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## Survey of dry root rot disease of chickpea in Marathwada region of Maharashtra

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### Abstract

A field survey of chickpea dry root rot disease, covering three Agro-climatic zones viz., Scarcity Zone (SZ), Assured Rainfall Zone (ARZ) and Moderate Rainfall Zone (MRZ) of Marathwada region of the Maharashtra state was undertaken during the months of December to February, 2016-17 and 2017-18 to assess occurrence and distribution of chickpea dry root rot disease. The results of the present survey indicated that overall root rot disease incidence was comparatively higher during *Rabi*, 2017-18 season compared to *Rabi*, 2016-17. During *Rabi*, 2016-17 and 2017-18 maximum root rot incidence of 24.23 and 30.55 per cent, respectively, with maximum pooled mean incidence of 27.39 per cent in Scarcity zone, followed by Assured rainfall zone (22.17 %, 26.63 % and 24.4 %) and Moderate rainfall zone (16.18 %, 20.29 % and 18.23 %).

**Keywords:** *R. bataticola*, chickpea, disease incidence

### Introduction

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, present investigation was planned to study *in vitro* evaluation of fungicides and bioagents against *Rhizoctonia bataticola* causing dry root rot of chickpea.

### Material and methods

A field survey of chickpea dry root rot disease, covering three Agro-climatic zones viz., Scarcity Zone (SZ), Assured Rainfall Zone (ARZ) and Moderate Rainfall Zone (MRZ) of Marathwada region of the Maharashtra state (Fig. 1) was undertaken during the months of December to February, 2016-17 and 2017-18 to assess occurrence and distribution of chickpea dry root rot disease.



Fig 1: Various agro-climatic zones of Marathwada region surveyed for dry root rot of chickpea

For the purpose, on the farmer's field, 1x1m<sup>2</sup> area, was randomly selected and name of variety and the per cent dry root rot disease incidence information was collected. The percent dry root rot disease incidence was calculated by using following formula.

$$\text{Per cent Disease Incidence: } \frac{\text{No. of plants infected}}{\text{Total no. of plants observed}} \times 100$$

## Results and discussion

### Occurrence and distribution of chickpea dry root rot

A survey of chickpea field was conducted to record dry root rot incidence during the *Rabi* seasons of 2016-17 and 2017-18 (PLATE I). Survey was conducted in 179 and 232 chickpea crop fields of 08 districts, distributed under three agro-climatic zones *viz.*, Scarcity zone (06), Assured Rainfall zone (07) and Moderate rainfall zone (08) of Marathwada region of the Maharashtra state (Fig. 1) respectively during 2016-17 and 2017-18.

The results obtained on dry root rot incidence, tahsil-wise (Table 1), district-wise (Table 2 and Fig. 2, 3 & 4), chickpea

variety-wise (Table 3 and Fig. 5 & 6) and agro-climatic zone-wise (Table 4 and Fig. 7 & 8) are being interpreted herein under following sub-heads.



**Fig 2:** Various districts of Marathwada region surveyed for dry root rot of chickpea



**Chickpea crop fields surveyed for recording dry root rot disease incidence**

**Plate 1:** Tahsil-wise incidence of dry root rot of chickpea

The results (Table 1) indicated a widespread incidence of dry root rot, during both the years of survey and it was ranged from 13.93 (Nanded) to 33.32 (Vaijapur) and 16.67 (Ahmadpur) to 38.56 (Ashti) per cent, during *Rabi*, 2016-17 and 2017-18 seasons, respectively. However, maximum dry root rot incidence was observed in Vaijapur tahsil (33.32 and 34.18 %), respectively during *Rabi*, 2016-17 and 2017-18 seasons, followed by Jalna tahsil (32.72 and 35.61 %) and Kalamb tahsil (30.24 and 35.21 %). Whereas in rest of

the tahsils dry root rot incidence was in the range of 14.24 (Ardhapur) to 30.12 (Manvat) per cent and 16.97 (Gevrai) to 31.49 (Manvat) per cent, during *Rabi*, 2016-17 and 2017-18 seasons, respectively. However, minimum dry root rot disease incidence was observed in Nanded tahsil (13.93 and 21.33 %), during *Rabi*, 2016-17 and 2017-18 seasons, respectively, followed by Ardhapur tahsil (14.24 and 17.62 %) and Ahmadpur tahsil (15.1 and 16.67 %).

