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EVALUATION OF DIFFERENT FUNGICIDES AND BIOPESTICIDES AGAINST STEM ROT OF RAJMASH (*Phaseolus vulgaris* L.)

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ABSTRACT : Stem rot caused by *Sclerotinia sclerotiorum* is an important disease of Rajmash (*Phaseolus vulgaris* L.) in Eastern U.P. The efficacy of seven fungicides and two bio-pesticides were tested *in-vitro* and *in-vivo.* Vitavax (0.10 %), Bavistin (0.10%) and Blitox-50 (0.20%) proved to be most effective in inhibiting the growth of the pathogen and controlling the disease in the field and increasing the yield also. Bio-pesticides, Neemark and Funginil are also proved effective, but slightly less effective than systemic fungicides. Neemark and Funginil being a safe eco-friendly and economical bioproduct, can be used in the control of the diseases.

Keywords : *Phaseolus vulgaris, stem rot, Sclerotinia sclerotiorum, evaluation, fungicides, bio-pesticides.*

Rajmash (*Phaseolus vulgaris* L.) is an important legume crop used as green pod vegetable. French bean is also known as Rajmash (Hindi) or haricot bean or kidney bean or snap bean. It is valued for its protein rich (23%) seeds. It is used as vegetable when pod are immature, delicate and tender, green shelled or as dry pulse, Seeds are also rich in calcium, phosphorus and iron. It is an important pulse crop. It suffers from a number of viral, bacterial, nemtodal and fungal diseases. Among the fungal diseases, *Sclerotinia sclerotiorum* (Lib.) de Bary causing stem rot of Rajmash has been observed to be more destructive causing losses at 20-40 per cent during the recent years under favourable environmental conditions. However, very meager information is available on this disease. Therefore, it was felt necessary to explore the possibility for the control of the disease through the use of fungicides and bio-pesticides.

MATERIALS AND METHODS

The efficacy of seven fungicides and two biopesticides to different groups (Table 1), were bioassayed against the pathogen under laboratory condition to find out there efficacy in inhibiting the growth of the pathogen in culture by the 'Food Position' technique (Schmitz, 5) using P.D.A. medium. Requisite quantity of each fungicides and biopesticides was incorporated in two per cent Potato dextrose agar medium thoroughly mixed by shaking, prior to pouring in Petri plates. The medium was allowed to solidify and then inoculated with 9 mm discs of inoculum from 10 days old culture of the pathogen. The inoculum was placed in the centre of each Petri plates. The fungal disc were reversed so that the pathogen could come in direct contact with the medium. Three replications were kept for each treatment. No fungicides and biopesticides were incorporated in control treatment. All the plates were kept at 20°C for 5 days. The radial growth of Sclerotinia sclerotiorum in three replications were recorded separately and their average were taken. The per cent inhibition over control was calculated by the following formula given by Bliss (2).

$$\text{Per cent inhibition over control} = \frac{C - T}{C} \times 100$$

Where, C = Growth of fungus in control

T = Growth of fungus in treatment.

For evaluating the efficacy of seven fungicides and two biopesticides (Table 2), as spray against the disease, the experiment was conducted in the field during the *Rabi* season 2011-12 and 2012-2013 at Students Research Farm Pilikothi, Jaunpur. A highly sick field with known history of stem rot of Rajmash was selected. The Rajmash (PDR- 14) was sown in plots (1x3 m) and the experiment was laid down in a randomized block design (R.B.D.) with three replications. The first spraying of fungicides and biopesticides was given as soon as the disease was noticed and subsequent two sprayings were followed at 10 days intervals. The controlled plots were sprayed with water only. The observations on disease intensity were recorded after 15 days of the last spraying and yield data were also recorded separately in each treatment after the harvested crop. The average yield was calculated in q/ha.

RESULTS AND DISCUSSION

The results presented in Table 1 indicate that all the fungicides and biopesticides were significantly

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Table 1: Effect of fungicides and biopesticides on the growth of *Sclerotinia sclerotiorum in - vitro*.

