

Effect of flush maturity and shoot orientation on bearing of mango

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Abstract: the experiment was conducted at the Garmplasm Centre of Fruit Tree Improvement Project (FTIP), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from December, 2004 to July, 2005. The experiment consisted of three factors viz. two variety (Amrapali and Mallika), three flush age (0-3, >3-6, >6-9, and >9-12 months) and four side orientation (north, south, east and west) of flushes. The experiment was designed in three factor Randomized Complete Block Design with three replications. The treatments of the study significantly influenced all the parameters related to bearing habit of mango. The length of panicle (36.76 cm), individual fruit weight (365 g) and TSS (25.10) were found to be maximum in Mallika in south sided >9-12 months flush. The number of flowers per panicle (2203), number of fruits at pea stage (25.0), marble stage (23.0) and at harvest (12.0) were highest in >9-12 months aged flush of Amrapali at southern orientation. There were no flowers and fruits produced by 0-3 months aged flushes from any side orientation.

Key words: Flush maturity, shoot orientation, cultivar and mango.

Introduction

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae widely grown in tropics and sub-tropics of the world. It is a popular fruit having some special organoleptic features. Ripe mango is a rich source of vitamins, minerals and carbohydrates (16.9%) (Bulanhke and Desai, 1984). Bangladesh cultivate 5067.28 ha of land and produces near about 243 thousand tons annually (BBS, 2004) which is considered much lower compared to that of the neighboring country like India (8.95 ton/ha) (Ghosh, 1998). The current production of mango falls appreciably short to meet the national demand. In the country 90% of the existing mango plants are raised from seeds (Hossain, 1994) and due to lack of suitable varieties, Bangladesh now is in a decreasing trend in mango production (Sarder *et al.*, 1995). Various factors such as variety, flush maturity,

shoot orientation etc. directly affected in flower bud differentiation of mango which finally affect production. Bearing habit is major problem in this manner. But few varieties are gaining popularity to meet the problem namely Amrapali, Mallika etc. Flush age is another factor that influenced flowering and fruit set of mango. A positive relationship between the fruits behavior of shoots in the preceding season and its vegetative growth in the subsequent season has also been established, that is, shoot that carried fruits maturity produced less vegetative growth and smaller number of shoots than those which failed to flower or had shed the flowers (Naik, 1949). Shoot orientation is the factor which also affected the sunlight as a result it may perform the subsequent vegetative and reproductive growth of mango (Ghosh, 1998). Considering the above factors, the experiment was undertaken to identify

the appropriate flush age, orientation in two popular varieties viz. Amrapali and Mallika.

Materials and methods

The experiment was carried out at the Garmplasm Centre of Fruit Tree Improvement Project (FTIP), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from December, 2004 to July, 2005. The experiment consisted of three factors, namely varieties (Amrapali and Mallika), flush ages (0-3, >3-6, >6-9 and >9-12 months) and different orientations of shoots (north, south, east and west). The experiment was laid out in three factors Randomized Complete Block Design with three replications. Ten years old 12 plants of each variety were used in this experiment. The shoots of different flushes were tagged according to identity of leaf colors of the flush leaves as light green with short leaves (0-3 months old flushes), pale green with normal leaves (>3-6 months old flushes), mat green with normal leaves (>6-9 months old flushes) and dark green with normal leaves (>9-12 months old flushes). Data were recorded on length of panicle (cm), number of flowers per panicle, number of fruits at pea stage, number of fruits at marble stage, number of fruits at harvest, weight/fruit (g) and total soluble solid (TSS). The data were statistically analyzed by F-test and DMRT was used for evaluation of the treatment effects.

Results and Discussion

There were significant effects of varieties on the flowering and fruiting behaviors of mango (Table 1). The longest panicle length was observed in Mallika (36.76 cm). Amrapali gave the highest

number of flowers (1465.12). Maximum number of fruits at pea stage (9.44) and at marble stage (7.94) was recorded in Amrapali. However, at harvest higher number of fruits was found in Mallika (5.13) compared to Amrapali (4.06). Individual fruit weight was also higher in Mallika (207.94) compared to Amrapali (86.19) however, the higher TSS was recorded in Amrapali (14.40). Effects of flush age on the flowering and fruiting behaviors of mango were also found significant (Table 1). The longest panicle length was observed in >9-12 months old flushes (29.10 cm) and the shortest was in >3-6 months aged (18.61 cm) flushes and no flowers were found in 0-3 month old shoots. The >9-12 months old flush gave the highest number of flowers (1496.44) and no bearing were observed in 0-3 months old flushes. Scholefield *et al.* (1996) reported the similar results as observed in the present study. According to them most of the inflorescence are older shoot flushes. The number of fruits at pea stage (14.13), marble stage (12.13) and also at harvest (6.13) were recorded highest from >9-12 months old flushes. No fruit were found from 0-3 months old flushes. Maximum individual fruit weight (228.50g) was recorded from >9-12 months aged flushes.

