

SAPROPHYTIC ACTIVITY OF RHIZOCTONIA BATATICOLA CAUSING ROOT ROT OF SAFFLOWER

G.M. LUKADE¹ and M.S. RANE²

ABSTRACT

The saprophytic survival of *R. bataticola* was studied. Among different levels of inoculum, four per cent was optimum for survival of the pathogen in the soil upto eight weeks. Different moisture levels were tested and the moisture at 50 per cent moisture holding capacity (MHC) was found to be most optimum for the development followed by 25 and 75 per cent. The saprophytic survival of the pathogen was much less at 100 per cent MHC. The pathogen could also survive in the air dried soil condition.

Rhizoctonia, a soil inhabiting fungus, can generally carry on an active saprophytic existence in the soil and survive in the absence of host by competitive colonization on dead soil organic matter. Little is known of its behaviour as a soil saprophyte, because most of the studies on the saprophytic growth have been carried out in pure culture. Therefore, present study was undertaken to find out the optimum requirement of inoculum density and soil moisture for development of *Rhizoctonia* in the soil under saprophytic condition.

MATERIALS AND METHOD

The plant colonization method described by Papavizas and Davey (1962) was followed which involves incubation of cotton stem segments in soil for eight weeks at room temp (26 + 2 C) during

which time the segments are saprophytically colonized by *Rhizoctonia*. The observations on colonization were recorded at 2, 4, 6 and 8 weeks after incubation period under stereoscopic research microscope.

Inoculum Density : The inoculum multiplied on sand maize (90:10) medium was mixed in the sterilized soil to obtain inoculum density of 2, 4, 8 and 12 per cent by weight of soil. The moisture was maintained at 50 per cent MHC throughout the period of 8 weeks. Each treatment was replicated twice. The percentage of segments colonized were worked out and analysed.

Moisture Levels : The moisture holding capacity of the soil was estimated by keen perforated box method (Piper, 1950). Different moisture holding capacities studied were; 100, 25, 50 and



1 Sorghum Pathologist, Mahatma Phule Agricultural University, Rahuri - 413 722.

2 Professor of Plant Pathology (Retd.), College of Agriculture, Pune - 411 005.

TABLE 1. Saprophytic colonization by *R. bataticola* in soil as influenced by inoculum levels.

Percent inoculum	Percentage of segments colonized after (Weeks)*				Mean
	2	4	6	8	
2	92.5 (83.5)	100.0 (90.0)	87.5 (69.4)	90.0 (71.6)	92.50 (78.62)
4	100.0 (90.0)	100.0 (90.0)	100.0 (90.0)	97.5 (83.5)	99.37 (88.37)
8	97.5 (83.5)	100.0 (90.0)	100.0 (90.0)	95.5 (77.1)	98.12 (85.15)
12	97.5 (80.8)	100.0 (90.0)	100.0 (90.0)	97.5 (83.5)	98.75 (86.07)
Mean	96.87 (84.45)	100.0 (90.0)	96.87 (84.85)	95.0 (79.0)	

Figures in parentheses are arcsin transformed values.

* mean of 2 replications.

	Inoculum	Period	I X P
S.E.+	2.86	2.86	4.13
C.D. at 5 per cent	8.57	8.57	N.S.

25 per cent (Air dry soil containing 7.5 per cent moisture was the control). The inoculum added to autoclaved soil was four per cent by weight. Each treatment was replicated thrice. The percentage of colonized were worked out and analysed.

RESULTS AND DISCUSSION

The colonization of *R. bataticola* as influenced by various inoculum density and different soil moisture levels during different periods of incubation are presented in Table 1 and 2 respectively.

Effect of Inoculum Density: The colonization percentage at six and eight per cent inoculum density was on par with four percent. Higher inoculum level does not result in higher colonization. Perhaps high concentration of maize meal added with the inoculum induced

rapid multiplication of microorganisms antagonistic to *Rhizotonia* (Sanford 1938, Das and Western 1959).

Incubation Period: The maximum saprophytic colonization was obtained at four weeks incubation period. The colonization percentage decreased slightly with increase in incubation period upto eight weeks. These results indicated that the activity of *R. bataticola* was almost parallel during the incubation period of eight weeks. Similar trend was obtained by Papavizas and Davey (1961).

Effect of Soil Moisture: It is observed from Table 2 that the moisture level at 50 per cent moisture holding capacity of soil showed significantly maximum colonization of fungus (98.33 per cent). It indicated that there was an increasing trend of colonization with

TABLE 2. Saprophytic colonization by *Rhizoctonia bataticola* in soil as influenced by moisture levels.

