 0.1 per cent, T_2- mancozeb @ 0.25 per cent, T_3- neem leaf extract @ 5 per cent, T_4- tulsi leaf extract @ 5 per cent, T_5- garlic bulb extract @ 5 per cent and T_6- Control (Untreated). The sarpgandha cultivar Rauvulfia Serpentina-1 are susceptible to Cercospora leaf spot.

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Table 1 : Effect of chemical and botanical biofungicides on Cercospora leaf spot (*Cercospora rauvolfiae*) disease of Sarpagandha during 2014-15.

S. no.	Treatments	Conc. (%)	Percent disease index	Percent disease control	Yield (q/ha)
1	T_1- Carbendazim	0.1	13.56 (21.59)	79.48(63.08)	21.57
2	T_2- Mancozeb	0.25	16.82 (24.20)	74.39(59.61)	19.76
3	T_3- Neem (leaf extract)	5.0	23.71 (29.13)	63.92(53.08)	17.06
4	T_4- Tulsi (leaf extract)	5.0	22.04 (28.08)	66.45(54.60)	18.15
5	T_5- Garlic (bulb extract)	5.0	25.50 (30.32)	61.28(51.52)	15.25
6	T_6- Contro (Water)	—	65.72 (54.16)	0.00(0.284)	10.95
	S.Em.±		0.419	0.548	0.55
	C.D. (P=0.05)		1.232	1.614	4.01
	C.V. (%)		2.16	1.897	3.8

Experimental Field was ploughed once with disc harrow and thrice with cultivator followed by planking for making a fine tilth. Recommended doses of nitrogen, phosphorus and potash were broadcast and mixed thoroughly in soil by light harrowing before sowing. The seedlings were raised in the nursery and transplanted at four leaf stage. The experimental field having plot size 3 × 4 m^2. The standard agronomical practices were performed.

Preparation of bio-fungicides

The leaf and bulb extracts of neem, tulsi and garlic were prepared by cold water extraction method described by Shekhawat and Prasad (1971a). The samples were washed separately in tap water and finally three changes in distilled water. They were crushed in a pestle and mortar by adding distilled water @ 2 ml/g fresh weight. The extracts were clarified by passing through two layers of cheese cloth and finally through Whatmann No. 1 filter paper. The filtered extracts were quoted in the study as 100% extract.

Preparation of botanical concentration

The appropriate volume of plant extract was mixed in sterilized distilled water to make the desired concentration (v/v) for experiments. For bioassay, double strength concentrations of botanicals were prepared by dissolving 10 ml of plant extract in 90 ml of sterilized distilled water, respectively to get the final concentrations of 5 per cent.

The number of infected plants was counted from the total number of plants in a plot. Per cent disease incidence and per cent diseases control were calculated by using the following formula:

$$\text{Disease incidence (\%)} = \frac{\text{No of infected plants per plot}}{\text{Total plant per plot}} \times 100$$

$$\text{Disesese control (\%)} = \frac{C - T}{C} \times 100$$

Where,

C = Per cent disease incidence in untreated plot

T = Per cent disease plot incidence in treated plot

$$\text{Local Severity Index} = \frac{\text{Total percent disease incide in all interies}}{\text{Total number of enteries}}$$

Sarpagandha root yield per plot was recorded by taking the weight of the entire produce harvested from the plot and the data were expressed in q/ha.

$$\text{Yield /ha} = \frac{\text{Yield per plot}}{\text{Area of the plot}} \times 10{,}000$$

Results and Discussion

The efficacy of chemicals and botanical biofungicides aginst Cercospora leaf spot disease of sarpgandha exhibited reductionin the disease incidence and increase significantly yield. Minimum disease incidence 13.56 per cent was recorded in T_1 (Carbendazim @ 0.1%) followed by 16.82, 22.04, 23.71 and 25.50 per cent disease in T_2 (Mancozeb @ 0.25%), T_4 (Tulsi leaf extract @ 5%), T_3 (Neem leaf extract @ 5%) and T_5 (Garlic bulb extract @ 5%). On the other hand, control plot (T_6) showed sever infection with higher disease incidence (65.72%). Maximum reduction (79.48%) in disease incidence was found in T_1 followed by T_2 (74.39%), T_4 (66.45%), T_3 (63.92%) and T_5 (61.28%). Maximum yield (q/ha) was found in T_1 (21.57 q/ha) followed by T_2 (19.76 q/ha), T_4 (18.15 q/ha), T_3 (17.06 q/ha) and T_5 (15.25 q/ha) (table 1). This finding supported by Chaudhary *et al*. (2011) and Shukla *et al*. (2010) also reported that foliar sprays of carbendazim and mancozeb reduced the disease incidence and increase the yield in sarpgandha with blossom blight disease. These statement support our experimental finding. Furthere more, reoeated and

continous use of these plant product is not associated with any health hazards and environmental pollution. These plant product, however, have not yet received commercial attention.

It is clear from the forgoing discussion that sarpgandha crop may be protected against infection and spread of a Cercospora leaf spot by the multiple spray of neem, tulsi and garlic. However, leaf extracts of neem was most effective. It was not only prevented fungal infection but also enhanced the growth of plants; as we have observed better plant growth, increase in number of secondary branch's and yield per plant.

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