Effects of shoot orientation on the flowering and fruiting behaviors of mango were also found significant (Table 1). The longest panicle length (19.82 cm) maximum number of flowers per panicle (1085.66), the highest number of fruits at pea stage (11.5), at marble stage (10.0), at harvest (4.88) and the maximum heavier individual fruit weight (175.38 g) were observed in south sided shoots and the shortest panicle length (12.10 cm), minimum number of flowers per panicle

Table 1. Effect of variety, flush age and flush orientation on the bearing habit of mango

Treatment	Panicle length (cm)	Number of flowers /panicle	Number of fruits at pea stage/ panicle	Number of fruits at marble stage/ panicle	Number of fruits at harvest	Weight/ fruit (g)	TSS
Factor A (Variety)							
Amrapali	17.10b	1465.12a	9.44a	7.94a	4.06b	86.19b	16.40a
Mallika	17.53a	490.74b	6.44b	5.19b	5.13a	207.94a	14.84b
Factor B (Flush age)							
0-3 months	No inflorescence developed						
>3-6 months	18.61c	1182.70c	7.75c	6.00c	2.63c	174.00c	19.33c
>6-9 months	21.55b	1232.57b	9.88b	8.13b	4.63b	185.75b	19.69b
>9-12 months	29.10a	1496.44a	14.13a	12.13a	6.13a	228.50a	23.47a
Factor C (Flush orientation)							
North	12.10d	795.62d	4.25d	3.25d	1.38d	81.38d	10.66d
South	19.82a	1085.66a	11.50a	10.00a	4.88a	175.38a	17.88a
East	19.37b	1063.81b	8.75b	7.25b	3.50b	168.75b	17.20b
West	17.99c	966.63c	7.25c	5.75c	2.63c	162.75c	16.74c

*Means bearing similar letter (s) in column do not differ significantly

Table 2. Combined effect of variety, flush orientation and flush age on the bearing habit of mango

Treatment (Variety × Flush age × Flush orientation)	Panicle length (cm)	Number of flowers /panicle	Number of fruits at pea stage/ panicle	Number of fruits at marble stage/panicle	Number of fruits at harvest	Weight/f ruit (g)	TSS
Amrapali × 0-3 months × North	No inflorescence developed						
Amrapali × 0-3 months × South	No inflorescence developed						
Amrapali × 0-3 months × East	No inflorescence developed						
Amrapali × 0-3 months × West	No inflorescence developed						
Amrapali × >3-6 months × North	20.79ij	1788ef	7.00i	5.00i	2.00h	110.0i	20.20a
Amrapali × >3-6 months × South	24.91def	2142ab	12.00de	10.00de	6.00d	120.0gh	22.50a
Amrapali × >3-6 months × East	24.31efgh	2091b	10.00fg	8.00fg	4.00f	115.0hi	21.40a
Amrapali × >3-6 months × West	21.25hij	1828def	8.00hi	6.00hi	3.00g	112.0i	20.60a
Amrapali × >6-9 months × North	22.46fghi	1846de	8.00hi	6.00hi	2.00h	110.0i	20.40a
Amrapali × >6-9 months × South	22.69fghi	1951c	17.00b	15.00b	7.00c	122.0g	22.90a
Amrapali × >6-9 months × East	22.49fghi	1934c	12.00de	10.00de	5.00e	115.0hi	21.80a
Amrapali × >6-9 months × West	20.64ij	1775f	9.00gh	7.00gh	4.00f	112.0i	21.20a
Amrapali × >9-12 months × North	21.29hij	1831def	10.00fg	8.00fg	4.00f	111.0i	21.50a
Amrapali × >9-12 months × South	25.62cdef	2203a	25.00a	23.00a	12.00a	124.0g	24.20a
Amrapali × >9-12 months × East	25.25cdefg	2165a	18.00b	16.00b	9.00b	115.0hi	23.10a
Amrapali × >9-12 months × West	21.96ghi	1889a	15.00c	13.00c	7.00c	113.0i	22.60a
Mallika × 0-3 months × North	No inflorescence developed						
Mallika × 0-3 months × South	No inflorescence developed						
Mallika × 0-3 months × East	No inflorescence developed						
Mallika × 0-3 months × West	No inflorescence developed						
Mallika × >3-6 months × North	No inflorescence developed						
Mallika × >3-6 months × South	20.09 ij	562.5k	10.00fg	8.00fg	3.00g	320.0e	23.80a
Mallika × >3-6 months × East	19.14 ij	535.9k	8.00hi	6.00hi	2.00h	315.0e	23.20a
Mallika × >3-6 months × West	18.39j	514.9k	7.00i	5.00i	1.00i	300.0f	22.90a
Mallika × >6-9 months × North	No inflorescence developed						
Mallika × >6-9 months × South	28.45c	796.6j	13.00d	11.00d	5.00e	352.0b	24.60a
Mallika × >6-9 months × East	28.02cd	784.6j	11.00ef	9.00ef	4.00f	345.0c	23.50a
Mallika × >6-9 months × West	27.62cde	773.4j	9.00gh	7.00gh	2.00h	330.0d	23.10a
Mallika × >9-12 months × North	32.15 b	900.6i	9.00gh	7.00gh	3.00g	320.0e	23.20a
Mallika × >9-12 months × South	36.76a	1029g	15.00c	13.00c	6.00d	365.0a	25.10a
Mallika × >9-12 months × East	35.73a	1000gh	11.00ef	9.00ef	4.00f	345.0c	24.60a
Mallika × >9-12 months × West	34.06 a	953.7hi	10.00fg	8.00fg	4.00f	335.0d	23.50a

