Research Article

Screening of Mango Germplasm against Malformation in West Bengal

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Abstract

Utilization of resistant germplasm against any disease is the most effective management practice than any other control aspect. Therefore here 29 mango germplasms were tested against malformation disease showing different susceptibility reaction. Out of which 4 germplasms viz. Kishan Bhog, Bombai, Zardalu, Bombay Green exhibit highly tolerant with expressing extremely low symptoms of floral malformation with PDI range up to 1.00 followed by 9 moderately tolerant (Fazli, Himsagar, Vanraj, Mahmud Bahar, Prabha Sankar, Mankurad, Baneshan, Langra, Fernandin), 11 moderately susceptible (Neelum, Bangalora, Mulgoa, Dashehari, Alphonso, Chousa, Amrapali, Swarna Jehangir, Au Rumani, Neeluddin and Neeleshan), 5 susceptible germplasms (Kesar, Suvarnrekha, Mallika, Neelgoa and Ratna). Result of this study identify Kishan Bhog, Bombai, Zardalu, Bombay Green are promising resistant germplasms against malformation disease.

Keywords: Germplasm Screening; Malformation; Management; Resistance; Susceptibility

Introduction

Mango (*Mangifera indica* L.) is a national fruit crop of India. It is susceptible to various biotic and abiotic diseases [1]. Malformation has become a crux amongst biotic diseases of mango. Yield may be reduced by as much as 90% [2]. A physiological race of *Fusarium moniliforme* var *subglutinans* (F. *mangiferae*) [3,4] is a known biotic agent associated with malformation and the disease symptoms manifest on inflorescence (floral malformation), shoots (vegetative malformation) and young seedlings (bunchy top). The mango bud mite, *Aceria mangiferae* Sayed (Eriophyidae), is often observed in high numbers on malformed tree. This association of the mite may be caused hypertrophied buds on mango leading to mango malformation disease [5,6]. Many control measures such as clipping practices, spray of chemicals and growth regulators have been reported to reduce the damage inflicted by malformation. But intensive use of fungicides leads to accumulation of toxic compounds potentially hazardous to humans and environment and also in built up of resistance of the pathogens. Planting of genetically resistant available cultivars are necessary to reduce the damage caused by mango malformation. Therefore, our present investigation was carried out to identify suitable cultivars which will be highly tolerant in Gangetic West Bengal condition.

Materials and Methods

The experiment was carried out in mango orchard located at Gayespur in Gangetic West Bengal during the year 2010-12 with 29 mango germplasms of 10 years bearing plants planted in RBD with six replications of each germplasm. Out of 29 mango

germplasm, there were 19 commercial mango cultivars and 10 hybrids. Commercial cultivars are Dasherai, Langra, Fazli, Chousa, Baneshan, Bangalora, Mulgoa, Neelum, Suvarnrekha, Alphonso, Kesar, Mankurad, Fernandin, Vanraj, Zardalu, Bombai, Bombay Green, Himsagar, Kishan Bhog and 10 mango hybrids - Swarna Jehangir (Chinnaswarnarekha X Jehangir), Ratna (Neelum X Alphonso), Au Rumani (Rumani X Mulgoa), Maliika (Neelum X Dashehari), Prabha Sankar (Bombai X Kalapadi), Neelgoa (Neelum X Perramulgoa), Neeleshan (Neelum X Baneshan), Neeluddin (Neelum XHimayuddin), Amrapali (Dashehari X Neelum), Mahmud Bahar (Bombai X Kalapadi). Data was recorded against intensity of malformation in all the cultivars during the reproductive stage in peak period of flowering i.e. during spring-summer months (March-May). The host-taxa were classified to 0 to 5 scales based on their response to the pathogen in Table 1 with a modification of susceptibility rating as proposed by Chakraborti, 2010 [7].

Scale	Range of panicle infected (per cent)	Symptom expressed	Reaction
0	0.00	No visible symptom	Total resistant/ Immune
1	up to 1.0	Extremely low	Highly tolerant
2	>1.00-5.00	Low	Moderately tolerant
3	>5.00-15.00	Intermediate	Moderately susceptible
4	>15.00-50.00	High	Susceptible
5	More than 50.00	Very High	Highly Susceptible

Table 1: Mango floral malformation susceptibility rating.

Result and Discussion

Among the germplasms expressively highest percentage of infection was observed in Neelgoa (19.98%) and least in Bombai (0.78%). There were 4 germplasms viz. Kishan Bhog, Bombai, Zardalu, Bombay Green showed highly tolerant with expressing extremely low symptoms of floral malformation with PDI range up to 1.00. There were 9 moderately tolerant germplasm viz. Fazli, Himsagar, Vanraj, Mahmud Bahar, Prabha Sankar, Mankurad, Baneshan, Langra, Fernandin expressing low symptoms of floral malformation. There were 11 moderately susceptible germplasms

viz. Neelum, Bangalora, Mulgoa, Dashehari, Alphonso, Chousa, Amrapali, Swarna Jehangir, Au Rumani, Neeluddin and Neeleshan expressing intermediate symptoms of disorder. There were another 5 susceptible germplasms viz. Kesar, Suvarnrekha, Mallika, Neelgoa and Ratna expressing high symptoms of the malady. The maximum hybrids attain the rating scale (score)-3 which signify the intermediate infection or moderately susceptible reaction (PDI range >5.00-15.00%). No germplasm showed either total resistant or highly susceptible one. Three years mean value of reaction (PDI) of the evaluated germplasm are presented in the Table 2 with a comprehensive glance in Table 3.

