



Survey of chickpea crops to assess the incidence of collar rot disease in Chhattisgarh state

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Abstract

The survey for the occurrence and severity of chickpea collar rot were undertaken at seedling and vegetative stage of the crop, from fifty seven locations in seven chickpea growing districts of Chhattisgarh state (Raipur, Dhamtari, Durg, Rajnandgaon, Kawardha, Bemetara and Mungeli) during *rabi* season 2016-17. The maximum mean disease incidence was recorded in Durg district 31.82 per cent followed by Mungeli district 21.88 per cent, Bemetara district 20.80 per cent and Raipur district 19.69 per cent. Minimum disease incidence was observed in district Kawardha 5.12 per cent.

Keywords: Chickpea collar rot, disease incidence, disease severity, field survey

Introduction

Chickpea (*Cicer arietinum* L.) is the world's third most important food legume after drybean and pea. India is the largest producer of chickpea, contributing more than 70 per cent of the total world production. Nearly 90 per cent of the area and production is from six states viz., Madhya Pradesh, Rajasthan, Maharashtra, Uttar Pradesh, Karnataka and Andhra Pradesh. Further, states like Jharkhand and Chhattisgarh are expanding their area and production of chickpea crop. In Chhattisgarh plains, chickpea is grown in mostly kanhar soil and particularly found in Durg, Rajnandgaon, Kawardha, Bilaspur and Raipur district. Various biotic and abiotic stresses affect stable and high yields of chickpea crop worldwide. Among the biotic stresses, collar rot caused by soil borne fungus *Sclerotium rolfsii* Sacc. is a major cause when weather conditions are conducive. Collar rot is a fast spreading and destructive disease of chickpea, causing seed rot and seedling mortality in the initial stage of crop growth up to 45 days. The mortality ranges from 54.7-95% in India (Kotasthane *et al.*, 1976) causing significant reduction in plant population. It has wide host range (Aycock, 1966 and Punja, 1988) [1, 5] and an omnivorous soil borne fungus, parasitizing root and collar region of the plant thus, producing wilt like symptoms. Generally, the disease is severe in loamy soil regions and more prevalent in paddy - chickpea or soybean - chickpea based cropping system, when soil moisture is high and temperature is warm at the seedling stage. Affected seedlings turn yellow and die. The seedlings generally collapse and show rotting at the collar region and below. Seedling mortality in chickpea due to *S. rolfsii* is the main problem in most of the tropical regions like Chhattisgarh. Therefore, intensive survey was conducted during *rabi* season, 2016-17, on the incidence of collar rot in chickpea growing seven districts of Chhattisgarh.

Material and Methods

An intensive survey was conducted during *rabi* season, 2016-17, on the incidence of collar rot in chickpea growing seven districts of Chhattisgarh. The field visits and collection of collar rot sample were undertaken during seedling and vegetative stages of the crop. The incidence of disease was recorded by random throwing of quadrat (1m²)

in 5 farmer's fields of the different villages. The number of healthy and diseased plants (Collar rot) was counted in quadrat and per cent disease incidence was calculated by using the following formula,

$$\text{Disease incidence (\%)} = \frac{\text{Number of diseased plants in quadrant}}{\text{Total number of plants in the quadrant}} \times 100$$

Each sample was kept in paper bag and tied with a rubber band and labeled immediately. Information pertaining to the locality, crop history, etc. was also obtained about the samples. Samples and roots were brought in the laboratory and analysed. The roots of affected plant showing the symptoms of collar rot were incised and isolation were made for the presence or absence of the causal agent.

Results and Discussion

The survey for the occurrence and severity of chickpea collar rot were undertaken at seedling and vegetative stage of the crop, from fifty seven locations in seven chickpea growing districts of Chhattisgarh state (Raipur, Dhamtari, Durg, Rajnandgaon, Kawardha, Bemetara and Mungeli) during January to February 2016-17. Observations were recorded from farmer's fields under natural condition.

