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Efficacy of Fungicides for the Management of Potato Black Scurf caused by *Rhizoctonia solani*

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ABSTRACT

Potato Black Scurf is serious disease worldwide, which is commonly found in most potato producing area this disease is favoured by the capacity of fungus to survive in soil as Sclerotia. Efficacy of Sevan fungicides against Black scurf of Potato caused by *Rhizoctonia solani* Kuhn was tested at 0.00, 0.5, 1.0, 2.0, 2.5, 3.0 % concentrations. The slices of 70 mm diameter and 5 mm thickness were dipped in the different concentration of fungicides for 10 min. These slices were inoculated with 5 mm disc of pathogen at center. The mycelial growth was observed and recorded for 15 days of incubation.The fungicide Carbendazium, Ridomil and Kavach shows complete inhubation of the pathogen at 2.0 % concentration then followed by sulpher, Captap; Blue copper gives intermediate inhibition at 2.5 % of pathogen, whereas Diethan M 45 at 3.0 % concentration noted least inhibition of pathogen. It's clear from this study that increase in concentration shows maximum inhibition of growth and decrease the incubation period. The fungicide efficacy against managements of Black scurf by the fungicides Carbendanzim, Ridomil and Kavach gives more effective control of black scurf as compared to other fungicides.

Key words: Fungicides, pathogen, carbendanzim, concentration, Black scurf.

INTRODUCTION

Potato *(Solanum tuberosum L)* is an herbaceous perennial plant which is grown for its edible tubers. Potato tubers are staple food source for temperate regions. Potato is infected by different fungal diseases which causes huge losses of the tuber. Among these diseases, tuber borne diseases are more responsible for loss in yield. The infection was found killing of young sprouts before emergence and also affects the tuber formation. It is responsible for heavy loss of potato tubers and marketability due to disease. (Pande, 2007). Potato is grown in tropical as well as in subtropical cool season in India. In Plain region about 86% of the the crop is grown during short day condition and 8% in the hills during summer, whereas in long day conditions around 6% in the Plateau during the rainy season. Black scurf is common disease of

potato tubers worldwide. The present study deals with black scurf of potato wide spread both in the hills and plain. It is infected at different stages of growth in potato. Black scurf infection to tuber shows skin chocolate, hard, small, dark brown to black resting bodies called sclerotia on the surface of mature tubers. The fungus also attacks young sprouts through epidemic and produce dark brown lesion, there by killing the sprout before emergence and elongated radish brown lesion developed on the stem. (Singh *et.al*, 2002).

MATERIAL METHODS

Isolation of Pathogen: Black scurf infected potato tubers were collected from at harvested tubers were surface sterilized with 1% sodium hypochlorite solution, dried and then used for isolation. The pathogen *Rhizoctonia solani* was identified on the basis of growth and characteristic features of mycelium as well as reproductive structure.Thease isolates were transferred from young growing hypale tips for three time on fresh potato dextrose agar medium(PDA) for purification and preserved on slant of PDA medium. The identification of the pathogen was made by referring the standard literature i.e. Barnett (1970), Alexopolous *et.al* (1996), Kamat, (1961) and Mukadam (1997).

Standard Potato dextrose agar (PDA): Composition
PAD = 39 gm/lit
DW = 1000 ml

The Present investigation for control of potato black scurf viz. caused by *Rhizoctonia solani* was evaluated by chemical (Fungicides) methods. Efficacy of Seven fungicides against Black scurf of Potato was tested at 0.00, 0.5, 1.0, 2.0, 2.5, 3.0 % concentrations. The slices of 70 mm diameter and 5 mm thickness were dipped in the different concentration of fungicides for 10 min. These slices were inoculated with 5 mm disc of pathogen at center. The mycelial growth was observed and recorded for 15 days of incubation. The observation shows significant inhibition of mycelia growth of *Rhizoctonia solani*. Seven fungicides viz. Kavach,Ridomil,Sulpher, Captap, Carbendanzim, Blue Copper, and Diethan M 45 were evaluated against *Rhizoctonia solani* at Six (6) Concentration percentage i.e. 0.5,1.0,1.5,2.0,2.5,3.0 and Control. The fungicide method was found to be effective against management of pathogen under In-vitro condition as per the method used by different workers Jalali I and Mehta N 1994, Kareppa, *et.al* 1999 and Wakle and Kareppa, 2000.

RESULTS & DISCUSSION

In the present study of seven fungicides i.e. Kavach, Ridomil, Captap, Sulpher, Carbendanzim, Blue copper and Diethane M 45, the mycelia growth was observed and recorded for 15 days of incubation.

Table 1: Efficacy of Fungicide against Potato Black Scurf.

