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Effect of Irrigation and Organic Mulching on Flowering and Fruit Setting in Mango cv Amrapali

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Abstract

An experiment with irrigation at different day's interval and with organic mulching was conducted during 2009-2010. The experiments were laid out in randomized block design with five replications and age of the tree is 15 years old. The following treatments were made : Ten days interval of irrigation (30 liter) (T_1) ; 20 days interval of irrigation (30 liter) (T_2) ; 30 days interval of irrigation (30 liter) (T_3) ; T_1 + dry leaves organic mulching (T_4) ; T_2 + dry leaves organic mulching (T_5) ; T_3 + dry leaves organic mulching (T_6), Mulching only (T_7) ; and Control (T_8). Observation on flowering initiation date was recorded during second week of February. Similarly, sex ratio, fruits/panicle in pea stage, marble stage were recorded during peak flowering period, second week of march, last week of March respectively and fruits/panicle at mature stage and total number of fruits/tree at harvest stage were recorded in second week of May respectively. The observation revealed that the date of first and last flowering initiation was first observed in T_4 on 15 February and T_8 on 23 February respectively. The maximum ratio of hermaphrodite flower/panicle was observed in T_7 (34.5%) and minimum in T_8 (28.2%). Fruits/panicle in pea stage and marble stage was highest in T_5 (16.3) and T_6 (9.6) and lowest in T_8 (13.0) and (7.3) respectively. Similarly, fruits/panicle in mature stage was highest in T_1 and T_2 (1.5) and lowest in T_8 (1.2) but the total number of fruits/tree in harvest stage was recorded highest in T_4 (424.0) and lowest in control (190.6) which significantly illustrated the control of fruits drop.

Key words : Mango, Irrigation, Organic mulching, Flowering, Fruit setting.

Mango (*Mangifera indica* L.), known as 'king of fruits' in India is the most popular fruit in the country. It is grown in India since from ancient time than 1,000 varieties exist today and grown in almost all the states. However, only about 20 varieties are grown commercially. India shares about 40.8% of total mango production in the world. Its production has been increasing since independence, contributing 21.7% of total fruit production of India. It is grown in at least 87 countries but no where it is so greatly valued as in India. Andhra Pradesh tops in total production and area (1). Although, India is the largest production of mango in the world, it productivity is still low compared to other major mango growing countries in the world. There are various factors which contribute low production in per unit area. Out of these, fruit drop is one of the major factors which contribute to low productivity. Murti et al. (2) reported that fruit drop in mango during initial stages is reported to vary with growth of fruitlets. It is more on number basis at mustard stage and on weight basis qt marble stage (active fruit growth phase). This reveals that the drop of larger fruitlets (those at marble stage) is more associated to ethylene evolution than those of smaller fruitlets. Keeping this in view and considering increase in production without deterioting the quality by controlling fruit drop through soil moisture stress in the flowering and fruit bearing stage with the application of irrigation and organic mulching, the experiment was designed with an objective to increase fruit retention at different bearing stage.

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Methods

Field experiment was carried out at Horticultural

Table 1. Treatments detail of the experiment.

T_1	10 days interval of irrigation (3 l water)
T_2	20 days interval of irrigation (30 l water)
T_3	30 days interval of irrigation (30 l water)
T_4	10 days interval of irrigation (30 l water) + mulching (dry organic leaves)
T_5	20 days interval of irrigation (30 l water) + mulching (dry organic leaves)
T_6	30 days interval of irrigation (30 l water) + mulching (dry organic leaves)
T_7	Mulching (dry organic leaves) only
T_8	Control (no irrigation and mulching)

Research Station, BCKV, Mondouri, West Bengal during 2009-2010. The research station is situated at $22^0 43'$ N latitude and $88^0 34'$ E longitudes with an average altitude of 9.43 m above the mean sea level. The experiment was laid out using randomized block design having eight treatments of five replications and the age of tree was 15 years with spacing of 5 × 5 m. Under this experiment, Amrapali which was known for regular bearing and dwarfing habit was evaluated for the flowering and fruit setting under different treatments of irrigation along with dry organic mulching. The treatment details are given in Table 1.

