

Original Research Article

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## Status of Chickpea Wilt caused by *Fusarium oxysporum* f. sp. *ciceri* in Marathwada Region of Maharashtra State

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### ABSTRACT

Chickpea (*Cicer arietinum* L.) is one of the important *rabi* pulse crop grown in Marathwada region of Maharashtra state. Among various diseases, wilt caused by *Fusarium oxysporum* f. sp. *ciceri* is major devastated disease of chickpea causing losses to the tune of 100 per cent in severe condition. Survey was conducted and chickpea wilt disease incidence were recorded during, the *rabi* seasons of 2018-19 and 2019-20, covering 150 and 162 chickpea fields, respectively from 51 tahsils under 08 districts, which are distributed under three agro-climatic zones *viz.*, scarcity zone, assured Rainfall Zone and moderately high rainfall zone of the Marathwada region of Maharashtra state. In the two cropping season the mean incidence of chickpea wilt was recorded in each district and it was found maximum in Hingoli district (33.06%), followed by Nanded (29.24 %), Beed (27.90 %), Latur (25.12 %), Aurangabad (24.41 %), Parbhani (23.17 %) and Jalna (22.20 %) districts of Marathwada region, whereas, the minimum disease incidence was recorded in the Osmanabad (21.50 %) district. Present study showed that chickpea wilt is highly distributed in all the surveyed areas of Marathwada region of Maharashtra state. Variety wise incidence were recorded in Marathwada region where the average mean incidence was more on local cultivar (46.50 %) followed by BDN 9-3 (35.34 %). However, the minimum incidence of chickpea wilt was recorded on variety Rajvijay 202 and Rajvijay 203.

#### Keywords

Chickpea, Survey, Wilt, Incidence, Marathwada

#### Article Info

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### Introduction

Chickpea (*Cicer arietinum* L.) is the world's third most important pulse widely grown in many subtropical and warm-temperate regions. In India, Chickpea was cultivated on an area of 106 lakh hectares with a production of 111 lakh tonnes and productivity of 1056 kg/ha. Total area of 20.38 lakh ha was under chickpea cultivation in Maharashtra with

production of 17.29 lakh tones and productivity 848.55 kg/ha during 2019-20. In Marathwada, Chickpea was cultivated on an area of 10.59 lakh hectares with a production of 7.96 lakh tones and productivity of 707.56 kg/ha.

Amongst the several biotic and abiotic constraints responsible for low productivity of chickpea, diseases are the most serious

constraints causing up to 100 per cent losses of crop. The crop is infected by 172 causal agents of biotic stresses, about 67 fungi, 3 bacteria, 22 viruses and 80 nematodes reported from 55 countries of the world (Nene *et al.*, 1996).

*Fusarium* wilt results in major economic losses ranging from 10-40% worldwide (Nene *et al.*, 1984). It causes 100% loss under specific conditions (Jalali and Chand, 1992) and at particular growth stages of crop like vegetative and reproductive (Halila and Strange, 1996). The wilt caused by *Fusarium oxysporum* f.sp. *ciceri* is most devastated, widespread and important throughout the world (Gupta *et al.*, 1997).

It infects chickpea crop with more incidence at flowering and pod forming stage, if the crop is subjected to sudden temperature rise and water stress (Chaudhry *et al.*, 2007). In India, it is estimated that 10% yield losses were caused annually under certain conditions it may go up to 60% (Singh *et al.*, 2007).

The incidence was varied from 14 to 32 per cent in different states as reported by Dubey *et al.*, (2010) and 72.16 per cent as recorded by Kumar and Bourai (2012). Chickpea wilt caused by *Fusarium oxysporum* f. sp. *ciceris* is one of the important disease and causes up to 90% losses depending on weather conditions (Venkataramanamma *et al.*, 2018). In early stage of crop wilt incidence is 77–94% whereas, late wilting 24–65% was observed (Sunkad *et al.*, 2019). Considering the losses caused by wilt disease of chickpea, the present study was undertaken to study the present status of chickpea wilt in Marathwada region of Maharashtra state.

## Materials and Methods

A roving survey of farmers chickpea fields was conducted in the agro-climatic zones of

Marathwada region of Maharashtra state during *Rabi* 2018-19 and 2019-20, to estimate disease incidence and collection of chickpea plants infected with wilt caused by *Fusarium oxysporum* f. sp. *ciceri*. Chickpea growing areas were identified from the records available at the office of Sub-Divisional Agriculture Officers of the respective districts. Roving survey was undertaken during the months of December to January when the chickpea crop was at various stages of growth such as flowering and pod formation and pod development stage.

