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Occurrence of Black Point Disease Complex of Wheat in Eastern Uttar Pradesh

D N SHUKLA[1*], J P SHRIVASTAVA[2], PARITOSH KUMAR[3] AND MANISH KUMAR YADAV[4]

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ABSTRACT

Black point disease complex of wheat resulting from different types of field fungi common in different region of eastern Uttar Pradesh due to delayed sowing of farmers, intermittent rain, high relative humidity and relatively rise in temperature during anthesis stage. Therefore, an extensive survey was done in different district of Eastern Uttar Pradesh during 2012-13 to monitor wheat grain samples for black point incidence and severity. Total 26 wheat seed samples tested for knowing the seed infection percentage and range of infection in different district. During the detection maximum black point infection (3.15%) was found in the wheat variety K-9423 of Faizabad produced and minimum average infection (0.13%) was found in the variety HD-2733 of Ghazipur, Azamgarh and Siddarth Nagar produced. The fungi isolated from discolored grain was *Bipolaris sorokianiana, Alternaria alternata* and the exceptionally the *Curvularia lunata*.

KEYWORD

Black point, seed samples, *Bipolaris*, *Alternaria* and *Curvularia*

INTRODUCTION

Wheat (*Triticum aestivum* L.) belongs to family Gramineae. It is the staple food and major source of energy and nutrition of Indian diet. It is known for its remarkable adoption to a wide range of environment. Its importance derived from the properties of their gluten, cohesive network of tuft endosperm protein, starch with the expansion of fermentations dough. It is utilized for bread, cakes, cookies, noodles, pestri-products, chapatti & macaroni etc. Wheat grain contains 60-68% starch, 8.0 to 15% protein, 1.5 to 2.0% fat, 2.0-2.5% cellulose and 1.5 to 2.0% minerals [5].Wheat is infested by various seed-borne diseases in which black point is one of the most important seed-borne diseases of wheat which induces qualitative loss. Black point, defined as the discolouration of the embryo and surrounding areas of the wheat kernel, occurs any time from grain filling to near harvest. Various fungi that cause black point often occur on developing kernels that do not exhibit symptoms. Since the first report of black point of wheat in the United States in 1913, it has been reported in other wheat growing countries. Wheat kernel discoloration is due to fungal invasion and termed as black point. Black point disease of wheat was first time in reported in India by Dastur. Black point caused mainly by *Bipolarissorokiniana, Alternaria alternata, Cladosporium cladosporioides, Curvularialunata*and *Fusarium* spp. is one of them [3]. The disease occurs almost all over the world wherever wheat is grown. Black point infection becomes severe when prolonged wet weather prevails during grain filling period of the crop. Black point has an adverse effect on seed weight, germination, and seedling emergence [4, 6].

MATERIALS AND METHODS

Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad has a well-equipped notified Seed Testing Laboratory under the Department of Seed Science & Technology.Samples of different release and notified varieties meant for quality seed production purposes i.e. nucleus, breeder, foundation and certified seed at different seed production farms/Krishi Vigyan Kendra of the University established at different location in eastern U.P. are collected and analyzed for testing against seed quality traits like germination, physical purity, genetic purity, seed vigour, seed health etc. Total 26 seeds samples comprising 11 released and notified varieties under university seed production chain were available in the seed testing lab from the produce of Rabi 2012-13. A part from the said seed samples were obtained and analyzed for black point complex. The black pointed seeds were categorized based on the symptoms on the grain. Thus collected samples were thoroughly mixed to form composite sample in Boerner type divider, to ensure homogeneity. Thereafter, a working sample of 250 g was drawn from each sample for conducting studies. Out of the working sample, 2000 seeds were drawn randomly and spread on purity board for the analysis of black point incidence. Per cent infected samples as well as percent infection was calculated as follows: The percent disease incidence was calculated by using the formulae :(Number of samples having black point grains /Total No. of samples) X 100.The level of disease severity in each of the samples was calculated by the formulae: Severity= (Number of black point grains in a sample/2000) X 100.

