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Occurrence and Distribution of Sesame Alternaria Blight under Environmental Conditions of Transitional Plain of Luni Basin of Rajasthan

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ABSTRACT: Sesame (*Sesamum indicum* L.), is an ancient important oilseed crop belonging to the family Pedaliaceae and native of India. Alternaria blight of sesame is widespread and have continued to be the major constraints in the production and productivity of sesame all over the country in mostly in the state of Rajasthan particularly. Looking to the economic importance of the disease and very meagre information available related to disease in Rajasthan, the present plant pathological studies were undertaken to generate the information on important various aspects of disease. To find out the status sesame Alternaria blight a rapid roving survey was conducted to record sesame Alternaria blight disease intensity during two *Kharif* seasons (2019 and 2020), covering 100 sesame crop fields of 20 villages in Pali region under transitional plain of Luni Basin (ZoneIIb) of Rajasthan, India. Alternaria blight disease appeared in all the surveyed areas of Pali regions from initiation of flowering stage to fruiting stage of the crop. The Alternaria blight disease intensity was ranging from 0.00 to 31.11 per cent with an average of 09.43 per cent in during 2019. While, during 2020 the average per cent disease intensity was 38.33, with ranging from 12.22 to 64.44 per cent. The maximum disease incidence was observed at Sonai Manji (31.11%) during 2019. Whereas, during 2020 Nayagaon recorded maximum per cent disease intensity (64.44%). Overall, our study provides evidence on the status of alternaria blight severity with cultivars adopted by the farmers, which are helpful in selection of resistant cultivars and developing stable disease management strategies.

Keywords: Alternaria blight, survey, disease intensity and sesame.

INTRODUCTION

Sesame (*Sesamum indicum* L.), is one of the important oilseed crop grown in tropical and sub-tropical parts of the world referred as "Queen of Oilseeds". It is cultivated in more than 55 countries of the world with native of India and belonging to the family Pedaliaceae reported by Joshi, (1961); Weiss, (1983). India is among the largest vegetable oil economies in the world and it is ranks first in area and production among the sesame growing countries (Ashri, 1998). According to Kumaraswamy *et al.*, (2015) sesame seed is an important source of edible oil (50%), protein (20%), oleic acid (47%) and linolenic acid (39%). Natural antioxidants like sesamoline, sesamin and sesamol is also present in abundant form in sesame reported by Shyu and Hwang, (2002).

Sesame is widely used for different purposes but many factors responsible for low productivity and yield loss of the crop *i.e.* non-availability of high-yielding varieties, resistant variety to biotic and abiotic stresses, low harvest index, seed shattering and indeterminate growth habit.

Cultivation in India constitutes about 14.19 lakh ha area for the production of 6.89 lakh tonnes of seed. In India, Rajasthan is contributing 14% of the total production. According to 2019-20 census Rajasthan produces about 91,524 tonnes of Sesame annually from about 2.79 lakh hectares area (DPD and Commissionerate of Agriculture, Rajasthan). Sesame is an important crop of western Rajasthan and is mainly grown in the districts of Pali, Sawai Madhopur, Ajmer, karauli, Sirohi and Jodhpur.

A number of fungal, bacterial, viral and mycoplasmal diseases of sesame have been reported in India. Major sesame diseases caused by fungi are: Leaf spot/blight (*Alternaria sesami*), Wilt (*Fusarium oxysporum f.* sp. *sesami*), stem blight (*Phytophthora parasitica*), Root rot (*Rhizoctonia bataticola*), *Cercospora* leaf spot (*Cercospora sesami*), Powdery mildew (*Sphaerotheca fuliginia*), and Anthracnose (*Colletotrichum capsici*). Among the fungal diseases sesame leaf spot/blight caused by *Alternaria sesami* (Kawamura) is most important disease causes considerable yield losses reported by Bhale *et al.,* (1998). It was first reported bin (1948) at Uttar Pradesh, which later spread in sesame growing region of the country (Kolte, 1985; Tripathi *et al.,* 2005; Dolle, 1981; Narute and Utikar, 1994). Kumar and Mishra, (1992); Prasad and Reddy (1997) reported that the disease (*A. sesami*) has been cause 20 to 40 per cent yield losses all over India.