For this purpose, chickpea growing areas of all the eight districts of Marathwada were surveyed. From the chickpea cropped fields surveyed, total number of chickpea plants / two rows was counted, of which wilt suspected plants were counted separately to calculate per cent wilt incidence. About five wilted chickpea plants / field were carefully uprooted, collected in paper bags, labelled with details and brought to the laboratory for further studies. During survey, various kinds of symptoms expressed by wilted chickpea crop plants were recorded. Based on numerical data obtained in respect of total number of chickpea plants and wilted plants per field surveyed, per cent wilt incidence was calculated by applying following formula as suggested by Mayee and Datar(1986).

$$\text{Wilt incidence (\%)} = \frac{\text{Total number of wilted plants}}{\text{Total number of plants observed}} \times 100$$

## Results and Discussion

The survey on incidence of chickpea wilt was carried out from eight districts of Marathwada region of Maharashtra state with geographical area covered three agro-climatic zones, 150 and 160 chickpea crop fields, during *Rabi* 2018-19 and 2019-20 seasons.

**District wise Chickpea wilt incidence in Agro climatic zones of Marathwada region of Maharashtra**

Results presented in Table 1 revealed that maximum average chickpea wilt incidence during *Rabi* 2018-19 and 2019-20 were found in Hingoli (34.12 and 32.00 %) followed by Beed (29.12 and 26.67 %), Nanded (29.03 and 29.44 %), Latur (23.92 and 26.31 %), Aurangabad (22.32 and 26.49 %), Parbhani (20.77 and 25.56 %), Osmanabad (20.71 and 22.28 %) and Jalna (20.48 and 23.92 %), respectively. The overall average of both the years indicated that the highest disease

incidence was recorded in Hingoli district (33.06%), whereas, minimum disease incidence was recorded in Osmanabad district (21.50 %).

The pooled mean (*Rabi*, 2018-19 and 2019-20) results (Fig. 1) revealed that maximum mean per cent incidence of chickpea wilt was recorded in Hingoli district (33.06%), followed by Nanded (29.24 %), Beed (27.90 %), Latur (25.12 %), Aurangabad (24.41 %), Parbhani (23.17 %) and Jalna (22.20 %) districts of Marathwada region, whereas, the minimum disease incidence was recorded in the Osmanabad (21.50 %) district.

**Table.1** District wise survey of Chickpea wilt incidence in Agro climatic zones of Marathwada region during *Rabi* 2018-2019 and *Rabi* 2019-2020

Sr. No.	District	No. of Location		Avg. Disease Incidence (per cent)		Mean Per cent disease Incidence
		2018-19	2019-20	2018-19	2019-20	
1	Aurangabad	24	31	22.32	26.49	24.41
2	Jalna	23	24	20.48	23.92	22.20
3	Parbhani	26	26	20.77	25.56	23.17
4	Hingoli	18	19	34.12	32.00	33.06
5	Nanded	14	13	29.03	29.44	29.24
6	Latur	10	11	23.92	26.31	25.12
7	Osmanabad	16	15	20.71	22.28	21.50
8	Beed	19	21	29.12	26.67	27.90
<b>Grand Mean</b>		<b>150</b>	<b>160</b>	<b>25.06</b>	<b>26.58</b>	<b>25.83</b>

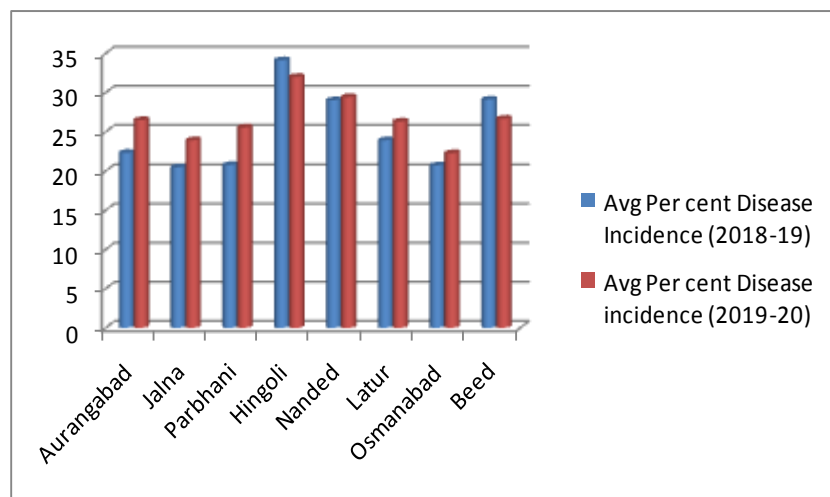
**Table.2** Agro-climatic zone wise disease incidence of chickpea wilt in Marathwada region of Maharashtra state during *Rabi* 2018-19 and *Rabi* 2019-2020

