

Original Research Article

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Survey for the Disease, Downy Mildew Incidence on Pearl Millet Cultivars in Rajasthan

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ABSTRACT

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A total of 50 fields comprising of approximately 59 hectare area covering 11 tehsils with 24 villages of Bikaner, Jodhpur, Sikar, Jaipur and Alwar districts of Rajasthan at preboot to flowering stage were surveyed during *kharif* 2016 and 2017. Out of these, ten fields of Jodhpur district showed less than 10 per cent downy mildew incidence which was 9.6 per cent of the total fields observed during survey. The average downy mildew incidence in different districts varied from 9.87 to 17.95 per cent. The maximum average downy mildew incidence of 17.95 per cent was noticed in Bikaner district followed by Sikar (17.4%), Jaipur (16.93 %), Alwar (13.35 %), and Jodhpur (9.87 %). The overall mean of downy mildew incidence of five districts was 15.1 per cent. Out of 28 cultivars grown on farmer's fields, six cultivars were found free from downy mildew incidence. Eleven cultivars showed incidence up to 10 per cent and 11 cultivars showed more than 10 per cent incidence.

Introduction

Downy mildew, caused by *Sclerospora graminicola* (Sacc.) Schoret, is the most important and widespread biotic constraint to sustain high productivity of pearl millet [*Pennisetum glaucum* [(L.) R. Br.] hybrids in India. The disease is of wide occurrence in arid and semi-arid areas of Rajasthan. Hence, through understanding is required of actual distribution and prevalence of the disease in the major pearl millet growing areas of the

Rajasthan, Therefore, the present study was carried out to know the actual distribution and prevalence of the disease in the major pearl millet growing areas of the Rajasthan,

Materials and Methods

Survey was undertaken in the major pearl millet growing districts of Rajasthan namely, Bikaner, Jodhpur, Sikar, Jaipur and Alwar. Surveys were conducted at preboot to flowering stage in *kharif* 2016 and 2017.

Observations for downy mildew incidence were recorded at every 10 km intervals, and fields on both sides of the road were scouted in a zigzag fashion. The selection of village and fields was done randomly. To assess the disease incidence, five fields were observed in each village and average incidence of the disease in each village was calculated. In each field, five random subplots (four at the corners and one in the middle) were selected, and within each subplot, a minimum of 50 plants were counted in 2–3 rows to record diseased and healthy plants. The sum totals of healthy and diseased plants from 5 subplots of each field were used to determine the downy mildew incidence percent. The per cent disease incidence was calculated as per formula given below

$$\text{Per cent disease incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants observed}} \times 100$$

Results and Discussion

Survey for the occurrence of downy mildew of pearl millet was undertaken during *kharif* 2016 and 2017 in Bikaner, Jodhpur, Sikar, Jaipur and Alwar districts of Rajasthan at preboot to flowering stage. During the surveys, discussions were held with the farmers regarding occurrence and incidence of the disease downy mildew. As a result of discussion, it was revealed that the disease appeared in most of the fields wherever, pearl millet crop has been grown regularly and area received average rainfall. Extensive surveys revealed that downy mildew of pearl millet appeared in all the districts surveyed. A total of 96 fields comprising of approximately 59 hectare area in 5 districts covering 11 tehsils with 24 villages of Rajasthan, were surveyed (Table 1 and Fig 1). Out of these, 10 fields of Jodhpur district showed less than 10 per cent downy mildew incidence which was 9.6 per cent of the total fields observed during

survey. The average downy mildew incidence in different districts varied from 9.87 to 17.95 per cent. The maximum average downy mildew incidence of 17.95 per cent was noticed in Bikaner district followed by Sikar (17.4%), Jaipur (16.93 %), Alwar (13.35 %), and Jodhpur (9.87 %).

The overall mean of downy mildew incidence of five districts was 15.1 per cent the above result are accordance with the scientist Rao *et al.*, (2005) who surveyed 585 pearl millet fields in 16 districts of Rajasthan, 59% of these showed downy mildew infection. The mean downy mildew (DM) incidence across pearl millet cultivars over four seasons varied from low to moderate (1–21%) in 14 districts, and minimum downy mildew (DM) was recorded in Alwar and Karauli districts.

