



RESEARCH ARTICLE

STUDIES ON SURVEY OF DRY ROOT ROT DISEASE OF CHICKPEA (*Cicer arietinum L.*) INCIDENCE IN CHICKPEA GROWING DISTRICTS OF EASTERN UTTAR PRADESH

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ABSTRACT

Chickpea (*Cicer arietinum L.*) is an important pulse crop of India popularly known as Gram. Dry root rot of chickpea (*Cicer arietinum*) is the most severe disease in the central and southern zone, where the crop is mostly grown under rainfed condition. *Rhizoctonia bataticola* (Taub.) Butler is one of the most destructive pathogen causing dry root rot disease in chickpea (chana). The survey studies indicated that overall dry root rot incidence comparatively higher in Deoria districts (26.76%) grown chickpea crop, compared to other four districts (Ghazipur, Mau, Azamgarh, and Gorakhpur). In five districts of Eastern Uttar Pradesh survey, the disease was found to be widely distributed and regular occurrence with moderate to severe incidence and its, average both years (2021-2022 and 2022-2023) incidence was found maximum in the districts of Deoria (26.76%) followed by Gorakhpur (25.017%), Azamgarh (23.69%), Mau (11.38%) and Ghazipur district (10.53%).

INTRODUCTION

Chickpea (*Cicer arietinum L.*) is one of the most important food grain legumes in the world with production of 14.78 million tons from an area of 14.56 million hectares and productivity of 1014.60 kg/ha in 2017 (FAOSTAT, 2019) Chickpea (*Cicer arietinum L.*) Known by different names i.e. Gram, Spanish pea, Chestnut bean (English), Poisichiche (French), Homos (Arabic), Garbanzo (Spanish) and Chana (Hindi). Mainly two types of chickpea are grown, brown seeded types (Desi) and white seeded called "Kabuli" (Haware et al. 1986). Chickpea belongs to Leguminaceae usually grown after rainy season on conserved soil moisture during winter in the tropics in spring in the temperate and Mediterranean regions. Chickpea (*Cicer arietinum L.*) is an important source of energy and protein. Mature chickpea grains contain 60-65 % carbohydrates, 6 % fat and between 12 to 31 % protein, which is higher than any other pulse crop (Kerketta et al., 2015). Chickpea is also good source of vitamins (especially Vitamins B) and minerals like potassium, calcium, magnesium, phosphorous, iron and zinc. Chickpea plays a significant role in improving soil fertility by fixing atmospheric nitrogen and the crop meets up to 80 % of the soil nitrogen needs from symbiotic biological nitrogen fixation, so farmers have to apply less nitrogenous fertilizer than they do for other non-legume crops. India is the world's leading producers of chickpea accounting for 11.23 million tons from the 10.56 million hectares with a productivity of 1063 kg/ha in 2017-18 (Agricultural Statistics at a Glance, 2018). India is the world's leading producers of chickpea accounting for 11.23 million tons from the 10.56 million hectares with a productivity of 1063 kg/ha in 2017-18 (Agricultural Statistics at a Glance, 2018).

In 2018-19, district Gorakhpur produced 268 metric tons production from 179 thousand hectares area with average productivity of 15.00 q/ha (DES, 2019). Dry root rot is one of the major production constraints that cause 10-20 per cent annual loss (Vishwadhara and Chaudhary, 2001). Dry root rot of chickpea is the most severe disease in the central and southern zone, where the crop is mostly grown under rain fed condition. *Rhizoctonia bataticola* (Taub.) Butler is one of the most destructive pathogen causing dry root rot disease in chickpea. Among the diseases of chickpea, dry root rot is emerging as the most destructive constraint to chickpea production, as the disease is more prevalent during hot temperature of 30 - 35°C and low soil moisture conditions (Taya et al., 1988; Pande and Sharma, 2010). Dry root rot caused by *Rhizoctonia bataticola* (Taub.) Butler [Pycnidial stage: *Macrophomina phaseolina* (Tassi) Goid] is a soil and seed borne necrotrophic fungal pathogen that has a global distribution. It can infect more than 284 plant species throughout the world including monocot and Dicots (Farr et al., 1995).

METHODS AND MATERIALS

The survey for the occurrences and incidence of chickpea dry root rot was conducted during crop Rabi season 2021-2022 and 2022-2023. Observation was recorded on farmer's field under natural conditions. The survey was conducted to record the occurrence and distribution of dry root rot of chickpea in 25 blocks of the five chickpea growing districts in Eastern Uttar Pradesh, India viz. Ghazipur, Mau, Azamgarh, Deoria, Gorakhpur during Rabi 2021-2022 and 2022-2023.