Result presented in Table indicated that the disease occurred in all chickpea growing area of Chhattisgarh. Disease incidence ranged from 3.08 to 51.23 per cent. In respect to district, maximum disease incidence was recorded in Durg district of Chhattisgarh (31.82 per cent) consist of six locations followed by Mungeli district (21.88 per cent) undertaking six locations, Bemetara district (20.80 per cent) undertaking eight locations and Raipur district (19.69 per cent) with comparatively more area with thirteen locations. Minimum incidence (5.12 per cent) was found in district Kawardha with five locations, Dhamtari district (6.77 per cent) with nine loctions and Rajnandgaon district (9.39) with ten locations of Chhattisgarh. Variation was also observed in soil types. Red, yellow and black soil types were found in one, four and fifty five locations of Chhattisgarh respectively. Results presented in Table indicated that the maximum average disease incidence was recorded in black soil (16.77 per cent) followed by red soil

(15.85 per cent). Minimum disease incidence was recorded in yellow soil (9.27 percent).

Observations of disease incidence were also recorded on improved and local chickpea varieties. Improved varieties were found in Forty five locations while, local varieties found in twelve locations. Results presented in Table indicated that the disease incidence was more in local varieties (19.31 per cent) in comparison to improved varieties (15.40 per cent). The disease incidence was maximum in untreated seed (19.31 per cent) found in twelve locations as compare to treated seed (15.40 per cent) found in forty five locations. Results also indicated that the disease incidence was more in irrigated condition (19.45 per cent) found in forty one locations. While, in rainfed conditions in sixteen location disease incidence recorded was 7.94 per cent.

Gosh *et al.* (2013) conducted survey in 2010-2011 *rabi* cropping season to obtain information on the distribution and incidence of chickpea diseases in respect to soil type, cultivar used, seed treatment in central and southern parts of India. Collar rot diseases were found at all of the sites and incidence ranged from 7.1% - 10.5% respectively irrespective of cultivar type and locations. Kadam *et al.* (2011)^[3] conducted field surveys in the Marathwada region of Maharashtra to determine the prevalence of diseases on groundnuts, the pathogen associated with the disease and the performance of different groundnut cultivars against collar rot in the field. The results showed that maximum disease incidence occurred in Renapur Tahsil (17.8%), followed by Udgir (16.7%), Ausa (14.7%) and Latur (14.3%). The lowest disease incidence was recorded in Nilanga (8.9%).

Table 1: Incidence of collar rot of chickpea in different location of Chhattisgarh during *Rabi* 2016- 2017.