Several Similar results reported by Sharma *et al.*, (2012) who surveyed total of 97 fields in the eight districts of Uttar Pradesh and found 86 fields (89%) with downy mildew incidence ranging from 2 to 100% with a mean incidence of 52% across infected fields downy mildew incidence was very high in the Hathras district with 100% incidence. None of the fields surveyed in Badaun, Bulandshehar, Mathura and Moradabad districts were free from downy mildew and the mean downy mildew incidence in these districts ranged from 45 to 83%.

Sharma *et al.*, (2012) surveyed pearl millet fields in Maharashtra, India during the rainy seasons of 2009 and 2010 to monitor on farm downy mildew (DM) incidence and assess the pathogenic diversity among native populations of *Sclerospora graminicola*. Of the 131 fields surveyed in seven districts in Maharashtra, DM was observed in 72 fields in the range of 1-90%. Downy mildew was quite severe in Ahmednagar, Jalgaon, Aurangabad and Jalna districts with mean disease incidence of 56, 40, 35 and 32, respectively.

Table.1 Status of downy mildew incidence in major pearl millet growing districts of Rajasthan (*kharif* 2016 and 2017)

S. No.	District	Tehsils covered	Village	Cultivar grown	No. of Fields	DM incidence (%)		Mean
						2016	2017	
1.	Bikaner	i. Bikaner	Beechwal&Khara,	Local, RHB 90, Unknownhybrid, Rewati 2123, Pioneer 7501, Pioneer 86M86, Proagro, Xylum 86M66, Bioseed 8434, ICMH 356, PG 5848,	10	18.6	17.3	17.95
		ii. Lunkansar	Bamanwali&kakarwala					
2.	Sikar	i. Khandela	Rampura&Sukhpura,	Pioneer 86M86, Nirmal hybrid, Unknown hybrid, Bioseed 8486Local, RHB 121, Anmol	10	16.5	18.3	17.4
		ii. Reengus	Bagadi&Nangal					
3.	Jodhpur	i. Bhopalgarh	Artiyakalan&Bandra,	Pioneer 86M86, Bioseed 8434, Pioneer 7501, Proagro 7501, Local, MRB 2210, PG 5848,	10	10.4	9.34	9.87
		ii. Mandor	Alakhdera&Keru					
4.	Alwar	i. Bansur	Khedla&Mothuka,	Unknown hybrid, Pioneer 86M86, Proagro 9450, JK Agro, Raj 171, Xylum 86M66, Proagro	10	12.3	14.4	13.35
		ii. Kishangarh Bas	Gothra&Aundhra					
5.	Jaipur	i. Chomu	Ghinoi&Kanarpura,	Rajlakshmi, Kaveribigboss, Pioneer78, Gurukripa, Local, ICMH 356, Bioseed 8469, Bioseed 8510, Nirmal 1651, Anmol, PG 5848, PB 106	10	16.3	17.56	16.93
		ii. Phulera	Pratappura&Gumaanpura,					
		iii. Jaipur	Jobner, Bagas, Rainwal, and Durgapura					
Total		11	24	50				15.1

*All the data are mean of *kharif* 2016 and 2017

Table.2 Downy mildew incidence in different cultivars recorded at farmers fields
(*kharif* 2016 and 2017)

S. No.	Name of cultivar	Area (ha.)	No. of Fields Observed	DM incidence (%) Mean
1	Rajlakshmi	4.0	1.0	4.6
2	Kaveri Big Boss	3.0	3.0	3.7
3	Pioneer-78	0.4	1.0	2.34
4	Guru Kripa	2.0	1.0	4.3
5	Local	10.0	17.0	16.7
6	Niramal Hybrid	0.25	5.0	4.7
7	Unknown Hybrid	9.0	12.0	19.45
8.	Xylum 86M66	1.0	1.0	10.34
9.	Proagro	0.6	2.0	1.0
10.	Pioneer (86M86)	3.0	3.0	0
11.	Pro Agro 9450	5.0	1.0	0
12.	JK Agro	0.60	1.0	0
13.	ICMH 356	5.0	6.0	27.3
14.	HHB 67	3.0	5.0	3.7
15.	Bioseed 8434	3.0	5.0	21.0
16.	Bioseed 8469	1.6	3.0	0
17.	Bioseed 8486	0.25	2.0	0
18.	Bioseed 8510	6.0	1.0	0
19.	Anmol	1.0	3.0	16.2
20.	PG 5848	3.0	2.0	17.3
21.	PB 106	5.0	4.0	17.7
22.	Proagro 7501	4.0	5.0	16.0
23.	RHB 90	0.25	6.0	19.3
24.	RHB121	4.0	4.0	12.6
25.	Nirmal 1651	2.0	3.0	6.45
26.	MRB 2210	1.0	1.0	2.34
27.	Raj 171	2.0	3.0	5.7
28.	Rewati 2123	1.0	1.0	1.0

