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REACTION OF BER CULTIVARS/GERMPLASM AGAINST *OIDIUM ERSIPHOIDES* F. SP. *ZIZIPHI* CAUSING POWDERY MILDEW DISEASE UNDER ORCHARD CONDITION

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ABSTRACT

Ber (*Ziziphus mauritiana* Lamk.) is the hardiest among the cultivated fruit trees, generally grown in arid regions of India and belongs to the family *Rhamnaceae*. Powdery mildew of ber is caused by *Oidium erysiphoides* f.sp. *ziziphi* is the most important disease that causes maximum reduction in yield and quality of ber fruits. Developing a resistance variety to disease, provides inexpensive, durable and effective means of plant disease control. The experiment was conducted in orchard to find out the performance of 31 germplasm of ber against powdery mildew disease and categorized as resistance and susceptible on the basis of disease intensity. Among these cultivars, three cultivars (Darakhi -2, Najuk and Katha Bombay) exhibited resistance reaction while others categorized as moderately susceptible to susceptible reaction in which, 19 germplasm (Phalisa Alwari, Jogia, Kaithali, Katha, Kishmis, Mehroon, Mundia, Chandni Supari, Saphar Chandi, Tabes Taso, ZG-3, Pemadi, Asapuri-2, Morchia, Pathani, Sukhawani, Kheera, Kharkhi and Early Banarasi Prolific) showed moderately susceptible reaction while remaining nine germplasm (Chuhara-1, Chuhara-2, Chonchal, Gola, Illaichi, Kathaphal, Sev, Thornless and Umran) were showed susceptible reaction to the disease. Among these, Gola cultivar was rated as highly susceptible as it depicted higher disease intensity (37.89%).

Keywords : Ber, *Ziziphus mauritiana*, powdery mildew, *Oidium erysiphoides* f.sp *ziziphi*, cultivars/germplasm.

Introduction

Ber (*Ziziphus mauritiana* Lamk.) is an old and important fruit of Indo-China region. Ber is a tropical fruit tree spp. belonging to the family *Rhamnaceae*. The genus *Zizyphus* has been derived from 'Zizaiif' which is the Arabic name of the fruits (Bailey, 1947). The genus *Zizyphus* has about 40 spp. and is distributed throughout the tropical and subtropical regions of the world. Ber is known for indigenous to the area stretching from India to South Western China and Malaya. Some other spp. of ber viz., *Zizyphus nummularia*, *Zizyphus rotundifolia* are also found in

the Indian subcontinent. *Ziziphus mauritiana* is a hardy tree with extreme temperatures and thrives under rather dry conditions with an annual rainfall of 15–225 cm. It also grows well on laterite, medium black soils with good drainage or sandy soil with neutral or slightly alkaline pH for their growth. The tree has a high tolerance to both water-logging and drought. The cultivation of ber is required the least maintenance, cost and care (Pareek, 1983). It has a remarkable adaptability enabling it to grow in a wide range of agro climatic conditions and soil. Ber is the strongest and hardy fruit trees with the wider adaptability to adverse soil and biotic or abiotic conditions which prove it as a

