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Effect of Black Point Infection on Germination of different varieties of Wheat Seed

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Abstract

The present investigation for recording the effect of black point on germination of wheat seed were conducted during 2016-17. The seven different varieties of wheat (HD2733, DBW17, PBW725, PBW386, PBW502, HD3086 and HD2967) were selected. The infestation of seed by black point was categorized on 0 to 5 grade scale. In which healthy seeds were consider as 0 grade. Further germination of seeds were categorized into normal seedling, abnormal seedling and un-germinated seeds. The result shows that the influence of infestation on seed germination appeared to be depend upon the wheat variety. In all seven wheat varieties, germination of BP infected wheat seeds was significantly lower for grade 5(infected seed) as compared to other infestation grades. At 0 grade maximum normal seedling (68-96%) were recorded. Whereas at 1, 2, 3, 4, 5 grades normal seedling ranges from 65-96%, 45-88%, 55.6- 92%, 53.34-72% and 25-50% respectively. Further the abnormal seedling (4-46.67%) and un-germinated seeds (0-75%) indicated that therewasseverity of black point infection on germination of seeds.

Keywords: *Black Point, Wheat, Varieties, Germination*

1. Introduction

Black point is common in all wheat growing regions of the world, including China, Australia, Canada, Serbia and others (Conner and Thomas, 1985; Lorenz, 1986;Mathur and Cunfer, 1993; Wang *et. al*., 2006). Several species of fungi are associated with black point grains. In which *Alternariaalternate*(Fr.) and *Drechslerasorokiniana* (Sacc.) is most dominating fungi species (Huguelet and Kiesling, 1973). The disease seeds are brown to black in colour, usually this discolouration restricted to the embryonic end of the grain. In case of severe infection, the whole grain may be discoloured and shriveled (Hanson and Christensen, 1953;Adlakha and Joshi,1974; Pathak and Zaidi,2013). Thus, it can cause significant economic losses by affecting the market price of wheat as well as the flour quality (Fernandez and Conner, 2011; Barkar *et. al*.,2008). Hence the present study was conducted on recording the effect of black point infectionon germination of different wheat seeds varieties.

2. Materials and Methods

Dry Inspection of Seeds

The experiment was conducted during 2016-17. Seeds of 7 popular wheat varieties (HD2733, DBW17, PBW725, PBW386, PBW502, HD3086 and HD2967) were obtained from the different grain markets of Punjab for further experimental work. 100 seeds per varieties of wheat were examined under four replicate.The seeds were subjected to visual observation under stereo-microscope. Seeds that showed distinct symptoms and abnormalities were selected and categorized in to six different grades from0-5 rating scale:

Grade-0=Grains free from any discolouration (apparently healthy), Grade-1=Tip of the embryo brown to blackish, Grade-2 =Discolouration covering the whole embryo, Grade-3 = Embryo with 1/4 of the grain discoloured, Grade-4 = Embryo with 1/2 of the grain discoloured, Grade-5 = Embryo with more than 1/2 of the grain discoloured and shriveled

Plating and Incubation of Seeds:

Infected seeds of each varieties were surface sterilized in 2% $HgCl_2$ for 15 min and rinsed for 2 min in three changes of sterile distilled water prior to plating. Twenty seeds were plated in each petri dish

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containing moist blotter papers. For each of the categories, a total of 400 seed were plated in four replicates of 100 seeds per variety. These petri dishes were incubated at 22°C ± 2°C under alternating cycles of 12 h light and 12 h darkness.

On the 8th day, incubated seeds were observed for germination. After 8 days, the number of normal seedlings, abnormal seedlings and ungerminated seeds were determined. The seeds classified as normal must fall into one of the following categories:

1 Intact seedlings, with all essential structures well developed, complete in proportion, and healthy.
2 Seedlings with slight defects of their essential structures, provided they show an otherwise satisfactory and balanced development comparable to that intact seedlings in the same test.
3 Seedlings with secondary infection that would have fallen into categories 1 or 2 but for infection by fungi or bacteria from sources other than the parent seed.

Germinated seeds were counted and expressed as a measure of seed viability using the formula.

$$Sv = n/N \times 100$$

Where Sv is % seed viability, n is the number of seeds germinated from each normal or abnormal seed type and N is the total number of seeds plated on blotter.

3. Results and Discussion

In seven wheat varieties the effect of black point on germination were recorded. Healthy seeds considered to be in 0 grade. However, germination of grade-5 were significantly lower than that of other infection grades. In case of PBW502, HD3086 and HD2967 wheat varieties more variability in healthy seed germination across the different infection grades were recorded. Poor germination and production of abnormal seedling indicated that there was severity of black point infection. The continuous increase in percentage of non-germination was recorded from grade point 0-5 in only two wheat varieties (DBW17and PBW725).The wheat varieties HD2733, PBW386, HD3086 and HD2967 were most susceptible to black point (Table 4.1). Previous studies disclosed that HD3086, HD2733, HD2967, HD2329 and WH1105 were most susceptible varieties for black point in South Western Punjab (Rani and Singh, 2017). Mihaela *et. al.*, 2013,also recorded higher germination value in black-point-free seeds (BPF) when compared to affected seeds (BP).Previous studies revealed that the germination rate varied with the variety and health of seeds (Sikder and Paul, 2010). Many authors were also reported that theblack point decreases the germination rate, number of embryonic roots, coleoptile length,delayed seedling emergence and seedling vigour (Ozer, 2005; Toklu*et. al.*,2008).

Tables 4.1 Effect of (Black Point) on germination of wheat seed as determined by the Standard Blotter Test

Infestation Grade	Germination		
	1	2	3
HD2733			
0	84	12	4
1	80	12	8
2	60	8	32
3	60	12	28
4	56	16	28
5	35	25	37.5
DBW17			
0	96	4	0
1	92	4	4
2	88	8	4
3	88	8	4
4	72	16	12
5	40	20	40
PBW725			
0	96	4	0
1	96	4	0
2	96	4	0
3	92	8	0
4	72	12	16
5	25	0	75
PBW386			
0	82.36	5.88	11.76
1	76.47	11.76	11.76
2	76.47	5.88	18.75
3	58.82	17.65	23.53
4	58.82	29.41	11.76
5	35.29	29.41	35.29
PBW502			
0	90	5	5
1	65	15	
2	45	10	25
3	55.6	22.3	33
4	60	20	20
5	50	25	25
HD3086			
0	73.34	20	6.67
1	73.34	20	6.67
2	53.34	26.67	20
3	73.34	6.67	20
4	53.34	26.67	6.67
5	33.34	46.67	20
HD2967			
0	68	28	4
1	84	12	1
2	64	32	1
3	68	12	20
4	35	5	48
5	33.3	16.67	50

1 = Normal germination, 2 = Abnormal germination, 3 = Ungerminated seeds

These seed-borne diseases had been found to affect the growth and productivity of crop plants(Kubiak and Korbas, 1999; Dawson *et. al.*,2001; Weber*et. al.*, 2001). Similarly, Rena and Gupta (1982) also

reported localized discoloured areas, usually around the embryo end of seeds was often responsible for reduced germinability. Hence the present study revealed that the black point reduced the germination of seed.

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