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RESEARCH ARTICLE

Status of Karnal bunt of wheat in Jammu division (J&K)

■ B. SINGH[1*], C. S. KALHA[2] V. K. RAZDAN[2] A. VAID[3] AND S.K.SINGH[4]

[1*]Regional Horticulture Research Sub Station, (SKAUST, J) Bhaderwah, DODA (J&K) INDIA
[2]Department of Plant Pathology, University of Agricultural Sciences and Technology, (J) Chatha, JAMMU (J&K) INDIA
[3]Krishi Vigyan Kendra, (SKAUST, J) Kathua, JAMMU (J&K) INDIA
[4]Pulses Research Sub Station, (SKAUST, J) SAMBA (J&K) INDIA

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* Corresponding author:
brajeshbhau@yahoo.co.in

ABSTRACT

It has been observed that numerous factors like varietal reshuffle, intensive cultivation and high input technology are responsible for minor diseases to become major production constraint. One such disease that has caused much concern is Karnal bunt of wheat caused by *Neovossia indica* (Mitra) Mundkur. The disease was observed in all the districts surveyed in Jammu division. Highest disease incidence was recorded in Rajouri and Udhampur (1.66%), followed by Kathua (1.58%), Doda (1.41), Jammu (1.28%) and least in Poonch (0.90%). Teliospores of the fungus were isolated from the infected seed samples collected from areas surveyed. Soil samples were collected from all location surveyed. Area wise count of teliospores in soil provided the evidence that Poonch (7.5) followed by Rajouri (7.0) and Udhampur (6.5) were hot spots and Doda (1.5) was found to be least having teliospores in. Jammu soils which recorded only 2.0.

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INTRODUCTION

Wheat (*Triticum* sp.) known in Neolithic times is one of the foundation crops of India's agriculture. India occupies third position in the world in production of wheat. Various factors like varietal reshuffle, intensive cultivation and high input technology are designated to be responsible for minor diseases to become major production constraint.

One such disease that has caused much concern is Karnal bunt of wheat caused by *Neovossia indica* (Mitra) Mundkur. This disease was first reported from Karnal district of Haryana (India) in 1930s and was subsequently found in Pakistan, Afghanistan, Mexico and Nepal (Singh *et al*., 1989).This disease is widely prevalent in all the wheat growing areas in North-Western India. During severe epidemics, total losses in India have been around 0.3 to 0.5 per cent with incidence as high as 89 per cent in some fields (Joshi *et al*., 1983)

Karnal bunt of wheat also known as ' partial bunt' is of great significance not only because it causes reduction in yield and quality of grain, but has proved a major setback in capturing the international wheat market due to strict quarantine and tolerance limit put to zero level by some countries (Agarwal *et al*., 1993). Karnal bunt of wheat has become a serious threat to around 16-19 per cent of the world wheat, traded annually between countries. Karnal bunt usually affects only a few spikelets within a wheat spike. In addition, the pathogen usually causes a partial bunt with teliospores replacing only a portion of the kernel. Yield losses in the Punjab and Jammu regions of India were estimated at 0.2 per cent during 1969–1970 (Munjal, 1975; Wareham , 1986). Even during the worst years of 'epidemic', the damage to wheat crops was reported as only 0.2– 0.5 per cent of total production in infested areas (Joshi *et al*.1983). Losses of 0.3–0.5 per cent have been assessed during the most severe years between 1982 and 1989 particularly in Uttar Pradesh (Singh, 1994; 2005). Many reports

of high losses emanate from the mid- to late-1970s when susceptible wheat cultivars were grown (Wareham, 1986).

MATERIALS AND METHODS

The present investigations were undertaken at Faculty of Agriculture, Division of Plant Pathology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu and Indian Agricultural Research Institute, New Delhi during 2005-08. Studies on Karnal bunt were based on laboratory and field experiments.