xerophytic tree (Rana *et al.*, 1979). The ber plants are attacked by many fungal and other pathogenic agents such as powdery mildew (*Oidium* spp.), sooty mold (*Isariopsis indica*), leaf spot (*Colletotrichum* spp.) and fruit rot (*Alternaria* spp.) and among these, powdery mildew is one of the most important, wide spread, easily recognizable and serious diseases of this fruit crop. It causes poor fruits set, dry and undersized fruits and the affected fruits either drop heavily or become graceless, cracked misshapen and underdeveloped (Pareek, 1983). India ranks first among the ber growing countries of the world. The total area under ber cultivation is 52,230 hectares with the annual production of 5,30,640 million tonnes. In Rajasthan, major production regions for Indian jujube are Bharatpur (mostly Deeg area), Alwar (Tijara and Ramgarh area), Barmer, Sri Ganganagar, Jodhpur, Jaipur (Chomu area), Pali, Chittorgarh and Hanumangarh. In Rajasthan, total area under ber cultivation is 1158 hectares with an average annual production of 9869 metric tonnes (Anon, 2022). The ber fruits are rich in vitamin A, C and B complex and the composition of nutrients are varying in different varieties. Ber is the most important and nutritious fruit and its pulp contain 11.2 to 19.4 per cent total soluble solids (TSS) depending upon the ber varieties. Fruits also contain calcium, phosphorus, protein and minerals. The ripened fruits of Umran cultivar contain amino acid like aspergine, aspartic, arginine, glutamic acid, glycine, serine, threonine, α -alanine, methionine, leucine and isoleucine (Bal and Uppal, 1992). Several ber cultivars have been screened to identify the resistance source against this disease (Jayarajan and cheema, 1972). The popular cultivars of the Bijapur region (Northern dry zone) "Umran" has been found to be highly susceptible. Jamadar and Desai (1996) have been observed 17.0-71.0 per cent disease index at fruiting stage of ber due to powdery mildew (*Oidium* spp.) in Bijapur, India. Gola is the most liked and popular cultivars of the ber grown in Jaipur and other regions of India have now been found to be highly susceptible to the powdery mildew disease. Although, the recognition of numerous chemical and biological inducers, some of which are traditionally accessible for use in routine farming (Vallad and Goodman 2004). Notably, use of resistant varieties is the cheapest mode of disease control for screening and identifying the resistance source against this disease (Jayarajan and Cheema 1972; Choudhary *et al.* 2017). In modern era, it is considered that food items produced organically are very less destructive to human health, eco-system and are full of nutritive values. Considering these issues, the present study was undertaken to evaluate the aforementioned products.

Materials and Methods

Reaction of ber cultivars to powdery mildew

Reaction of ber cultivars to powdery mildew: Thirty-one cultivars of ber grown at Asalpur Farm, Jobner, Jaipur was observed for disease intensity at the peak of disease (in mid of December), under RBD manner with three replications. As per following detail, per cent disease intensity (PDI) was calculated on randomly picked up 100 fruits (25 from each direction) of a tree as per 0-5 disease rating scale of McKinney (1923) and categorized as immune (PDI=0), resistant (PDI=1-5), moderately susceptible (PDI=6-20), susceptible (PDI=21-50) and highly susceptible (PDI=51-100).

$$\text{Per cent disease intensity} = \frac{\text{Sum of individual rating}}{\text{Total No. of observation} \times \text{Maximum disease rating}} \times 100$$

Disease rating scale for assessing host reaction against powdery mildew of ber are as follows

Grade/ Numerical scale	Description
0	0% No infection
1	1-10% fruit area covered with pathogen
2	11-25% fruit area covered with pathogen
3	26-50% fruit area covered with pathogen
4	51-75% fruit area covered with pathogen
5	76-100% fruit area covered with pathogen

Results and Discussion

Reaction of ber cultivars against powdery mildew

The thirty-one cultivars were elucidated (Table:1) against powdery mildew of ber as per disease rating scale of McKinney (1923). Among these 31 cultivars, only three *i.e.* Darakhi-2, Najuk and Katha Bombay were categorized as resistant with minimum disease intensity (2.63, 4.77 and 3.80%, respectively), nineteen as moderately susceptible (Phalisa Alwari, Jogia, Kaithali, Katha, Kishmis, Mehroon, Mundia, Chandni Supari, Saphar Chandi, Tabes Taso, ZG -3, Pemadi, Morchia, Pathani, Asapuri-2, Sukhawani, Kheera, Kharkhi and Early Banarasi Prolific) whereas nine cultivars (Chhuhara-1, Chhuhara-2, Chonchal, Gola, Illachi, Kathaphal, Sev, Thornless and Umran) were categorized as susceptible to the disease. It is true that use of resistant varieties is the cheapest mean of disease control. For choosing disease resistant cultivar against the disease, during present investigation, 31 cultivars were regularly observed and noticed that Darakhi-2, Najuk and Katha Bombay cultivars showed