RESULTS AND DISCUSSION

Total 26 seed samples of newly released wheat varieties grown at different locations like Faizabad, Sultanpur, Bahraich, Basti, Barabanki, Sidharth Nagar,

[1]Department of Plant Pathology,.Dr. Rajendra Prasad Central Agricultural Uni. Pusa, Samastipur (Bihar)
[2]Department of Plant Pathology, N. D. University of Agri. and Technology Kumarganj, Faizabad (UP)
[3]Department of Entomology, Dr. Rajendra Prasad Central Agricultural Uni. Pusa, Samastipur (Bihar)
*Corresponding author email: dnshuklagnd@gmail.com

Mahrajganj, Ghazipur and Azamgarh under quality seed production programme and submitted to the Notified Seed Testing laboratory of the Department of Seed Science and Technology, N.D. University of Agriculture & Technology, Narendra Nagar (Kumarganj) Faizabad. A part of these samples was obtained from the set laboratory and analyzed for black point of wheat. The black point infected seeds were categorized on the basis of conversion of the grain part. Besides, infected seeds were subjected to pathogenic association also.

Four samples of wheat varieties PBW 502 produced in Bahraich, Faizabad, Sultanpur and Mahrajganj districts was analyse. Out of four samples, one samples from Mahrajganjwere found infected (0.25%), from Bahraich(0.30%), Faizabad(0.35%) and Sultanpur(0.20%). Thus, the range of black point infection was 0.20 to 0.35 per cent with average infection of 0.27 per cent.The fungi which were found associated with back point infected grain were *Alternaria alternata* and *Bipolaris sorokiniana* and *Curvularia lunata* (Table 1).

Table 1: Incidence and severity of Black point in wheat varieties of eastern Uttar Pradesh.

S.N.	Variety	Production site	Per cent seed infection (BP average)	Pathogenic associations (Fungi isolated) Descending order
1.a)	PBW502	Bahraich	0.30	*Alternaria alternataBipolarissorokiniana*
b)	PBW502	Faizabad	0.35	*Curvularialunata*
c)	PBW502	Sultanpur	0.20	*Alternaria alternata*
d)	PBW502	Maharajganj	0.25	*Alternaria alternata B. sorokiniana*
	Total/average	4 districts	1.10/0.27	*A. alternata B.sorokiniana*
2.a)	PBW550	Bahraich	0.25	*B.sorokiniana*
b)	PBW550	Faizabad	0.20	*A.alternata*
c)	PBW550	Basti	0.30	*B.sorokiniana*
d)	PBW550	Siddarth Nagar	0.25	*B.sorokiniana, A.alternata*
	Total/average	4 districts	1.00/0.25	*B.sorokiniana, A.alternata*
3.a)	Raj 3077	Barabanki	0.50	*A.alternata, B.sorokiniana*
b)	Raj 3077	Faizabad	0.25	*B.sorokiniana, A.alternata*
c)	Raj 3077	Sultanpur	0.25	*B.sorokiniana, C. lunata*
	Total/average	3 districts	1.00/0.33	
4.a)	K-7903	Faizabad	0.30	*B.sorokiniana, A.alternata*
b)	K 7903	Sultanpur	0.20	*B.sorokiniana*
c)	K 7903	Barabanki	0.25	*B.sorokiniana*
	Total/average	3 districts	0.75/0.25	
5.a)	HD2733	Ghazipur	0.10	*B.sorokiniana*
b)	HD2733	Azamgarh	0.10	*B.sorokiniana*
c)	HD2733	Siddarth Nagar	0.20	*A.alternata*
	Total/average	3 districts	0.40/0.13	
6.a)	PBW 343	Faizabad	0.30	*A.alternata*
b)	PBW 343	Sultanpur	0.30	*B.sorokiniana*
c)	PBW 343	Faizabad	0.35	*B.sorokiniana*
	Total/average	3districts	0.90/0.30	
7.a)	NW 1012	Faizabad	0.35	*B.sorokiniana*
b)	NW 1012	Barabanki	0.30	*B.sorokiniana*
	Total/average	2 districts	0.65/0.32	
8.a)	K 307	Faizabad	0.15	*B.sorokiniana, A.alternata*
9.a)	K-9423	Faizabad	3.15	*A.alternata, B.sorokiniana*
10.a)	DBW17	Faizabad	1.20	*B.sorokiniana, A.alternata C. lunata*
11.a)	UP262	Barabanki	1.35	*A.alternata*

