

## Status of Karnal bunt of wheat in different wheat growing regions of Uttarakhand

DEEPSHIKHA and BIMLA KUMARI

*Department of Plant Pathology, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar - 263 145 (U.S. Nagar, Uttarakhand)*

**ABSTRACT:** An attempt has been made to draw attention towards the status of Karnal bunt (KB) in major wheat growing areas of Uttarakhand. Karnal bunt of wheat is an important disease in Uttarakhand besides Rusts and Powdery mildew. The post-harvest grain sampling and analysis of grain samples was done for monitoring the status of Karnal bunt disease in different wheat growing regions of Uttarakhand during two crop seasons 2012-2013 and 2013-2014. In both the years, variations occur in the disease as evident from the percent Karnal bunt free samples observed. A total of percent infected samples and percent rejection during 2012-2013 was found to be more as compared to crop season 2013-2014. It is inferred from survey and surveillance that disease incidence was higher during 2012-2013 and amongst all the districts, the disease was least in Udham Singh Nagar which may be due to the dependence of disease on the climatic factors.

**Key words:** Disease incidence, Karnal bunt, KB- free samples, *Neovossia indica*, wheat

Uttarakhand consists of hilly tracts as well as Tarai/Plains areas where wheat is an important rabi crop. Overall, the state has produced 0.838 mt of wheat during 2012-2013 from 0.358 mha area with a productivity of 23.41 q/ha (Anonymous, 2013). This is due to the fact that wheat in hills mainly rainfed as compared to irrigated crop in the tarai. The constraints are water scarcity in hill and tarai areas, low soil organic carbon status, high nutrient mining, imbalance fertilization and infestation of rust, powdery mildew and Karnal bunt (ICAR, 2007). Karnal bunt of wheat caused by *Neovossia indica*, is a disease of considerable economic importance reducing grain quality and severely affecting international trade.

### MATERIALS AND METHODS

The post-harvest grain sampling and analysis of grain samples was done for monitoring the status of Karnal bunt disease in different wheat growing regions of Uttarakhand (Udham Singh Nagar, Dehradun, Haridwar, Almora, Pauri Garhwal and Nainital) during two crop seasons i.e. 2012-2013 and 2013-2014.

To study frequency of Karnal bunt (KB) incidence, wheat grain samples (1 kg each) from various districts of the state was collected randomly in paper bags. A working sample of 1000 grains was drawn and KB grains were counted by placing them on white colored tray. From the total no. of grains analysed, percent KB infection in both the years and of each district was calculated. Number of samples in different range of

infection was categorized (below 0.25%, 0.26-1%, 1.1-5% and 5.1-10%).

### RESULTS AND DISCUSSION

A total of 2779 grain samples were analyzed out of which 382 samples had Karnal bunt infection (Table.1). Out of the total infected samples, 152 were in the category of below 0.25 per cent, which is the tolerance limit of Karnal bunt for certified seeds (Table.1). The rest 230 samples had more than 0.25 per cent infected grains. Maximum incidence (80.9%) was observed in the district Haridwar followed by Almora (77.3%), Nainital (61.2%) and Dehradun (46.2%). In Haridwar and Almora districts the prevalence of Karnal bunt recorded was high (72 out of 89 samples and 17 out of 22 seed samples, respectively) and severity was also high. Based on the overall KB occurrence, it emerged that this year (2012-2013) KB incidence was high and more prevalent.

During the year 2013-14, a total of 2763 wheat grain samples collected from the seed growers of four districts of Uttarakhand namely, Udham Singh Nagar, Dehradun, Almora and Pauri Garhwal were analyzed, out of which 681 samples were found to be infected with Karnal bunt. Out of the total infected samples, 442 were in the category of below 0.25 per cent, remaining 239 samples had more than 0.25 per cent infected grains as depicted in Table.2. Highest percentage of infected samples were collected in district Dehradun (82.38%) followed by Pauri Garhwal (75.27%) and severity was also high (up to 10%).