Sr. No.	Agro-climatic Zone	<i>Rabi</i> 2018-19		<i>Rabi</i> 2019-20		Mean Per cent disease Incidence
		No. of Location	Per centdisease Incidence	No. of Location	Per cent disease Incidence	
1	Scarcity zone	18	19.36	20	22.11	20.74
2	Assured rainfall Zone	110	25.12	118	26.18	25.65
3	Moderate rainfall Zone	22	29.28	22	30.60	29.94
<b>Over all mean of region</b>		<b>150</b>	<b>24.59</b>	<b>162</b>	<b>26.30</b>	<b>25.44</b>

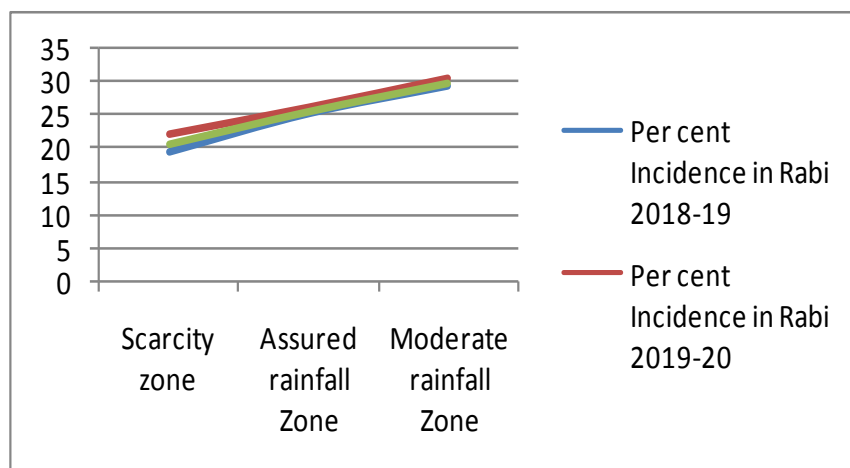
**Table.3** Variety wise incidence of Chickpea wilt in agro climatic zones of Marathwada region during *Rabi* 2018-19 and *Rabi* 2019-20

Sr. No.	Chickpea Varieties	No. of Location		Avg. disease Incidence (per cent)		Mean Per cent Incidence
		2018-19	2019-20	2018-19	2019-20	
1	BDNG 797	20	12	17.90	18.58	18.24
2	BDN 9-3	5	6	34.00	36.67	35.34
3	Vijay	18	10	20.56	19.30	19.93
4	Vishal	11	11	21.55	20.09	20.82
5	Digvijay	15	11	22.73	19.27	21.00
6	Phule G 12	8	5	26.88	19.00	22.94
7	JAKI 9218	20	20	32.00	21.25	26.63
8	Rajvijay 202	8	6	11.88	09.33	10.61
9	Rajvijay 203	6	6	11.33	11.67	11.50
10	Vishwas	6	4	36.25	18.75	27.50
11	SAKI 9516	4	6	32.50	20.83	26.67
12	PhuleVikram	8	4	17.75	19.00	18.38
13	Local	4	5	49.00	44.00	46.50
14	BDNGK 798	5	5	23.10	14.00	18.55
15	Virat	10	5	22.60	22.60	22.60
16	PKVKabuli 2	5	4	25.75	17.50	21.63
17	Krupa	4	6	23.67	16.33	20.00
18	Dolar	6	8	24.30	16.25	20.28
<b>Grand Mean</b>		<b>167</b>	<b>134</b>	<b>24.65</b>	<b>19.42</b>	<b>22.31</b>

