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EFFECT OF TREE ASPECT AND HEIGHT ON TIME OF EMERGENCE OF INFLORESCENCE, SEX EXPRESSION, FRUIT SETTING, FRUIT DROP AND FRUIT YIELD IN MANGO

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The effect of position of mango tree on its various characters is reported in case of Langra and Samar Bahisht varieties. The different sides and heights of the tree have shown effect on time of emergence of inflorescence, sex expression and fruit setting. There was no apparent difference in tree aspect as for as total drop in both the varieties was concerned. No significant differences were noted in the yield of Langra and Samar Bahisht due to tree aspect and height. These results serve as guide lines in those experiments where a single tree is required to be used for different treatments.

INTRODUCTION

The time and duration of flowering in mango manifest great variations in different regions of the world. Flowering time is from January to March in America, December to January in Philippines, June to July in Queensland (Australia), August to September in South Africa, February and March in Israel, Egypt and Pakistan while the third week of March in Utter Perdesh (India). The duration of flowering is twenty to twenty-five days in Pakistan and eleven to twenty-one days in Java.

Regarding the sex of flowers various workers (Khan, and Singh, 1946 and Ali and Mazhar, 1960) have reported 67 to 85 per cent perfect and 15 to 33 per cent staminate flowers in Langra, 78 per cent perfect and 22 per cent staminate flowers in Dusehri, 82 per cent perfect and 18 per cent staminate flowers in Samar Bahisht and 84 per cent perfect and 16 per cent staminate flowers in Alphonso. Gardner, Bradford and Hocker (1952) have described that the development of sex organs was profoundly influenced by the nutritive conditions within the plants. They also stated that certain plants showed whole-plant response to nutritional influences at any one time for sex expression.

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Sharif (1962) found that on the tree as a whole, Langra fruit drop was more abundant than those of Samar Bahisht and Dusehri. Similarly, Jawanda and Singh (1961) reported that in mango major fruit drop occurred in April, but in May, drop was also substantial. Moreover, Singh (1954) noticed various causes of fruit drop in Mango. He described ovule distintegration, ovule shrivelling and abortive pistils under varying conditions.

In citrus, the effect of tree sector on growth and other characters of the fruit had been reported by some workers. Waynick (1927) found that the "inside" fruits made a proportionately more growth after December Ist, than did the "outside" fruits in case of Valencia Late oranges. Waynick (1928) further noted that the soil moisture and sunshine were the potent factors which affected growth rate in Valencia oranges.

MATERIALS AND METHODS

Three trees, each of Langra and Samar Bahisht varieties, growing in the Experimental Fruit Garden and Nursery of University of Agriculture, Lyallpur were selected for these studies.

For studying the effect of aspect of the tree on various characters, each tree was divided into four parts according to four directions; North, East, West, and South. Each part was further subdivided into two halves, upper half and lower half. Thus there were eight sectors of each tree, replicated three times. Two flowering shoots were labelled in each sector and the total number of shoots labelled on each tree were 16. In all, 96 (16x3x2) flowering shoots were involved in these studies. The analysis of variance technique based on splite plot design was used.

In each sector the labelled flowering shoot was examined daily to record time of emergence of the inflorescence. The total number of flowers carried by each labelled inflorescence were counted for studying the percentage of perfect flowers in various tree sectors. The data on fruit setting was expressed as per cent of the total flowers borne on an inflorescence.

The fruit drop was counted periodically commencing from the time of fruit setting until harvesting. For this the number of fruits retained on the labelled inflorescence was counted fortnightly to know the total drop during the fortnight. The drop was expressed as per cent of the initial total fruit set. The yield was recorded as total harvested matured fruits from each sector.

