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Some Physiological Aspects of Mango Malformation

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ABSTRACT

Studies were conducted to observe some physiological aspects of mango malformation. Early season flushes showed less effect of malformation and its intensity increased in flushes of later months. Previous year's malformation was found to affect the branch in the next blooming season and 47–94% malformed inflorescences were observed on the last year malformed branches. Pruning of malformed panicles reduced the malady. The malformed panicles were pruned soon after their emergence and on later stages. Thus, the terminals from where the panicles were removed immediately, sprouted early in the season and showed less tendency of floral malformation during the following year. Reoccurrence of floral malformation on sites where pruning was delayed, was higher in the next blooming season.

Key Words: Mango; Malformation; Carry over; Effect

INTRODUCTION

Mango (*Mangifera indica* L.) is second important fruit of Pakistan. Mango malformation is one of the most serious maladies which has been described both for vegetative and reproductive shoots (Singh & Dillon, 1993). Its intensity has been reported to vary from region to region and with the cultivar (Verma *et al.*, 1969; Sing *et al.*, 1991). The shoots destined to bear normal inflorescences have been reported to show greater initial growth, leaf area and produce 45.5% of perfect flowers in contrast to 4.52% on the shoots which bear malformed inflorescences in the following season and make less initial growth (Khan & Khan, 1962). It has been reported that the trees subjected to shoot excision for bud wood purposes produced a higher percentage of malformed panicles which, although hypothetically, has been attributed to ethylene release from the damaged shoots (Khader *et al.*, 1986). This paper describes some physiological aspects of mango malformation which are expected to help in devising control strategies of mango malformation.

MATERIALS AND METHODS

Studies were conducted in experimental fruit garden, Department of Horticulture, University of Agriculture, Faisalabad during 1996-1998. Ten healthy mango trees cv. Langra aging 8-10 years were selected for studies. New flushes during April to September were tagged monthwise on experimental trees. At the blooming, the tagged flushes were observed for occurrence of malformation and their carry over effect during the subsequent year. Malformed panicles were pruned at fortnightly intervals starting from their emergence till first July. Following data were recorded:
i. Percentage of malformation in various flushes,
ii. Frequency of carryover effect of malformation,
iii. Emergence of bunchy top in the same or in the next year, iv. Incidence of floral malformation in the next blooming season, iv. Monthwise flush emergence, and vi. Blooming behaviour of the healthy flushes

RESULTS AND DISCUSSION

Malformation (%) and its carry over effect on blooming subsequent year was variable in different flushes (Fig. 1). It was maximum (91.67%) in the flushes of September followed by August (68.96%), July (47.71%), June (17.85%), May (13.15%) and April (10.76%). The trend of carry over effect on different flushes was similar to that of malformation being lowest in April (47.17%) and highest (94.79%) in September.

The removal of affected panicles just after their emergence reduced the carry over effect of malformation to zero. As opposed to it, delaying the removal of malformed panicles increased the carry over effect (Table I). Early removal of such panicles was found helping to promote healthy vegetative growth in the season, thus normal inflorescences were observed on these terminals in the next blooming season. Late removal, however, did not affect to produce healthy vegetative growth (Table II).

These results confirmed the previous findings (Singh *et al.*, 1974; Singh & Dhillon, 1988) who are of the similar opinion. Likewise, cutting of the terminal buds during or just before flowering resulted in an increase in the auxiliary flower bud induction and decrease in the incidence of malformation (Sesa, 1989).

CONCLUSIONS

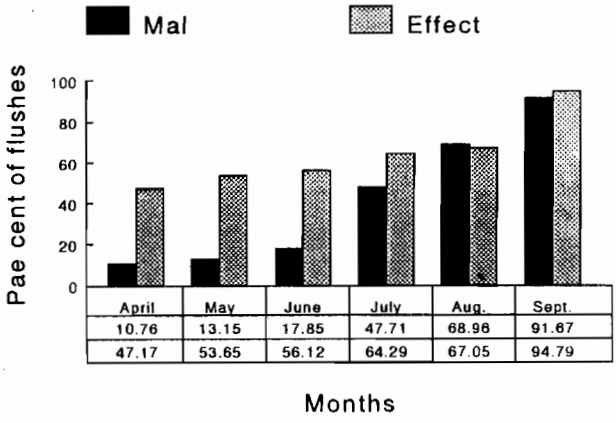
It is suggested that malformed panicles be removed earlier to control the mango malformation. This will not only increase the production but also reduce the carry over effect in subsequent years.