*Means bearing similar letter (s) in column do not differ significantly

(795.62), minimum number of fruits at pea stage (4.25), at marble stage (3.25), at harvest (1.38) and minimum individual fruit weight (81.38g) were found in north sided shoots.

Combined effects of variety, flush maturity and flush orientation were found significant for number of fruits per panicle at harvest (Fig. 1 and Fig. 2). The combined effect of variety, flush maturity and flush orientation were found significant for all parameters under study (Table 2). The longest panicle length was observed >9-12 months old north sided flushes of Mallika (36.76 cm) which was statistically similar to the west and east sided flushes of >9-12 months age

in Mallika. No inflorescence developed from the youngest shoots (0-3 months) of both cultivars in all sides. The >9-12 months old north sided flushes of Amrapali gave the highest number of flowers (2203) and no flowering observed in the youngest shoots (0-3 months) of both cultivars in all sides. The number of fruits at pea stage (25.0), at marble stage (23.0) and at harvest (12.0) were maximum in >9-12 months old north sided flushes of Amrapali. Individual fruit weight was measured the highest (365.0g) from >9-12 months old north sided flushes of Mallika and the highest TSS was found in >9-12 months old north sided flushes of Amrapali.

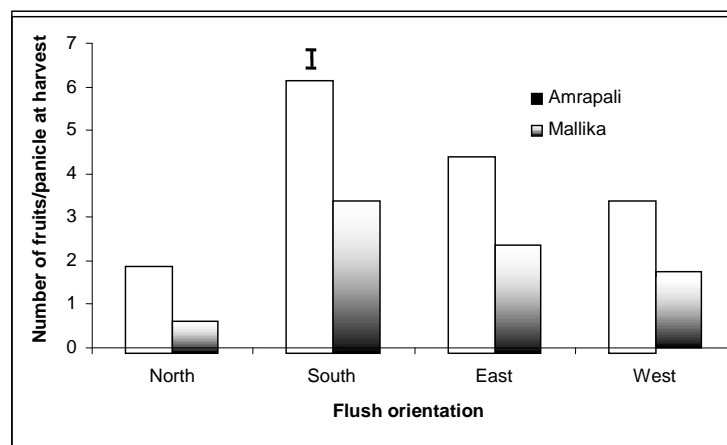


Fig.1. Combined effect of variety and flush orientation on the number of fruits/panicle of Mango. Vertical bar represent LSD at 0.05 levels.

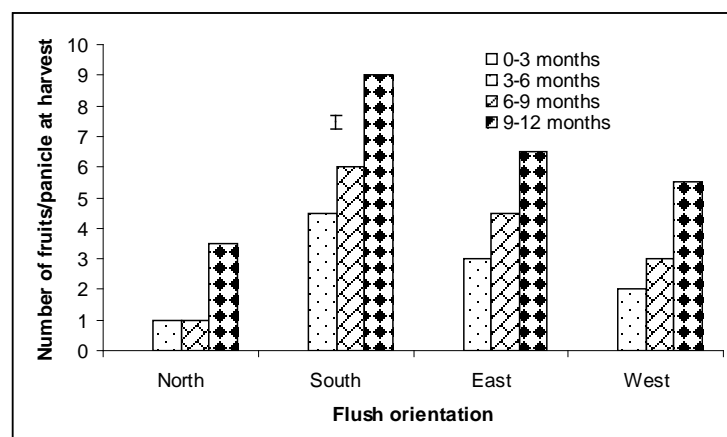


Fig.2. Combined effect of flush maturity and flush orientation on the number of fruits/panicle of Mango. Vertical bar represent LSD at 0.05 levels.

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