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Screening of Chickpea Varieties, Cultivars, Elite Lines Against *Rhizoctonia bataticola* Causing Dry Root Rot of Chickpea

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ABSTRACT

Effect of different systemic, contact and comi-fungicides and different bioagents on *Rhizoctonia bataticola* causing dry root of chickpea (*Cicer arietinum* L.). crop were studied during 2018-19 at VNMKV, Parbhani. In present studies, all of the 12 fungicdes tested were found effective against *R. bataticola* and however, the systemic fungicides Carbendazim 50% WP, Tebuconazole 29.9% EC, Hexaconazole 5%EC and Azoxystrobin and the contact and combi-fungicides Carbendazim 12% +Mancozeb 63 %WP and Carboxin 37.5% + Thiram 37.5% WP gave cent percent (100%) mycelial inhibition. Whereas *Trichoderma asperellum* recorded highest mycelial growth inhibition (88.27%) followed by *T. harzianum* (83.4%).

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INTRODUCTION

India is largely a vegetarian country and pulses are an important part of the daily diet. India is the largest cultivator and consumer of pulses. Maharashtra state is a leading supplier of pulses, by making pulses growing in the State an attractive and remunerative proposition to farmers. Chickpea is an important *Rabi* crop grown in over 50 countries of Asia, Africa, America and Oceania in rainfed environments (Sharma *et al*., 2015). Among the several soil borne fungal diseases of Chickpea, dry root rot caused by *Rhizoctonia bataticola* (Taub.) Butler (*Macrophomina phaseolina* (Tassi.) Goid)) is the most severe disease can affect chickpea production, causes considerable yield losses that vary from 5 to 50 % and may cause 100% losses in susceptible cultivars under favorable condition (Pande *et al*., 2012) and considerable yield losses which may be as high as 50 to 71% (Veena *et al*., 2014a). The disease is more prevalent during hot temperature of 30 to 35°C and low soil moisture conditions (Taya *et al*., 1988; Pande *et al*, 2010). Considering the economic importance of disease and crop, present investigation was planned to study screening of chickpea varieties, cultivars and elite lines against *Rhizoctonia bataticola* causing dry root rot of chickpea.

MATERIALS AND METHODS

Screening of chickpea entries was attempted by employing sick soil method. For the purpose, autoclaved and cooled potting mixture of soil: sand: FYM (2:1:1) was filled into black coloured nursery polybags (20 x 30 cm), disinfected with 5 percent copper sulphate solution. The test isolate Rb-6 was multiplied on sand: maize medium and inoculated (@ 50 g / kg potting mixture), separately in these bags, mixed thoroughly in top 5-6 cm layer, watered lightly and maintained in screen house for two weeks, so as to proliferate the test pathogen and make the potting mixture sick with *R. bataticola*.

Surface sterilized (0.1 % $HgCl_2$) healthy seeds of chickpea JG-62 were sown (10 seeds/bag) in these bags, watered lightly and maintained in the screen house. Two bags per test chickpea entry were sown and maintained.

Observations on pre-emergence seed rot (PRESR) and post-emergence seedling mortality (POESM) were recorded, respectively at 7-8 days and 15 and 30 days after sowing and total mortality was computed. Percent PRESR, POESM and total mortality were calculated by applying the formulae as detailed under sub-head 3.2.8.1.1.

Based on percent total mortality incidence, the test chickpea entries evaluated under pot/polybag culture was categorized as described below, by applying following disease rating scale (Nene *et al.*, 1981).

Disease incidence (%)	Disease reaction
1.0-10.0 %	Resistant
10.1-20.0%	Moderately resistant
20.1-30.0%	Moderately susceptible
30.1-50.0%	Susceptible
Above 50 %	Highly susceptible

RESULT AND DISCUSSION

Reactions of chickpea varieties, cultivars and germplasm lines in polybag culture

To find out the sources of resistance in chickpea against dry root rot (*R. bataticola*), 22 chickpea entries were examined by sick soil method in pot/polybag culture, under screen house condition, during *Rabi*, 2016-17, at the Department of Plant Pathology, VNMKV, Parbhani.

The results (Table 1 and PLATE I) elucidated that all of the chickpea test entries found to reacted differently against *R. bataticola*, However, among the test entries, pre-emergence seed rot (PRESR), post-emergence seedling mortality (POESM) and total mortality was in the range of 6.67 to 80.00 percent, 10.00 to 100.00 percent and 8.33 to 90.00 percent, respectively.

