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Occurence and distributional outline of black point and karnal bunt of Wheat in North Gujarat

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ABSTRACT

Examination of wheat grain samples for the infection of black point and karnal bunt of wheat during 2011-12 to 2016-17 in various marketing yards and farmer's field of various talukas of North Gujarat has resulted that the overall per cent severity of black point of wheat was higher during the year 2012-13 and 2013-14. While during the remaining of study, the severity of black point were in the range of 21 to 23 per cent. The maximum range of infection of black point of wheat in the infected grain samples was observed during 2011-12 whereas it was under the range of 5.6 to 9.5 during the years 2012-13 to 2016-17. All the grain samples collected from the various talukas of North Gujarat were free from the infection of karnal bunt during all the study years which suggested that the climatic condition of North Gujarat doesn't favour the development of karnal bunt of wheat.

Key words: *Alternaria alternata*, black point, discolouration, market price, karnal bunt

Alternaria alternata is considered as primary causal organism for black point of wheat (Adlakha and Joshi, 1974; Srivastava *et al.*, 2014). Black Point of wheat is the major limiting factor for milling and baking property of chapatti and bread making since it lead to quality deterioration of wheat in India (Singh *et al.*, 2018). The diagnostic symptom of black point of wheat is the presence of conspicuous brownish to black discolouration mainly at embryonic end of wheat seed. It also strikes on endosperm tissues and ventral crease of seeds imparting brownish to black discoloration along with the shrivelling of seed. Sometime, in a very extreme condition, microscopic observations of pericarp tissues verified the presence of typical fungal growth within. These discolourations on various parts of seeds affect grain quality which ultimately leads to reduction in market price of wheat. The infection of black point of wheat reduces quality appearance of grain mainly the colour and luster which reduces the market price of wheat in the range of 3.71 to 12.49 per cent in Gujarat (Solanki *et al.*, 2006; Mishra and Srivastava, 2015). Grain losses due to the black point ranged from 24 to 27 per cent in very susceptible cultivars due to the loss in number of kernels and dry weight of kernel (Bhandari *et al.*, 2003). The infection invariably causes deprivation of seed and grain quality coupled with diminution of nutritive value (Vuckovic *et al.*, 2012). Defective agronomical practices coupled with favourable meteorological conditions endorse the growth of pathogen which in turn causes development of symptoms in grains (Patel and Manipara, 2015). Moreover, delayed application of irrigation in field to utilise the residual soil moisture also facilitates the infection and symptom expression of black point of wheat (Srivastava *et al.*, 2014). The infection becomes severe when prolonged wet weather prevails during grain filling period stage of crop. When seed moisture content exceeds 20 per cent, coupled with the presence of high relative humidity of above 90 per cent, then the amount of infection of black point increases significantly (Toklu *et al.*, 2008). Reduction in germination, seedling emergence, plant stand, root and shoot growth, tillering and grain yield were directly related with the severity of black point of wheat (Stoyanova *et al.*, 1997; Ozer, 2005).

Karnal bunt of wheat, caused by *Neovossia indica* is a limiting factor in wheat export since the pathogen is reported as quarantine pest in India and its seed borne nature also threaten trading of wheat between countries and seed certification point of view (Kumar *et al.*, 2008; Tan *et al.*, 2009). Thus, the present investigation was carried out to know the occurence

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Table1 List of places from where samples were collected in North Gujarat.

Places of sample collection					
2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Mansa	Mansa	Mansa	Mansa	Mansa	Mansa
Dehgam	Dehgam	Dehgam	Dehgam	Dehgam	Dehgam
Rakhiyal	Talod	Talod	Talod	Talod	Prantij
Talod	Khedbramha	Khedbramha	Prantij	Prantij	Talod
Prantij	Idar	Idar	Khedbramha	Idar	Kalol
Mehsana	Vadali	Vadali	Vadali	Kadi	Khedbramha
Visnagar	Bhiloda	Bhiloda	Visnagar	Kalol	Idar
Vijapur	Himmatnagar	Himmatnagar	Mehsana	Khedbramha	Vadali
Farmer's field	Kukarvada	Kukarvada	Kukarvada	Vadali	Dhansura
	Gogaria	Gogaria	Vijapur	Salal	Mehsana
	Mehsana	Mehsana	Farmer's field	Mehsana	Visnagar
	Visnagar	Visnagar		Visnagar	Vijapur
	Vijapur	Vijapur		Kukarvada	Farmer's field
	Farmer's field	Farmer's field		Vijapur	
				Farmer's field	

Table 2 Status of black point infection of wheat during 2011-12 to 2016-17.