*All the data are mean of *kharif* 2016 and 2017

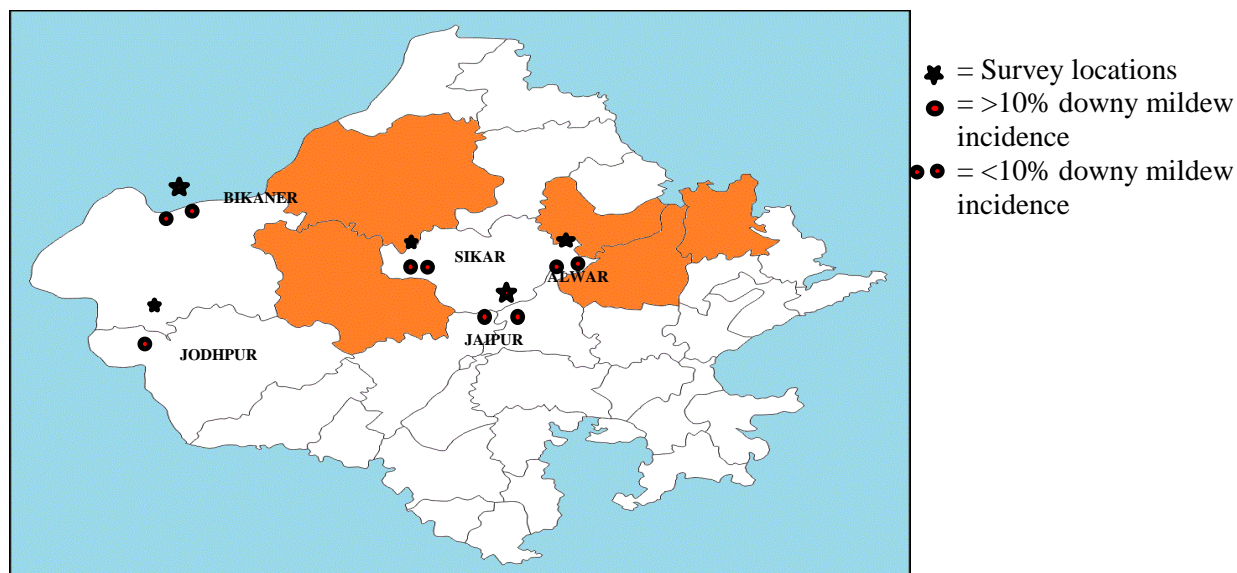


Fig.1 Map of Rajasthan showing prevalence of downy mildew of pearl millet (*Kharif*, 2016 and 2017)

Out of 28 cultivars grown on farmer's fields, six cultivars were found free from downy mildew incidence. Eleven cultivars showed incidence up to 10 per cent and 11 cultivars showed more than 10 per cent incidence (Table 2). The maximum incidence was recorded in cultivar ICMH 356 (27.3 %), followed by Bioseed 8434 (21 %), Unknown Hybrid (19.45 %), RHB 90 (19.3 %), PB 106 (17.7 %), PG 5848 (17.3 %), Local (16.7 %), Anmol (16.2%), Pro Agro 7501 (16%), RHB 121 (12.6 %), Xylum 86M66 (10.34 %), Nirmal 1651 (6.45 %), Raj 171 (5.7 %), Nirmal Hybrid (4.7 %), Rajlakhsmi (4.6%), Guru Kripa (4.3 %), Kaveri big boss and HHB 67 (3.7%), MRB 2220 and Pioneer 78 (2.34 %), and lowest incidence (1%) was recorded in Proagro and Rewati 2123. These results were accordance with Thakur *et al.*, (1997), Thakur *et al.*, (2003), Rao *et al.*, (2007) and Sharma *et al.*, (2012).

From the experimental results it was concluded that the disease appeared in most of the fields wherever, pearl millet crop has been grown regularly and area received average rainfall.

Therefore, downy mildew is the most important and widespread biotic constraint to sustain high productivity of pearl millet hybrids in India.

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