Four samples of wheat varieties PBW 550 produced in Bahraich, Faizabad, Basti, Siddarth Nagar districts were analyse. Out of four samples, one sample from Siddarth Nagar was found infected (0.25%) and the others from Bahraich(0.25%), Faizabad(0.20%) and Basti(0.30%) were found infected with black point infection. Thus the range of black point infection was 0.20 to 0.30 per cent with average infection of 0.25 per cent.The fungi which were isolated

prominently from the infected grains were *Alternaria alternata* and *Bipolaris sorokiniana*.

Three samples of wheat variety Raj 3077 produced in Barabanki(0.50%), Faizabad(0.25%) and Sultanpur(0.25%) districts were analyses. All the three samples were found infected with black point ranging between 0.25 to 0.50 per cent with average infection of 0.33 per cent. The fungi which were isolated from the infected grains were *Alternaria alternata*, *Bipolaris sorokiniana* and *Curvularia lunata*.

Three samples of wheat varieties K.7903 (Halna) produced in Faizabad, Sultanpur and Barabanki districts were analyse. Out of three samples all samples were found infected one from Faizabad (0.30%) and the other from Barabanki (0.25%). The produce of Sultanpur(0.20%) was also found infected with black point infection. Thus, the range of black point seed infection was 0.20 % to 0.30% per cent with average infection of 0.25 per cent.The fungi which were isolated prominently from the infected grain were *Alternaria alternata* and *Bipolaris sorokiniana*.

Three samples of the wheat variety HD 2733 produced in Ghazipur, Azamgarh and Siddarth Nagar districts were analyze. All the samples were found infected with black point. Out of three samples, one samples were found infected with black point in Ghazipur(0.10%) and two samples were produce from Azamgarh and Siddarthnagar were also found infected with 0.10% and 0.20% respectively.All the three samples were found infected with black point ranging between 0.10 to 0.20 per cent with average infection of 0.13 per cent.The fungi isolated from infected grains were *Biopolaris sorokiniana* and *Alternaria alternata*.

Three samples of wheat variety PBW 343 produced in Faizabad and Sultanpur districts were analyze. Out of three samples, two sample from Faizabad were found infected (0.30%) and other 0.35% produce from Sultanpur(0.25%) was also infectedwith black point infection. All the three seed lots were found infected with black point ranging between 0.25 to 0.35 per cent with average infection of 0.30 per cent. The fungi isolated from the infected grains were *Alternaria alternata* and *Bipolarissorokiniana*.

Two samplesof wheat varieties NW 1012 produced in Faizabad and Barabanki district was analyzed and found infected with black point (0.35%)and (0.30%) respectively All the twoseed lots were found infected with black point ranging between 0.30 to 0.35 per cent with average infection of 0.32 per cent. The fungi isolated from the infected grains were *Bipolaris sorokiniana*.

One sampleof wheat varieties K-307 produced in Faizabad district was analyzed and found infected with black point (0.15%). The fungi isolated from the infected grains were *Bipolaris sorokiniana* and *Alternaria alternata*.

One sample of wheat variety K-9423 produced in Faizabad district was analyzed found infected with black point which was 3.15 per cent. The fungi isolated from the infected grains were *Alternaria alternata* and *Bipolaris sorokiniana*.

One sample of wheat variety DBW-17 produced in Faizabad was analyzed and found infected with black point, which was 1.20 per cent. The fungi isolated from infected grains were *Bipolaris sorokiniana, Alternaria alternata* and *Curvularia lunata*.

One sample of wheat variety UP-262 produced in Barabanki was analyze and found infected with black point which was 1.35 per cent respectively. The fungi isolated prominently from the infected grain was *Alternaria alternata*.

