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Short communication

Weather relations on floral sex expression in Alphonso mango*

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Alphonso is the leading commercial mango variety in Konkan region of Maharashtra. Due to its typical sugar-acid blend, pleasant flavour, good taste, firm flesh, attractive colour and long keeping quality are the merit points of this variety. This variety, however suffers from serious drawbacks like irregular and shy bearing habit and eventually low fruit set and poor yield. Numerous factors like flower numbers, sex ratio, flower behaviour, pollinators, pollinizers, diseases, insects and weather influence the flowering and fruit set in Alphonso mango. Alphonso mango is very sensitive to changes in weather and needs critical evaluation.

The field experiment was therefore conducted on Alphonso mango during 2000-2002 at Regional Fruit Research Station, Vengurle to evaluate weather influence on floral sex expression in Alphonso mango. For this purpose observations were recorded from 20 Alphonso mango trees of 35 years age. Four inflorescences were tagged during each month on each tree from October 2000 to February 2001 and from October 2001 to February 2002 before anthesis of flowers. The male and hermaphrodite flowers opened on that day were counted daily by removing with forceps

The percentage of hermaphrodite flowers was calculated and evaluated with the minimum temperature, maximum temperature and humidity during respective periods.

The per cent hermaphrodite flower ranged from 4.98 to 17.10 (Table 1) during October 2000 to February 2001. During the mango season 2000-2001 the flowering in Alphonso occurred in three flushes. In the first flush occurring from 42nd met week (15-10-2000) to 49th met week (9-12-2000) the per cent hermaphrodite flowers were 12.29 to 15.88, whereas during the second flush of flowering extending from 5o met. week to 2nd met week (10-12-2000 to 14-1-2001) the per cent hermaphrodite

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Table 1 : Sex ratio (hermaphrodite flowers) affected by climatic factors in Alphonso mango 2000-2001.

Met. week (Dates)	Hermaphrodite flowers (%)	Weather			No. of flowers/panicle			
		Min. Temp. (^{0}C)	Max. Temp. (^{0}C)	Average Humidity (%)	Male	Herma.	Total	Hermaphrodite flowers (%)
43 (15-21.10)	13.65	25.1	31.0	89	965	140	1105	14.50
44 (22-28.10)	15.88	25.5	32.0	83				
45 (29-4.11)	12.83	25.2	32.4	85				
46 (5-11.11)	14.23	23.4	33.7	72	1003	146	1149	14.55
47 (12-18.11)	15.80	20.1	34.0	69				
48 (19-25.11)	14.28	20.6	33.8	70				
49 (26-2.12)	12.29	20.4	33.0	74	2039	174	2213	8.53
50 (3-9.12)	15.74	18.3	33.6	67				
51 (10-16.12)	6.32	15.7	32.6	67				
52 (17-23.12)	4.98	14.5	33.1	65				
53 (24-31.12)	8.19	16.0	32.3	66				
1 (1-7.1)	6.90	16.6	32.0	70	1332	210	1542	15.81
2 (8-14.1)	7.71	19.4	30.9	69				
3 (15-21.1)	17.10	18.7	32.6	74				
4 (22-28.1)	15.47	17.3	33.3	70				
5 (29-4.2)	14.54	17.6	32.4	73				
6 (5-11.2)	14.89	17.0	33.7	62				

Table 2 : Effect of weather on sex ratio of Alphonso mango (2001-2002).

Meteorological week	Temperature (°C)		Humidity (%)	No. of Male flowers	No. of Hermap-hrodite flowers	Hermap-hrodite (%)	Remark
	Max.	Min. (Mean range)					
40	30.10	24.29 (23.3-26.9)	82	-	-	-	Flowering from 2nd fortnight of Oct. 2001 in hilly area due to low temp. and other factors
41	30.24	24.49 (23.9-24.7)	83				
42	31.24	24.31 (23.1-25.7)	84				Excessive Vegetative growth in Oct-Nov 2001 due to high temp., high humidity, rainfall in some trees
43	34.34	18.89 (17.3-20.8)	73				
44	32.31	21.36 (18.7-22.9)	78				
45	34.26	20.51 (19.2-23.1)	69				
46	33.61	20.86 (18.5-22.9)	70	70	18	20.45	Flowering initiated from 48th Met. week in mature shoots due to low temp
47	33.81	20.60 (18.7-21.9)	72	529	98	15.62	
48	33.07	19.47 (17.5-21.9)	72	345	63	15.44	
49	33.59	15.63 (14.0-16.5)	69	459	70	13.23	
50	32.06	15.34 (14-15.7)	67	529	72	11.98	
51	32.81	15.37 (14.1-17.4)	60	509	59	10.38	
52	32.89	19.26 (16.6-22.0)	70	484	55	10.20	
1	33.37	16.9 (15.0-18.3)	63	478	42	8.07	Reduction in hermaphrodite flower (%) due to continuous cold and low humidity
2	32.87	17.24 (14.3-20.3)	67	304	18	5.59	
3	30.37	16.69 (14.9-17.8)	67	201	31	13.36	
4	30.94	13.38 (12.7-17.1)	60	316	38	10.73	
5	31.60	19.82 (13.2-20.3)	68	406	136	20.09	Recurring flowering due to continuous cold
6	32.52	18.65 (18-21.7)	63	106	32	23.18	