resistance reaction while others categorized as moderately susceptible to highly susceptible (Gola cultivar was rated as highly susceptible, PDI 37.89%). Our observations are parallel with the earlier workers (Thind and Kaur 1997; Sharma and Panwar 2002; Choudhary et al. 2017). Thind and Kaur (1997) screened and finalized that Chhuhara, Illaichi, Sanaur-2 and Umran varieties of ber were resistance to powdery mildew (*Oidium erysiphoides* f. sp. *ziziphi*). Pradeep and Jambhale (2001) evaluate 82 ber cultivars/germplasm accessions belonging to *Zizyphus mauritiana* and one accession to *Z. rugosa* for resistance to powdery mildew under natural conditions. Among these, four genotypes viz., Darakhi-1, Darakhi-Z, Seedless and *Z. rugosa* showed immune reaction in leaves and fruits, while Guli and Villaiti, for fruits only. Leaf reaction of bud grafted seedlings of the 56 genotypes including immune ones under polyhouse conditions revealed susceptibility of all the genotypes except seedless. Sharma and Panwar (2002) have also been assessed 37 ber cultivars for resistance against powdery mildew and among these only Umran and Kaithali were moderately susceptible. Choudhary et al. (2017) evaluated 21 cultivars of ber for resistance against *Oidium erysiphoides* f. sp. *Ziziphi* and concluded that two cultivars namely Darakhi-2 and Nazuk showed minimum disease intensity (2.60 and 4.67%) and categorized as resistance to the disease. Mane and More (2020) have also been observed 34 genotypes of ber for resistance against *Oidium erysiphoides* f. sp. *ziziphi*. Among these, Kharkhi No.1 exhibited 3.0 per cent disease intensity and categorized as resistant, whereas Badami, Betawadi and Sandhura Narnaul exhibited moderately susceptible reaction and Illaichi, Thornless, Jogia, S2 11 exhibited susceptible reaction.

Table 1 : Disease reaction of different cultivars of ber against powdery mildew disease

S.No.	Cultivars	% disease intensity*	Host reaction
1	Darakhi -2	2.63	R
2	Nazuk	4.77	R
3.	Katha Bombay	3.80	R
4.	Phalisa Alwari	17.61	MS
5	Jogia	11.89	MS
6	Kaithali	18.29	MS
7	Katha	7.42	MS
8	Kismis	9.13	MS
9	Mehroon	13.33	MS
10	Mundia	17.17	MS
11	Chandni Supari	11.21	MS
12	Saphar Chandi	10.20	MS
13	Tabes Taso	9.93	MS
14	ZG -3	13.91	MS
15	Pemadi	12.50	MS
16	Maurchia	17.20	MS
17	Pathani	12.10	MS
18	Asapuri -1	16.18	MS
19	Sukhawani	14.21	MS
20	Kheera	12.13	MS
21	Kharkhi	19.20	MS
22	Early Banarasi Prolific	19.96	MS
23	Chhuhara-1	26.80	S
24	Chhuhara-2	28.8	S
25	Chonchal	29.4	S
26	Gola	37.89	S
27	Illachi	26.18	S
28	Kathapal	28.13	S
29	Seb	29.4	S
30	Thornless	27.5	S
31	Umran	30.95	S

I = Immune (PDI=0), R = Resistant (PDI=1-5), MS = Moderately susceptible (PDI=6-20), S = Susceptible (PDI = 21-50), HS = Highly susceptible (PDI = 51-100).