Since the information of black point incidence in the districts surveyed were based on the variable number of wheat grain samples received seed samples in seed testing laboratory of N.D. University of Agriculture and Technology Kumarganj,Faizabad.Black point was widely distributed in various districts of eastern Uttar Pradesh.Present investigation showed that the wheat variety K-9423 was infected from black point with 3.15% seed infection followed by Raj-3007 with average infection 0.33 per cent, whereas the wheat verities NW 1012(0.32%), PBW 343(0.30%), PBW 502(0.27%), K-7903(0.25%) and PBW 550(0.25%) were found average seed infection. A trace level of average seed infection was found in the wheat variety HD-2733(0.13%) and in the variety K 307 showed the 0.15% seed infection. Based on the overall black point occurrence, it emerged that Black point incidence is common in the Eastern Uttar Pradesh and depend on the susceptible wheat varieties, time of sowing and weather condition.

CONCLUSION

Black point disease complex of wheat caused by *Bipolaris sorokiniana* is become alarming conditions in seed production areas of wheatin eastern Uttar Pradesh.As we know that, disease causes discolouration on the seeds which reduce the visible quality as well as reduce market price. Weather condition like intermittent rains, high relative humidityand

Total no. of seed samples = 26
Total no. of districts = 9
No. of infection range =0.10-3.15%

Table 2: Effect of sowing dates and variety on test wt. and Karnal bunt of wheat.

Date of sowing	1000 grain wt.(gm)	KB infection
5-11 Nov. (D_1)	35.19	0.01
12-18 Nov. (D_2)	35.20	0.03
19-25 Nov. (D_3)	35.33	0.00
SEm±	0.257	0.006
CD 5%	0.753	0.017
Variety		
HD-2733 (V_1)	36.16	0.00
PBW-343 (V_2)	36.62	0.04
K-307 (V_3)	31.40	0.00
PBW 39(V_4)	36.78	0.01
SEm±	0.296	0.007
CD5%	0.513	0.020

particularly rise in temperature at the anthesis stage helped the pathogen to cause the disease in wheat verities because the pathogen is seed borne.Frequent rainfall from milk to soft dough stage, late season irrigation and lodging often trigger infection by these seed-inhabiting fungi.

Table 3 : Effect of fertilizer doses and varieties on incidence of Karnal bunt of wheat.

Fertilizer doses	1000 grain wt.	KB infection
40 kg N(N_1)	41.54	0.00
60 kg N (N_2)	41.92	0.00
80 kg N (N_3) alongwith basal dose of P_2O_5 @ 30 kg/ha^{-1}	42.43	0.00
SEm±	0.202	0.002
CD 5%	0.594	NS
Variety		
HD-3070	41.89	0.00
C-306	41.88	0.00
K-8027	42.07	0.02
HD 2888	42.01	0.00
SEm±	0.234	0.003
CD5%	0.686	0.008

Table 4: Efficacy of fungicides *N. indica* (Per cent inhibition to radial growth)

Fungicides	Per cent Inhibition to radial growth		
	Concentration (% a.i.)		
	0.1%	1.0%	2.5%
T_1- Carboxin (Vitavax 75 WP)	15.10 (22.87)**	24.23 (29.49)	31.67 (34.24)
T_2- Carbendazim (Bavistin 50 WP)	17.17 (24.48)	26.27 (30.83)	33.11 (35.07)
T_3- Carbendazim-Subeej (Bavistin 25 SD)	12.09 (20.34)	21.33 (27.37)	28.38 (32.19)
T_4- Propiconazole 20 EC (Tilt 20EC)	19.30 (26.06)	27.72 (31.77)	38.23 (38.19)
T_5- Vitavax Power (Crop Uni Royal)	14.20 (22.14)	23.85 (29.24)	32.53 (34.78)
Control	*		
Factors			**CD at 5%**
Fungicides (F)			**0.957**
Concentration (C)			**0.256**
F x C			0.572

* Radial growth in check 39.00 mm. check consisted of the medium without fungicides.

** Values given in parenthesis are angular transformed values.

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