Table 1: Incidence of Karnal Bunt of wheat in different wheat growing regions of Uttarakhand during 2012-2013

Districts	Varieties	Total samples	No. of infected samples	No. of disease free samples	% infected Samples	No. of samples in different range of infection				Percent rejection
						Below 0.25%	0.26-1%	1.1-5%	5.1-10%	
<b>1. Udham Singh Nagar</b>										
<b>a) Pantnagar</b>										
	PBW 343, DPW 621-50, PBW 502, PBW 550, UP 262, PBW 373, DBW17, HD 2967, PBW 154, WH 711, HD 2894, UP 2338, UP 2628, UP 2425, UP 2565, UP 2526, HD 2733, VL 829, UP 2554, DBW 16, VL 107, WH 542, RR 21	1586	60	1526	3.78	31	28	01	0.0	1.83
<b>b) Kashipur</b>										
	PBW 343, DPW 621-50, PBW 502, PBW 373, DBW17, HD 2967, PBW 154, HD 2894, UP 2628, UP 2565, UP 2526, HD 2932, UP 2628	89	08	81	8.98	05	03	0	0	3.37
<b>c) Bajpur</b>										
	PBW 343, PBW 226, UP 262, PBW 502, PBW 550, DBW17, DBW 17, DBW 16, PBW 373, UP 2572, DPW 621-50, HD 2932, HD 2894, WH 711, PBW 154, HD 2967, HD 2733, VL 829, VL 802, PBW 154, VL 804, UP 2638	413	06	407	1.45	05	01	0	0	0.24
<b>d) Khatima</b>										
	PBW 343, VL 892, PBW 502, VL 829, PBW 154, PBW 550, UP 2526, DBW17, WH 711, HD 2733, PBW 373, VL 738, UP 2572, HS 365, VL 107, HS 490	109	03	106	2.75	03	0	0	0	0.0
<b>e) Sitarganj</b>										
	PBW 502, DPW 621-50, PBW 343, UP 262, DBW17, HD 2967, PBW 552, WH 711, PBW 373, RR 21, PBW 154, HD 2733, HD 2526, HD 2628, HD 2425	73	08	65	10.9	05	03	0	0	4.11
<b>Total</b>										
		2270	85	2185	3.74	49	35	01	0	1.58
<b>2. Dehradun</b>										
	DBW17, UP 2572, VL 804, and RR 21, VL 802, VL 892, VL 907, HS 365, VL 829, VL 616, VL 738	238	110	128	46.2	29	63	18	0	34.0
<b>3. Almora</b>										
	PBW 343, VL 738, DPW 621-50, PBW 502, PBW 550, PBW 373, DBW17, PBW 154, HS 490, HS 365, VL 892, VL 907, PBW 226, UP 2572, VL 802, PBW 226, VL 829	22	17	05	77.3	08	09	0	0	40.9
<b>4. Haridwar</b>										
	PBW 502, PBW 550, DPW 621-50, PBW 550, DBW17, PBW 154, HS 365, VL 892, VL 907, UP 2572, UP 262, HD 2967	89	72	17	80.9	34	34	04	0	42.7
<b>5. Nainital (Kotabagh)</b>										
	PBW 343, VL 738, DPW 621-50, PBW 550, PBW 373, DBW17, PBW 154, VL 892, VL 907, UP 2572, VL 802, VL 829, PBW 373, DBW 16, UP 2554, UP 2425, HD 2967	160	98	62	61.25	32	57	09	0	41.3
<b>Grand total of all the districts</b>		<b>2779</b>	<b>382</b>	<b>2397</b>	<b>269.39</b>	<b>152</b>	<b>198</b>	<b>32</b>	<b>0</b>	<b>160.48</b>

Table 2: Incidence of Karnal Bunt of wheat in different wheat growing regions of Uttarakhand during 2013-2014