**Table 1:** Tahsil-wise incidence of dry root rot of chickpea, during *Rabi*, 2016-17 and 2017-18.

Sr. No.	Districts	Tahsils	2016-17		2	017-18
			No. of Fields	Av. Disease Incidence (%)	No. of Fields	Av. Disease Incidence (%)
Scarcity zone						
1	Aurangabad	Vaijapur	2	33.32	3	34.18
		Gangapur	2	24.99	4	26.19
2	Beed	Ashti	1	25.53	3	38.56
		Patoda	2	23.33	2	32.33
		Shirur (Kasar)	2	25.67	3	26.21
3	Osmanabad	Bhoom	2	16.23	3	25.97
		Paranda	3	20.55	2	30.44
Overall Average / Total:			14	24.23	20	30.55
Assured rainfall zone						
1	Aurangabad	Paithan	3	19.32	4	21.55
		Aurangabad	3	21.69	6	18.2
		Soegaon	2	15.45	3	26.81
		Sillod	2	21.37	3	30.33
2	Jalna	Jalna	4	32.72	6	35.61
		Badnapur	4	18.26	5	23.88
		Partur	6	27.34	8	31.66
		Mantha	5	29.1	9	32.52
3	Beed	Gevrai	3	14.98	3	16.97
		Beed	5	19.65	5	21.2
		Majalgaon	4	18.03	4	24.83
		Ambajogai	4	18.99	4	22.23
4	Osmanabad	Parali (Vajinath)	4	24.99	5	30.66
		Osmanabad	1	26.19	2	30.47
		Kalamb	4	30.24	5	35.21
		Tuljapur	1	15.52	1	18.62
5	Latur	Umarga	2	22.45	3	26.72
		Latur	5	24.11	9	29.33
		Chakur	3	17.96	5	22.87
		Renapur	2	18.65	3	18.44
6	Parbhani	Ahmadpur	2	15.1	2	16.67
		Ausa	2	22.98	1	25.11
		Parbhani	10	22.45	12	28.5
		Jintur	6	22.1	6	31.63
		Gangakhed	4	17.46	4	23.31
		Manwath	5	30.12	6	31.49
		Sailu	5	29.24	5	35.52
		Purna	3	19.65	4	23.23
7	Nanded	Pathri	5	28.44	4	34.65
		Sonpeth	2	25.71	2	28.82
		Loha	3	18.42	4	21.76
		Mukhed	1	20.22	1	27.55
Hingoli	Senggaon	Naigaon	2	18.81	3	24.74
		Kandhar	2	19.33	3	25.63
		Senggaon	5	29.12	7	35.57
Overall Average / Total:			124	22.17	157	26.63
Moderate rainfall zone						
1	Nanded	Nanded	5	13.93	9	21.33
		Ardhapur	3	14.24	4	17.62
		Mudkhed	2	17.42	3	20.88
		Bhokar	3	15.5	2	17.67
2	Hingoli	Basamat	6	16.93	8	21.97
		Hingoli	9	15.54	11	20.65
		Aundha	8	19.33	10	22.87
		Kalanuri	5	16.56	8	19.4
Overall Average / Total:			41	16.18	55	20.29

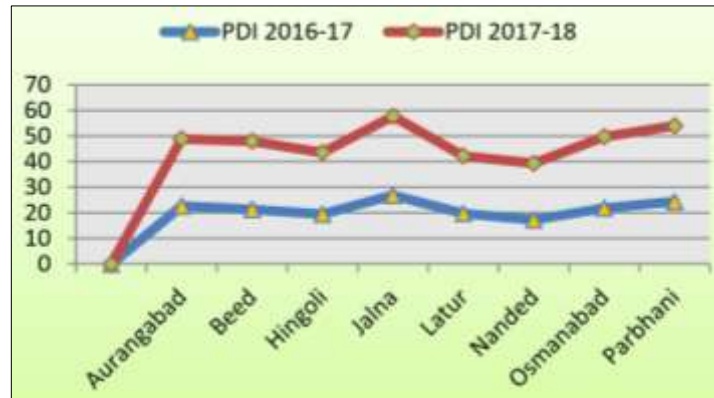
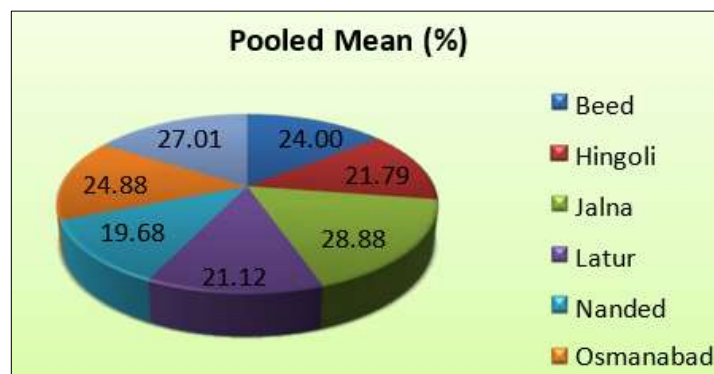
**District-wise incidence of dry root rot of chickpea**