RESULTS AND DISCUSSION

Effect of Tree Side and Height on the Time of Emergence of Inflorescence

The observations made in case of Langra have shown that the time of emergence of inflorescence and the duration for full bloom are affected to some extent by its location on the tree. On Eastern and Southern sides of Langra tree not only that flowering commenced earlier (1/4.3.68) by about 4 days as compared to Western aspect, but also it took lesser number of days to reach full bloom stage than on the latter side. With regard to these characters the Northern aspect took intermediate position. The variety Samar Bahisht behaved like Langra in respect of initiation of flowering and the period taken for full bloom. The results are presented in Figures 1 (a) and 1 (b). Moreover, initiation of flowering started a couple of days earlier on the upper half of the tree as compared to the lower half. But the total time taken to reach full bloom stage was almost similar.

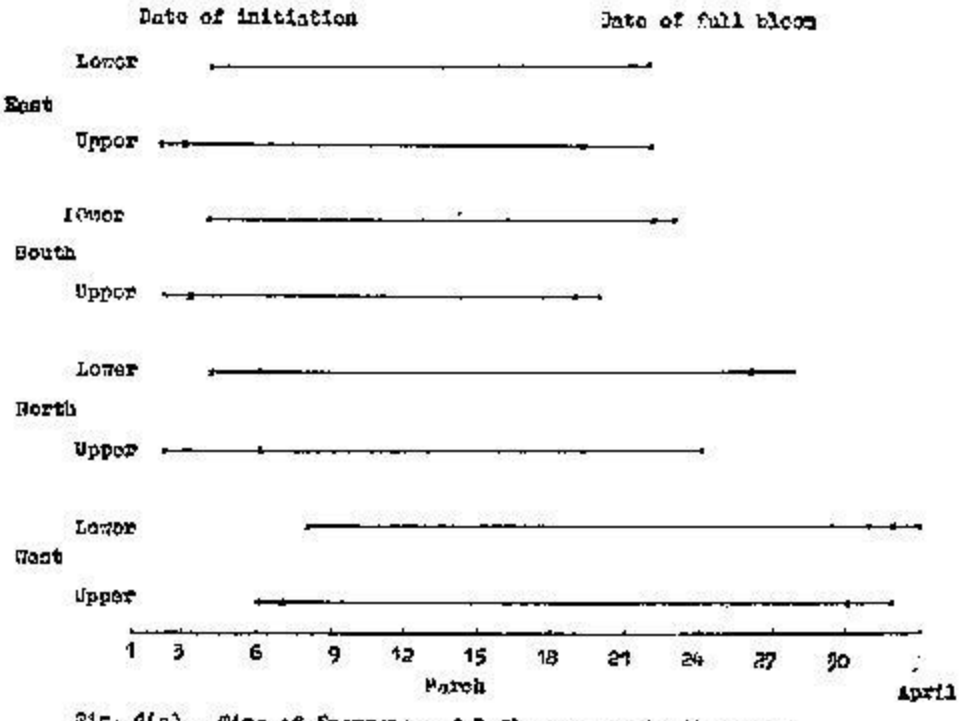

Fig. 1(a). Time of Emergence of Inflorescence in Different Sectors of Langra 1967-69.