S. No.	District	Block	Village/ Location	Soil type	Seed type	Seed Treated/ Untreated	Rainfed/ Irrigated	% Disease Incidence
1	Raipur	Raipur	IGKV, Farm	Black	Improved (Experimental seed)	Treated	Irrigated	9.51
2			IPM, Field	Black	Improved (JG 9218)	Untreated	Irrigated	40.97
3			Dharampura	Black	Local	Untreated	Rainfed	8.22
4		Arang	Arang	Black	Local	Untreated	Irrigated	50.40
5			Lengadi	Yellow	Local	Untreated	Rainfed	12.18
6			Charoda	Yellow	Local	Untreated	Rainfed	6.47
7		Abhanpur	Hasda	Black	Improved (Vishal)	Untreated	Rainfed	3.08
8			Umarpoti	Black	Local	Untreated	Rainfed	10.88
9			Khurha	Black	Local	Untreated	Rainfed	21.47
10			Sonekali	Black	Local	Untreated	Irrigated	25.47
11			Alekhuta	Black	Local	Untreated	Irrigated	50.83
12			Sonpur	Black	Improved (JG 9218)	Untreated	Rainfed	9.27
13			Chatod	Black	Improved (JG 9218)	Untreated	Rainfed	7.27
14	Dhamtari	Dhamtari	Borda	Black	Improved (JG 9218)	Treated	Irrigated	5.73
15			Ghatha	Black	Improved (JG 9218)	Untreated	Rainfed	8.55
16			Kharinga	Black	Improved (JG 9218)	Untreated	Rainfed	4.35
17			Shankardah	Black	Improved (JG 9218)	Untreated	Rainfed	3.97
18		Kurud	Gobra	Black	Improved (JG 9218)	Treated	Rainfed	5.64
19			Kosmarra	Black	Local	Untreated	Rainfed	8.83
20		Nagari	Kukral	Black	Improved (JG 9218)	Untreated	Irrigated	12.11
21			Siyadai	Yellow	Improved (JG 9218)	Untreated	Rainfed	7.66
22			Keregaon	Black	Improved (JG 9218)	Untreated	Rainfed	4.07
23	Durg	Durg	Anjora	Black	Improved (JG 9218)	Treated	Irrigated	15.71
24		Dhamda	Dhamda	Black	Improved (JG 11)	Untreated	Irrigated	51.23
25			Dodki	Black	Improved (Vishal)	Untreated	Irrigated	38.53
26			Pagbandi	Black	Improved (JG 11)	Untreated	Irrigated	25.85
27			Parsuli	Black	Improved (JG 9218)	Untreated	Irrigated	39.83
28			Khanarpuri	Black	Improved (JG 9218)	Untreated	Irrigated	19.73
29	Rajnandgaon	Rajnandgaon	Surgi	Black	Improved (JG 9218)	Treated	Irrigated	10.56
30			Bori	Black	Local	Untreated	Irrigated	15.12
31			Sandiyi	Black	Local	Untreated	Irrigated	17.89
32			Mohba	Black	Improved (Vishal)	Untreated	Irrigated	10.93
33			Padumtari	Black	Improved (JG 11)	Untreated	Irrigated	7.76
34			Gadula	Black	Improved (JG 11)	Treated	Irrigated	5.34
35		Khiragarh	Khiragarh	Black	Improved (JG 9218)	Untreated	Irrigated	8.68
36			Uridabari	Black	Improved (JG 11)	Untreated	Irrigated	6.59
37			Tolagaon	Black	Improved (JG 1918)	Treated	Irrigated	4.95
38			Dumardih	Black	Improved (JG 1918)	Untreated	Irrigated	6.13
39	Kawardha	Kawardha	Newari farm	Black	Improved (JG 9218)	Treated	Irrigated	3.68
40			Dharmapura	Black	Improved (JG 9218)	Treated	Rainfed	4.74
41			Mohgaon	Black	Improved (JG 9218)	Treated	Rainfed	5.36
42			Ghotiya	Black	Improved (JG 11)	Treated	Irrigated	8.47
43			Ganpur	Black	Improved (JG 9218)	Treated	Rainfed	3.34
44	Bemetara	Bemetara	Bemetara	Black	Improved (JG 11)	Untreated	Irrigated	23.12

45		Saja	Thankhamriya	Black	Improved (Vishal)	Untreated	Irrigated	35.72
46			Gadua	Black	Improved (JG 11)	Untreated	Irrigated	19.46
47			Sauri	Black	Improved (JG 11)	Untreated	Irrigated	26.41
48			Kharinga	Black	Improved (Vishal)	Untreated	Irrigated	16.51
49			Bhandarwani	Black	Improved (Vishal)	Untreated	Irrigated	18.51
50		Berla	Berla	Yellow	Improved (JG 11)	Untreated	Irrigated	10.75
51			Bhatagaon	Red	Improved (JG 11)	Untreated	Irrigated	15.85
52	Mungeli	Mungeli	Mungeli	Black	Improved (JG 74)	Untreated	Irrigated	19.40
53			Karpal	Black	Improved (JG 74)	Untreated	Irrigated	26.74
54			GajiyaNavagaon	Black	Improved (JG 63)	Untreated	Irrigated	23.42
55			Kodukupa	Black	Improved (JG 74)	Untreated	Irrigated	19.57
56			Hedaspur	Black	Improved (JG 74)	Untreated	Irrigated	24.05
57			Chatarakhar	Black	Improved (JG 63)	Untreated	Irrigated	18.12

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