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EVALUATION OF MANGO (*Mangifera indica* L.) GERMPLASM AGAINST MALFORMATION

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ABSTRACT

Mango germplasm comprising of 40 varieties was evaluated for tolerance against panicle malformation at Mango Research Station, Shuja-Abad. Out of these three were tolerant, 24 were moderately tolerant, and six were moderately susceptible while seven were highly susceptible under the climatic condition of the region. Attack was highest in 'Lab-e-Mashooq' (68.70 %) followed by 'Ghulam Muhammad Wala' (64.28 %) and lowest in 'Gulab Khas' (7.8 %) followed by 'Maya (9.5 %) and 'Kensington Pride' (9.8 %). The lowest affected varieties may be used for incorporating their tolerance in the other commercial varieties through breeding programme.

Key Words: Mango, *Mangifera indica*, malformation, germplasm

INTRODUCTION

There are about 1500 varieties of mango in the world, of which about 300 are found in Pakistan. However, only a dozen varieties are grown commercially around the world. The Mango Research Station (MRS), Shujabad, maintains 72 mango accessions collected from different parts of the world. These are used for breeding, propagation and physiological studies. Floral malformation is a major problem in mango, rendering mango cultivation unproductive in subcontinent and other regions of the world (Pandey et al., 1977; Ram, 1991; Ahmad et al., 2002). Incidence of malformation is high in many indigenous and some exotic accessions under Punjab ecological conditions. Mango breeders in Pakistan have directed their research efforts to developing hybrids, rendering more yields of high quality and possessing resistant to diseases including malformation. Unfortunately, presently there is no detailed data for screening of germplasm for tolerance to floral malformation. The information generated from this study will lead to design combinations among various varieties leading to evolution of mango strains tolerant to this malady.

MATERIALS AND METHODS

Bearing plants (12-15 years old) of 40 diverse varieties (both indigenous and exotic) namely Maya, Kensington Pride, Tommy Atkins, Neelum, Zafran, Burma Surkha, Badia Mona Syed, Almas, Intikhab, Langra, Anmol, Alphanso, Gulab Khas, Bara Masi, Dusehri, Haider Shah Wala, Swaranreka, Zill, Momi-K, Kiett, Malda, Bangan Pali, Yakta, Collector, Chaunsa Rampri, Sindhri, Ghafoory Wala, Black Chaunsa, Malda Late, Sanglakhi, Sobhey de Ting, Pohi Lot,

Totapari, Lab-e-Mashooq, Shah Pasand, Zardalu, Fajri, Spring Fells were selected for the study , A sampler frame of size (2m x 1m) was used on the four sides (North, West , South, and East) on the middle height of the canopy of a tree. Observations were collected from four trees of each variety. The number of healthy and malformed panicles on each variety were counted in April, l999 and April 2000 and averaged to give the incidence of malformation. Data for the two years were pooled and analyzed using a randomized design.

RESULTS AND DISCUSSION

Data regarding the intensity of mango malformation on different varieties of mango are shown in Table-1. Data was recorded from four sides of each tree for malformed shoots from four trees of each variety. The observations recorded showed that there was highest malformation in Lab-e-Mashooq (68.70 %), which produced medium compact type of inflorescence with reddish color. The cultivar Lab-e-Mashooq thus proved to be the susceptible cultivar for mango malformation. The incidence of malformation was also high in Ghulam Mohammad Wala (64.28 %), which also produced medium compact inflorescence.

Almas, Haider Shah Wala, Swaranreka, Collector and Mai Wala were found to be moderately susceptible cultivars, which showed medium percentage of malformation i.e. 42.08, 43.20, 31.53, 31.18 and 34.00 %, respectively. All the cultivars produced slightly compact inflorescence.

Twenty four varieties including Tommy Atkins, Neelum, Zafran, Burma Surkha, Badia Mona Syed, Intikhab, Langra, Anmol, Bara Masi, Dusehri, Kiet, Yakta, Chaunsa Rampuri Sindhry, Ghafoory Wala, Malda Late, Sanglakhi, Sobhey de Ting, Pohi Lot, Totapari, Shah Pasand, Zardalu and Sprig Fells were found moderately tolerant. The average intensity of malformed inflorescences in the case of above varieties falls between 11 to 30%.

The malformation susceptibility was lowest in Gulab Khas (7.80 %), which showed compact inflorescence. Cultivar Gulab Khas was at par with Maya, Kensington Pride and Tommy Atkins cultivars which showed lower malformation percentage of 9.5 %, 9.8 % and 11.16 %, respectively. These cultivars were found to be the most tolerant to mango malformation in Multan region. All other cultivars fall into the category of moderately tolerant cultivars for the attack of mango malformation. Floral malformation of mango is common in Punjab gives malformed panicles with mostly male flowers, resulting in reduced crops and this disorder has a high incidence on scarred shoots and is more prevalent in certain cultivars like Chaunsa and Lab-e-Mashooq (Majumder and Diware, 1989).