Collection of wheat seed samples to assess the status of Karnal bunt in Jammu division :

Wheat seeds were collected from various wheat growing areas, covering all the six districts falling within Jammu division during 2006-07 and 2007-08. During disease surveys for Karnal bunt, wheat grain samples were collected from threshing floors and various godowns located throughout Jammu division .Field samples not less then 250 g were generally collected, covering all six districts, falling in Jammu division. The working sample of approximately 2500 to 3000 grains was obtained by division and re division of the 250 g seed lot. Out of this working sample, 1000 grains were taken and infected seeds were sorted to calculate the percentage of infection. From each district, ten samples each were taken up to assess the status of Karnal bunt in Jammu division. Same methodology was adopted in subsequent surveys too. Infection percentage was calculated using formula :

$$\frac{\text{Total infected grains}}{\text{1000 grains}} \text{x100} = \text{Infection percentage}$$

Collection of soil samples to assess the status of Karnal bunt in Jammu division :

Teliospores of caustive agent of Karnal bunt enter the soil at the time of harvest, threshing or winnowing or may be as external seed contaminant. Teliospores act as potential inoculum load for next crop and are known to remain viable in the soil for a long time time (Mathur and Ram, 1963; Munjal, 1970). Thus, it is very important to assess the status of teliospores in soils of an area.

In order to assess the status of Karnal bunt inoculum in Jammu soils, four soil samples were randomly collected from all six districts falling with in Jammu division. Soil sampling (approximately 100 g) was done from four corners and one from centre of each selected field, which was followed by thorough mixing of all the five samples. 10 g of thoroughly mixed soil sample from selected hot spot was further taken up for quantification of teliospores. Four hot spots per district were randomly selected and further analyzed (Singh *et al.,* 1990).

Quantification of teliospores among soil samples of Jammu division :

Teliospores of are known to remain viable in the soil for a long time, thus acting as potent inocculum load for next crop (Mathur and Ram, 1963; Munjal, 1970). Teliospores get into the soil during harvest, threshing or winnowing or as seed contaminant. Status of soil inoculum load significantly determines disease incidence in an area, thus a study was carried out to generate soil mapping for the presence of Karnal bunt inoculum load in Jammu division. (Singh. *et al.* 1990). For extraction of teliospores from soil, thoroughly homogenized soil samples collected from hot spots in Jammu division were used. 10 g of homogenized soil was taken up from each soil sample and then subjected to oven drying at 105°C for 24 hrs before further processing. Oven dried soil was taken up in a 500 ml beaker in which 200 ml double distilled water and 1 ml mineral oil was added. Soil suspension thus prepared was subjected to agitation over magnetic stirrer for 5 minutes. The suspension after being thoroughly homogenized was allowed to settle for 2 hours. The supernatant thus formed was sieved through 20 mμ mesh, it was then back washed with distilled water and a final volume was made up to 200 ml. Teliospore count per ml was taken under light microscope using Hawksley eelworm cell (Datnoff *et al*., 1988).

RESULTS AND DISCUSSION

The disease was observed in all the districts surveyed in Jammu division of Jammu & Kashmir. During survey highest disease incidence was recorded in Rajouri (1.64%) and Udhampur (1.66%), followed by Kathua (1.58%), Doda (1.41), Jammu (1.28%) and least in Poonch (0.90%) (Table 1) .

Table 1 : Per cent disease incidence in different districts of Jammu division

Districts surveyed	Per cent infected grains		
	2006-07	2007-08	Pooled
Jammu	1.08 (1.44)	1.48 (1.57)	1.28 (1.50)
Kathua	1.55 (1.59)	1.61 (1.61)	1.58 (1.60)
Udhampur	1.79 (1.66)	1.53 (1.58)	1.66 (1.62)
Poonch	0.93 (1.34)	0.87 (1.32)	0.90 (1.33)
Doda	1.30 (1.51)	1.53 (1.58)	1.41 (1.54)
Rajouri	1.64 (1.61)	1.69 (1.63)	1.66 (1.62)
C.D.(P=0.05)	0.18	0.18	0.13

Soil samples were collected from four locations, per district surveyed. Data (Table 2) provide the evidence that Poonch had highest teliospore count in soils (7.5) followed by Rajouri (7.0). District Udhampur recorded teliospore count of 6.5 per 10 ml of soil analyzed. District Doda recorded 1.5

teliospores per 10 ml of soil and least teliospore count among all the six districts surveyed, Jammu soils recorded only 2.0 teliospores per 10 ml of soil analyzed.

Table 2 : District wise population of teliospores in soil

Sr. No.	Districts	Pooled spore count/10 mg soil
1.	Jammu	2.0 (1.6)
2.	Kathua	2.5 (1.7)
3.	Udhampur	6.5 (2.7)
4.	Poonch	7.5 (2.9)
5.	Doda	1.5 (1.50)
6.	Rajouri	7.0 (2.8)
C.D. (P=0.05)		1.70

*Figures in parentheses are square root transformed values

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