Results (Table 2, Fig. 2, 3 & 4) showed that maximum dry root rot incidence was recorded in Jalna district which was 26.85 % and 30.91%, respectively, during *Rabi* 2016-17 and 2017-18, with maximum pooled incidence of 28.88 %. This was followed by the districts of viz., Parbhani (24.39 %, 29.64 % and 27.01%), Aurangabad (22.69 %, 26.21 % and

24.45 %), Osmanabad (21.86 %, 27.9% and 24.88 %), Beed (21.39 %, 26.62 % and 24.00 %), Latur (19.76 %, 22.48 % and 21.12 %), Hingoli (19.49 %, 24.09% and 21.79 %) and Nanded (17.23 %, 22.14 % and 19.68 %). Overall average dry root rot incidence was maximum during *Rabi*, 2017-18 which was (26.24%) and it was comparatively minimum (21.7 %) during *Rabi*, 2016-17.

**Table 2:** District-wise chickpea dry root rot incidence, during *Rabi*, 2016-17 and 2017-18

Sr. No.	Districts	No of locations		Av. Disease Incidence (%)		Pooled Mean Incidence (%)
		2016-17	2017-18	2016-17	2017-18	
1	Aurangabad	14	23	22.69	26.21	24.45
2	Beed	25	29	21.39	26.62	24.00
3	Hingoli	33	44	19.49	24.09	21.79
4	Jalna	19	28	26.85	30.91	28.88
5	Latur	14	20	19.76	22.48	21.12
6	Nanded	21	29	17.23	22.14	19.68
7	Osmanabad	13	16	21.86	27.9	24.88
8	Parbhani	40	43	24.39	29.64	27.01
	Average / Total	179	232	21.7	26.24	---

**Fig 3:** District-wise incidence of chickpea dry root rot in Marathwada region (*Rabi*, 2016-17 and 2017-18)**Fig 4:** District wise pooled mean incidence of chickpea dry root rot in Marathwada region (*Rabi*, 2016-17 and 2017-18)

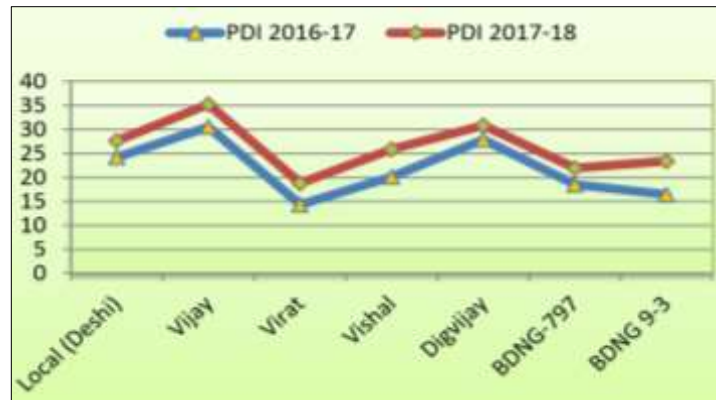
#### Variety-wise incidence of dry root rot of chickpea

Result (Table 3, Fig. 5 & 6) indicated that among these different chickpea varieties cultivated by the farmers of the Marathwada region surveyed during *Rabi* 2016-17 and 2017-18, maximum dry root rot incidence was observed in Vijay 30.56 % and 35.24 %, respectively during *Rabi*, 2016-17 and 2017-18, with pooled mean maximum disease incidence 32.90 %. This was followed by the

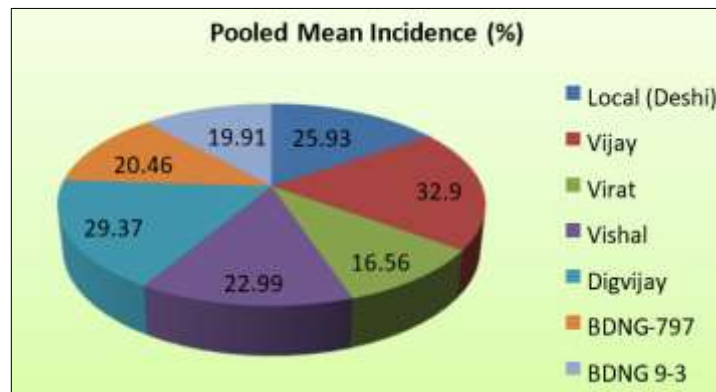
varieties viz., Digvijay (27.89 %, 30.84 % and 29.37 %), Local (Deshi) (24.21 %, 27.64 % and 25.93 %) and Vishal (20.12 %, 25.86 % and 22.99 %). Whereas with respect to the remaining varieties, the root rot incidence was ranged from 14.33 % to 20.12 % during *Rabi*, 2016-17 and 18.78 % to 25.86 % during *Rabi*, 2017-18, with pooled mean incidence in the range of 16.56 % to 22.99 %.

