



# Surveillance of Chickpea Wilt Caused by *Fusarium oxysporum* f. sp. *Cicer*

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## ABSTRACT

Chickpea (*Cicer arietinum* L.) is one of the important rabi pulse crop grown in Vindhya region of Madhya Pradesh. Among vascular wilt caused by *Fusarium oxysporum* f. spp. *ciceri* is major devastated disease of chickpea causing losses to the tune of 100 per cent in severe condition. A survey was conducted and chickpea wilt disease incidence were recorded during the *rabi* seasons of 2020-21 and 2021-22, covering 120 chickpea fields from 25 block under 05 districts distributed under three agro-climatic zones viz., scarcity zone, assured rainfall zone and moderately high rainfall zone of the Vindhya region of Madhya Pradesh. In the two cropping season the mean incidence of chickpea wilt was recorded in each district was found maximum in Panna district (14.9%) followed by Katni (12.95.24 %) and Sidhi (12.25 %) and the minimum disease incidence was recorded in Satna (10.83 %) followed by Rewa (11.78%) districts of Vindhya region. Present study showed that chickpea wilt was highly distributed in all the surveyed areas of Vindhya region of Madhya Pradesh.

**Key Words:** Survey, Vascular wilt, Chickpea, Disease incidence

## INTRODUCTION

Chickpea comprises of two main types; one desi type with small and brown seed accounts for nearly 90 per cent and kabuli type with bold and cream-colored seed, grown in around 10 percent area. Satna is the major chickpea growing district as compared to Vindhya region of Madhya Pradesh. Satna rank seventh in both area (1.9 lakh ha.) and production (127 Mt) and the average productivity is 1162 kg /ha.in Vindhya region (Anonymous, 2018). Fifty different pathogens have so far been reported on chickpea (Nene *et al*, 1989) including diseases caused by fungal, bacterial, nematodes mycoplasma and viral pathogen. The chickpea wilt caused by *Fusarium oxysporum* f. sp. *ciceri* was reported to be widely distributed in near about 32 countries of the world and at national scenario; six fungal diseases have been reported to be important and causing considerable damage to the crop (Nene *et al*, 1996).

Considering the variable types of wilt reactions of the released variety in the farmer's field and sick

plot at different locations and yield losses caused, the investigations were undertaken to find out the major causal organism involved in chickpea wilt complex in Vindhya region of the Madhya Pradesh state. Survey and surveillance of chickpea wilt complex incidence on farmer's field, collection, isolation, purification and pathogenicity of wilt pathogen was done.

## MATERIALS AND METHODS

A roving survey of farmers chickpea fields was conducted in the agro-climatic zones of Vindhya region of Madhya Pradesh during Rabi 2020-21 and 2021-22, 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.

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**Table 1. Survey and surveillance to record chickpea wilt on farmer's field.**

Sr. No.	Name of district	Number of location	Location
1	Satna	25	Majhgawan, Birsinghpur, Sohawal ,Nagoud , Unchehra
2	Rewa	25	Patauna ,Raura,Hanumana, Jawa, Mauganj, Naigarhi
3	Sidhi	25	Churhat,Kushmi,Majhauri,Sihawal, Rampur naikin
4	Panna	20	Ajaigarh,Amanganj, Devendranagar, Gunnor
5	Katni	25	Badwara, bahoriband, Barhi, Dhimarkhed, Murwara

For this purpose, chickpea growing areas of all the five districts of Vindhya region 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)

## RESULTS AND DISCUSSION

### Disease intensity in district Satna

Among 120 locations, none of the surveyed villages were found free from the disease. In the year 2020-21, the minimum disease intensity was recorded in Majhgawan (9.2 %) followed by Nagoud (10.4%) and Birsinghpur (10.5 %) and maximum intensity was recorded in Unchehra (11.8 %), followed by Shohawal (11.5%) in Satna district. In the year 2021-22, the minimum disease intensity was recorded in Majhgawan (10.2 %) followed by Unchehra( 10.5%) and Shohawal (10.8 %) and maximum intensity was recorded in Nagoud (12.1 %), followed by Birsinghpur(11.3 %) at Satna district.