flowers were 4.98 to 8.19 and during third flush occurring from 3rd to 6th Met. week (15-1-2001 to 11-2-2001) the per cent hermaphrodite flowers were 14.54 to 17.10. Thus, it is evident that during the second phase of flowering the per cent hermaphrodite flowers was very poor.

These observations when evaluated against temperature and humidity revealed that the low per cent of hermaphrodite flowers during second flush of flowering was due to extended low temperature (14.46 to 16.60°C) from 50th Met week to 1st Met week (10-12-2000 to 7-1-2001). During this period the humidity was also low (64.99 to 69.61%) During first and third phases of flowering the per cent hermaphrodite flowers was 13 to 17 when minimum temperature was 18 to 25°C and humidity was 68 to 85%. Thus low temperature during inflorescence development was reported to decrease the per cent bisexual flowers, fruit set and yield (Sukhvibul *et al.*, 1999, Chaikiattiyos *et al.*, 1997). Correlation coefficients of weather factors and hermaphrodite flowers revealed that minimum temperature (r=0.572*) and humidity (r=0.511*) have significant association with hermaphrodite flowers in Alphonso mango.

The flowering was initiated in 43rd Meteorological week (Table 2) in Alphonso mango during 2001-2002 due to low temperature 17.3°C Up to 49th Met. week percentage hermaphrodite flowers was high 13.23 to 20.45 and it reduced from 50th Met. week (11.98%) to 4th Met. week (10.73%). Lowest per cent hermaphrodite flowers were 5.59% during 2nd Met. week. Again increase in per cent hermaphrodite flowers was recorded in 5th & 6th Met. week. The reduction in per cent hermaphrodite flowers during 50th to 4th Met. week was attributes to extended low temperature (14°C) and reduced humidity (60 to 70 %).

The flowering initiated on 43rd Met. week was only in orchards on hilly area due to early water stress effect. The flowering in mango was reported to be stress induced (Rameshwar, 1988). Excessive vegetative growth occurred in that week at high temperature (34.34°C), humidity (73.14%) and rainfall (86 mm). Again the reduction in temperature took place from 48th Met. week that resulted in flowering on plain land mango trees having mature shoots. Recurring flowering (initiation of flowering at base of previously emerged flower panicle) occurred due to repeated cold climate (continuos cold) Shinde *et al.* 2001. Thus low temperature seems to play an important role in production of hermaphrodite flowers. Cool temperature for extended period affect

pollen viability, sex ratio, pollination activity, pollen germination, flower size and thereby yield (Sukhvibul *et al.* 1999).

REFERENCES

Chaikiattiyos, S., Dasanonda, M., Pongsomboon, W. and Anupunt, P. 1997. Floral sex expression of Khieo Sawoei and Nam Doc Mai mangoes grown in tropical and subtropical climates of Thialand. *Acta Horticulture*, 455:202-208.

Rameshwar, A. 1988. Mango flowering-stress induced. *Acta Horticulture* 231:433-439.

Shinde, A.K., Burondkar, M.M., Waghamare, G.M. and Wagh, R.G. (2001). Control of recurring flowering in mango by GA_3. *Indian J. Plant Physiol.*, 6 (1) : 100-102.

Sukhvibul, N., Whiley, A.W., Smith, M.K., Hetherington, S. E. and Vithange, V. 1999. Effect of temperature on inflorescence development and sex expression of mono and poly embryonic mango cultivars *J. Hort. Sci. Biotech.*, 74:64-68.

Whiely, A.W., Sahanah, J.B., Rasmussen, T.S., Winston, E.C. and Wolstenholme, B.N. 1989. Effect of temperature on 10 mango cultivars with relevance to production in Australia. Proceedings 4th Australian conference on tree and nut crops. ACOTANC, Lismore PP :176-185.