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Research Article

EVALUATION OF DIFFERENT CONTROL PRACTICES ON DAMPING OFF DISEASE OF TOMATO (*LYCOPERSICON ESCULENTUM* MILL.) VAR. NOVADAY

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Abstract- The present investigation was conducted at research plot of the Department of Plant Protection, am Higginbottom University of Agriculture, Technology and Sciences, Naini, Prayagraj, 211007, Uttar Pradesh, India. The observations recorded at successive stages of plant growth were statistically analyzed for interpretation of results. The effect of seed rates on incidence of damping-off was studied at three seed rates and found that the incidence of damping-off increased progressively with increase in the seed rates but dry neem leaves checked the decrease in disease incidence. The effect of different treatments on incidence of damping-off of seedlings was studied. Of these, soil application of Dry Neem Leaves showed better results in managing damping-off both in field.

Keywords- *Seed rates, Damping off, Population density, Field conditions*

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Introduction

Tomato is one of the most important vegetable crops in all over the world, because of its high nutritive value, an excellent source of vitamin a and its plays a significant role in maintaining the human health being a rich source of Lycopin. The tomato has been used in the treatment of cancer [1]; it is economically attractive and the area under production is increasing daily. The production of tomato is the tomato production is the damage by pathogens, including viruses, bacteria, nematodes and fungi, which result in severe losses in production [2]. Tomato plants are subjected to attack by several soil-borne fungal pathogens of *Fusarium, Rhizoctonia, Pythium* and *Phytophthora*, causing serious diseases such as root rot and wilt [3,4]. *Fusarium oxysporum* is regarded as a widespread soil borne plant pathogen, causing a vascular wilting and crown and root rot [5].

Plant-derived natural substances are non-phytotoxic compounds and potentially effective against plant pathogenic fungi. These plant products have an ability to inhibit soil borne pathogens that are environmentally potential safe alternatives and as components in integrated pest management programs [6]. Conventional chemical methods of disease management are expensive and unsuitable for the environment, also are not entirely efficient and may lead to the appearance of new resistant strains of phytopathogens [7], therefore we evaluated numbers of different seed rates & control practices for the management of damping off disease of tomato (*Lycopersicon esculentum* Mill.) var. Novaday"

Materials and Methods

The present investigation was conducted at research plot of the Department of Plant Protection, am Higginbottom University of Agriculture, Technology and Sciences, Naini, Prayagraj, 211007, Uttar Pradesh, India During kharif season of 2001-2002 to evaluate the effectiveness of various seed rate and control practices against damping off disease of tomato .Three seed rate S1(500 g/ha)S2(400g/ha) & S3(300g/ha) and Seven treatments including control were tried in the experiment, 3 x 7 Factorial Randomized Block Design (R. B. D.) was adopted and the analysis of variance (ANOVA) technique was applied. For drawing conclusion from the data, the calculated values were compared to the tabulated values at 5% level of significance. The research plots size 1mx1m tomato var. Navoday was planted during 27.06.2001and 25.06.2002. Three seed rate and seven treatments including control were tested as fallow.

Seed rate

S_1- 500 g/ha
S_2- 400 g/ha
S_3- 300 g/ha

Treatments

T_0 - Control
T_1 - Thiram @ 250 g a.i. g/q seed treatments.
T_2 - Bavistin (a.i. 50%) @ 1 k a.i./ha at the time of sowing0
T_3 - Dithane Z-78- @ 0.25% a.i. at 15 and 25 DAS foliar application .
T_4 - Dry neem leaves @ 600g/m^2
T_5 - *Beauveria bassiana* @4.0g/m^2
T_6 - Soil solarization used white polythene of thickness 50 um size (1.5m x1.5m)

Treatment combinations

S_1T_0	S_2T_0	S_3T_0
S_1T_1	S_2T_1	S_3T_1
S_1T_2	S_2T_2	S_3T_2
S_1T_3	S_2T_3	S_3T_3
S_1T_4	S_2T_4	S_3T_4
S_1T_5	S_2T_5	S_3T_5
S_1T_6	S_2T_6	S_3T_6

The treatments thiram used for seed treatment, Dithane Z-78 for foliar application at 15 and 25 days after sowing, carbendazim, *Beauveria bassiana* and dry neem leaves for soil treatment.