**Table 3:** Variety wise incidences of dry root rot of chickpea, during *Rabi*, 2016-17 and 2017-18

Sr. No.	Chickpea Variety	No. of locations		Av. Incidence (%)		Pooled Mean Incidence (%)
		2016-17	2017-18	2016-17	2017-18	
1	Local (Deshi)	34	41	24.21	27.64	25.93
2	Vijay	38	47	30.56	35.24	32.90
3	Virat	25	32	14.33	18.78	16.56
4	Vishal	16	27	20.12	25.86	22.99
5	Digvijay	24	29	27.89	30.84	29.37
6	BDNG-797	26	33	18.48	21.93	20.46
7	BDNG 9-3	16	23	16.42	23.39	19.91
	Overall Average / Total	179	232	21.7	26.24	----



**Fig 5:** Variety-wise incidence of chickpea dry root rot in Marathwada region (*Rabi*, 2016-17 and 2017-18)



**Fig 6:** Variety wise pooled mean incidence of chickpea dry root rot in Marathwada region (*Rabi*, 2016-17 and 2017-18)

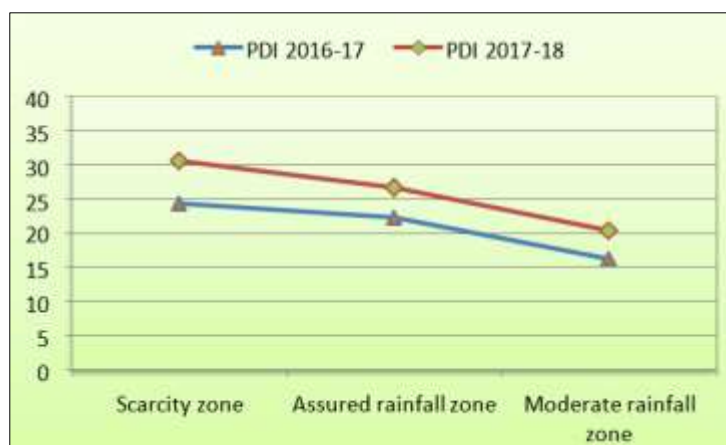
**Agro-climatic zone-wise incidence of dry root rot of chickpea, during *Rabi*, 2016-17 and 2017-18**

Results (Table 4, Fig. 7 & 8) showed that out of three agro-climatic zones surveyed such as, Scarcity zone (SZ), Assured rainfall zone (ARZ) and Moderate rainfall zone (MRZ), maximum dry root rot incidence was observed which was 24.23 per cent during *Rabi* 2016-17 and 30.55 per cent, during *Rabi* 2017-18, with maximum pooled mean

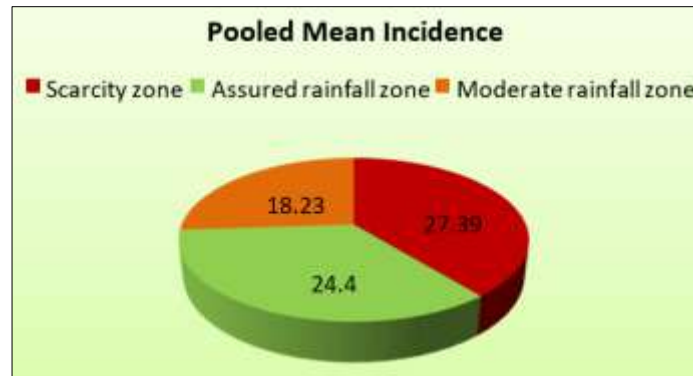
disease incidence of 27.39 per cent in Scarcity zone, followed by Assured rainfall zone (22.17 %, 26.63 % and 24.4 %) and Moderate rainfall zone (16.18 %, 20.29 % and 18.23 %). Whereas, maximum average root rot incidence was observed during *Rabi*, 2017-18 which was 25.82 per cent as compared with the incidence during *Rabi*, 2016-17 which was 20.86 per cent.

**Table 4:** Agro-climatic zone-wise incidences of dry root rot of chickpea, during *Rabi*, 2016-17 and 2017-18

Sr. No	Agro-climatic Zone	No of locations		Av. Incidence (%)		Pooled Mean Incidence (%)
		2016-17	2017-18	2016-17	2017-18	
1	Scarcity zone	14	20	24.23	30.55	27.39
2	Assured rainfall zone	124	157	22.17	26.63	24.4
3	Moderate rainfall zone	41	55	16.18	20.29	18.23
	Overall Average/ Total	179	232	20.86	25.82	23.34



**Fig 7:** Agro-climatic zone wise incidence of chickpea dry root rot in Marathwada region (*Rabi*, 2016-17 and 2017-18)



**Fig 8:** Agro-climatic zone wise pooled mean incidence of chickpea dry root rot in Marathwada region (*Rabi*, 2016-17 and 2017-18)

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