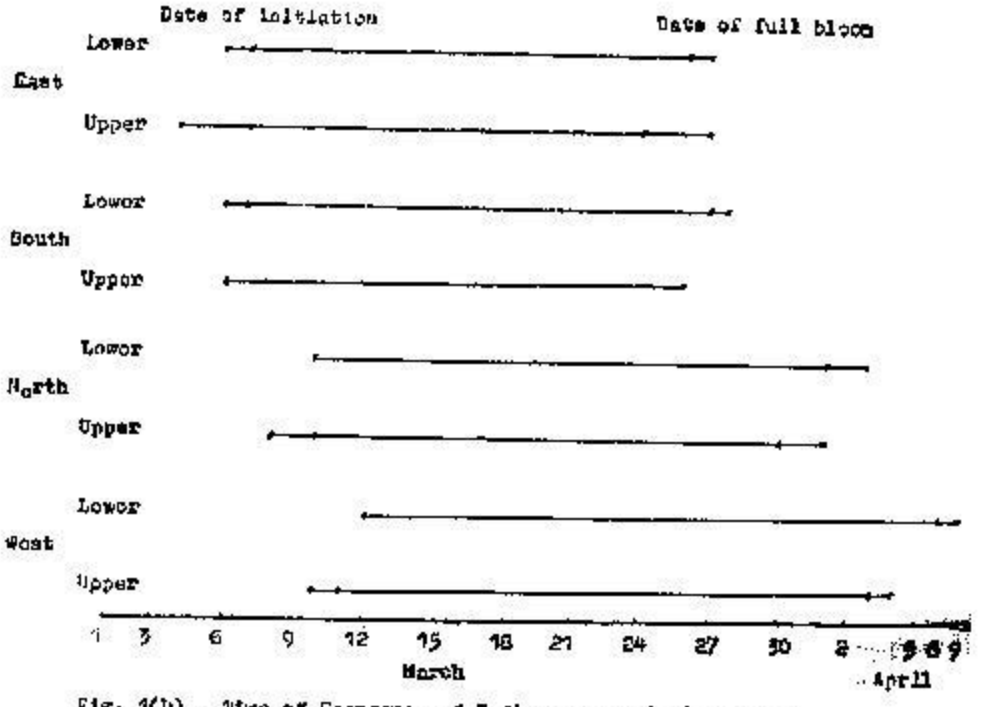

Fig. 1(b). Time of Emergence of Inflorescence in Different Sectors of Samar Bahishat 1957-60.

The data presented here is consistent in both Langra and Samar Bahisht varieties with regard to effect of tree side and height on the time of emergence of inflorescence and duration of flowering. The duration of flowering was found to range from 17 to 23 days in these varieties.

The flowering process is considered to be under the influence of relative length of photoperiod and dark period and the temperature. The temperature modifies the photoperiodic requirements of the plant for flowering. The aspects of the tree with longer photoperiod would have slightly higher temperature than the sides which receive lesser light. Thus the micro-climate of the plant with regard to light and temperature would differ with the various aspects of the tree, consequently affecting the time of initiation of growth and anthesis. This view has been advanced also by Waynick (1927 and 1928) in case of citrus. He found that the soil

moisture and sunshine were the potent factors which affected the growth rate in flowers and fruit of Valencia Oranges.

Effect of Tree Side and Height on Sex Expression

In Langra mango the number of perfect flower was lower on the Southern side than that of the Northern, while the positions on Eastern and Western sides were intermediates (Table 1). The lower half of the tree produced same percentage of perfect flowers the upper half.

TABLE 1: *Effect of tree side and height on sex expression of Langra and Samar Bahisht Mangoes (1967-68).*

Variety	Tree side					Tree height		
	%Perfect Flowers							
	North	East	West	South	S. E.*	Lower	Upper	S.E.*
Langra	87.33	81.77	81.58	80.21	.126	82.96	82.49	.099
	North	West	East	South				
Samar Bahisht	83.93	79.30	78.75	77.16	.08	79.63	79.94	.073

*S. E = Standard Error

The Samar Bahisht variety showed similar position as reported in Langra except that Western and Eastern sides also showed significant difference in percentage of perfect flowers, while in Langra they were not different (Table 1).

The previous studies showed 80 to 87 per cent perpect flowers in Langra and 77 to 83 per cent in Samar Bahisht, (Khan and Singh, 1946 and Ali and Mazhar, 1960). These observations corroborate the present findings during which 80.21 to 87.33 per cent perfect flowers in Langra and 77.16 to 83.93 per cent in Samar Bahisht were noted.

The difference found in sex of mango flower on different sides and sectors of the same tree can be explained in light of the differences in nutritional environments of various branches in relation to sex expression. Gardner, Bradford and Hooker (1952), have discussed the relationship indicated above. According to them, the development of sex organs is profoundly influenced by the nutritive conditions within the plant. They also stated that there are plants such as strawberry, banana and pineapple in which there is whole plant response to nutritional influence at any one

time. On the other hand, in most species whose plants branch freely, there is more or less independence among branches as in apple, pear, mango and citrus. In the latter cases the branches show different performances with regard to fruiting, and these differences are associated with the difference in nutritional conditions, especially nitrogen and carbohydrate balances. It is also known that the duration and intensity of light also influence the nutritive condition within the branch. Thus the tree side and height may affect sex of the flowers of the same tree through perceiving variable light intensities of different durations which, in turn, may exert their influence on other sex expression through changing the nutritive conditions of different branches of the tree.