Based on these reactions (Table 2), the chickpea test entries were categorized as immune (no disease), resistant (1-10.0), moderately resistant (10.1-20), moderately susceptible (20.1-30), susceptible (30.1-50.0) and highly susceptible (>50). None of the chickpea entry was found immune to root rot disease.

Table No. 1: Reactions of chickpea varieties, cultivars, elite lines against *R. bataticola*

(Polybag culture)

Sr. No.	Genotypes	PRESR%	POESM%	Average Mortality (%)	Reactions
1	Vishal	13.33	15.55	14.44	MR
2	Vijay	23.33	25.00	24.16	S
3	Digvijay	20.00	22.22	21.11	MR
4	JAKI 9218	13.33	16.66	14.99	MR
5	SAKI 9516	8.33	10.00	9.16	R
6	AKG 1103	36.66	50.00	43.33	S
7	BDNG 13-1	10.00	11.11	10.55	R
8	BDNG 2013-2	53.33	57.14	55.23	HS
9	BDNG 2013-1	6.66	12.5	9.58	R
10	BDNG 9-3	15.00	22.5	18.75	MS
11	BDNG 797	26.67	32.83	29.75	MS
12	BCP 26	6.67	10.00	8.33	R
13	BCP 21	10.00	13.33	11.66	R
14	BCP 49	6.67	11.11	8.89	R
15	Rajas	10.00	14.44	12.22	R
16	JG 315	8.33	15.55	11.94	R
17	JG 62	80.00	100.00	90.00	HS
18	PG 0515	10.00	13.33	11.66	R
19	PG 9801	65.00	73.33	69.16	HS
20	PG - 4333	71.66	77.77	74.71	HS
21	PG 0302-10	73.33	15.55	44.44	MR
22	ICCV- 5313	23.33	25.00	24.16	MS

PRESR-Pre-emergence Seed Rot, POESM- Post Emergence Seedling Mortality,

HS: Highly Susceptible, MR: Moderately Resistant, R: Resistance, S: Susceptible

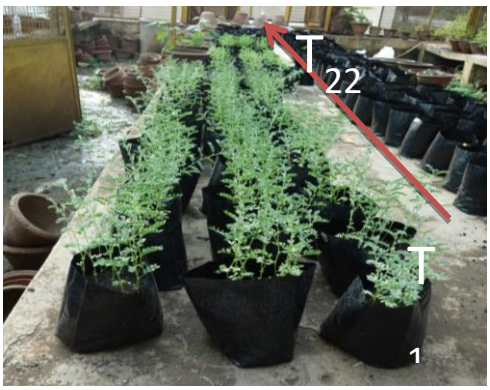

PLATE I. Screenhouse reactions of chickpea varieties, cultivars, germplasm lines against *R. bataticola* (Polybag culture)

However, nine entries were found to be with resistant reactions were SAKI 9516, BDNG 13-1, BDNG 2013-1, BCP 26, BCP 21, BCP 49, Rajas, JG 315, PG 0515; four entries with moderately resistant reactions were Vishal, Digvijay, JAKI 9218, PG 0302-10; three entries with moderately susceptible reactions were BDNG 9-3, BDNG 797, ICCV- 5313; two entries with susceptible reactions were Vijay, AKG 1103; and rest four entries with highly susceptible reaction were BDNG 2013-2, JG 62, PG 9801, PG – 4333.

Use of host plant resistance is the most economical strategy for management of dry root rot of chickpea as *R. bataticola* includes a broad host range and survives in soil for long periods in the form of sclerotia and influenced by the changes in climatic conditions. The sclerotia will survive up to ten months even in the absence of the host plant and beneath prevailing dry soil conditions.

Table No. 2: Categorization of chickpea varieties, cultivars, elite lines based on reaction against *R. bataticola* (Polybag culture)

Sr. No.	Disease Reactions	Chickpea entries
1	Immune (I)	None
2	Resistant (R)	**Nine:** SAKI 9516, BDNG 13-1, BDNG 2013-1, BCP 26, BCP 21, BCP 49, Rajas, JG 315, PG 0515
3	Moderately Resistant (MR)	**Four:** Vishal, Digvijay, JAKI 9218, PG 0302-10
4	Moderately Susceptible (MS)	**Three:** BDNG 9-3, BDNG 797, ICCV- 5313
5	Susceptible (S)	**Two:** Vijay, AKG 1103
6	Highly Susceptible (HS)	**Four:** BDNG 2013-2, JG 62, PG 9801, PG - 4333

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