Place	Years of sample examined	Total sample examined	No. of infected sample	Average per cent of infection	Average range of infection
Mansa	2011-12 to 2016-17	212	61	30.51	5.7
Dehgam	2011-12 to 2016-17	190	71	35.62	6.1
Rakhiyal	2011-12	13	03	15.40	5.9
Talod	2011-12 to 2016-17	200	46	27.20	5.1
Prantij	2011-12 and 2014-15 to 2016-17	126	24	16.85	3.6
Kadi	2015-16	45	10	22.20	4.7
Kalol	2015-16 to 2016-17	43	20	23.80	4.2
Khedbramha	2012-13 to 2016-17	168	56	35.58	4.7
Idar	2012-13 to 2016-17	187	70	36.40	6.6
Vadali	2012-13 to 2016-17	186	63	34.22	5.3
Bhiloda	2012-13 to 2013-14	62	29	46.66	7.9
Salal	2015-16	20	04	20.00	4.4
Dhansura	2016-17	30	06	20.00	3.2
Himmatnagar	2012-13 to 2013-14	45	20	45.53	5.8
Kukarvada	2012-13 to 2015-16	162	58	35.85	5.2
Gogaria	2012-13 to 2013-14	49	22	44.53	6.0
Mehsana	2011-12 to 2016-17	261	80	33.36	6.8
Visnagar	2011-12 to 2016-17	249	76	31.50	6.8
Vijapur	2011-12 to 2016-17	318	84	28.34	6.9
Farmer's field	2011-12 to 2016-17	345	85	31.36	5.7

Table 3 Year wise severity of black point and karnal bunt of wheat in North Gujarat.

SN	Year	No. of sample	Per cent severity examined	Per cent severity of black point of karnal bunt
1.	2011-12	251	21.50	0
2.	2012-13	380	49.85	0
3.	2013-14	485	47.24	0
4.	2014-15	536	21.80	0
5.	2015-16	629	23.20	0
6.	2016-17	673	22.60	0