MATERIAL AND METHOD

To know the status Alternaria blight of sesame at the different areas of Pali region under transitional plain of Luni Basin (Zone IIb) of Rajasthan, India an intensive rapid roving survey was carried out during Kharif of 2019 and 2020. Five fields were selected in a village, which was on the survey route. In both the years, the survey was carried out during August, when the sesame crop was at flowering stage. Details of sesame crop fields surveyed are given in the Table 2. In the selected sesame crop fields, 20 plants were randomly selected and recorded the observations on blight disease intensity by applying 0-9 grade disease rating scale (Mayee and Datar, 1986), as detailed in Table 1. Per cent Alternaria blight disease intensity (PDI) was worked out by applying following formula (McKinney, 1923).

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of the individual disease ratings}}{\text{Total number of leaves observed} \times \text{Maximum grade}} \times 100$$

RESULTS AND DISCUSSION

During survey, natural leaf spot/blight symptoms expressed a wide range of variability in respect of their shape, size, colour and presence or absence of concentric zonation etc. (Plate I). In Pali region under transitional plain of Luni Basin (Zone IIb) of Rajasthan, 20 extensively sesame growing villages were surveyed to record the occurrence sesame blight disease during *kharif* season of 2019 and 2020. The villages were surveyed from flowering (1st week of September) and fruiting stages (4th week of September) of the crop. The data depicted in Table 1 revealed that the blight intensity was ranging from 0.00 to 31.11 per cent with an average of 09.43 per cent during 2019. While, during 2020 the average per cent disease incidence was 38.33, with ranging from 12.22 to 64.44 per cent. During 2019 maximum disease intensity was observed at Sonai Manji (31 %) followed by Dhamli, Nayagaon, Guda Narkan, Bariya and Dhandheri with 25.00, 24.44, 23.33, 11.11 and 11.11 per cent, respectively. However, in 2020 the disease intensity was observed in the range of 12.22 to 64.44 per cent with an average of 38.33 per cent. The maximum disease incidence was found in Nayagaon (64.44 %) during 2020 followed by Bariya, Dhamli, Sonai Manji, Guda Narkan and Asan with 62.22, 61.11, 48.89, 42.22 and 41.11 per cent, respectively. Overall, yellow vein mosaic incidence was higher in fruiting stage compared to flowering stage. The disease was higher (38.33 %) in during 2020 as compared to of 2019 (09.43 %).

Table 1: Alternaria blight disease rating scale.

Rating scale	Description
0	No symptoms on the leaf.
1	Small, irregular brown to black spots covering 1 per cent or less of the leaf area.
3	Small, round to irregular brown spots with concentric rings covering 1-10 per cent of the leaf area.
5	Round to irregular brown lesions enlarging, with concentric rings covering 11-25 per cent of the leaf area.
7	Lesions enlarging and coalescing to form irregular brown patches with concentric rings and covering 26-50 per cent of the leaf area. Lesions also appeared on stem petioles and pods
9	Lesions enlarged coalesced to forming irregular, dark brown patches with concentric rings covering 51 per cent or more of the leaf area. Lesions on stem petioles and capsules.

The powdery mildew caused losses in proportion to the disease intensity and it varies significantly depending upon the stage of the plant growth at which disease occurs. Similar results on sesame crop were reported by several earlier workers (Mohanty and Behera, 1958; Leppik and Sowell, 1964; Chohan, 1978; Kolte, 1985; Naik *et al.,* 2004; Akbari and Parkhia, 2011; Anonymous, 2014). Ojiambo *et al.,* (1998), they reported the long period of high humidity and spore dispersal by frequent rain showers during *Kharif* were more suitable for infection of leaf spot/ light of sesame. Leppik and Sowell, (1964) observed that wherever sesame is grown species *Alternaria sesame* probably also occurs. 80 per cent losses in grain yield under wet climate conditions were reported by Akbari and Parkhia (2011) due to occurrence of Alternaria leaf spot/blight of sesame under Saurashtra region of Gujrat state.

Anonymous (2014) observed similar results in Tamil Nadu (Cuddalore district) 1-2 grade, Keonjhor and Dhenkanal districts (2-3 grade) and less in Madhya Pradesh (Jabalpur and Chhatrapur districts) 1-2 grade, Jodhpur district (0-2 grade) showing that Alternaria leaf blight of sesame incidence was higher due to unfavourable environmental conditions.