### Panna district

In the year 2020-21, the minimum disease intensity was recorded in Devendranagar(13.5 %) followed by Ajaigarh(14.3 %) and maximum disease intensity was recorded in Gunnor (16.5%), followed by Amanganj (15.5 %) at Panna district. In the year 2021-22, the minimum disease intensity was recorded in Ajaigarh(13.5 %) followed by (8.33 %) and Devendranagar (14.5 %) and the maximum disease intensity was recorded in Amanganj (16.2 %), followed by Gunnor(15.2 %), at Panna district.

### Rewa district

In the year 2020-21, the minimum disease intensity was recorded in Raura(10.9 %) followed by Patuwara(11.2 %) and Naigarhi(11.8 %) and the maximum disease intensity was recorded in Mauganj, (12.2 %), followed by Hanumana at Rewa district. In the year 2021-22, the minimum disease intensity was recorded in Raura, (11.5 %) followed by Naigarh(11.5 %) and Hanumana, (11.6 %). While the maximum disease intensity was recorded in Patuwara(12.5 %), followed by Mauganj(12.5 %) at Rewa district.

### Sidhi district

In the year 2020-21, the minimum disease intensity was recorded in Majhauri (10.8 %) followed by Sihawal, (11.3 %) and churhat (11.5%). While the maximum disease intensity was recorded in Kushmi( 12.5 %), followed by Rampur naikin (12.3 %). In the year 2021-22, the minimum disease intensity was recorded in Majhauri(11.4 %) followed

**Table 2. incidence of Vascular wilt of chickpea during 2020-21 and 2021-22 at different locations.**

Sr.No.	District	Block	Average % of wilt in each block		Mean
			2020-21	2021-22	
1.1	Satna	Majhgawan	9.2	10.2	9.70
1.2		Sohawal	11.5	10.8	11.15
1.3		Nagoud	10.4	12.1	11.25
1.4		Unchehra	11.8	10.5	11.15
1.5		Birsinghpur	10.5	11.3	10.90
	Average		10.68	10.98	10.83
2.1	Panna	Ajaigarh	14.3	13.5	13.9
2.2		Amanganj	15.5	16.2	15.85
2.3		Devendranagar,	13.5	14.5	14
2.4		Gunnor	16.5	15.2	15.85
	Average		14.95	14.85	14.9
3.1	Rewa	Patauna	11.2	12.5	11.85
3.2		Raura	10.9	11.5	11.2
3.3		Hanumana	12.1	11.6	11.85
3.4		Mauganj,	12.2	12.5	12.35
3.5		Naigarhi	11.8	11.5	11.65
	Average		11.64	11.92	11.78
4.1	Sidhi	Rampur naikin	12.3	13.5	12.9
4.2		Churhat	11.5	12.2	11.85
4.3		Kushmi	12.5	14.5	13.5
4.4		Majhauri,	10.8	11.4	11.1
4.5		Sihawal	11.3	12.5	11.9
	Average		11.68	12.82	12.25
5.1	Katni	Badwara,	13.2	13.5	13.35
5.2		Bahoriband	12.5	13.8	13.15
5.3		Barhi	11.6	13.9	<b>12.75</b>
5.4		Dhimarkhed,	12.5	14.3	<b>13.4</b>
5.5		Murwara	11.5	12.7	<b>12.1</b>
	Average		12.26	13.64	12.95

by Churhat(12.2 %) and Sihawal (12.5%).While the maximum disease intensity was recorded in Kushmi(14.5 %), followed by Rampurnaikin(13.5 %)at Sidhi district.

In the year 2020-21, the minimum disease intensity was recorded in Murwara (11.5 %) followed by Barah (11.6 %). While the maximum disease intensity was recorded in Badwara (13.2%),

followed by Bahoriband (12.5%) and Dhimerkheda (12.5 %). In the year 2021-22, the minimum disease intensity was recorded in Murwara (11.4 %) followed by Badwara(13.5 %).While the maximum disease intensity was recorded in Dhimerkheda (14.3 %), followed by Barhi (13.9 %) and Bahoriband (13.8 %) at Katni district.