Effect of tree Side and Height on Fruit Setting

The data in Table 2 would show that fruit setting was more on Northern aspect (14.95 per cent) as compared to Eastern (9.85 per cent), Western (9.71 per cent) and Southern (9.56 per cent) aspects. In case of Samar Bahisht mango the fruit setting was 8.45 per cent in South, 7.47 per cent in North, 7.38 per cent in West and 7.08 per cent in the East side of the tree. The tree height, in both varieties, did not affect fruit setting.

The tree did not affect fruit setting capacity of the tree while tree sides showed different behaviour in two varieties. In general, the fruit setting from various tree aspects was somewhat related to the amount of perfect flowers noted on a particular side. For instance, in case of Langra mango, the fruit-setting from different tree sides found in the same order as the per cent perfect flowers. The same situation existed with Samar Bahisht mango excepting southern side. Probably it may be due to the fact that the sides which were more exposed to the sunlight would have better fruit setting.

TABLE 2. *Effect of Tree side and height on fruit setting of Langra and Samar Bahisht Mangoes (1967-68).*

Variety	Tree Side					Tree height		
	North	East	West	South	S.E	Lower	Upper	S.E
Langra	14.95	9.85	9.71	9.56	.93	10.68	11.37	.882
	South	North	West	East				
Samar Bahisht	8.45	7.47	7.38	7.08	.47	8.00	7.23	.09

Effect of Tree Side and Height on fruit Drop

In Langra there was no apparent difference in total fruit drop on different tree aspects. However, the major drop from each side occurred during April, then in May, none afterwards. The lower and upper halves of the tree also did not differ in respect of total drop. The data are presented in Figure 2 (a). The total drop during the season was 86 to 93 per cent, out of which 54 to 61 per cent took place during the month of April, in case of Langra.

In Samar Bahisht mango the total drop and periodical drop showed same behavour in relation to tree side and height as that in Langra. The total drop of this variety during the season was 88 to 90 per cent, the major portion of which (66 to 73 per cent) occurred during April as shown in Figure 2 (b). Moreover, the intensity of drop was more at young stage and decreased as the maturity approached. Similar reports have been given by Sharif (1962) and Jawanda and Singh (1961) in case of Langra and Samar Bahisht June drops.

In the present studies, lack of effect of micro-environments pertaining to various tree sectors on frult drop has been demonstrated. The high intensity of drop occurring at young fruit stage is, however, a usual characteristic of almost all fruit species.

Effect of Tree Side and Helght on Yield

The yield data from each sector and side for Langra and Samar Bahisht are given in Table 3. No significant differences were noted in yield of Langra or Samar Bahisht due to tree aspect and height. It has been shown before that tree aspect affected the fruit setting but there was no corresponding difference introduced into the ultimate fruiting capacity of matured fruit of various tree sectors.

TABLE 3. *Effect of tree side and height on fruit yield (gms) of Langra and Samar Bahisht Mangoes (1967-68)*

Variety	Tree side					Tree height		
	East	North	West	South	S. E.	Lower	Upper	S. E.
Langra	2052.22	1796.72	1513.98	1574.50	237.13	1767.08	1701.63	139.8
	East	South	West	North				
Samar Bahisht	646.28	542.37	504.20	371.99	114.52	53.19	50.01	45.61

It appears thrt the major factor of nutrition within the branches and factors of micro-climate did not differ much to effect appreciably the ultimate yield from various sides of the tree.

