

VARIETAL RESISTANCE AND CONTROL OF COLLAR ROT OF MUSTARD

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INTRODUCTION

Rhizoctonia solani Kunh. an anamorph of Thanatephorus cucumeris (Frank.) Donk. is found to cause various disease symptoms on Brassicas. (Damping Off and Root rot from Pakistan 1977; Malaysia 1980; Finland 1984; Canada 1984, 1987; Wire-stem from U.K. 1983; and Root and Collar Rot from India 1985).

Here, in certain parts of Rajasthan, an outbreak of Collar Rot induced by R. solani of Mustard (T-59) was noticed in the year 1986. Since then this has spread fast causing destruction to the mustard crop and resulting in significant loss in yield. The disease symptoms appear on 4-6 weeks old plants in the form of small, oval, light brown to pale brown lesions at the collar portion resulting in wilting and complete drying of the standing plants.

Looking to the severity of the incidence and magnitude of losses caused by this fungus a study was undertaken. The present paper deals with the varietal resistance under artificial inoculation conditions, laboratory and field evaluation of fungicides for the control of this disease.

MATERIALS AND METHODS

For varietal resistance 123 cultivars of mustard were sown in 30 cm earthen pots with sandy soil. Each variety was sown in six replication for two years. The inoculum of the fungus (R. solani) was added to the soil at the time of sowing. The inoculum was prepared by multiplying the fungus on sorghum medium which was homogenously mixed in the upper 10 cm soil in pots. Degrees of resistance and susceptibility were determined on plant mortality percentage which was recorded after 90 days of sowing and catagorised as under:

Resistant	No infection
Moderately Resistant	0.1 to 5.0 per cent infection
Moderately Susceptible	5.1 to 20.0 per cent infection
Susceptible	20.1 to 50.0 per cent infection
Highly Susceptible	50.1 to 100.0 per cent infection

In the second experiment eight systemic and non-systemic fungicides were evaluated by poisoned food technique (Zentmayer, 1955). The fungicides were vitavax (5,6-dihydro-2-methyl-1-4-oxathiin-3-carboxanilide), Thiram (Bis(dimethylthiocarbamoyl) disulphide), Brassicol (Pentachloronitro benzene), Dithane M-45 (Zinc + manganese ethylene bisdithiocarbamate), Bayleton (1-(4-

chlorophenoxy)-3,3-dimethyl-1 (1, 2, 4-triazol-1-yl) butan-2-one), Bavistin (Methyl benzimidazol-2-yl-carbamate), Difolatan (N (1,1,2,2-tetrachloroethylthio = cyclohex-4 ene-1,2-dicarboximide), Topsin-M (Dimethyl 4,4-O-phenylenebis = 3-thioallophanate) Calirus (2-iodobenzanilide), Rovral (3-(3,5-dichlorophenyl)-N- isopropyl-2,4-dioximidazolidine-1-carboxamide). All the fungicides at 50, 250, 500 and 1000 ppm were tested. Stock solutions of each fungicides was prepared and was further diluted so as to give the desired ppm when added to 100 ml of Potato Dextrose Agar (PDA) medium. 20 ml of PDA mixture so prepared was poured in sterilized petriplates. These petriplates were inoculated with 2 mm bit of young cultures of R.solani and incubated at 28±2°C for 7 days. Four replications were kept for each fungicide concentrations. Colony diameter in mm was recorded and compared with Check.

In another experiment ten fungicides were evaluated in the field. The mustard variety T-59, the most susceptible one was sown in a randomized block design consisting of 11 treatments in 3 m x 3 m plots with 4 replications. Fungus (R.solani) inoculum was added to the soil at the time of sowing in furrows. Appropriate Checks without fungicide but with fungus was also maintained. Observations for plant mortality were recorded after 90 days of sowing to evaluate the efficacy of fungicides being tested.

RESULTS AND DISCUSSIONS

Out of the 133 cultivars of mustard, no cultivar was free from infection. Although five cultivars viz. RLC 1034, RS 76, RS 123, RJ 1 and RFD 1 were found to be moderately resistant. The incidence was being 2.0 to 5.0 per cent. The others were moderately susceptible to highly susceptible. (Table-1).

Table-1. Performance of mustard cultivars against R.solani.