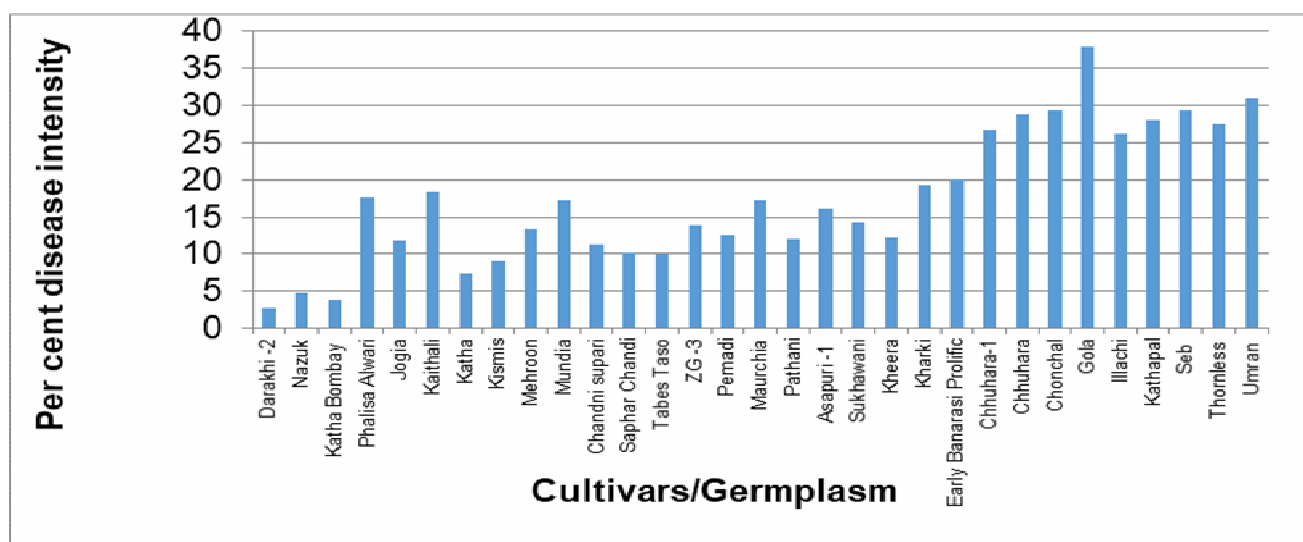


Fig. 1 : Disease reaction of different cultivars of ber against powdery mildew disease

Conclusion

Among 31 cultivars, 3 (Darakhi -1, Najuk and Katha Bombay) were resistant to the disease and may be utilized for resistant sources in breeding programs. Therefore, these findings may be helpful for growers to earn income by producing organic fruits of ber in lieu of consumer health consciousness.

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References

- Anonymous. (2022-23) Indian Horticulture Database (2018). National Horticulture Board, Gurgaon
- Bailey, L.H. (1947) The Standard Cyclopoedia of Horticulture, Macmilan and Company, New York. pp. 3547-8.
- Bal, J.S. and Uppal, D.K. (1992) Ber varieties associated publishing company New Delhi. P.52
- Choudhary, M. Ghasolia, R.P., Lakhran, L. and Bajaya, T. (2017) Screening of ber cultivars/germplasm against *Oidium erysipoides* f. sp. *ziziphi*, causing powdery mildew. *Journal of Pharmacognosy and Phytochemistry*, **6**(4), 1366-1367
- Jamadar, M.M. and Desai, S.A. (1996) Varietal screening of ber against powdery mildew. *Karnataka Journal Agriculture Science* **9**(3), 545-546
- Jayaranjan, R. and Cheema, S.S. (1972) Screening of ber varieties for resistance to leaf spot and powdery mildew disease. *Indian Journal of Horticulture*, **29**(3-4), 353.
- Mane, P.A. and More, P.E. (2020) Analysis of ber germplasm against *Oidium erysipoides* f. sp. *ziziphi*, causing powdery mildew. *Indian Journal of Plant Protection*, **48**(4)
- Mckinney, H.H. (1923) A new system of grading of plant disease. *Journal of Agriculture Research*, **26**, 195-218.
- Pareek, O.P. (1983) The jujube. Indian Council of Agricultural Research, New Delhi pp.7
- Pradeep, T. and Jambhale, N.D. (2002) Screening of *Zizyphus* germ plasm against powdery mildew. *Indian Phytopathology*, **54**(3), 332-234.
- Rana, R.S., Ahuja, P.S. and Singh, K.N. (1979) The ber in salt affected areas. *Indian Farming*, **29**(5), 5-7
- Sharma, S. and Panwar, R.D. (2002) Varietal behavior under varying powdery mildew (*Zizyphus mauritiana* Lamk.) in the Punjab. *Journal Research of Punjab Agriculture University* **12**(1), 26-29.
- Thind SK, Kaur N (1997) Screening of promising ber varieties against powdery mildew and its control. *Plant Disease Resistance*, **12**(2), 194-196
- Vallad, G.E. and Goodman, R.M. (2004) Systemic acquired resistance and induced systemic resistance in conventional agriculture. *Crop Science*, **44**, 1920–1934.