

Effect of culture media, temperature and pH on the growth of different isolates of *Rhizoctonia bataticola*

PRIYA JOHN, NARENDRA NATH TRIPATHI AND NAVEEN KUMAR

Department of Plant Pathology, College of Agriculture, CCS Haryana Agricultural University, Hisar 125 004, Haryana

Rhizoctonia bataticola infects sesame, urd and seedlings of gulmohar, bottlebrush, popular and cassia. Among the natural and synthetic media tested, all the seven isolates of the fungus were found to grow best on potato dextrose agar and glucose asparagine media. The optimum temperature range which favoured the mycelial growth was between 25-30°C. The optimum pH for the growth was found to be 6.

Key words : Charcoal-rot, effect of some growth conditions, *Rhizoctonia bataticola*

INTRODUCTION

Rhizoctonia bataticola (Taub. Butler) is worldwide in distribution and is known to infect a wide variety of plants including pulses, oilseeds, sorghum, maize, jute, vegetables, fruit crops as well as ornamental and forest trees. In India, Thirumulachar (1952) reported several host plants of *R. bataticola*. In Haryana, this pathogen is found to infect various plant species like sesame (*Sesamum indicum*), urd (*Vigna mungo*), gulonoha (Delouix regia), bottlebrush (*Callistemon lanceslotus*) popular (*Populus regia*) and cassia (*Cassia siamea*). The present investigation was undertaken to study the effect of culture media, temperature and pH on the mycelial growth of isolates of *R. bataticola*.

MATERIALS AND METHODS

The isolates of *R. bataticola* used in this study were isolated from the infected plants of sesame and urd. Other isolates were collected from the Department of Forestry, College of Agriculture, CCS HAU, Hisar. These isolates were maintained on PDA at 4 ± 1°C and subcultured after every seven days.

Seven media, Potato dextrose agar (PDA), Oat meal

agar, Richard's, Asthana-Hawker, Glucose asparagine, Elliot, Nash-Synder, water agar (control) were used to see the variation in growth behaviour of different isolates of *R. bataticola*. The pH of the medium was adjusted to 6.5 Mycelial discs (5 mm diameter) of 7 day old culture of *R. bataticola* were placed at the centre of sterilized culture medium in 90 mm sterilized petriplates. The plates were incubated at 30 ± 2°C. The linear growth of colony was measured periodically upto the seventh day. Three replicates were maintained for each treatment.

Effect of temperature was studied on PDA and Glucose asparagine media, 20 ml of each medium was taken in each of the sterilized petriplate. Mycelial discs of different isolates were inoculated at the centre of the petriplates as described earlier and incubated for 72 h at temperatures of 15, 20, 25, 30 and 35°C with three replications for each treatment.

The effect of pH of the medium on growth was studied by inoculating 250 ml Erlenmeyer flasks in triplicate containing 100 ml glucose asparagine solution at different pH levels (4, 6 and 8). The pH were adjusted by addition of dilute 0.1 N HCl or 0.1 N NaOH. The flasks were incubated at 30 ± 2°C

and mycelial dry weights were calculated on the 7-day.

RESULTS AND DISCUSSION

Among natural media, PDA supported best growth of all the isolates (Table 1), the highest being 100 per cent in sesame isolate and in cassia isolate. Among synthetic media, glucose asparagine

supported the maximum growth of all isolates. Sobti and Sharma (1992) and Periera *et al.* (1995), while working with various isolates of *R. bataticola*, noted variation in growth of isolates in different culture media.

It is clear from the Table 2 that growth of all isolates initiated at $25 \pm 2^\circ\text{C}$. At 15°C the maximum growth was expressed by PopA1 (34.44 per cent)

Table 1 : Effect of different media on per cent mycelial growth of isolates of *R. bataticola*

* Medium	Per cent linear growth						
	Isolates						
	Sesame	Urd	Gulmohar	Bottlebrush	PopA1	PopA2	Cassia
Potato Dextrose	100.00	73.33	83.33	65.55	92.22	78.88	37.77
Oat-Meal	78.88	67.77	46.66	57.77	25.55	31.44	20.00
Richard's	38.88	77.77	83.33	100.00	67.77	67.77	73.33
Asthana-Hawker	73.33	100.00	51.11	55.55	34.44	22.22	87.77
Glucose Asparagine	100.00	74.44	78.88	71.11	90.00	81.11	38.88
Elliot	29.11	83.33	45.55	64.44	38.88	76.66	52.22
Nash-Synder	76.66	50.00	35.55	52.22	70.00	100.00	78.88
Water	16.66	12.22	13.88	11.11	15.55	13.33	10.00

*with agar

Table 2 : Effect of temperature on per cent growth of isolates of *R. bataticola* on PDA.