Rating (Scale)	Cultivars
Resistant	Nil
Moderately Resistant	RLC 1034, RS 76, RS 123, RJ 1 and RFD1
Moderately Susceptible	RSK 8, Kranti, RK 8506, RK 8602, RK 8604, Krishna, RLC 1357, RH 847, NDR 8602, TM 21, RS 77, RS 85, Durgamani, DIRA 334, DIRA 335, DIRA 336, DIRA 342, RIM 173, UUR 751 and PR 7304.
Susceptible	PR 8601, PR 8602, PR 8603, PR 8604, RLC 1036, RLC 1047, RLC 1105, RLC 8601, TM 2, TM 19, RS 30, RS 65, RS 76, RS 77, RS 83, RS 84, RS 86, RS 88, RS 91, RS 104, RK 1407, RK 1467, RK 1494, RS 14118, DIRA 247, DIRA 329, DIRA 341,

Highly Susceptible

DIRA 367, RSK 9, RSK 10, RFD 3, —
RH 848, RH 8311, NDR 8601, RW 11841/2BVaruna (T-59), RSM 9, RSM 10, RSM 64,
RSM 111, RS 64, RS 92, RS 96, RS 97,
RS 98, RS 100, RS 102, RS 103, RS 104,
RS 105, RS 106, RS 107, RS 108,
RS 109, RS 111, RS 112, RS 113,
RS 115, RS 120, RS 121, RS 122,
RS 751, RSK 2, RSK 4, RSK 6, RH 837,
RH 839, RH 846, RH 8512, RH 8554,
RH 8559, RK 8501, RK 8503, RK 8504,
RH 8507, RH 8508, RH 8601, RH 8605,
RLC 1209, RLC 1351, RLC 1359,
RLC 7369, RJ 2, RJ 4, TM 4, TM 9,
TM 20, PR 8306, PR 8308, PR 8309,
DIRA 35, DIRA 128, RW 2351,/B2
Pusa Bold, RAUR 83-2, UUR 57,
Prakash, RAU-PR-1, CSR 43, CSR 142,
CSR 622, CSR 741, TMV 3, YRT 1,
YRT 3, RLM 571, RI 26/21, Chamba 2.

The data obtained from bioassay studies indicates that all the eight fungicides viz. Bavistin, Dithane M-45, Topsin-M, Difolatan, Brassicol, Calirus, Rovral and Thiram were found effective in inhibiting the growth of *R.solani* (Table-2). The minimum growth was recorded in Bavistin at all the four concentrations tested.

Table 2. Efficacy of different fungicides in controlling the growth of *R.solani*.

S.No.	Fungicides	*Average colony diameter (mm)			
		Concentration (ppm)			
		50	250	500	1000
1.	Bavistin	6.00	4.00	3.00	3.00
2.	Dithane M-45	40.00	27.72	15.00	5.00
3.	Topsin-M	25.00	19.50	7.00	6.00
4.	Difolatan	53.00	26.00	18.00	16.25
5.	Brassicol	9.72	7.50	5.00	4.50
6.	Calirus	72.00	61.50	28.00	13.00
7.	Rovral	62.00	52.00	36.00	16.00
8.	Thiram	20.00	19.00	9.50	6.00
9.	Check	76.00	76.00	75.00	78.00

*Average of 3 replications.

The data of the field experiment indicate that out of 10 fungicides, Bavistin, Thiram and Brassicol exhibited superimacy in the reduction of the disease severity as compared to Check. Bavistin also resulted in maximum grain yield followed by Thiram and

Brassicicol (Table 3).

Table-3, Effect of various fungicides on disease incidence and grain yield of mustard due to R.solani.

S.No.	Treatments	Dose/Kg. seed (gm)	Disease index %		Yield q/ha	
			1987	1988	1987	1988
1.	Bavistin	2.0	5.62	12.06	9.47	11.89
2.	Vitavax	2.0	11.73	19.28	7.12	7.92
3.	Dithane M-45	2.5	9.77	14.40	7.46	9.02
4.	Topsin-M	2.0	20.35	21.10	6.40	8.11
5.	Calirus	2.0	17.30	22.07	6.83	8.03
6.	Thiram	3.0	6.31	13.06	8.90	10.27
7.	Bayleton	2.0	17.99	18.43	6.88	8.47
8.	Rovral	2.0	19.21	22.33	7.12	7.44
9.	Difolatan	2.0	12.77	17.92	8.0	7.89
10.	Brassicicol	2.0	16.89	13.59	8.72	10.70
11.	Check	-	24.64	47.02	6.20	3.57
C.D.			2.58	3.46	0.73	1.12
CV (%)			9.90	12.22	6.84	9.82

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