

# Effect of Different Concentration and Duration of Chemical Treatment on the Germination and Growth of Sclerotia of *Rhizoctonia Solani* Kuhn

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**Abstract:-** Specified concentrations of different chemicals were tried as the sclerotial treatment for the duration of 10, 20 and 30 minutes separately. Treated sclerotia were planted on PDA medium in the Petridishes. Sclerotia treated in distilled water for different duration were kept as check. Colony diameter of fungal growth was measured in all treatments and the data very much clarify that treatment of sclerotia even at 10 minutes of the higher tested concentration proved completely inhibitory against the fungus in case of all tested chemical except Acetic acid + Zinc sulphate (1:1), Thiram and Indophill M-45.

**Keywords:-** sclerotial, PDA medium, Petridishes, Colony diameter.

## I. INTRODUCTION

Potato (*Solanum tuberosum* L.) is the 4<sup>th</sup> important food crop after rice, wheat and maize. It is aptly called the second bread of the world and poor man's friend. It is used as staple food-cum-supplementary diet in both developing and developed countries. India is a major potato cultivator. The staning crop in the field is attacked by a number of diseases. Out of which *Rhizoctonia Solani* Kuhn contributes a major role. Farmer gets only a portion of the estimated yield. They face losses not only in the yield but also in the tuber quality and cost in raising the lost crop. *Rhizoctonia solani* (*Thanatephorus cucumeris*) is a fungus that is wreaking havoc on numerous crops. The black scurf disease, which causes both quantitative and qualitative harm to potato

crops, is inflicting economic losses in potato production locations all over the world. The fungus restricts development by developing cankers on sprouts, subterranean stems, and stolons, as well as making tubers unsightly by growing black scurf (sclerotia) on their surfaces. *Rhizoctonia solani*, which causes black scurf, is a complex species with at least 13 genetically anastomosis groups (AGs). The information on the effect of different concentration and duration of chemical treatment on the germination and growth of sclerotia of *Rhizoctonia Solani* Kuhn is limited. In present paper, important epidemiological aspects, in relation to the black scurf disease, have been discussed.

## II. EXPERIMENTAL MATERIALS AND METHODS

A field experiment was conducted at OPJS, Churu, (Rajasthan), during winter (rabi) season of 2019-20 to find out the effective management of black scurf disease of potato.

The experimental plot was upland and fairly uniform in topography. The experiment was laid out under randomized block design with 8 treatments. The gross and net plot size were 4.8×4m and 3.6×3.6m, respectively. Tubers were planted at the spacing of 60×20 cm. Sclerotia of almost similar shape and size were collected or all treatments as noted below by immersing it for the duration of 10, 20 and 30 minutes into different concentration of the individual treatment solution.

Treatment No.	Particulars	Concentration
T1	Acetic acid + ZnSo <sub>4</sub> (1:1)	0.05 and 0.1%
T2	Agallol	0.5 and 1.0%
T3	Emissan	0.25 and 0.5%
T4	Thiram	0.1 and 0.2%
T5	Indophill M-450.1 and 0.2	0.1 and 0.2%
T6	Bavistin	0.25 and 0.05%
T7	Companion	0.1 and 0.2
T8	Distilled water (check)	

Table 1

Treated sclerotia were planted on the PDA medium in the petriplate and were put in the incubator at 25 ±10°C. Growth of the mycelium in each treatment were measured and the treatment showing no or negligible growth indicated as the desirable treatment for the management of the disease. Although eight treatment studied under RBD with 3 replications.

### III. RESULTS AND DISCUSSION

Potato (*Solanum tuberosum* L.) black scurf disease, caused by *Rhizoctonia solani*, is a severe concern all over the world. Because this disease is difficult to manage due to its soil-borne origin, numerous means of control were investigated, including chemical control by specified concentration of different chemicals were tried as the sclerotial treatment for the duration of 10, 20 and 30 minutes separately. Treated sclerotia were planted on PDA medium in the Petridishes. Sclerotia treated in distilled water for different duration were kept as check. Colony diameter of

fungal growth was measured in all treatments and the data are presented in given below table. It is clear from the data that all the tested chemicals were effective against the fungal growth even at lower tested concentration.

The data very much clarify that treatment of sclerotia even at 10 minutes of the higher tested concentration proved completely inhibitory against the fungus in case of all tested chemical except Acetic acid + Zinc (1:1) sulphate, Thiram and Indophill M-45. However, if these chemicals were treated at higher concentration for 20 minutes then all tested chemicals except Thiram proved completely inhibitory against the sclerotial germination and growth.

It may be observed from the response of different tested chemical that Companion may be the best test chemical against the test fungus followed by Emissan, Agallol and Bavistin. Treatment kept as check showed almost complete coverage of Petriplate.

Particulars	Concentration	Response of treatment duration on colony diameter in (mm)		
		10 minutes	20 minutes	30 minutes
Acetic acid + ZnSo4(1:1)	0.50%	15	5	3
	1.0%	2	-	-
Agallol	0.5 %	4	-	-
	1.0%	-	-	-
Emissan	0.25 %	6	2	-
	0.5%	-	-	-
Thiram	0.1 %	2.0	12	18
	0.2%	7	2	-
Indophill M-45.1 and 0.2	0.1 %	18	9	4
	0.2%	2	-	-
Bavistin	0.25	16	5	2
	0.05%	-	-	-
Companion	0.1 %	8	2	-
	and 0.2%	-	-	-
Distilled water (check)		86	88	88

Table 2

The results obtained in the present study are more encouraging with respect to the management of the economically important disease. A relationship between different concentration of fungicides and different duration of treatment on the germination and growth of sclerotia which indicated that different concentration adversely affect the sclerotial growth. Similarly, duration of treatment under same concentration for longer period proved better against the fungal growth. Treated sclerotia and seed material showed the best inhibitory response against the test fungus. Seed material treated with Acetic acid + Zinc sulphate or Companion took minimum time for seedling emergence. These were followed by Bavistin, Agallol, Emissan and Indophill M-45. However tuber yield had been observed as the highest when tuber was treated with companion followed by Emissan, Agallol, Bavistin even for 10 minutes at tested concentration except in the case of Acetic acid + Zinc sulphate, Thiram, Indophill, M-45. However, if these chemicals were tested at higher concentration for 20

minutes, then all tested chemical except Thiram proved completely inhibitory against sclerotia of *R. solani*.

Seed treatment with Companion showed the minimum incidence (2%) and intensity (1.0) of scurfed tuber at the time of harvest followed by Emissan, Agallol and Bavistin. However Thiram proved least effective showing incidence and intensity 10 percent and 1.5 respectively.

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