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Studies on survey of dry root rot of chickpea incidence in chickpea growing districts of 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 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. The survey studies indicated that overall dry root rot incidence comparatively higher in Ayodhya districts (27.39%) grown chickpea crop, compared to other four districts (Basti, Gonda, Sultanpur and Kanpur). In five districts of Uttar Pradesh survey, the disease was found to be widely distributed and regular occurrence with moderate to severe incidence and its, average both years (2017-18 and 2018-19) incidence was found maximum in the districts of Ayodhya (27.39%) followed by Kanpur (25.29%), Sultanpur (23.89%), Gonda (11.41) and Basti district (10.30%).

Keywords: Chickpea, survey, dry root rot, disease incidence and *Rhizoctonia*

Introduction

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 family usually grown after rainy season on conserved soil moisture during winter in the tropics; in spring in the temperate and Mediterranean regions. The total world acreage under pulses is about 85.40 (Mha) with production of 87.40 (Mt) and 1023 kg/ha productivity. India, with >29 Mha pulses cultivation area, is the largest pulse producing country in the world. It ranks first in area and production with 34 per cent and 26 per cent respectively. During 2017-18 the country's productivity at 835 kg/ha, is a significant increase over Eleventh (662 kg/ha) and Twelfth plans (745 kg/ha). The area of Uttar Pradesh is 562 Th area with a production of 626.00 Tt and productivity of 1114 kg/ha (Anonymous, 2018) [1]. Dry root rot is one of the major production constraints that cause 10-20 per cent annual loss (Vishwadhar and Chaudhary, 2001) [14]. Dry root rot of chickpea 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. 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 to 35°C and low soil moisture conditions (Taya *et al.*, 1988; Pande and Sharma, 2010) [13, 8]. 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) [2].

Method and Materials

The survey for the occurrences and incidence of chickpea dry root rot was conducted during crop *Rabi* season 2017-18 and 2018-2019. Observation was recorded on farmer's field under natural conditions. The survey were conducted to record the occurrence and distribution of dry root rot of chickpea in 25 blocks of the five chickpea growing districts in Uttar Pradesh, India viz. Basti, Gonda, Faizabad, Sultanpur and Kanpur during *Rabi* 2017-18 and 2018-2019. The blocks and farmers field in each districts were selected randomly. The five blocks visited per district and a distance of 15 - 20 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

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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 (2017-18 and 2018-19) 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) (Parashurampur, Vikarmjot, Harriya, Gaur, Kaptanganj, Mankapur, Chapiya, Babhanjot, Katra, Nawabganj, Milkipur, Masaudha, Bikapur, Sohawal, Rudauli, Waldirai, Kadipur, Dhanpatganj, Kurwar, Lambhua, Kalyanpur, Bilahaur, Chaubeypur, Bidhanu and Shivrajpur) of the five major chickpea growing districts (Basti, Gonda, Ayodhya, Sultanpur and Kanpur) in Central and Eastern Uttar Pradesh, state during the year, 2017-18 and 2018-2019. Observations were recorded on farmer's field under natural conditions. Data pertaining to survey conducted during 2017-2018 and 2018-19 on the both years average basis as presented in Table revealed, that the chickpea dry root rot disease incidence was varied from 6.85- 35.8 per cent, 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 Ayodhya district 27.39 per cent followed by 25.21%, 23.89%, 11.41% and 10.30% in Kanpur, Sultanpur, Gonda and Basti district during 2017-18 and 2018-19, respectively. Over-all average disease incidence were recorded 19.64% respectively. With respect to individual surveyed places the on pooled basis both years maximum disease incidence was recorded 35.8 per cent in Milkipur, Ayodhya district and minimum 6.85 per cent in Parashurampur, Basti district.

Similar finding have been reported by Prajapati *et al.* (2004) [10]. 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) [12]. Reported that dry root rot incidence was recorded different blocks of Bhundelkhand region of Uttar Pradesh found infection of *Rhizoctonia bataticola* on chickpea ranged from 5-22%. Gurha and Trivedi (2008) [4]. Reported that *R. bataticola* was found as the predominant pathogen which infected 60.0 per cent plants in the fields of Gulbarga. Manjunatha *et al.* (2011) [7]. 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) [6]. 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) [5]. Reported that maximum disease incidence was recorded in Latur district (23%) and minimum in Aurangabad district (10.20%). Such variation in incidence and wide spread nature of chickpea have been reported by earlier worker like Sharma *et al.* (1983) [11], Pandey and Singh (1990) [9], and Ghosh *et al.* (2013) [3].

Table 1: Pooled data of two years survey for the occurrence and dry root rot incidence in chickpea growing districts of Uttar Pradesh during year 2017-18 and 2018 -2019

Districts	Blocks	Disease incidence
Basti	Parashurampur	6.85
	Vikarmjot	10.1
	Harriya	12.1
	Gaur	12.05
	Kaptanganj	10.44
Mean		10.30
Gonda	Chapiya	11.6
	Mankapur	8.825
	Babhanjot	12
	Katra	12.3
	Nawabganj	12.35
Mean		11.41
Ayodhya	Milkipur	35.8
	Masaudha	28.6
	Bikapur	28
	Rudauli	25.74
	Sohawal	18.85
Mean		27.39
Sultanpur	Waldirai	22.6
	Kadipur	24.3
	Dhanpatganj	30.8
	Kurwar	26.95
	Lambhua	14.8
Mean		23.89
Kanpur	Kalyanpur	22.95
	Bilahaur	27.985
	Chaubeypur	26
	Bidhanu	32.15
	Shivrajpur	17
Mean		25.217
Total mean Average (25 Blocks)		19.64

Conclusion

A survey for recording chickpea dry root rot incidence was under taken in chickpea growing districts of Uttar Pradesh. In five districts of Uttar Pradesh survey, the disease was found to be widely distributed and regular occurrence with moderate to severe incidence and its, average both years (2017-18 and 2018-19) incidence was found maximum in the districts of Ayodhya (27.39%) followed by Kanpur (25.29%), Sultanpur (23.89%), Gonda (11.41) and Basti district (10.30%).

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