

Ber germplasm screening and management of black leaf spot disease under Eastern U.P. conditions

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Abstract

Forty ber accessions grown at N.D. University of Agriculture & Technology, Kumarganj, Faizabad (U.P.) were screened against black leaf spot disease during 1997-98 to 1999-2000 to find out resistant source(s) for crop improvement programme. Tikri during 1997-98 and 1999-2000, Seedless during 1998-99; and ZG-3 during 1999-2000 were found immune. Guli, Seedless and Ber selection-5 during 1997-98; Guli, Darakhi-2, Ber selection-2, 3, 4 and 5 during 1998-99 and Jalandher, Kali, Bagwadi, Banarasi Peondi, Ilaichi, Villaiti, Sanour-3, Chhohara, Katha, Seedless, Darakhi-2 and Ber selection-5 during 1999-2000 were recorded as resistant cultivars. Other accessions showed moderately susceptible to susceptible reaction against the disease. Spraying of 0.1% Carbendazim 50 W.P. @ 10 litre solution per plant at the time of disease appearance i.e. early November was found most effective in management of the disease, which showed 77.21 per cent disease control (PDC) followed by 0.2% Mancozeb (54.78 PDC), 3.0% Neem powder (54.02 PDC) and 0.2% Copper oxychloride (51.37 PDC).

Key words: Ber, *Zizyphus mauritiana*, varieties, black leaf spot disease, *Isariopsis indica*

Introduction

Ber (*Zizyphus mauritiana* Lamk.) belonging to family Rhamnaceae is considered as “King of arid fruits” due to its xerophytic nature and ability to survive during drought. It can be successfully grown in saline and alkali soils too. At present, ber is a commercial fruit in the states of Rajasthan, Gujarat, Haryana, Punjab and Uttar Pradesh which provides economic as well as nutritional and ecological security (Pareek and Vashishtha, 1999). Black leaf spot disease (*Isariopsis indica* var. *zizyphi*) is a hurdle in ber fruit production. This disease appears in the form of brown to blackish brown necrotic spots on leaves and fruits. Under severe conditions, the black sooty growth covers the lower side of the affected leaves which is responsible for large reduction in photosynthetic area and leads to premature defoliation (Kumar, 1987). Therefore, an attempt was made to screen the resistant germplasm and simultaneously, to manage the disease by foliar application of fungicides and a biopesticide (neem powder).

Materials and methods

Forty ber accessions at N.D. University of Agriculture & Technology, Kumarganj, Faizabad (U.P.) were screened against black leaf spot disease under field conditions. Observations were made with the advancement of disease on leaves during March, in terms of per cent disease index (PDI) on the basis of leaves examined from all the 4 directions consecutively for 3 years (1997-98 to 1999-2000). The disease reaction was rated with 0-5 grade scale as suggested by McKinney (1923): Grade 0 was assigned for no disease. Grades 1,2,3,4, and 5 were assigned to 0.1-10, 10.1-25, 25.1-50, 50.1-75 and 75.1-100 per cent leaf area affected. Per cent disease index (PDI) was calculated by the following formula: $PDI = (\text{Sum of all numerical ratings} \times 100) / (\text{Total number of leaves examined} \times 5)$, where: 5 being highest rating.

Varietal reaction to black leaf spot disease was considered as Immune (I), Resistant (R), Moderately Susceptible (MS), Susceptible (S), Highly Susceptible (HS) with 0.1, 0.1-5.0, 5.1-20.0, 20.1-50.0, 50.1 – 100.0, respectively.

Experiment on management of the disease was conducted with cultivar “Gola” (a susceptible cultivar) on three plant Units in 4 replications considering each direction as one replication. Single spraying of fungicides and neem powder (Nimuri) @ 10 litre solution per plant was done on November 15, 1999 after initiation of the disease under field conditions. The data in terms of per cent disease index (PDI) and corresponding per cent disease control (PDC) were recorded and analyzed statistically.

Results and discussion

The symptoms of the disease appeared as minute brown to black necrotic spots on leaves and fruits in the month of November. These spots increased slowly during November to January (winter season) but after winter spread rapidly in number and size both which coalesces to cover large area resulting premature drop of affected leaves and fruits at later stages. Maximum disease intensity was recorded during March in all the 3 years observations. Ber cultivars Guli, Ber selection-5, Seedless and Darakhi-2 were found resistant against black leaf spot disease during 1997-98 and 1999-2000 (Table 1). As well, the cultivar Tikri during 1997-98 and 1999-2000, ZG-3 during 1999-2000 and Seedless during 1998-1999 were recorded immune. Other cultivars/germplasm showed moderately susceptible to susceptible reaction under field conditions in eastern Uttar Pradesh. The cultivars Kakrola Gola, Gola and Safeda Rohtak having 25.43, 29.02 and 36.76 PDI, respectively and showed serious occurrence of the disease. Gupta *et al.* (1980) reported that ber