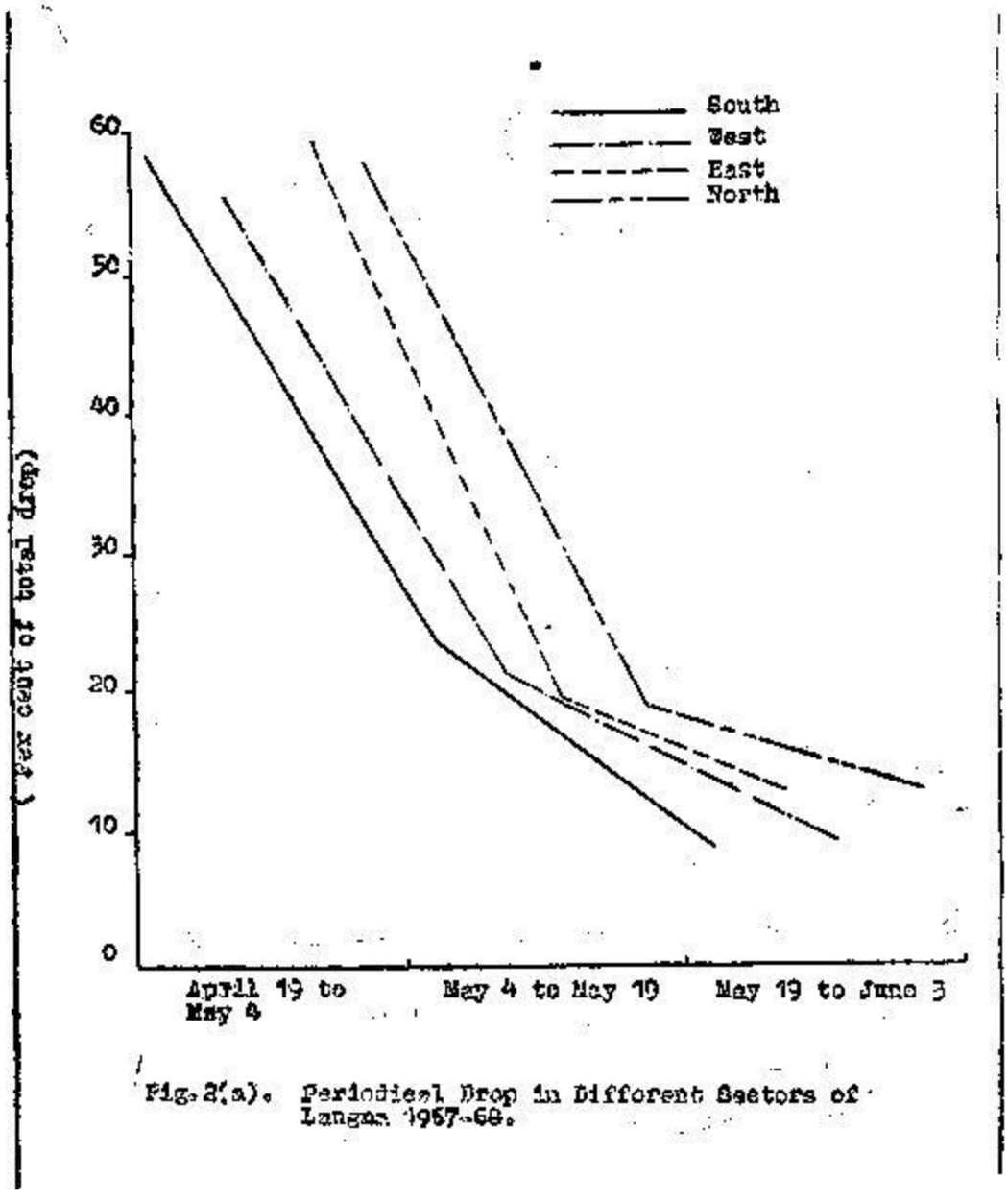

Fig. 2(a). Periodical Drop in Different Sectors of Langan 1967-68.