Table-1 *Disease incidence of damping-off at 15 DAS in field conditions*

Treatment		2001 Seed Rate			2002 Seed Rate		
		S_1 (500 g/ha)	S_2 (400 g/ha)	S_3 (300 g/ha)	S_1 (500 g/ha)	S_2 (400 g/ha)	S_3 (300 g/ha)
T_0	Control	4.24	3.51	2.92	3.7	2.63	3.01
T_1	Thiram	2	1.46	1.8	1.33	1.35	1.07
T_2	Bavistin	1.85	2.28	2.69	1.76	2.77	1.58
T_3	Dithane Z-78	2.84	2.93	2.52	2.97	2.56	3.21
T_4	Dry Neem Leaves	0	0.37	0	1.39	0.4	1.04
T_5	*Beauveria bassiana*	3.16	2.81	2.48	3.14	3.47	2.4
T_6	Soil Solarization	2.56	2.47	2.23	1.46	1.77	1.37
at 5% level = 1.93					C. D. at 5% level = 1.77		
(B) Individual Effect							
	S_1	2.38	T_0	3.55	S_1 2.11	T_0	3.11
	S_2	2.26	T_1	1.75	S_2 1.94	T_1	1.25
	S_3	2.09	T_2	2.27	S_3 1.86	T_2	2.04
			T_3	2.76		T_3	2.91
			T_4	0.12		T_4	0.94
			T_5	2.82		T_5	3
			T_6	2.42		T_6	1.53
C. D. at 5% Level		S = 0.73	T = 1.11		S = 0.67	T = 1.02	
C. D. at 5% Level		(2001- 2002)	0.9				

Table-2 *Disease incidence of damping-off at 20 DAS in field conditions*

Treatment		2001 Seed Rate			2002 Seed Rate		
		S_1 (500 g/ha)	S_2 (400 g/ha)	S_3 (300 g/ha)	S_1 (500 g/ha)	S_2 (400 g/ha)	S_3 (300 g/ha)
T_0	Control	4.85	5.67	5.34	5.27	5.61	5.16
T_1	Thiram	1.11	1.12	1.04	1.79	1.32	1.1
T_2	Bavistin	1.12	1.74	0.96	1.82	2.28	1.63
T_3	Dithane Z-78	4.3	3.8	4.16	4.34	4.18	4.41
T_4	Dry Neem Leaves	0.75	0	0.78	1.41	0.8	1.03
T_5	*Beauveria bassiana*	4.53	4.06	3.45	3.91	3.9	4.39
T_6	Soil Solarization	3.71	3.82	3.31	3.5	3.42	2.84
at 5% level = 1.90					C. D. at 5% level = 1.80		
(B) Individual Effect							
	S_1	2.91	T_0	5.29	S_1 3.15	T_0	5.34
	S_2	2.89	T_1	1.09	S_2 3.07	T_1	1.4
	S_3	2.72	T_2	1.27	S_3 2.94	T_2	1.91
			T_3	4.08		T_3	4.31
			T_4	0.51		T_4	1.08
			T_5	4.01		T_5	4.07
			T_6	3.61		T_6	3.25
C. D. at 5% Level		S = 0.72	T = 1.10		S = 0.68	T = 1.04	
C. D. at 5% Level		(2001-2002)	0.58				