Table 1. Screening of ber germplasm against *Isariopsis* leaf spot disease during 1997-98, 1998-99 and 1999-2000

Accession	1997-98		1998-99		1999-2000		Average	
	PDI	Disease reaction	PDI	Disease reaction	PDI	Disease reaction	PDI	Disease reaction
Jalandhar	9.52	MS	7.55	MS	2.48	R	6.51	MS
Kali	9.53	MS	16.79	MS	4.79	R	10.37	MS
Z G-3	10.79	MS	18.43	MS	0.00	I	9.74	MS
Sanaur-5	16.36	MS	18.13	MS	5.18	MS	13.22	MS
Panda	17.83	MS	11.60	MS	20.66	S	16.69	MS
Resmi	21.02	S	18.98	MS	11.47	MS	17.15	MS
Godhaw	28.47	S	20.41	S	16.38	MS	21.75	MS
Pathan	17.93	MS	17.77	MS	11.67	MS	15.79	MS
Tikri	0.00	I	16.42	MS	0.00	I	5.47	MS
Baguradi	28.08	S	18.45	MS	3.74	R	16.75	MS
Banarasi Karaka	9.29	MS	20.97	S	6.11	MS	12.12	MS
Banarasi Peondi	21.56	S	15.94	MS	2.89	R	13.46	MS
Narma	13.38	MS	15.67	MS	7.88	MS	12.31	MS
Ilaiichi	23.80	S	16.63	MS	3.55	R	14.66	MS
Kaithali	13.07	MS	19.40	MS	5.36	MS	12.61	MS
Mundia Murhara	18.23	MS	24.90	S	8.98	MS	17.37	MS
Villaiti	18.97	MS	14.38	MS	2.56	R	11.97	MS
Safeda selection	31.62	S	23.85	S	15.12	MS	23.53	S
Sanaur-3	14.95	MS	22.13	S	2.94	R	13.34	MS
Kakrola Gola	26.38	S	24.75	S	25.16	S	25.43	S
Chhohara	12.88	MS	19.50	MS	3.52	R	11.96	MS
Katha Rajasthan	23.43	S	20.32	S	10.82	MS	18.19	MS
Sindhura Namaul	16.13	MS	19.07	MS	7.56	MS	14.25	MS
Katha	20.95	S	22.11	S	3.32	R	15.46	MS
Mirchia	24.97	S	23.95	S	24.20	S	24.37	S
Tikadi	19.11	MS	19.44	MS	6.42	MS	14.99	MS
Umrans	12.32	MS	18.75	MS	6.49	MS	12.52	MS
Seo	16.45	MS	19.46	MS	8.43	MS	14.78	MS
Akhrota	23.09	S	22.51	S	11.56	MS	19.05	MS
Kala Gora	33.08	S	24.64	S	15.57	MS	24.63	S
Gola	13.13	S	29.33	S	26.61	S	29.02	S
Safeda Rohtak	55.51	MS	39.26	S	15.53	MS	36.76	S
Guli	1.10	R	0.75	R	-	-	1.42	R
Seedless	2.23	R	0.00	I	4.99	R	2.40	R
Darakhi-2	6.01	MS	1.47	R	1.41	R	2.96	R
Ber selection- 1	27.75	S	5.60	MS	23.68	S	19.01	MS
Ber selection -2	14.27	MS	1.94	R	6.34	MS	7.51	MS
Ber selection -3	5.26	MS	3.91	R	9.15	MS	6.10	MS
Ber selection -4	12.88	MS	4.17	R	11.24	MS	9.43	MS
Ber selection -5	1.62	R	1.71	R	3.56	R	2.29	R

Table 2. Chemical control of black leaf spot of ber during 1999-2000

Treatments	Concentration	Disease index (%)	Disease control (%)
Carbendazim	0.1%	6.06	77.21
Mancozeb	0.2%	12.03	54.78
Neem product (Nimuri)	3.0%	12.32	54.02
Copper oxy chloride	0.2%	12.94	51.37
Control	-	26.61	0.00

cultivars ZG-3, Safeda Rohtak, Mundia Murhera and Seo Bahadurgarhia were resistant to the disease under Haryana conditions. The variation in disease intensity in this region over Haryana in certain cultivars might be due to the change in host susceptibility.

Fungicides / biopesticide [Nimuri] were found effective significantly in management of the disease through spraying of fungicides and neem powder over control (Table 2). The highest per cent disease control (77.21 PDC) was recorded with single spraying of 0.1% Carbendazim followed by 0.2% Mancozeb (54.78 PDC) and 3.0% Nimuri (54.02 PDC) while lowest per cent disease control (51.37 PDC) was observed with 0.2% Copper oxychloride. These findings suggests that spraying of 0.1% Carbendazim as protectant spray is very useful in managing of black leaf spot disease in ber orchards. These findings are in conformity with Anon (1996, 1998, 2000).

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