Sl. No.	Germplasm	Per cent infection (Overall Mean)	Rating Scale	Expressed symptom	Rank
1	**Dashehari**	8.49	3	Moderately susceptible	6
2	**Langra**	1.45	2	Moderately resistant	23
3	**Fazli**	3.67	2	Moderately resistant	20
4	**Chousa**	8.05	3	Moderately susceptible	8
5	**Baneshan**	1.47	2	Moderately resistant	22
6	**Bangalora**	5.45	3	Moderately susceptible	13
7	**Mulgoa**	5.58	3	Moderately susceptible	12
8	**Neelum**	5.91	3	Moderately susceptible	11
9	**Suvarnrekha**	16.01	4	Susceptible	5
10	**Alphonso**	8.17	3	Moderately susceptible	7
11	**Kesar**	16.36	4	Susceptible	4
12	**Mankurad**	1.45	2	Moderately resistant	23
13	**Fernandin**	1.78	2	Moderately resistant	21
14	**Vanraj**	3.67	2	Moderately resistant	20
15	**Zardalu**	0.86	1	Highly resistant	25
16	**Bombai**	0.78	1	Highly resistant	27

17	Bombay Green	0.96	1	Highly resistant	24
18	Himsagar	3.93	2	Moderately resistant	18
19	Kishan Bhog	0.79	1	Highly resistant	26
20	Swarna Jehangir	6.20	3	Moderately susceptible	10
21	Ratna	19.08	4	Susceptible	2
22	Au Rumani	5.29	3	Moderately susceptible	15
23	Mallika	17.19	4	Susceptible	3
24	Prabha Sankar	3.76	2	Moderately resistant	19

25	**Neelgoa**	**19.98**	4	Susceptible	1
26	Neeleshan	5.09	3	Moderately susceptible	16
27	Neeluddin	5.42	3	Moderately susceptible	14
28	Amrapali	6.45	3	Moderately susceptible	9
29	Mahmud Bahar	4.16	2	Moderately resistant	17
	SE (m)	**2.12**			
	CD (0.05)	**5.36**			

Table 2: Screening of mango germplasm against floral malformation.

Score	Score 5	Score 4	Score 3	Score 2	Score 1	Score 0
Reaction	Highly Susceptible	Susceptible	Moderately susceptible	Moderately tolerant	Highly tolerant	Total resistant/ Immune
Number of variety	Nil	5	11	9	4	Nil
Percentage of the total	0	17.24	37.93	31.04	13.79	0
Name of the germplasm	Nil	Kesar, Suvarnrekha, **Mallika, Neelgoa, Ratna**	Neelum, Bangalora, Mulgoa, Dashehari, Alphonso, Chousa, **Amrapali, Swarna Jehangir. Au Rumani, Neeluddin, Neeleshan,**	Fazli, Himsagar, Vanraj, **Mahmud Bahar, Prabha Sankar,** Mankurad, Baneshan, Langra, Fernandin,	Kishan Bhog, Bombai, Zardalu, Bombay Green,	Nil

Table 3: Summary of total number of germplasm in different level against mango floral malformation.

On an average maximum variety (11 varieties i.e 37.93 %) attain the rating scale (score)-3 which signifies intermediate level of infection or moderately susceptible reaction for tolerance against floral malformation followed by moderately tolerant reaction (9 varieties i.e 31.04%). In this context mention may be made that mango germplasm comprising of forty-three varieties was evaluated by [8] for the level of the panicle malformation disease intensity. Out of tested varieties, 4 (9.3%) were tolerant, 27 (62.79%) were moderately tolerant, and 5 (11.62%) were moderately susceptible while 7 (16.27%) were recorded highly susceptible to malformation.

Conclusion

Twenty-nine mango germplasm are evaluated for tolerance against floral malformation during 2010-12 in Gangetic West Bengal. It was recorded that among the varieties Neelgoa is the most susceptible taxon regarding tolerance against this malady and Bombay green is recorded as the most tolerant germplasm which attain the minimum rating scale (scale-1) and signifies very low infection or highly tolerant reaction against floral malformation. Use of a tolerant cultivar is an effective measure for management a disease than chemical control having fungicidal hazardous to humans and environment including soil health and four germplasm (Kishan Bhog, Bombai, Zardalu, Bombay Green) can be suggested to cultivate against this disease due to their high tolerance compare to other germplasm screened.

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