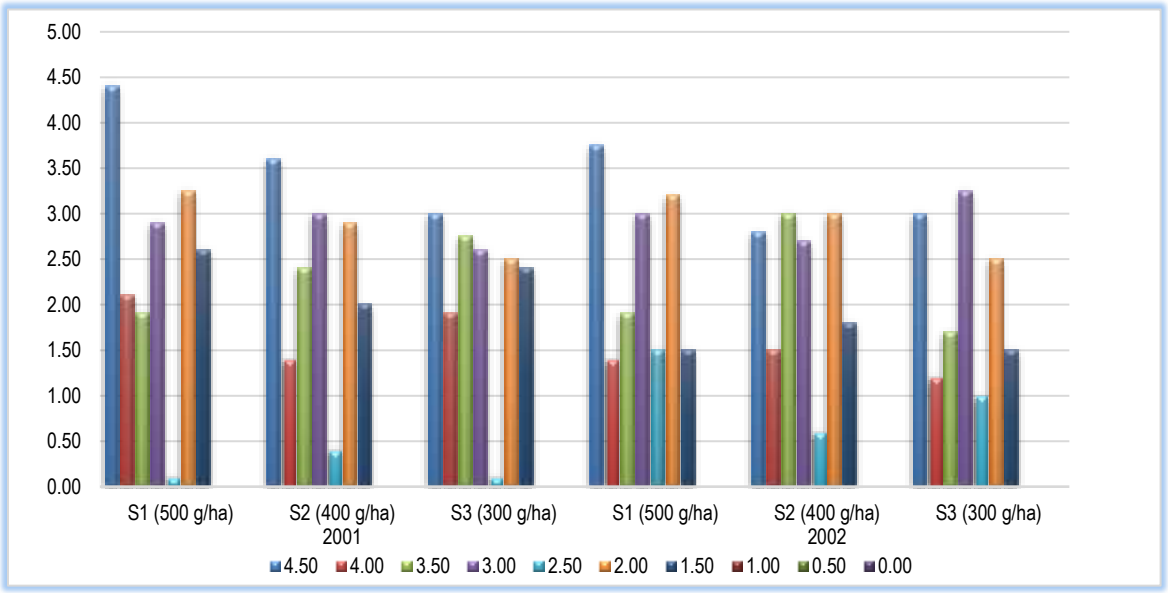

Fig-1 Disease incidence of damping-off at 20 DAS in field condition

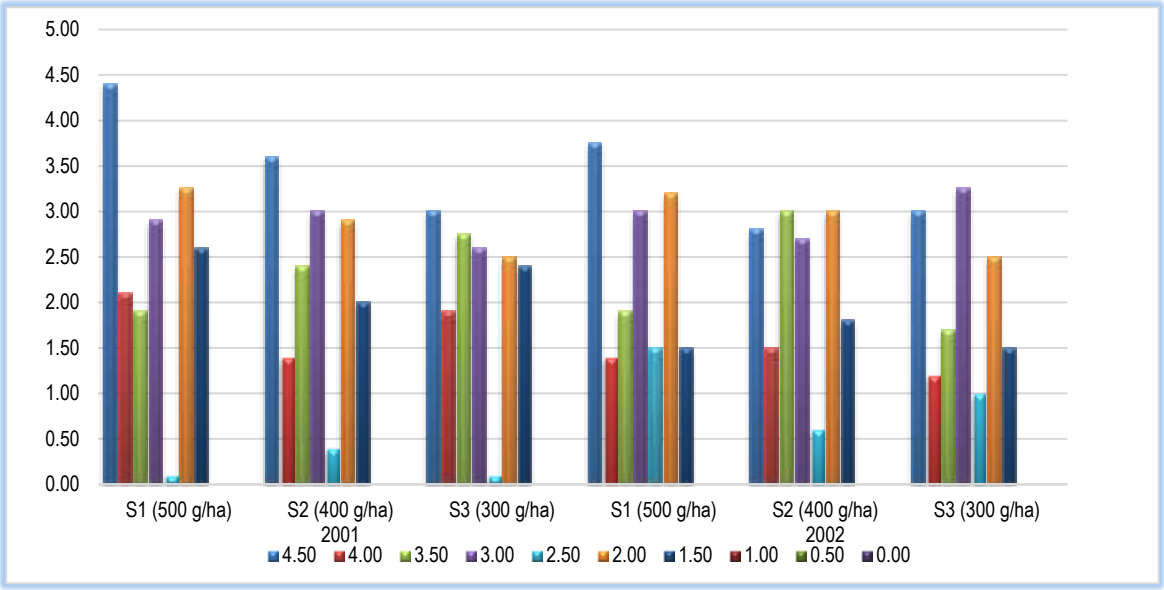

Fig-2 Disease incidence of damping-off at 20 DAS in field condition

Finally, the leaves were graded according to the percent leaf area affected by damping-off. The infection index was calculated by using the formula suggested by James, *et al*., (1971) [8].