The blocks and farmers field in each districts were selected randomly. The five blocks visited per district and a distance of 15 - 30 km. To assess the disease incidence, five to seven fields were observed in each blocks and average incidence of the disease in each blocks was calculated. During the survey disease incidence was recorded. Four 1m² quadrants were randomly selected in each field and infected plants were counted in each quadrant. Based on infected and total number of plants disease incidence was calculated. Chickpea plants showing the typical dry root rot symptoms were collected from surveyed areas. The percent disease incidence was calculated by using 0-9 disease rating scale (AICRP Scale). On an average both years (2021-2022 and 2022-2023) of each district were surveyed for dry root rot of chickpea disease incidence recorded are presented in below table.

The per cent disease incidence was calculated as per formula given below-

$$\text{Per cent disease incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

RESULT AND DISCUSSION

The survey for the occurrences and incidence of chickpea dry root rot were under taken at flowering and pod formation stage, from 25 location (blocks) (Ghazipur, Karanda, Bhadaura, Saudpur, Manihari, Badraon, Dohari Ghat, Pardaha, Ranipur, Ratanpura, Ahiraula, Bilariyaganj, Haraiya, Mahrajganj, Mirzapur, Barhaj, Lar, Salempur, Bhatni, Rudrapur, Campierganj, Jungle Kaudia, Sardarnagar, Pipraich, and Sahjanwa) of the five major chickpea growing districts (Ghazipur, Mau, Azamgarh, Deoria and Gorakhpur) in Central and Eastern Uttar Pradesh, state during the year, 2021-2022 and 2022-2023.

Observations were recorded on farmer's field under natural conditions. Data pertaining to survey conducted during 2021-2022 and 2022-23 on the both years average basis as presented in Table revealed, that the chickpea dry root rot disease incidence was varied from 7.86- 34.7 %, depending upon the location of crops during both years on average basis respectively. Over all on the basis of pooled data of two years presented in the Table average maximum disease incidence was also recorded in the Deoria district 26.76 % followed by 25.01%, 23.69%, 11.38 % and 10.53% in Gorakhpur Azamgarh, Mau, and Ghazipur district during 2021-2022 and 2022-2023, respectively. Over-all average disease incidence were recorded 19.47% respectively. With respect to individual surveyed places the on pooled basis both years maximum disease incidence was recorded 34.7 per cent in Barhaj, Deoria district and minimum 7.86 per cent in Ghazipur, Ghazipur district. Similar finding have been reported by Prajapati et al. (2004).

Reported that incidence of chickpea dry root rot in Uttar Pradesh. Survey was conducted at 20 locations of different agroclimatic regions of Uttar Pradesh. The disease was wide spread in occurrence in UP with 19.0 to 42.0 per cent. Shubha and Gurha (2006). Reported that dry root rot incidence was recorded different blocks of Bundelkhand region of Uttar Pradesh found infection of *Rhizoctonia bataticola* on chickpea ranged from 5-22%. Gurha and Trivedi (2008). Reported that *R. bataticola* was found as the predominant pathogen which infected 60.0 % plants in the fields of Gulbarga. Manjunatha et al. (2011). Reported from Karnataka that the dry root rot incidence was more in severe (9.8%) in Gulbarga district as compared to Raichur (7.6%) and Bidar (6.18%) in chickpea. Khan et al. (2012). Reported the maximum disease was observed in village Shangus (40.0%) of Kashmir division. Minimum disease was observed in Naina (4.11%). Kadam et al. (2018). Reported that maximum disease incidence was recorded in Latur district (23%) and minimum in Aurangabad district (10.20%).

