

ORIGINAL ARTICLE

Survey of Wet root rot of Chickpea (*Rhizoctonia solani* f. sp. *ciceri*) disease in Marathwada region of Maharashtra state

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ABSTRACT

Chickpea (*Cicer arietinum* L) is an important pulse crop of India popularly known as 'Gram'. In 2017-18 this crop was cultivated in about 106 L/ha. The country harvested a record production of > 112 lit at a highest productivity level of 1063 kg/ha. As usual, MP has contributed a significant 34% of the total gram area and 41% of total gram production in the country, thereby ranking first both in area and production followed by Maharashtra in area (19% and 16%) Annual report [1]. The major fungal diseases infecting chickpea, wet root rot incited by *Rhizoctonia solani* (kuhn). Is one of the most destructive and wide spread disease which cause average yield losses of 05-30%. Keeping in view, economic importance of chickpea and losses incurred by wet root rot disease, present investigations on the aspects viz., survey against *Rhizoctonia solani* were undertaken during Rabi, 2014-15 at the Department of Plant Pathology, College of Agriculture, Badnapur. Incidence of wet root rot chickpea was noticed in all the places surveyed on commonly grown varieties as mentioned. In Marathwada region, the wet root rot incidence was recorded in the range of 6.5 to 20.5 per cent, highest incidence of wet root rot (20.5 %) was noticed at Panbusi, Kandhar Tahsil (District Nanded) and minimum disease incidence (6.5 %) was recorded at Pirsawangi, Jalna district.

Keywords: Chickpea, Wet root rot, *Rhizoctonia solani* f. sp. *ciceri*, Survey

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INTRODUCTION

The cultivated chickpea (*Cicer arietinum* L.) was one of the first grain legumes to be domesticated in the old world. Chickpea is most probably originated in area of present day south eastern Turkey and adjoin Syria. The genus cicer belongs to foy Leguminoceae and sub family papilionoidae. The centre of origin of chickpea is in Eastern Mediterranean. The Kabuli and Desi chickpea is grown throughout the world with different names i.e. chickpea (UK), garbanzo (Latin America), bengal gram (India), hommes hamaz (Arab world), shimbra (Ethiopia) and nohud and loblebi (Turkey). India is largest producer of chickpea in world sharing 65.25 per cent in area and 65.49 per cent in production. In India, chickpea is grown on 10.23 million ha area with production 9.88 million tonnes and productivity 967 kg/ha. The production of chickpea in Maharashtra is 1.62 million tonnes with productivity 891 kg/ha which covered nearly 1.82 million ha of area. Maharashtra contributes about 16.42 per cent share in total production of country. Chickpea grows best as a post-monsoon cool season crop in semi-arid regions of the sub-continent. It takes 80 to 170 days to mature. Optimum conditions for growth include 21 to 29°C nights and 18 to 26°C day's temperature with 600-1000 mm annual rainfall, Muehlbauer *et al.* [5]. In the dry land area, it fixes atmospheric nitrogen in the soil and helps in the management of soil fertility, Sharma and Jodha [7]. It plays a vital role in the diet of poor people which serves as a major source of vegetable protein for nutritionally balanced food. It has highest nutritional composition of dry edible grains containing vitamins, carbohydrates, proteins and minerals. It does not contain any anti-nutritional factor. It has

considerable amount of fat contents ranging between 3.8-10.2 per cent in different cultivars. After dehulling chickpea seed is valued for its high nutritive value, with 25.3 to 28.9 per cent protein contents, Muehlbauer and Rajesh [4] and Hulse [3]. In addition to source of proteins it has carbohydrate 38- 59 per cent, fiber 3 per cent, oil 4.8-5.5 per cent, ash 3 per cent, calcium 0.2 per cent, and phosphorus 0.3 per cent. Its protein and carbohydrate digestibility varies from 76 to 78 per cent and from 57 to 60 per cent, Hulse [3], Huisman and Vanderpoel [2]. Susceptibility of the crop to different biotic and abiotic stress. Abiotic stress is basically due to insufficient moisture. regarding biotic stresses, diseases, insect pest, nematodes and parasitic weeds account major losses for example, extend of yield loss due to wilt and root rot disease is far more in the event of drought high temperature in the country. The chickpea crop is attacked by 172 pathogen viz as 67 fungi, 22 viruses, 3 bacteria, 80 nematodes and mycoplasma from all over the world [6]. Root rot of chickpea caused by several pathogens have been described on chickpeas. Wilt complex in chickpea is caused by several pathogens however, *Sclerotium rolfsii*, *Rhizoctonia solani* (kuhn), *F. oxysporum* f. sp. ciceri have been considered as the major pathogens. The disease can appear at any stage of plant growth, symptoms in a highly susceptible cultivar can develop any time between 25 days after sowing till as late as vegetative stage [6].