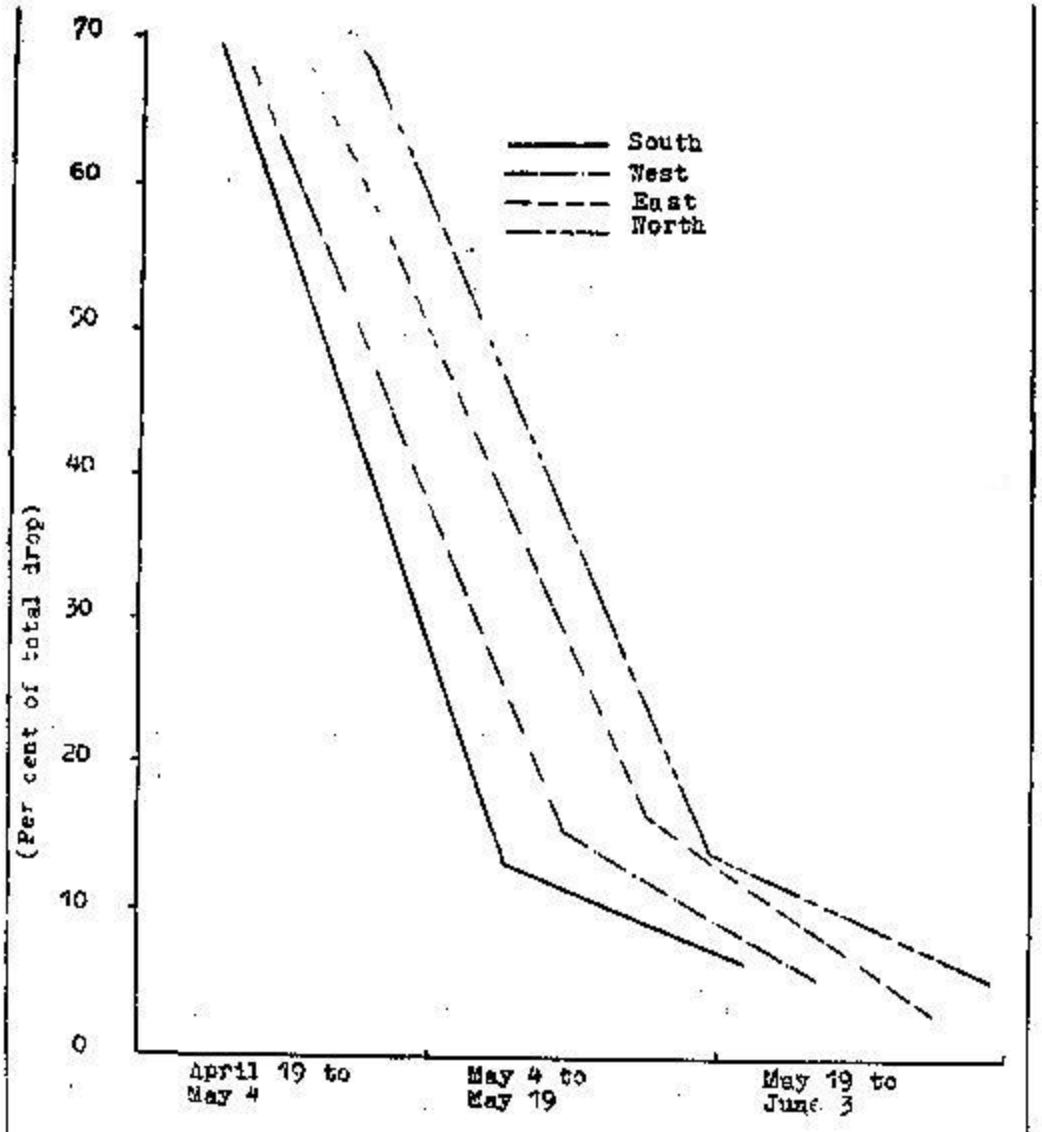

Fig. 2(b). Periodical Drop in Different Sectors of Samar Bahishat 1967-68.

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