Result and Discussion

Effect of different treatment on incidence of damping-off at three seed rates *viz*., S1 (500 g/ha), S2 (400 g/ha) and S3 (300 g/ha), were as recorded in [Table-1] and [Fig-1] shows that damping-off significantly differed amongst all the seed rates *viz*. S1 (500 g/ha), S2 (400 g/ha) and S3 (300 g/ha) from one another. Maximum damping-off was observed in S1 (2.38) followed by S2 (2.26) and S3 (2.09), respectively (2001). And Year 2002: Data recorded in [Table-1] and [Fig-1] shows that damping-off significantly differed amongst all the seed rates *viz*. S1 (500 g/ha), S2 (400 g/ha) and S3 (300 g/ha) from one another. Maximum damping-off was observed in S1 (2.11) followed by S (1.94) and S3 (1.86), respectively.

The effect of treatments recorded in [Table-2] and [Fig-2] shows that disease incidence of damping-off was significantly less in treatments *viz*., T4 (Dry Neem Leaves @ 600 g/m^2), T1 (Seed treatment with Thiram @ 250 g/q), T2 (Soil treatment by carbendazim @ 1 a.i.kg/ha) and T6 (Soil Solarization) compared to T0 (Control), which was not significantly different from T3 (Dithane Z-78) and T5 (*Beauveria bassiana* @ 4 g/m^2). Minimum incidence was recorded in T4. Treatments T1, T2, T6 and T0, T3, T5 were not significantly different among themselves in both the years during 2001 and 2002. Effect of interaction between seed rates and treatments year 2001. The general effect of seed rates of tomato was found to be significant in respect of disease incidence of damping-off. The treatments and the interaction in respect of incidence of damping-off were significant.

Disease incidence in treatments T4 (Dry Neem Leaves @ 600 g/m^2) and T2 (soil treatment by carbendazim @ 1 kg/ha) at seed rate of S1 (500 g/ha) were found significant when compared with other combination at seed rate of S1 (500 g/ha) whereas incidence of damping-off in treatment T4 (0.00) and T1 (2.00) only at seed rate of S1 (500 g/ha) were significant when compared with different combinations at seed rate of S2 (400 g/ha) and S3 (300 g/ha).In year2002 the general effect of seed rates of tomato was found to be significant in respect of disease incidence of damping-off. The treatments and the interaction in respect of incidence of damping-off were significant. Disease incidence in treatment T4 (Dry Neem Leaves @ 600 g/m^2) and T2 (soil treatment by carbendazim @ 1 kg/ha) at seed rate of S1 (500 g/ha) were found significant when compared with other combination at seed rate of S2 (400 g/ha) whereas incidence of damping-off in treatment T4 (0.40) and T1 (1.33) only at seed rate of S2 (400 g/ha) were found significant when compared with different combinations at seed rate of T1 (500 g/ha) and S3 (300 g/ha) [Table-1].

Then present findings corroborated with the result of the Singh and Singh, (1982) [9] recorded that neem cakes when applied in soil reduced the wilt of pigeon pea. This amendment was found to affect bacterial and fungal population in rhizosphere of wheat and also the behavior of pathogen. Singh and Singh, (1983) [10] reported the effect of green manure plant residues on the population of *Pythium aphanidermatum* in soil samples. When plated by using selective medium, reduced the population of *Pythium aphanidermatum* in the soil. Shenoi, *et al.,* (1993) [11] reported ten botanicals were evaluated invitro by paper disc and aqueous leaf extracts methods against *Pythium aphanidermatum*, *Alternaria alternata, Azadirachta indica* and *Lawsonia enemies*, effectively inhibited the radial growth of mycelia sporulation and germination of species, indication broad spectrum fungicidal potentiality in sick microplots. All the five neem products tested, controlled damping off caused by *Pythium aphanidermatum* upto 25 -30 days.

Application of research: Study of damping off disease of tomato (*Lycopersicon esculentum* Mill.) var. Novaday

Research Category: Plant Pathology & Nematology

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Study area / Sample Collection: Sam Higginbottom University of Agriculture, Technology and Sciences, Naini, Prayagraj, 211007, Uttar Pradesh, India

Cultivar / Variety / Breed name: Tomato (*Lycopersicon esculentum* Mill.) var. Novaday

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.
Ethical Committee Approval Number: Nil

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