MATERIAL AND METHODS

A survey was carried out for recording the incidence of chickpea wet root rot caused by *Rhizoctonia solani* (kuhn) during Rabi 2014-15 in Aurangabad, Beed, Hingoli, Jalna, Latur, Nanded, Osmanabad and Parbhani districts of Marathwada region (Maharashtra State) and Variety wise disease incidence of wet root rot chickpea was noticed in all the places surveyed on commonly grown varieties as mentioned On an average 08 farmer's field of chickpea in each district were visited and the percent wet root rot disease incidence was recorded by counting total chickpea plant in 1x1m² area and total wet root rot infected plants in that area. Chickpea plants showing typical symptoms were collected in separate paper bags and brought to the laboratory for investigations. The intensity of disease was noted by counting at least 400 plants in each field. *Rhizoctonia solani* showed characteristic white, radiating, abundant mycelial growth on the affected portion of chickpea crop. Large number of white mycelia growth initiation was noticed on the mycelial mat. Initially white colour and later turned to brown, sclerotia were seen on the affected parts.

RESULTS AND DISCUSSION

A survey was carried out for recording the incidence of chickpea wet root rot caused by *Rhizoctonia solani* during Rabi 2014-15 in Aurangabad, Beed, Hingoli, Jalna, Latur, Nanded, Osmanabad and Parbhani districts of Marathwada region (Maharashtra State) and the results obtained are presented in (Table 1, 2, 3).

Statues of Wet root rot in Marathwada.

District-wise seasonal incidence

Incidence of wet root rot chickpea was noticed in all the places surveyed on commonly grown varieties as mentioned in Table 1. In Marathwada region, the wet root rot incidence was recorded in the range of 6.5 to 20.5 per cent, highest incidence of wet root rot (20.5 %) was noticed at Panbusi, Kandhar Tahsil (District Nanded) and Average (Max.) wet root rot disease incidence in Nanded district was 16.50 and minimum disease incidence (6.5 %) was recorded at Pirsawangi, (Jalna district) and Average (Mini.) wet root rot disease incidence was 08.36 in jalna district.

Table 1: Disease incidence of chickpea wet root rot of Marathwada region.

Sr. No.	Aurangabad	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
	Village							
1	Kangaon	Gangapur	Local	Black cotton soil	Bajra	Seedlings	4	15.0
2	Anapur	Gangapur	Vijay	Medium soil	Soybean	Seedlings	2	12.0
3	Andhaner	Kannad	Digvijay	Light soil	Bajra	Seedlings	3	13.0
4	Ambala	Kannad	Vijay	Light soil	Soybean	Seedlings	4	11.5
5	Ambala	Kannad	Vijay	Black cotton soil.	Maize	Seedlings	2	15.5
6	Indapur	Khultabad	Local	Medium soil.	Soybean	Seedlings	2	14.0
7	Indapur	Khultabad	Vijay	Light soil.	Soybean	Seedlings	3	13.0
8	Aland	Fulambri.	Vijay	Black cotton soil.	Bajra	Seedlings	3	14.5
Average mean of disease incidence of Aurangabad district								13.56 %