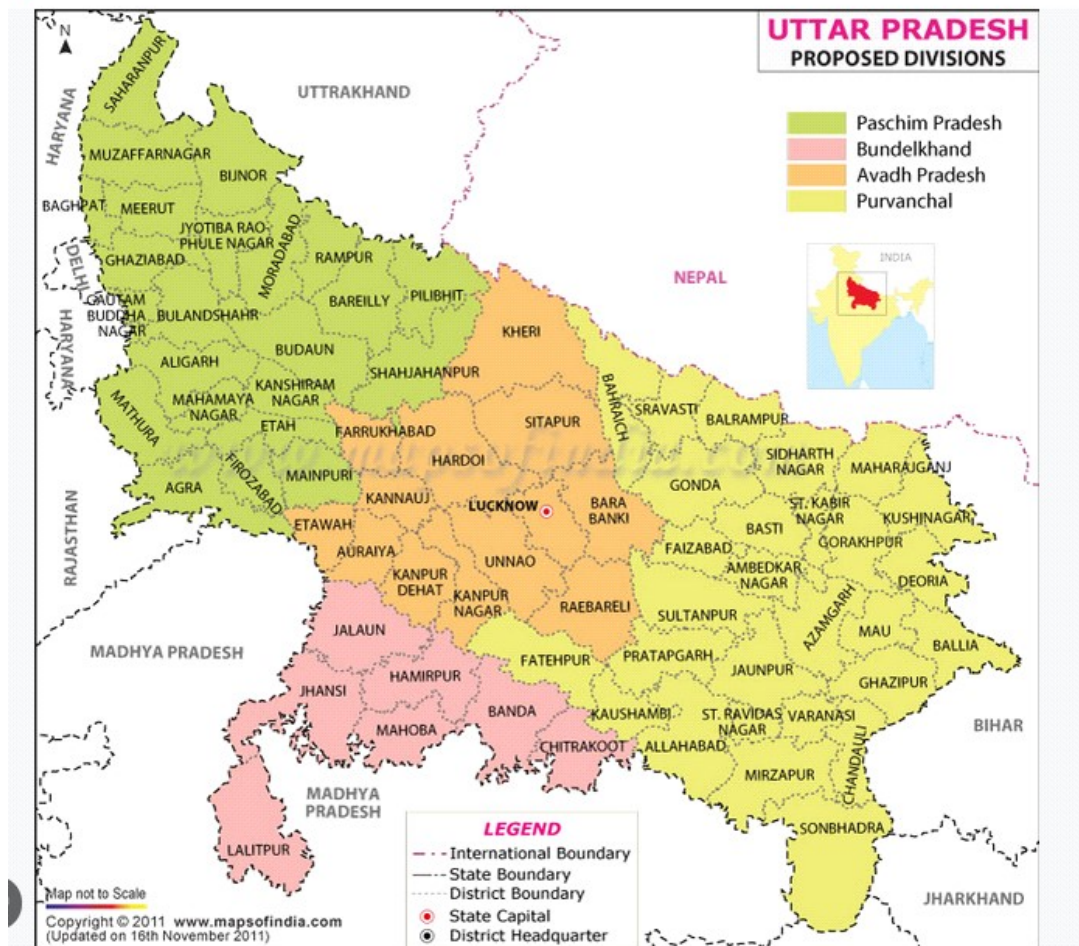


Table 1. Pooled data of two years survey for the occurrence and dry root rot incidence in chickpea growing districts of Eastern Uttar Pradesh during year 2021-2022 and 2022 -2023

Sr. No.	Districts	Blocks	Disease incidence
1.	Ghazipur	Ghazipur	7.86
		Karanda	9.1
		Bhadaura	13.2
		Saidpur	12.06
		Manihari	10.43
		Mean	10.53
2.	Mau	Badraon	10.6
		Dohrighat	9.825
		Pardaha	13
		Ranipur	11.2
		Ratanpura	12.30
		Mean	11.385
3.	Azamgarh	Ahiraula	21.6
		Bilariyaganj	23.3
		Haraiya	29.8
		Maharajganj	27.95
		Mirjapur	15.8
		Mean	23.69
4.	Deoria	Barhaj	34.7
		Lar	27.6
		Salempur	29
		Bhatni	24.74
		Rudrapur	17.80
		Mean	26.768
5.	Gorakhpur	Campianganj	21.95
		Jangle kaudia	26.985
		Sardarnagar	27
		Pipraich	31.15
		Sahjanwa	18
		Mean	25.017
	Total mean Average (25 Blocks)		19.47

Such variation in incidence and wide spread nature of chickpea have been reported by earlier workers like Sharma *et al.* (1983), Pandey and Singh (1990) and Ghosh *et al.* (2013).

CONCLUSION

A survey for recording chickpea dry root rot incidence was undertaken in chickpea growing districts of Eastern Uttar Pradesh. In five districts of Eastern Uttar Pradesh survey, the disease was found to be widely distributed and regular occurrence with moderate to severe incidence and its average both years (2021-2022 and 2022-2023) incidence was found maximum in the districts of Deoria (26.76%) followed by Gorakhpur (25.01%), Azamgarh (23.69%), Mau (11.38%) and Ghazipur district (10.53%).

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