Temperature (°C)	Per cent mycelial linear growth						
	Isolates						
	Sesame	Urd	Gulmohar	Bottlebrush	PopA1	PopA2	Cassia
15	22.22	20.00	32.22	22.22	34.44	23.33	0.00
20	33.33	34.44	47.77	33.33	53.33	46.66	0.00
25	66.66	55.55	57.77	46.66	68.88	61.11	13.33
30	100.00	73.33	83.33	78.88	92.22	78.88	37.77
35	77.77	61.11	70.00	66.66	72.22	68.88	31.11

Table 3 : Effect of temperature on per cent growth of isolates of *R. bataticola* on glucose asparagine medium.

Temperature (°C)	Per cent mycelial linear growth						
	Isolates						
	Sesame	Urd	Gulmohar	Bottlebrush	PopA1	PopA2	Cassia
15	16.66	25.55	27.77	30.00	32.22	34.44	0.00
20	27.77	44.44	43.33	38.88	50.00	48.88	0.00
25	61.11	54.44	54.44	48.88	65.55	63.33	18.88
30	100.00	74.44	78.88	65.55	90.00	81.11	38.88
35	66.66	57.77	66.66	56.66	83.33	72.22	33.33

Table 4 : Effect of hydrogen ion concentration on growth of isolates of *R. bataticola* on glucose asparagine solution.

pH	Mycelial dry weight (mg)						
	Isolates						
	Sesame	Urd	Gulmohar	Bottlebrush	PopA1	PopA2	Cassia
4	1000	100	720	190	700	350	1160
6	1500	570	970	290	1000	700	1300
8	800	80	570	90	300	190	1490
Control (6.5)	1600	600	1000	300	800	800	1390

C.D. at 5% pH - 24.313 ; Isolates = 32.8245 ; pH X Isolates = 65.6490

followed by gulmohar (32.22 per cent). The growth of sesame isolate and bottlebrush were similar. All the isolates exhibited maximum growth at $30 \pm 2^\circ\text{C}$, but declining trend was observed by enhancing temperature from $30 \pm 2^\circ\text{C}$. The cassia isolate did not grow at all at 25° and 15°C .

The test medium was changed from PDA to glucose asparagine to find out differences to shift in temperature (Table 3). It was noticed that the 15°C , PopA2 isolate showed highest growth of 23.41 per cent followed by PopA1 isolate. The poorest growth was noted in sesame isolate at 15°C though it attained 100 per cent growth at 30°C . In the present investigation it was found that all the isolates of *R. bataticola* grew well at $30 \pm 2^\circ\text{C}$ on PDA and glucose asparagine media. This observation is in accordance with that made by Singh and Kaiser (1992) on maize isolate of *R. bataticola*. Tripathi (1996) reported the augmented mycelial growth of *R. bataticola* isolated from *Phaseolus vulgaris* at 30°C . The growth of *R. bataticola* isolates decreased with the decrease or increase of temperature from 30°C .

All the isolates grew better at pH 6.5 (Table 4). Cassia isolate grew better in alkaline than acidic range, as its best growth was obtained at pH 8, which may be due to its adaptability to alkaline soil which is prevalent in Haryana. Singh and Kaiser (1994) obtained best growth of *R. bataticola* between pH range of 5 to 7, while Devi and Singh (1998) reported that *Vigna radiata* isolates of *R. bataticola* grew best at pH range between 5.0 to 6.0. In the present studies isolates different in pH requirement for their growth and can be grouped in two groups, one preferring acidic range and the another which can grow both on acidic as well as

on alkaline range (cassia isolate).

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