	Beed	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
	Village							
9	Nathara	Parali	Local	Medium soil.	Soybean	Seedlings	2	10.0
10	Nathara	Parali	Local	Medium soil.	Bajra	Seedlings	1	10.0
11	Amalner	Patoda	Vijay	Black cotton soil	Bajra	Seedlings	4	12.5
12	Bhayal	Patoda	Vijay	Medium soil.	Soybean	Seedlings	3	09.5
13	Anadgaon	Shirur	Vijay	Medium soil.	Maize	Seedlings	2	10.0
14	Telgaon	Gevarai	Local	Medium soil.	Bajra	Seedlings	1	09.0
15	Telgaon	Gevarai	Local	Medium soil.	Bajra	Seedlings	2	11.0
16	Sondhana	Aashti.	Local	Light soil	Bajra	Seedlings	1	08.5
Average mean of disease incidence of Beed district								10.06 %
Sr. No.	Hingoli	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
	Village							
17	Sakhra	Sakhra	Vijay	Black Cotton soil	Soybean	Seedlings	3	16.5
18	Vatkali	Sengaoon	Vijay	Light soil	Soybean	Seedlings	1	09.5
19	Kolsa	Sengaoon	Local	Light soil	Soybean	Seedlings	1	11.0
20	Kesapur	Vasmatnagar	Local	Medium soil.	Bajra	Seedlings	2	14.5
21	Akurka	Vasmatnagar	Local	Black Cotton soil	Soybean	Seedlings	2	16.0
22	Jawala	Hingoli	Local	Medium soil.	Bajra	Seedlings	3	15.0
23	Jawala	Hingoli	Vijay	Black Cotton soil	Soybean	Seedlings	1	17.0
24	Jawala	Jawala	Vijay	Medium soil.	Soybean	Seedlings	2	13.5
Average mean of disease incidence of Hingoli district								14.25 %
	Jalna	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
Sr. No.	Village							
25	Somthana	Badnapur	Local	Medium soil	Bajra	Seedlings	4	9.0
26	Nidhana	Badnapur	Local	Light soil	Soybean	Seedlings	3	7.5
27	Dawalwadi	Badnapur	Local	Medium soil	Soybean	Seedlings	3	9.0
28	Nanewadi	Jalna	Vijay	Black cotton soil	Bajra	Seedlings	4	8.0
29	Mapegaon	Jalna	Virat	Black cotton soil	Soybean	Seedlings	3	9.4
30	Pirswangi.	Jalna	Local	Medium soil	Bajra	Seedlings	4	6.5
31	Rajewadi	Jalna	Vijay	Light soil	Maize	Seedlings	2	9.0
32	Khasgaon	Jaffrabad.	Local	Medium soil	Bajra	Seedlings	2	8.5
Avreage mean of disease incidence of Jalna district								8.36 %

Sr. No.	Latur	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
	Village							
33	Aalagwadi	Chakur	Local	Light soil	Maize	Seedlings	2	09.0
34	Ahamadpur	Anjani	Vijay	Black cotton soil	Bajra	Seedlings	4	10.0
35	Ahamadpur	Anjani	Local	Light soil	Soybean	Seedlings	3	09.0
36	Atala	Devani	Vijay	Black cotton soil.	Bajra	Seedlings	2	11.0
37	Dari	Devani	Local	Light soil	Bajra	Seedlings	1	08.5
38	Ajnur	Jalkot	Vijay	Medium soil.	Bajra	Seedlings	2	10.5
39	Gondi	Jalkot	Local	Medium soil	Soybean	Seedlings	3	09.0
40	Adilgaon	Renapur	Digvijay	Light soil	Bajra	Seedlings	1	08.5
Avreage mean of disease incidence of Latur district								09.43 %
	Nanded	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
Sr. No.	Village							
41	Panbusi	Kandhar	Local	Black Cotton soil	Bajra	Seedlings	4	20.5
42	Amulga	Kandhar	Vijay	Medium soil.	Soybean	Seedlings	2	18.0
43	Biloli	Biloli	Local	Black Cotton soil	Bajra	Seedlings	1	16.0
44	Badul	Biloli	Digvijay	Black Cotton soil	Maize	Seedlings	1	15.5
45	Gordha	Umari	Vijay	Medium soil.	Bajra	Seedlings	2	11.5
46	Pardha	Kinwat	Local	Medium soil.	Bajra	Seedlings	3	12.0
47	Raywadi	Loha	Virat	Black Cotton soil	Maize	Seedlings	3	20.0