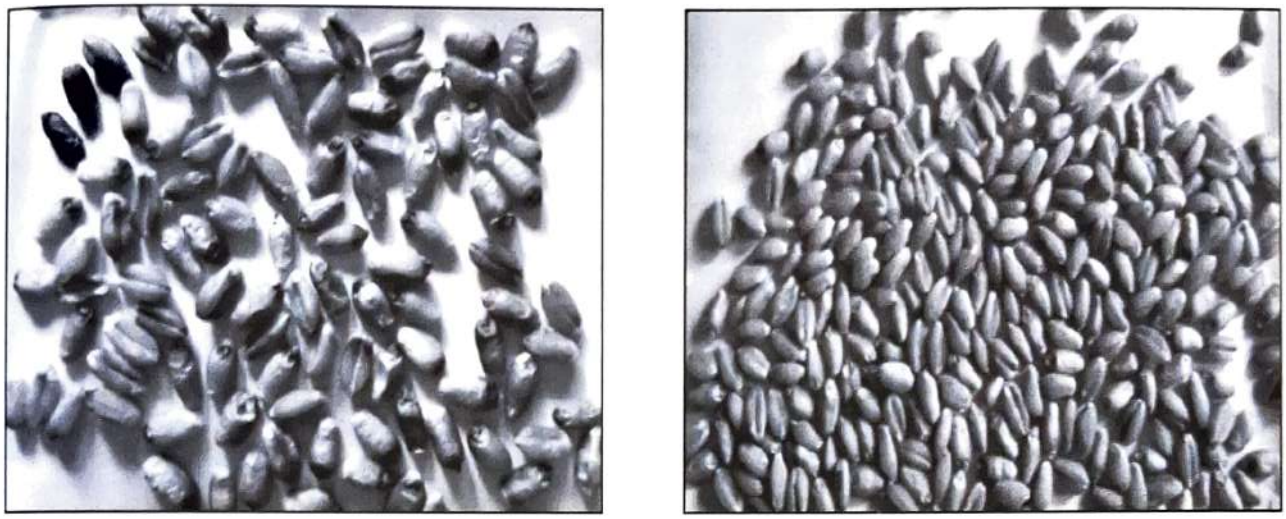

Fig 1. Black point infected grains and healthy grains of wheat

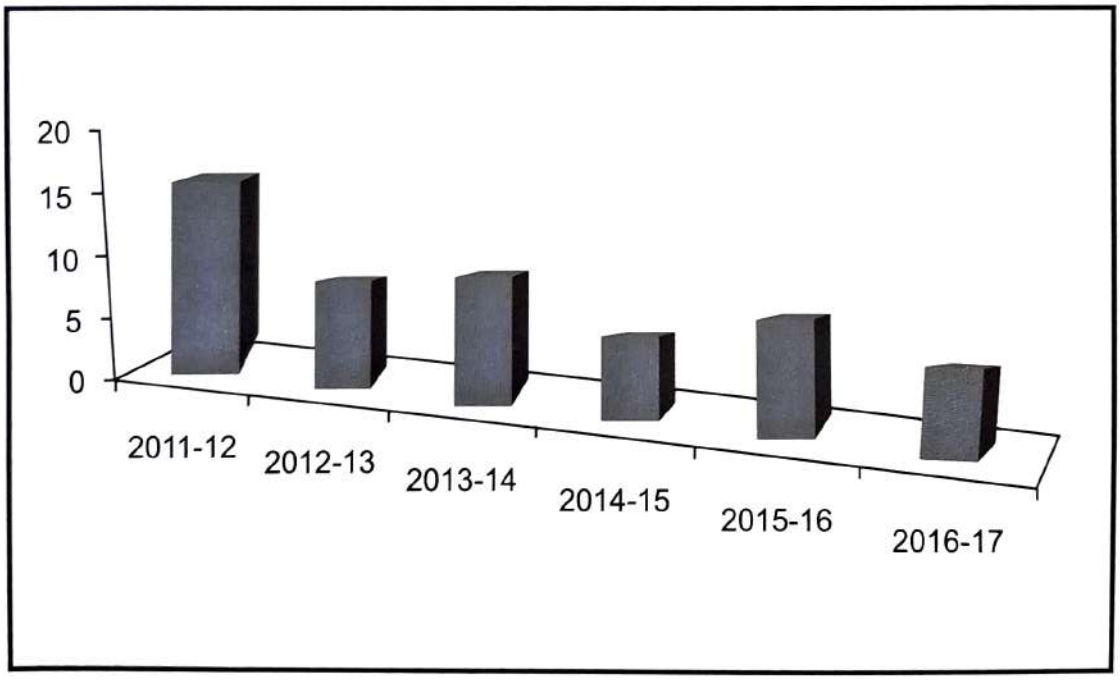

Fig 2. Range of infection of black point in infected grain samples of wheat

and distributional status of black point and karnal bunt of wheat in various marketing yards and farmer's field under different talukas of North Gujarat.

MATERIALS AND METHODS

Mobile survey in local grain marketing yards and farmer's fields under various talukas of North Gujarat were conducted after harvest of crop for the collection and examination of grain samples during 2011-12 to 2016-17. Various talukas of North Gujarat were visited as provided in table 1 and samples were collected for examination of disease. Proper examination of grains for characteristic symptoms of black point and karnal bunt of wheat were conducted by visual observation and later on per cent grain samples infected with the disease were calculated as follows:

Per cent grain sample infected =

$$\frac{\text{No. of samples infected}}{\text{Total no. of samples examined}} \times 100$$

Then, per cent range of infection of black point was determined by collecting 1000 grains from the mixed seed lot and they were examined critically in a ten sub samples of 100 grains each and calculated as follows:

Per cent range of infection =

$$\frac{\text{No. of grains infected with black point}}{\text{Total no. of grains examined}} \times 100$$

RESULTS AND DISCUSSION

Area wise distributional status of black point of wheat is presented in table 2. The overall per cent severity of black point and karnal bunt of wheat under different talukas of North Gujarat during 2011-12 to 2016-17 is presented in Table 3 and overall their range of infection is presented in Fig. 2. During the year, 2012-13 and 2013-14 the overall per cent severity of black point of wheat were higher i.e. 49.85 and 47.24 respectively (Table 3). While during the years of study i.e. 2011-12, 2014-15, 2015-16 and 2016-17 the overall severity of black point infection were in the range of 21 to 23 per cent. But, during all the years of study, infection of karnal bunt of wheat was not reported in all the grain samples collected from various talukas of North Gujarat which suggested that climatic condition of North Gujarat doesn't favour the development of karnal bunt. Examination on the overall range of infection of black point of wheat has indicated that during 2011-12 it was higher i.e. 15.6 while during the years of study i.e. 2012-13 to 2016-17 the overall range of infection of black point of wheat were in the range of 5.6 to 9.5 (Fig. 2).

Visual observation of wheat grains after harvest has indicated that the incidence of black point increased with the increase in exposure period of the spikes due to the airborne inocula of the primary pathogen associated with black point of wheat (Malaker and Mian, 2010). Similar result also reported that the infection of black point of wheat was invariably present in all wheat growing region of North Gujarat with certain degree of its infection in 6664 wheat grain samples of various surveyed areas of marketing yards and farmer field during 2001-02 to 2009-2010 as well as suggested that the occurence of karnal bunt of wheat was free form the state which support the findings of present investigation (Patel and Solanki, 2012). The result of Singh *et al.* (2018) has indicated that infection of black point of wheat was prevalent during 2012-13 to 2014-15 in states of North Western Plain Zone (NWPZ) from where samples were analyzed but there was difference in the disease incidence in different states of India which suggested that the weather factors prevailing in different states at vulnerable stage of the crop affect the disease outbreak.

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