Every treated plant was supplemented with 600 : 300:400 g N:P:K/plant per year. First split dose of the recommended dose was applied at marble stage of fruit i.e. March along with a light irrigation and the remaining half of the recommended dose of fertilizer is applied in July along with 50kg FYM. The first irrigation was applied is applied just after fruit set. In all the plants basin was prepared around the 0.91 × 1.22 m away from the trunk. The mulches (dry organic leaves) ware applied during March after the basin preparation is completed to a thickness of 8—10 cm. Watering is done at 30 liter/plant in each case. If rain occurred the irrigation was stopped on that day. The irrigation was stoped at least 10–15 days before harvest.

Crop Data

Simple randomization of each plot was done to select five plants from each treatment and the following plant parameters were recorded i.e. date of flowering initiation, number of hermaphrodite/panicle, number of fruit at pea and marble stage/panicle and number of fruit/panicle at mature stage and total number of fruit/tree at harvest stage and its mean were recorded.

Statistical Analysis

The data collected for various variables were statistically analyzed using analysis of variance (ANOVA) technique. The means were compared by applying least significant difference (LSD) at 5% following Steel and Torrie (3)

Results and Discussion

Data on the ratio of hermaphrodite flowers per panicle are given in Tables 2 and 3. It was evident that ratio of hermaphrodite flowers per panicle (T_7) showed highest ratio of hermaphrodite flowers per panicle (34.52) which was closely followed by T_4 (32.82) and least by T_8 (28.2). Similar results was also reported by Sharma and Singh (4) that sex ratio was higher in panicles of un-pruned trees and lower in severely pruned trees. Flowers that appeared in panicles at tree top, had comparatively lower sex ratio than at lower canopy height. In date of initiation of flowering most of the treatments expressed flowering from second to third weeks of February (Table 2) and T_8 expressed late flowering from week 3 to 4 of February which indicated that majority of control plants showed 5—7 days late in initiation of flowering in Amrapali variety (Table 2).

The data on the number of fruits in pea, marble

Table 2. Date of initiation of flowering in mango cv Amrapali.

Treatments	Date of initiation of flowering
T_1	17-21 Feb
T_2	17-21 Feb
T_3	17-20 Feb
T_4	15-20 Feb
T_5	17-22 Feb
T_6	17-20 Feb
T_7	17-20 Feb
T_8	23-27 Feb

Table 3. Effects of irrigation and organic mulching on flowering and fruit setting.

Treatments	Hermaphrodite flower ratio/ tree	Fruits/ panicle in pea stage	Fruits/ panicle in marble stage	Fruit/ panicle at mature stage	Total number of fruits/tree
T_1	30.18	14.10	8.30	1.30	331.40
T_2	31.74	13.60	7.92	1.50	312.20
T_3	28.48	13.25	7.70	1.50	308.80
T_4	32.82	15.70	9.28	1.30	424.00
T_5	31.10	16.32	8.70	1.30	394.00
T_6	32.10	15.06	9.60	1.40	340.40
T_7	34.52	13.12	7.76	1.30	291.40
T_8	28.20	13.00	7.30	1.20	198.60
CD 5%	3.14	1.43	0.87	NS	99.02

and number of fruits per panicle in mature stage and total number of fruits per tree are presented in Table 3. In pea stage maximu number of fruit was retained in T_5 which was closely followed by T_4. In the marble stage, maximum number of fruits per panicle was reported in T_6 followed by T_4 and minimum by T_8. Similarly, number of fruits/panicle in mature stage showed highest number fruits per panicle in T_2 and T_3, lowest by control but no significant difference was found among the treatments. However, the total number of fruits per tree showed maximum in T_4 followed by T_5 and least recorded in control. Information regarding the effects of dry organic mulching + irrigation at different intervals on the initiation of flowering and yield of mango plants are lacking in the alluvial zone West Bengal. However, some studies were conducted in other parts of the country. It has been reported that 8—13% of flowers set fruit in mango and less than 1% reach maturity (5). The various factors attributed to this malady include nutritional deficiency (6) assimilate limitation (7), hormonal imbalance (8) and lack of proper understanding of physiological mechanisms underlying the incidence of fruit drop (9). Thus fruit retention was increased by the application of irrigation and dry organic mulching as compare to control since it improved the soil moisture condition which result in the reduction of the moisture stress in the fruit bearing stage which cause fruit drop as also reported by Bhambid et al. (10) that lack of irrigation caused heavy fruit drop in mango bearing stage. Therefore, it is concluded that irrigation 10-day intervals (at 30 liter/tree) along with dry organic mulching is applicable to increased fruit retention in future mango production.

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