Percent moisture	Percentage of segments colonized after (weeks)*				
	2	4	6	8	Mean
1. Air dry	20.00 (26.46)	21.66 (26.80)	20.00 (26.06)	15.00 (22.60)	19.16 (25.48)
2. 25	98.33 (84.50)	100.00 (88.20)	85.00 (67.40)	83.33 (66.26)	91.66 (76.59)
3. 50	100.0 (88.20)	100.0 (88.20)	100.0 (88.20)	93.33 (75.26)	98.33 (84.97)
4. 75	96.66 (82.66)	98.33 (84.50)	81.66 (64.80)	75.00 (60.06)	87.91 (73.00)
5. 100	78.66 (61.20)	36.33 (37.93)	36.66 (37.20)	23.33 (28.80)	42.24 (41.28)
Mean	78.73 (68.60)	71.26 (65.12)	64.66 (56.73)	58.00 (50.60)	

Figures in parentheses are Arcsin transformed values

* Mean of 3 replications.

	Moisture	Period	N x P
S.E. +	0.65	0.52	2.58 ¹
C.D. at 5 per cent	1.84	1.84	N.S.

increasing soil moisture upto 50 per cent level. However, thereafter it was in declining trend with increasing soil moisture. The soil moisture at 25 and 75 per cent MHC were also found promising for the development in soil, as they exhibited 91.66 and 87.91 per cent colonization respectively. Soil moisture at 100 per cent MHC adversely effected the growth as it showed 42.24 per cent colonization. These results are in agreement with those reported by Papavizas and Davey (1961, 1962), Sneh et al. (1966), Satishchandra et al. (1979), Dhingra and Sinclair (1974), Dhingra and Chagas (1981) and Banerjee et al. (1982). In the present study, the moisture content in the air dry soil was also found

to be sufficient for survival of *R. bataticola* as it exhibited 19.16 per cent colonization. It indicated that the pathogen prefers to dwell in dry rather than wet conditions of soil. These findings are in agreement with the results reported by Sanford (1938).

Incubation Period: Significantly maximum colonization of 68.60 per cent was observed at two weeks incubation period and it decreased with increase in incubation period. However, the activity of the pathogen maintained at 50 per cent MHC level was not affected upto six weeks period and it slightly reduced at eight weeks period.

REFERENCES

- BANARJEE, S., MUKHERJEE, B., and SEN, C., 1982. Effect of temperature & moisture interaction on the production of dormant propagules of *Macrophomina phaseolina* in amended soil. *Indian J. Microbiol.* 22:236-237.
- DAS, A.C., and WESTERNJ.H., 1959. The effect of inorganic manures, moistures and inoculum on the incidence of root disease caused by *Rhizootonia solani* (Kuhn) in cultivated soil. *Ann. Appl. Biol.* 47:37-48.
- DHINGRA, O.D., and SINCLAIR, J.B., 1974. Effect of soil moisture and carbon nitrogen ratio on survival of *Macrophomina phaseolina* in soybean stem in soil. *Plant. Dis. Repr.* 58:1034-1035.
- DINGRA, O.D., and CHANGAS, D., 1981. Effect of soil temperature, moisture and nitrogen on competitive saprophytic ability of *Macrophomina phaseolina*. *Tran Brit. Mycol.Soc.* 77:15-21.
- PAPAVIZAS, G.C. and DAVEY, C.B. 1962. Isolation and pathogenicity of *Rhizoctonia* saprophytically existing in soil. *Physiopathology* 52: 834-840.
- PIPER, C.S. 1950. *Soil and plant analysis.* Academy Press, New York.
- SANFORD, G.B., 1938. Studies on *Rhizoctonia solani* Kuhn. IV. Effect of soil temperature and moisture on virulence. *Can J. Research (C).* 16:203-213.
- SATISHCHANDRA, K.M., HIREMATH, R.V., and HEGDE, R.K. 1979. Effect of organic amendments and fungicides on the saprophytic activity of *Rhizoctonia bataticola* causing root rot of beans. *Indian Phytopath.* 32:543-546.
- SNEH, B., KATAN, J., HENIS, Y., and WAHL, I. 1966. Methods for evaluating inoculation density of *Rhizoctonia* in naturally infested soil. *Phytopathology* 56:74-78.

Madras Agric. J. 80 (8) : 424 - 429 August 1993

INFLUENCE OF WEATHER FACTORS ON SORGHUM EARHEAD BUG

R. RAMAMURTHY¹ and M. GOPALAN²

ABSTRACT

The sorghum earhead bug *Calocoris angustatus* Lethierry population at pre-flowering, milky, dough stage and maturity stage of earhead was influenced by three weeks average weather parameters. Morning and evening relative humidity were positively correlated with the population while maximum and minimum temperature and wind velocity were negatively correlated in all the stages of the earhead. The regression equation of three weeks mean

1. Assistant Professor and 2. Dean (P.G.Studies), Tamil Nadu Agricultural University, Coimbatore - 641 003.