S.N.	Fungicides/biopesticides	Dose (%)	Av. diameter of colony (mm)	Per cent inhibition over control
1.	Vitavax	0.10	0.00	0.00
2.	Bavistin	0.10	0.00	0.00
3.	Blitox-50	0.20	4.18	95.35
4.	Jkstein	0.20	7.83	91.30
5.	Neemark	0.50	12.18	86.46
6.	Funginil	0.20	18.75	79.16
7.	Ridomil	0.20	22.18	75.35
8.	Indofil M-45	0.20	47.54	47.17
9.	Ziram	0.20	52.18	42.02
10.	Control	-	90.00	-
C.D. (P = 0.05)			5.40	

Note : Calculation was done from S.N. 3 to 10

superior over control in inhibiting the growth of the pathogen Vitavax and Bavistin were the most effective against the test pathogen as they completely inhibited the growth of pathogen, whereas, Ziram was the least effective fungicide. Blitox-50 and Jkstein were found to be the next best in of superiority in inhibiting the growth of the pathogen, which were statistically at par each others. On rest of the fungicides, the growth of the pathogen varied from 22.18 mm to 52.18 mm that showed their ineffectiveness against the growth of the pathogen. Among the bio-pesticides Neemark was most effective than the Funginil and inhibiting the growth of the pathogen 12.18 and 18.75 mm respectively. The finding of Singh *et al.* (6) and Adbou *et al.* (1) also confirmed the efficacy of Vitavax in checking the vegetative growth of *S. sclerotiorum* under laboratory condition. Palat *et al.* (3) observed the biocidal properties of the Neemak against the *S. sclerotiorum in- vitro* condition.

The results (Table 2) indicate that all the fungicides and biopesticides proved significantly effective in controlling the disease over check. Three sprayings of Vitavax (0.1%) and Bavistin (0.1%) at an interval of 15 days was found most effective in minimizing disease under field conditions and increasing the yield and proved statistically at par. Highest yield of 29.60 q/ha was obtained by Vitavax followed by Bavistin (28.60q/ha).

Table 2 : Efficacy of fungicides and biopesticides against stem rot of Rajmash in field condition.

S.N.	Fungicides / biopesticides	Dose (%)	Av. disease intensity (%)		Yield (q/ha)	
			2011-12	2012-13	2011-12	2012-13
1.	Vitavax	0.10	9.00(17.75)	8.00(16.42)	28.30	29.60
2.	Bavistin	0.10	10.30(18.71)	9.36(17.81)	27.00	28.60
3.	Blitox-50	0.20	11.33(19.63)	12.63(20.78)	27.60	26.33
4.	Jkstein	0.20	14.60(22.46)	14.30(22.22)	26.33	25.60
5.	Neemark	0.50	17.33(24.57)	17.63(24.78)	24.33	23.30
6.	Funginil	0.20	19.60(26.28)	18.63(25.54)	22.60	21.00
7.	Ridomil	0.20	21.60(27.69)	20.40(26.85)	20.60	19.90
8.	Indofil M-45	0.20	25.90(30.59)	23.33(28.86)	17.60	17.90
9.	Ziram	0.20	28.60(32.33)	26.30(30.79)	16.90	17.30
10.	Control	-	42.00(40.40)	43.00(40.98)	14.60	15.90
C.D.(P=0.05)			(1.62)	(1.56)	0.982	1.023

*****Figures in parenthesis are angular transformed values.*

The next best effective fungicide Blitox-50(0.20%), which showed 11.33 per cent disease and 27.60 q/ha in the year of 2011-12. However, Ziram (0.2%) proved to be the least effective fungicide. The bio-pesticides, Neemark proved numerically better than Ridomil, Indofil M-45 and Ziram and showing disease intensity of 17.33 per ent and 24.33 q/ha yield.

The performance of systemic fungicides was better in controlling the disease as comparison to non-systemic fungicides and it could be possible to control the disease through the spraying of fungicide on Rajmash. Peg (4) also concluded that of Sclerotinia stem rot of French beam caused by S. sclerotiorum was effectively controlled by spraying of Benomyl at full bloom stage. Singh *et al.*(6) observed that the spraying of Vitavax (0.1 %) or Fundazol (0.1 %) gave the best result against *S. sclerotiorum* (stem rot of Ajowan). Similarly, Singh *et al.*(7) suggested that *Sclerotinia* blight of brinjal could be managed by spraying of Vitavax, Bavistin and Blitox-50.

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