Table I. Removal of malformed panicles and its effect on vegetative/reproductive malformation

Time of removal		NPR	Veg. Mal.		Flo. Mal.
			Same year	Next year	Next year
Emergence	1996	30	-	-	-
	1997	31	-	-	-
Ist March	1996	30	-	-	-
	1997	36	-	-	-
15th March	1996	30	-	-	-
	1997	39	-	-	-
Ist April	1996	30	-	-	-
	1997	38	-	-	-
15th April	1996	30	-	-	-
	1997	36	2(5.56)	1(2.78)	-
Ist May	1996	30	-	2(6.67)	2(6.67)
	1997	34	1(2.94)	2(5.88)	1(2.94)
15th May	1996	30	1(3.33)	2(6.67)	4(13.33)
	1997	40	2(5.00)	3(7.50)	1(2.50)
Ist June	1996	30	2(6.67)	3(10.00)	7(23.33)
	1997	36	3(8.33%)	5(13.89)	2(5.56)
15th June	1996	30	4(13.33)	5(16.67)	10(33.33)
	1997	42	3(7.14)	5(11.90)	5(11.90)
Ist July	1996	30	7(23.33)	8(26.67)	14(46.67)
	1997	34	5(14.70)	7(20.59)	11(32.35)

Values in parenthesis indicate percentage; NPR= Number of panicles removed; Veg. Mal.= Vegetative malformation; Flo. Mal.= Floral malformation

Fig. 1. Intensity of malformation and its carryover effect in various flushes



REFERENCES

Khader, S.E.S.A., R.N. Pal and K.C. Srivastava, 1986. Mango malformation in relation to shoot excision. *Indian J. Hort.*, 43: 230-1.

Khan, M.D. and A.H. Khan, 1962. Relations of growth to malformation of inflorescences in mango. *W. Pak. J. Agr. Res.*, 1: 51-63.

Table II. Removal of malformed panicles and response of such terminals towards healthy vegetative extension and blooming

Time of removal		NPR	Monthwise vegetative extension during the same year						Flowering in the next year	
			April	May	June	July	Aug.	Sep.	N	M
Emergence	1996	30	11(36.67)	6(20.00)	4(13.33)	3(10.00)	1(3.33)	-	8(26.67)	-
	1997	31	11(35.48)	7(22.58)	6(19.35)	4(12.90)	1(3.23)	-	9(29.03)	-
Ist March	1996	30	3(10.00)	15(50.00)	7(23.33)	2(6.67)	1(3.33)	-	6(20.00)	-
	1997	36	3(8.33)	18(50.00)	10(27.78)	2(5.56)	1(2.78)	1(2.78)	7(19.44)	-
15th March	1996	30	-	16(53.33)	9(30.00)	3(10.00)	-	-	6(20.00)	-
	1997	39	-	19(48.72)	12(30.77)	4(10.26)	2(5.13)	1(2.56)	7(17.95)	-
Ist April	1996	30	-	6(20.00)	13(43.33)	9(30.00)	1(3.33)	-	5(16.67)	-
	1997	38	-	7(18.42)	17(44.74)	10(26.25)	1(2.63)	2(5.26)	6(15.79)	-
15th April	1996	30	-	2(6.67)	9(30.00)	7(23.33)	4(13.33)	2(6.67)	3(10.00)	-
	1997	36	-	2(5.56)	13(36.11)	15(41.67)	3(8.33)	1(2.78)	4(11.11)	-
Ist May	1996	30	-	-	3(10.00)	9(30.00)	15(50.00)	1(3.33)	2(6.67)	1(3.33)
	1997	34	-	-	4(11.76)	11(32.35)	16(17.05)	1(2.94)	2(5.88)	2(5.88)
15th May	1996	30	-	-	1(3.33)	7(23.33)	11(36.67)	2(2.67)	1(3.33)	2(6.67)
	1997	40	-	-	2(5.00)	9(22.50)	14(35.00)	4(10.00)	1(2.50)	2(5.00)
Ist June	1996	30	-	-		4(13.33)	13(43.33)	1(3.33)	-	2(6.67)
	1997	36	-	-		6(16.67)	15(41.67)	4(11.11)	-	3(8.33)
15th June	1996	30	-	-		2(6.67)	14(46.67)	3(10.00)	-	3(10.0)
	1997	42	-	-		3(7.14)	19(45.23)	3(7.14)	-	5(11.9)
Ist July	1996	30	-	-		-	9(30.00)	4(13.33)	-	3(10.0)
	1997	34	-	-		-	9(26.47)	5(14.70)	-	6(17.65)

Values in parenthesis indicate percentage; NPR= Number of panicles removed; N=Normal; M=Malformed: The number of removed malformed panicles was variable in 1996 and 1997, hence to make the data uniform, it is also calculated on percentage basis

Sesa, K., 1989. Effect of deblossoming on mango (*Mangifera indica* L.) malformation and fruit quality. *Indian J. Agri. Sci.*, 59: 667-8.

Singh, Z. and B.S. Dhillon, 1963. Metabolic changes associated with floral malformation of mango (*Mangifera indica* L.). *Trop. Agri.*, 70: 68-73.

Singh, R.N., P.K. Majumder, D.K. Sharma, G.C. Sinha and P.C. Bose, 1974. Effect of deblossoming on the productivity of mango. *Scientia Hort.*, 2: 399-403.

Singh, Z. and B.S. Dhillon, 1988. Influence of deblossoming on floral malformation of mango (*Mangifera indica* L.). *Trop. Agri.*, 65: 295-7

Singh, U.R., J.H. Gupta and L. Dhar, 1991. Performance of mango cultivars against malformation in Uttar Pradesh. *Prog. Hort.*, 8: 65-8.

Verma, A., V.C. Lele, P.K. Majundar *et al.*, 1969. Report of the work done on mango malformation (Horticultural aspects) under the coordinated research project at IARI New Delhi. Workshop on Fruit Research, Ludhiana, April, 28-30.

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