48	Makpuri	Loha	Vishal	Black Cotton soil	Maize	Seedlings	2	18.5
Average mean of disease incidence of Nanded district								16.5 %
Sr. No.	Osmanabad	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
	Village							
49	Adsulwadi	Kalamb	Local	Light soil	Green gram	Seedlings	1	12.0
50	Adsulwadi	Kalamb	Local	Light soil	Green gram	Seedlings	1	11.0
51	Umra	Kalamb	Vijay	Medium soil.	Bajra	Seedlings	3	13.5
52	Kadhi	Tuljapur	Local	Light soil	Soybean	Seedlings	2	10.5
53	Kadhi	Tuljapur	Digvijay	Medium soil.	Green gram	Seedlings	2	13.0
54	Asuri	Paranda	Vijay	Light soil	Bajra	Seedlings	1	12.0
55	Asuri	Paranda	Local	Light soil	Bajra	Seedlings	3	11.0
Average mean of disease incidence of Osmanabad district								11.88%
Sr. No.	Parbhani	Tahsil	Variety	Soil Type	Previous crop	Stage of Crop	Area (acres)	Disease Incidence (%)
	Village							
56	Antervali	Gangakhed	Local	Black Cotton soil	Bajra	Seedlings	2	14.0
57	Ilegaon	Gangakhed	Vijay	Black Cotton soil	Soybean	Seedlings	1	15.5
58	Asegaon	Jintur	Local	Medium soil.	Soybean	Seedlings	2	13.0
59	Idoli	Jintur	Digvijay	Medium soil.	Soybean	Seedlings	3	13.0
60	Kadsavangi	Jintur	Virat	Black Cotton soil	Bajra	Seedlings	3	14.6
61	Kasar	Pathari	Local	Black Cotton soil	Soybean	Seedlings	2	15.0
62	Ukhalikurd	Manvat	Vijay	Light soil	Soybean	Seedlings	2	11.5
Average mean of disease incidence of Parbhani district								13.8 %

Table 2: District wise disease incidence and its range of chickpea wet root rot

Sr. No.	Name of District	Average wet root rot disease incidence (%)	Range (%)
1	Aurangabad.	13.56	11.5 to 15.0
2	Beed	10.06	08.5 to 12.5
3	Hingoli	14.25	09.5 to 17.0
4	Jalna.	08.36	06.5 to 09.4
5	Latur	09.43	08.5 to 11.0
6	Nanded	16.50	11.5 to 20.5
7	Osmanabad	11.88	10.5 to 13.5
8	Parbhani	13.80	11.5 to 15.5

Variety-wise seasonal incidence

During Rabi 2014-15 (Table 3), amongst different 62 field location of Marathwada region, Vijay variety shown 12.02 % average incidence of wet root rot, Virat (17.3 %), Vishal (18.1 %), Digvijay (12.6 %) and Local varieties were shown the highest average wet root rot incidence i.e. 12.07 per cent. It indicated that, in occurrence of disease and its incidences were not shown much more difference amongst currently cultivated varieties including local.

Results of the present study on wet root rot of chickpea incidence are in consonance with the earlier reports of various workers.

Table 3: Variety wise chickpea wet root rot disease incidence

Sr. No.	Variety→	Vijay	Virat	Vishal	Digvijay	Local
	↓Districts					
1	Aurangabad	13.3(5)	--	--	13.00 (1)	14.4 (2)
2	Beed	10.6 (3)	--	--	--	9.6 (5)
3	Hingoli	14.1 (4)	--	--	--	14.1 (4)
4	Jalna.	8.8(3)	--	--	--	8.5(5)
5	Latur	10.3 (3)	--	--	8.5(1)	8.8(4)
6	Nanded	14.7 (2)	20.0 (1)	18.5 (1)	15.5(1)	16.1(3)
7	Osmanabad	12.7 (2)	--	--	13.0(1)	11.1 (4)
8	Parbhani	13.5 (2)	14.6 (1)	--	13(1)	14 (3)
Mean Incidence		12.2 (24)	17.3(2)	18.5(1)	12.6(5)	12.07(30)

Figures in parenthesis are total locations surveyed of particular variety in each district.

CONCLUSIONS

Survey for recording chickpea Wet root rot disease incidence was undertaken in Marathawada region. The highest disease incidence was observed in Nanded district and lowest in Jalna district. *Rhizoctonia solani* is one of the most destructive pathogen causing Wet root rot diseases in Chickpea and there by inflicting accountable yield losses. Survey report in Marathawada region showed that the Wet root rot of Chickpea was severe during *Rabi* 2014-15 in wet land soil.

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