Pawar *et al*., (2019) found that Central Maharashtra Plateau Zone (37.99 %), followed by the zones *viz*., Western Maharashtra Plain Zone (36.21 %), Central Vidarbha Zone (34.27 %) and Western Maharashtra Scarcity Zone (31.06 %) reported maximum mean blight disease intensity whereas, it was minimum in the zones of Western Ghat Zone (20.24 %) and North Konkan Coastal Zone (21.82 %). Maximum mean blight disease intensity was recorded on AKT-64 (43.76 %) among various sesame cultivars/varieties grown in the nine agro climatic zones, followed by Local cultivar (40.08 %); whereas, rest of the cultivars exhibited minimum mean blight disease intensity in the range of 19.63 to 32.33 per cent (Prathyusha *et al*., 2021) conducted a systematic and robust survey during kharif 2018 in Krishna and Guntur districts and also during rabi 2018-19 in Guntur district of Andhra Pradesh at 30-35, 40- 45, 50-55 and 60-70 DAS and revealed that the disease incidence kept on increasing with increase in the age of the crop. There was no disease incidence observed upto 30-35 days old crop.

Mean okra yellow vein mosaic disease incidence of 36.13 was reported by Kumar *et al*., (2018) with values ranging from 16 and 66 per cent. During the year 2017 and 2018 the maximum disease incidence was found in Arathwara (64 and 68 %). Similarly, Sharma *et al*., (2016) found that compared to flowering stage (12.46 %) powdery mildew intensity was higher in fruiting stage (36.39%). During 2016 the disease was higher (40.92 %) in fruiting stage as compared to fruiting stage of 2015 (31.85 %).

Table 2: The per cent disease intensity of Alternaria blight in different villages of Pali region under transitional plain of Luni Basin (Zone IIb).

Sr.No.	Village	Alternaria Blight of Sesame		
		PDI		
		2019	2020	Av.
1.	Hemawas	6.67	31.11	18.89
2.	Sonai manji	31.11	48.89	40.00
3.	Guda Narkan	23.33	42.22	32.78
4.	Sodawas	8.33	37.78	23.06
5.	Tewali	0.00	22.22	11.11
6.	Busi	8.89	35.56	22.22
7.	Somesar	0.00	12.22	6.11
8.	Bhimaliya	8.33	31.11	19.72
9.	Dhamli	25.00	61.11	43.06
10.	Nayagaon	24.44	64.44	44.44
11.	Bariya	11.11	62.22	36.67
12.	Jaitpura	8.89	37.78	23.33
13.	Aauwa	10.00	35.56	22.78
14.	Asan	6.67	41.11	23.89
15.	Kharchi	0.00	27.78	13.89
16.	Jadan	6.67	33.33	20.00
17.	Bagawas	0.00	25.56	12.78
18.	Dhinawas	10.00	28.89	19.44
19.	Sojat	8.89	34.44	21.67
20.	Dhandheri	11.11	53.33	32.22
Average PDI		09.43	38.33	23.88

CONCLUSION

From the study it is clearly evident that during the survey, occurrence of sesame Alternaria blight disease was observed in serious proportion, inflicting heavy losses in different areas of Pali region under transitional plain of Luni Basin (ZoneIIb) of Rajasthan, India Considering the seriousness of the disease, the present investigation was carried out on disease intensity related information on this important pathological problem and to develop suitable management strategies to prevent the crop losses.

Alternaria blight disease intensity was ranging from 0.00 to 31.11 per cent with an average of 09.43 per cent in during 2019. While, during 2020 the average per cent disease intensity was 38.33, with ranging from 12.22 to 64.44 per cent. The maximum disease incidence was observed at Sonai Manji (31.11%) during 2019. Whereas, during 2020 Nayagaon recorded maximum per cent disease intensity (64.44%). Overall, our study provides evidence on the status of alternaria blight severity with cultivars adopted by the farmers, which are helpful in selection of resistant cultivars and developing stable disease management strategies.

Plate 1: Typical symptoms of Alternaria light on sesame crop in surveyed area.

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Conflict of Interest. Nil.

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