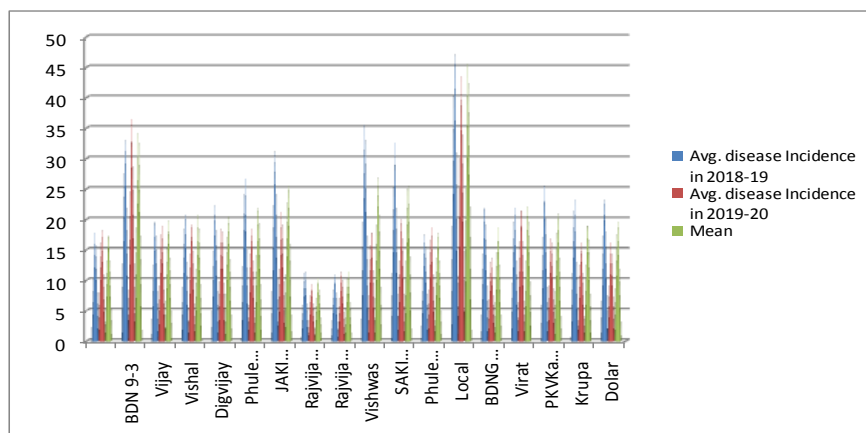
**Fig.1** District wise survey of Chickpea wilt incidence in Agro climatic zones of Marathwada region during *Rabi* 2018-2019 and *Rabi* 2019-2020



**Fig.2** Agro-climatic zone wise disease incidence of chickpea wilt in Marathwada region



**Fig.3** Variety wise incidence of Chickpea wilt in agro climatic zones of Marathwada



**Agro-climatic zone wise disease incidence of chickpea wilt in Marathwada region of Maharashtra**

The data presented in Table 2 revealed that chickpea wilt disease incidence was found maximum in Moderate rainfall zone (29.28 and 30.60 %) followed by Assured rainfall zone (25.12 and 26.18 %) respectively, during *Rabi* 2018-19 and 2019-20. However, minimum disease incidence was recorded in Scarcity zone (19.36 and 22.11 %) during *Rabi* 2018-19 and 2019-20.

**Variety wise incidence of Chickpea wilt in agro climatic zones of Marathwada region**

Result (Table 3 and Fig. 3) revealed that maximum chickpea wilt disease incidence was found on Local variety (49.00 and 44.00 %) during *Rabi*, 2018-19 and 2019-20 respectively, followed by Phule G-5 (36.25%), BDN 9-3 (34.00 %), SAKI 9516 (32.50 %), JAKI 9218(32.00 %) and minimum wilt disease incidence was found in variety Rajvijay 203 (11.33 %) during *Rabi* 2018-19. While during *Rabi* 2019-20,

maximum chickpea wilt disease incidence was found in BDN 9-3 (36.67 %) followed by Phule G 95418 (22.60 %), JAKI 9218(21.25 %), SAKI 9516 (20.83 %) and minimum wilt disease incidence was found in variety Rajvijay 202 (9.33 %) during *Rabi* 2019-20.

The results (Fig. 3) revealed that pooled per cent mean incidence of chickpea wilt during *Rabi*, 2018-19 and 2019-20 was recorded maximum on Local variety (46.50 %) followed by BDN 9-3 (35.34 %) and Vishwas (27.50%), whereas, it was minimum on Rajvijay 202 (10.61 %) and Rajvijay 203 (11.50 %).

These results obtained in the present studies on occurrence, distribution, yield loss and survey of chickpea wilt caused by *Fusarium oxysporum* f.sp. *ciceri* are similar to those reported earlier by several workers on chickpea and other crops.

Studies carried by Ghosh *et al.*, (2013) on survey during *Rabi*2010-2011 to find information on the occurrence and distribution chickpea diseases in respect to soil type, cultivar, seed treatment in central and Southern parts of India. It was revealed that local cultivars transcendent in most farmer's fields (25 to 48%), whereas, 63 % of the farmers were practices seed treatment with fungicide and reported the incidence of chickpea wilt disease ranged from 9.7 to 13.8 %.Nikam *et al.*, (2011) conducted survey on chickpea wilt in Tashils of Latur district and described the average wilt incidence to the tune of 12.26 % with maximum wilt incidence was found in AUSA (15.4 %).

Aforesaid variation in wilt incidence and wide spread nature of disease have been reported by earlier worker like Nema and Khare (1973), Trapero-Casas and Jimenez-diaz (1985), Jalali and Chand (1992),Navas-Cortes *et al.*, (2000), Reddy (2002), Jadhav *et al.*,

(2006), Pitambar *et al.*, (2010), Abera *et al.*, (2011), Jendoubi *et al.*(2017), Singh *et al.*(2017), Mulekar *et al.*, (2017), V. Govardhan Rao *et al.*, (2019) and Yimer *et al.*, (2018).

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