This variation in the disease intensity among varieties i.e. Gulab Khas, Maya, and Kensington Pride might be attributed to the interaction of the host variety to pathogen. The variation in malformation incidence might be due to several factors like growth habit, physiology and cellular structure. Besides this, a natural defensive metabolite against mango malformation i.e. Mangiferin is also present in some cultivars, which reduces the incidence of malformation (Chakrabarti et al., 1997).

Furthermore, the trees of the same variety growing at same location differ significantly among themselves for the incidence of mango malformation. This might be due to the fact that disease causes systemic infection. The availability of more sugar contents in Alphonso, Malda and Black Chaunsa might be favorable for proliferation of pathogen (*Fusarium sub-glutinans*) and thus make it more susceptible for the attack of mango malformation. The results of this study are in line with the findings of Ram et al. (1990) and Sharma and Badiyala (1990) who reported that Chaunsa, Dusehri and Langra showed a high percentage of malformed panicles. Furthermore, Om et al. (1987) reported that majority of mango cultivars were susceptible and were not tolerant to mango malformation.

CONCLUSION

These results indicate mango accessions for tolerant to panicle malformation under Southern Punjab ecological conditions. Further studies are needed into the inheritance of malformation to facilitate its use as a character that is used in selecting parental stock. Based on the results of evaluation of mango germplasm for panicle malformation, the 40 mango cultivars tested can be classified into five groups, viz. highly tolerant to panicle malformation (Gulabkhas Maya, and Kensington Pride), moderately tolerant (24 varieties, having rank B), moderately susceptible Almas, Haider Shah Wala, Swaranreka, Collector and Mai Wala and the most susceptible varieties are (Lab-e-Mashooq and Ghulam Mohammad Wala).

Keeping in view the results of present study it can be assumed that if some tolerant cultivars like Gulab Khas and Maya are used in breeding program and crossed with a susceptible cultivar like Lab-e-Mashoooq or other commercial cultivars, it might result in production of moderately tolerant or tolerant cultivars.

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TABLES

Table 1: Intensity of malformation in different varieties of mango

	Name of variety	Range (%)	Average (%)	Type of Inflorescence	Ranking
1	Maya	9.4-11.00	9.5	Compact	A
2	Kensington Pride	7.00-11.5	9.8	Slightly loose	A
3	Tommy Atkins	7.5-13.16	11.16	Heavy compact, red in colour	B
4	Neelum	18.75-30.66	24.83	Semi loose	B
5	Zafran	18.00-22.62	20.62	Medium compact	B
6	Burma Surkha	16.5-31.00	25.66		B
7	Badia Mona Syed	18.6-51.80	25.05		B
8	Almas	35.00-47.50	42.08		C
9	Intikhab	24.22-33.57	26.04		B
10	Langra	15.00-23.68	19.36	Loose and open	B
11	Anmol	22.5-34.8	28.26		B
12	Alphanso	50.00-58.82	53.76		D
13	Gulab Khas	4.00-13.5	7.80		A
14	Bara Masi	13.3-21.27	20.31		B
15	Dusehri	11.42-55.8	30.23		B
16	Haider Shah Wala	42.8-43.6	43.20		C
17	Swaranreka	27.2- 35.00	31.53		C
18	Zill	47.00-65.20	53.33		D
19	Momi-K	45.30-62.66	54.48	Medium compact	D
20	Kiett	19.00-32.20	26.31	Medium compact	B
21	Malda	43.27-48.38	55-21	Semi compact	D
22	Bangan Pali	17.50-20.66	19.38		B
23	Yakta	28.50-31.11	29.59	Compact, redish	B
24	Collector	26.66-34.37	31.18		C
25	Chaunsa Rampri	13.07-18.82	16.18		B
26	Sindhri	18.00-24.2	21.23		B
27	Ghafoory Wala	13.60-26.30	19.65		B
28	Black Chaunsa	33.57-	50.28		D

		68.75			
29	Malda Late	18.82-33.84	27.90		B
30	Sanglakhi	8.42-30.55	24.67		B
31	Sobhey de Ting	7.00-16.50	13.32		B
32	Pohi Lot	9.33-26.92	16.75		B
33	Totapari	12.22-24.76	19.90	Compact, reddish	B
34	Lab-e-Mashooq	37.14-98.00	68.70		D
35	Ghulam Muhammad Wala	45.00-80.64	64.28		D
36	Mai wala	29.09-28.70	34.00		C
37	Shah Pasand	----------	16.30*	Large size, compact	B
38	Zardalu	14.76-32.22	23.84		B
39	Fajri	27.77-40.00	35.00	Light compact, mixed	C
40	Spring Fells	----------	25.33*		B

Criteria for ranking:
Up to 10 % = Tolerant (A), 11-30 % =Medium tolerant (B)
31-50 %= Medium susceptible (C), > 50 %=Susceptible (D)
Note: * *Only one plant of the variety was available in this regard*.

FIGURES

Figure 1: Malformed panicle of mango cv. ‘Langra’