

Status of Karnal Bunt in Unprocessed Wheat Seed Produced in Haryana by Public and Private Seed Producers in Rice-Wheat Rotation

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Karnal bunt [*Neovossia indica* (Mitra) Mundkur] is a seed-borne disease posing threat to wheat (*Triticum aestivum* L.) production in India and export of wheat due to its zero per cent tolerance limit [1, 2]. The movement of Karnal bunt pathogen with the infected seeds from infested areas to disease-free areas through seed trade cannot be overlooked. Therefore, it is the urgency to check the movement of Karnal bunt inoculum with the infected seed to Karnal bunt free or lower disease prone areas. Karnal bunt affects both the quality and quantity of seed. So the survey was conducted in five districts; Yamuna Nagar, Sirsa, Hisar, Fatehabad and Kurukshetra of Haryana during September 2016 to determine the status of Karnal bunt in unprocessed wheat seed produced in various by public and private seed producers in rice-wheat rotation system.

In total, 167 unprocessed seed samples comprising of 26 varieties were collected and homogenized by seed divider. Two replicates comprising of 2000 seeds each per sample were analysed for the prevalence of Karnal bunt by examination of dry seed method. Observations were recorded for percentage of infected samples, range of infection and average infection.

Varying degree of Karnal bunt infection was observed in seeds collected from different districts and varieties (Table 1 & 2). The numbers of samples having Karnal bunt infection were 63 out of 167 constituting 37.72% with average infection of 0.038%, wherein it ranged from 0.05 to 0.30%

i.e. above the permissible limit of Indian Minimum Seed Certification Standards [3] for quality seed production. On the basis of average of five districts, the highest infected samples (65.71%) with average infection of 0.074% in the range of 0.05 to 0.25% were observed in Sirsa district followed by Fatehabad district (38.88%). The lowest numbers of infected samples (25.00%) with average infection of 0.019% in the range of 0.05 to 0.15% were observed in Kurukshetra district.

Among 26 varieties, HD 2851 recorded the maximum average infection (0.135%), whose maximum number of samples; six and five were collected from districts of Fatehabad and Sirsa, respectively. It was followed by DBW 71 (0.070%) and WH 1105 (0.052%). No infection was observed in varieties; WH 711, HD 3059, DBW 621-50 and PBW 550. The variety, HD 2851 recorded the highest range of infection (0.05-0.30%) in Fatehabad district. Among five districts surveyed, none of them was found free from Karnal bunt. On the basis of infection, only one sample was rejected in Fatehabad district (5.55%) and rest of districts had incidence of infection with in permissible limit of Indian Minimum Seed Certification Standards. In Haryana, Karnal bunt infection was observed in the range from 0.05-9.90% and 0.05-3.00% during 1995-96 and 1996-97, respectively [4, 5]. The disease was recorded in almost all the districts of Haryana in all cultivated varieties. Jakhar and Punia [6] also carried out a survey in 10 districts of Haryana to find out status of Karnal bunt in

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Table 1. Karnal bunt infected samples in five districts of Haryana during 2015-16

Districts	Total samples	Infected samples		Infected seed	Average infection	Range of infection	Rejected samples	
	No.	No.	%	No.	%	%	No.	%
Yamuna Nagar	29	11	37.93	22	0.037	0.05-0.20	0	0
Sirsa	35	23	65.71	52	0.074	0.05-0.25	0	0
Hisar	29	8	27.58	16	0.027	0.05-0.20	0	0
Fatehabad	18	7	38.88	18	0.05	0.05-0.30	1	5.55
Kurukshetra	56	14	25	22	0.019	0.10-0.15	0	0
Total	167	63	37.72	130	0.038	0.05-0.30	1	0.59

Table 2. Association of Karnal bunt with codes of varieties of wheat in five districts of Haryana during 2015-16

Varieties	Total samples	Infected samples		Infected seed	Average infection	Range of infection	Rejected samples	
	No.	No.	%	No.	%	%	No.	%
PBW 550	7	0	0	0	0	0	0	0
DBW 621-50	6	0	0	0	0	0	0	0
DBW 17	10	3	30	8	0.04	0.05-0.25	0	0
DBW 71	5	3	60	7	0.07	0.05-0.15	0	0
DBW 88	7	2	28.57	2	0.014	0.05	0	0
DBW 90	8	2	25	2	0.012	0.05	0	0
WH 1105	22	12	54.54	23	0.052	0.05-0.20	0	0
WH 1124	12	6	50	11	0.045	0.05-0.15	0	0
WH 1142	1	1	100	1	0.05	0.05	0	0
WH 1080	7	3	42.85	6	0.042	0.05-0.15	0	0
HD 2851	20	20	100	54	0.135	0.05-0.30	1	5
HD 2894	4	1	25	2	0.025	0.1	0	0
HD 3086	5	2	40	3	0.03	0.05-0.10	0	0
HD 2967	32	6	18.75	6	0.009	0.05	0	0
HD 3059	8	0	0	0	0	0	0	0
HD 2329	1	1	100	4	0.02	0.2	0	0
KRL210	1	0	0	0	0	0	0	0
KRL 213	1	0	0	0	0	0	0	0
WH 711	3	0	0	0	0	0	0	0
WH 147	1	0	0	0	0	0	0	0
WH 283	1	0	0	0	0	0	0	0
C 306	1	1	100	1	0.05	0.05	0	0
PBW 343	1	0	0	0	0	0	0	0
PBW 502	1	0	0	0	0	0	0	0
Raj 3765	1	0	0	0	0	0	0	0
Raj 3077	1	0	0	0	0	0	0	0
Total	167	63	37.72	130	0.038	0.05-0.30	1	0.598

farmers' saved wheat seed samples during 2007-08 to 2010-11. It was observed that out of 1713 samples, only 289 samples (16.87%) were found infected with Karnal bunt and overall range of infection was observed 0.05-0.25%, which was within permissible limit of IMSCS for quality seed production. Jakhar and Bhuker [7] conducted a survey in eight districts of Haryana to find out status of Karnal bunt in unprocessed wheat seed produced by public and private seed producers during rabi 2012-13. The results revealed that out of 410 samples, only 181 samples (44.14%) were infected with Karnal bunt. The overall range of infection was observed 0.05 – 6.40%, which was exceeding the permissible limit of IMSCS (2013) for quality seed production. The higher disease incidence may be attributed to the favourable environmental conditions such as high rainfall and mild temperature at the ear emergence stage of the crop. It is noticed that none of the districts was found free from Karnal bunt. Hence, to reduce the Karnal bunt infection, the seed must be treated prior to sowing. The tolerant varieties like; WH 711, HD 3059, DBW 621-50 and PBW 550 are suggested to be used for enhanced yields and better quality seed production. The seed production programme should be taken in less disease prone areas, which need to be identified. Last but not the least, this study indirectly also suggests that the

efforts to develop new resistant varieties should continue to meet the challenges posed by the changing climate.

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