**Table 3. District wise percentage disease intensity of Vascular wilt of chickpea in Vindhya region of Madhya Pradesh.**

Sr. No.	Name of district	Number of location traversed	Average % of wilt in each district		Mean
			2020-21	2021-22	
1	Satna	05	10.5	11.30	10.90
2	Rewa	05	11.64	11.92	11.78
3	Sidhi	05	11.68	12.82	12.25
4	Panna	04	14.95	14.85	14.90
5	Katni	05	12.26	13.64	12.95
	Average	24	12.61	12.56	12.59



During 2020-21, the disease intensity was recorded in Satna district (10.5 %) followed by Rewa, (11.92 %), Sidhi (11.68 %), Katni (14.85%) and Panna (14.95 %) and the year 2021-22, the disease intensity was recorded in Satna, (11.30 %) followed by Rewa, (11.92 %), Sidhi (12.82%), Katni 13.64% and Panna (14.85 %) at Vindhya Region Madhya Pradesh. These results obtained in the present studies on occurrence, distribution, yield loss and survey of chickpea wilt caused by *Fusarium oxysporum* f.sp. *ciceri* were similar to those reported earlier by Ghosh *et al* (2013) during Rabi 2010-2011 to find information on the occurrence and distribution of 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 farmers' fields (25 to 48%), whereas, 63 % of the farmers were practicing seed treatment with fungicide and reported the incidence of chickpea wilt disease ranged from 9.7

to 13.8 % (Nikam *et al*, 2011). Aforesaid variation in wilt incidence and wide spread nature of disease have been reported by earlier workers like Mulekar *et al* (2017), Govardhan Rao *et al* (2019) and Yimer *et al* (2018).

### CONCLUSION

In the two cropping seasons the mean incidence of chickpea wilt was recorded in each district was found maximum in Panna district (14.9%) followed by Katni (12.95.24 %) and Sidhi (12.25 %) and the minimum disease incidence was recorded in Satna (10.83 %) followed by Rewa (11.78%) districts of Vindhya region. Present study showed that chickpea wilt was highly distributed in all the surveyed areas of Vindhya region of Madhya Pradesh.

### REFERENCES

Anonymous (2018). *Agricultural Statistics at a glance*. Department of Agricultural Govt. of India, New Delhi.

- Ghosh R, Sharma M, Telangre R and Pande S (2013). Occurrence and distribution of chickpea diseases in central and southern parts of India. *American J Pl Sci* **4** : 940-944.
- Gupta SK, Upadhyay JP and Ojha KH. (1997). Effect of fungicidal seed treatment on the incidence of chickpea wilt complex. *Ann Pl Prot Sci* **5** : 184- 187.
- Gupta OM, Khare MN, Kolasthane SR (1986). Variability among six isolates of *Fusarium oxysporum* f. sp. ciceri causing wilt of chickpea. *Indian Phytopath* **39** (1) : 279-281.
- Haware M P and Nene YL (1986). Influence of wilt at different stages on the yield loss in the chickpea. *Trop Grain legume Bull.* **19**: 38.
- Nene Y L, Shelia V K and Sharma S B (1996). *A world list of chickpea and Pigeon pea pathogens*. 5th Edn. Patancheru, Andhra Pradesh, India ICRISAT pp, 1- 28.
- Nikam P S, Jagtap G P and Sontakke P L (2011). Survey, surveillance and cultural characteristics of chickpea wilt caused by *Fusarium oxysporium* f. sp. ciceri. *African J Agric Res* **6**(7): 1913- 1917.
- Mulekar V G, Desai A G and Ambadkar C V (2017). Influence of hydrogen-ion concentration on variability in *Fusarium oxysporum* f. sp. ricini causing wilt of castor. *Multilogic in Science* **7** (23): 67-70.
- Govardhan Rao V, Dhutraj DN, Bhalerao SR, Apet KT, Ambadkar CV, Prasanna Kumar B, Daunde AT, Sontakke PL and Patil AG (2019). Investigation of genetic diversity in fusarium wilt of egg plant caused by *Fusarium oxysporum* f. Sp. melangene (Schlecht) Mutuo and Ishigami in Marathwada Region of Maharashtra, India. *Int J Curr Microbiol App Sci* **8**(7): 1079-1093.
- Singh D and Simon S (2017). Bio control potential of *Pseudomonas fluorescens* against *Fusarium* wilt of chickpea. *Prog Agri* **17**(1):47-51.
- Yimer S M, Ahmed S, Fininsac C, Tadessed N, Hamwiehe A and Douglas R Cookf (2018). Distribution and factors influencing chickpea wilt and root rot epidemics in Ethiopia. *Crop Prot* **106** :150–155.

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