Incubation Periods (Days)	Mycelial growth Percent inhibition																	
	Concentration Percentage (%)																	
	Carbendanzim			Blue copper				Diethane M 45					Carbendanzim					
	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5	0.5	1	1.5
1	12	25	38	12	25	38	12	25	38	12	25	38	12	25	38	12	25	38
2	27	36	45	27	36	45	27	36	45	27	36	45	27	36	45	27	36	45
3	36	50	57	36	50	57	36	50	57	36	50	57	36	50	57	36	50	57
4	47	59	65	47	59	65	47	59	65	47	59	65	47	59	65	47	59	65
5	59	68	73	59	68	73	59	68	73	59	68	73	59	68	73	59	68	73
6	65	73	77	65	73	77	65	73	77	65	73	77	65	73	77	65	73	77
7	70	77	80	70	77	80	70	77	80	70	77	80	70	77	80	70	77	80
8	74	79	82	74	79	82	74	79	82	74	79	82	74	79	82	74	79	82
9	76	81	84	76	81	84	76	81	84	76	81	84	76	81	84	76	81	84
10	78	83	85	78	83	85	78	83	85	78	83	85	78	83	85	78	83	85
11	80	84	87	80	84	87	80	84	87	80	84	87	80	84	87	80	84	87
12	82	86	88	82	86	88	82	86	88	82	86	88	82	86	88	82	86	88
13	84	88	89	84	88	89	84	88	89	84	88	89	84	88	89	84	88	89
14	85	89	90	85	89	90	85	89	90	85	89	90	85	89	90	85	89	90
15	85	89	90	85	89	90	85	89	90	85	89	90	85	89	90	85	89	90
Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE ±	5.8	5	4.2	5.8	5	4.2	5.8	5	4.2	5.8	5	4.2	5.8	5	4.2	5.8	5	4.2
CDat 0.01	15	13	11	15	13	11	15	13	11	15	13	11	15	13	11	15	13	11
Incubation	Mycelial growth Percent inhibition																	

Periods (Days)	Concentration Percentage (%)																	
	Kavach				Ridomil				Sulphur					Captap				
	0.5	1	1.5	2	0.5	1	1.5	2	0.5	1	1.5	2	2.5	0.5	1	1.5	2	2.5
1	12	25	25	38	25	25	38	38	12	25	25	38	38	13	25	25	38	38
2	27	36	36	55	36	36	45	55	27	36	36	45	55	27	36	36	45	55
3	36	43	43	64	43	43	50	64	21	43	50	57	64	36	43	50	50	64
4	41	47	53	71	47	47	53	71	24	47	59	65	71	41	47	59	53	71
5	50	55	64	77	55	55	64	77	32	55	68	73	77	45	55	59	64	77
6	54	58	69	81	58	62	69	81	35	58	73	77	81	50	58	65	69	81
7	57	63	73	83	60	67	73	83	33	63	77	80	83	53	60	70	73	83
8	59	68	76	85	62	71	76	85	35	68	79	82	85	56	62	74	76	85
9	59	70	78	86	62	73	78	86	38	70	81	84	86	57	62	76	78	86
10	63	73	80	88	66	76	80	88	41	73	83	85	88	59	63	78	80	88
11	67	76	82	89	69	78	82	89	47	76	84	87	89	60	66	80	82	89
12	71	78	84	90	73	80	84	90	53	78	86	88	90	63	71	82	84	90
13	73	80	86	91	75	82	86	91	57	80	88	89	91	64	73	84	86	91
14	75	82	87	91	77	84	87	92	61	82	89	90	92	66	75	85	87	92
15	75	82	87	92	77	84	87	92	61	82	89	90	92	66	75	85	87	92
Control	0	0	0	92	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE ±	4.6	4	5.2	4	4	4.7	4.1	4	3.7	4	6.7	4.2	3.9	3.9	3.7	4.6	4.1	3.9
CDat 0.01	12	12	14	10	10	12	11	10	9.6	12	17	11	10	10	9.6	12	11	10

The fungicide Carbendanzim, Ridomil and Kavach shows complete inhibition of the pathogen at 2.0 % concentration in 15 days of incubation period i.e. 91.80 % then followed by Sulpher, Captap and Blue copper gives 91.80 % inhibition at 2.5 % concentration in 15 days of incubation period. The fungicide Dithane M 45 at 3.0 % concentration shows 91.80% inhibition in 15 days of incubation. It's clear from this study that increase in concentration shows maximum inhibition of growth and decrease the incubation period. These observation are in agreement with finding of other investigators i.e Jalali and Mehta ,(1994), Kareppa,(1999) and Wakle et al,(2007). The fungicide sensitivity against control of black scurf by the fungicides Carbendanzim, Ridomil and Kavach gives more effective control of black scurf as compared to other fungicides.

Kareppa,(1999) also carried out investigation on *Fusarium coerulum* causing dry rot of potato control by using different fungicides. They were also used Carbendanzim and Thiram by dipping the potato slices in fungicides solution of 2000 µg / lit of fungicides found was more inhibition to the *Fusarium coerulum of potato.* Wakle, (2007) evaluated Carbendanzim fungicide to control of dry rot of potato caused by *Fusarium coerulum* (*Lib*) *socc* by slice method.They were used *carbendanzim* at different concentration i.e. 100 to 1000 µg / lit. They found that carbendanzim at concentration 1000µg / lit shows maximum inhibition of growth of *Fusarium coerulum*.

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