Districts	Varieties	Total samples	No. of infected samples	No. of disease free samples	% infected Samples	No. of samples in different range of infection				Percent rejection
						Below 0.25%	0.26-1%	1.1-5%	5.1-10%	
<b>1. Udham Singh Nagar</b>										
<b>a) Pantnagar</b>	PBW 343, DPW 621-50, PBW 502, PBW550, UP 262, PBW 373, DBW17, HD 2967, PBW 154, WH 711, HD 2894, UP 2338, UP 2628, UP 2425, UP 2565, UP 2526, HD 2733, VL 829, UP 2554, DBW 16, VL 107, WH 542, RR 21	1500	186	1314	12.40	174	12	0.0	0.0	0.80
<b>b) Kashipur</b>	PBW 343, DPW 621-50, PBW 502, PBW 373, DBW17, HD 2967, PBW 154, HD 2894, UP 2628, UP 2565, UP 2526, HD 2932, UP 2628	102	24	78	23.53	16	08	0.0	0.0	7.84
<b>c) Bajpur</b>	PBW 343, PBW 226, UP 262, PBW 502, PBW 550, DBW17, DBW 17, DBW 16, PBW 373, UP 2572, DPW 621-50, HD 2932, HD 2894, WH 711, PBW 154, HD 2967, HD 2733, VL 829, VL 802, PBW 154, VL 804, UP 2638	384	47	337	12.24	45	02	0.0	0.0	0.52
<b>d) Khatima</b>	PBW 343, VL 892, PBW 502, VL 829, PBW 154, PBW 550, UP 2526, DBW17, WH 711, HD 2733, PBW 373, VL 738, UP 2572, HS 365, VL 107, HS 490	127	22	105	17.32	20	02	0.0	0.0	1.57
<b>e) Sitarganj</b>	PBW 502, DPW 621-50, PBW 343, UP 262, DBW17, HD 2967, PBW 552, WH 711, PBW 373, RR 21, PBW 154, HD 2733, HD 2526, HD 2628, HD 2425	119	13	106	10.92	12	01	0.0	0.0	0.84
<b>Total</b>		<b>2232</b>	<b>292</b>	<b>1940</b>	<b>13.08</b>	<b>267</b>	<b>25</b>	<b>0.0</b>	<b>0.0</b>	<b>1.12</b>
<b>2. Dehradun</b>	DBW17, UP 2572, VL 804, and RR 21, VL 802, VL 892, VL 907, HS 365, VL 829, VL 616, VL 738	227	187	40	82.38	64	93	28	02	54.19
<b>3. Almora</b>	PBW 343, VL 738, DPW 621-50, PBW 502, PBW550, , PBW 373, DBW17, PBW 154, HS 490, HS 365, VL 892, VL 907, PBW 226, UP 2572, VL 802, PBW 226, VL 829	211	132	79	62.56	81	45	06	0.0	24.17
<b>4. Pauri Garhwal</b>	DPW 621-50, PBW 550, PBW 502, PBW 154, HD 2733, UP 2425, UP 2565, VL 829, VL 902, HS 365, HS 490, VL 804, VL 907, VL 892	93	70	23	75.27	30	31	06	03	43.01
<b>Grand total of all the districts</b>		<b>2763</b>	<b>681</b>	<b>2082</b>	<b>233.29</b>	<b>442</b>	<b>194</b>	<b>40</b>	<b>5</b>	<b>122.49</b>

A total of per cent infected samples and percent rejection during 2012-2013 was 269.39 and 160.48 respectively which is found to be more as compared to crop season 2013-2014 (233.29 and 122.49, respectively).

Based on the overall Karnal bunt occurrence, it is concluded that the disease incidence was higher during 2012-2013 and amongst all the districts, the disease was least in Udham Singh Nagar. Variations in disease development in the disease endemic areas have been attributed to varietal susceptibility and the environmental conditions prevalent in different years at vulnerable stage of wheat growth (Singh *et al.*, 2003; Sharma *et al.*, 2004; Kumar *et al.*, 2007 and Ahmed *et al.*, 2013).

The study may be beneficial for wheat traders and farmers for obtaining healthy seed material from these least Karnal bunt infected areas and thus primary spread of inoculum of *Neovossia indica* can be avoided.

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