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Effect of Ringing on Flowering and Yield of Mango (Mangifera Indica L.) Var. Alphonso

V. V. Shinde
Incharge
Deptt. of Soil Conservation Resource Station
AWASHI
Dr. Babasahib Sawant Konkan Krishi VidhyaPith, Dapoli

J. J. Dubale
Agriculture Officer
Deptt. of Soil Conservation Resource Station
AWASHI
Dr. Babasahib Sawant Konkan Krishi VidhyaPith, Dapoli

P.M. Haldankar
HOD
Deptt. of Horticulture

Y. R. Parulekar
Assistant Professor
Deptt. of Horticulture
College of Agriculture
Dapoli

S. B. Thorat
Assistant Professor
Deptt. of Horticulture
College of Agriculture
Dapoli

Abstract

A study was undertaken to induce flowering in mango cultivar 'Alphonso'. The experimental results opined that the number of fruits per tree, fruit yield per tree and per hectare were recorded maximum in T_1 - ringing during first fortnight of May which was at par with T_2 - ringing in second fortnight of May and T_3- ringing in first fortnight of June. Earliness in fruit due to ringing in first fortnight of May has recorded the minimum shoots per terminal, minimum shoot length, maximum shoot diameter and minimum individual fruit weight with maximum net realization.

Keywords: Ringing, mango, vegetative, yield.

Introduction

Mango is important tropical fruit crop grown throughout the world. India is the largest producer of mango in the world, grown on an area of 2500 thousands ha, with production of 18002 thousands M. tons, and productivity of 7.2 MT/ha. In Maharashtra, it is grown on an area of 482 thousands ha with production of 633 thousands M.tons. The productivity of mango is very low (1.3 MT/ha) however as compared to the national productivity, Alphonso is the leading cultivar grown in konkan region of Maharashtra on a large acerage. The area under mango in konkan is 1,82,000 ha with the annual production of around 4,00,000 tons. Alphonso is recognized nationally and internationally for its attractive fruit shape, colour, flavour, taste and aroma besides excellent keeping quality after ripening. The variety not only preferred in Indian metropolitan markets but also in export especially to the countries like UAE, Soudi Arabia, UK, and USA etc. Inspite of having tremondous nation and international market, the productivity of the variety is quite low than that of the potential productivity. The important reason for low productivity of Alphonso mango is the alternate bearing habit. In Alphonso the twig which induces flowering is about 8-9 month age. Each mature twig produces early flowering in Alphonso as compared to less mature twigs. The induction of early flowering results in early maturity of fruits and such fruit fetches higher prices in the market as compared to late maturing fruits. Urban *et al* (2009) reported that girdling is one of the ways to improve the earliness and intensity of flowering in mango. Girdling is the removal of a ring of phloem which stops the basipetal movement of assimilates through phloem which results in accumulation of carbohydrates above girdle which ultimately helps for induction of early and assured flowering. Hence an investigation was carried out on effect of ringing on flowering and yield of mango (*Mangifera indica* L.) var. Alphonso.

Material and Methods

A field experiment was conducted at Research cum demonstration farm of Department of Horticulture, Dr. Balasaheb Sawant konkan krishi Vidyapeeth, Dapoli, Dist- Ratnagiri during the year 2012-13. Ringing was done with the help of sharp grafting knife by removing a bark (2-3 mm thickness) of tertiary branch having 2 to 2.5 inch diameter. It was done at fortnightly interjval. There were elevan treatments viz. T_1- ringing during I^{st} fortnight of May, T_2- ringing during II^{nd} fortnight of May, T_3- ringing during I^{st} fortnight of June, T_4- ringing during II^{nd} fortnight of June, T_5- ringing during I^{st} fortnight of July, T_6- ringing during II^{nd} fortnight of July, T_7- ringing during I^{st} fortnight of August, T_8- ringing during II^{nd} fortnight of August, T_9- ringing during I^{st} fortnight of September, T_{10}- ringing during II^{nd} fortnight of September, T_{11}-Control. This investigation was laid out in randomised block design (RBD) with three replication. Three mango trees were treated per treatment per replication. Uniformly grown twenty years

old trees were selected for this investigation. The observations were recorded on date of emergence of flowering, length of panicle, diameter of panicle, number of shoots per panicle, percentage of hermaphrodites flowers, percent fruit set, days required for harvesting, number of fruit per plants, yield per plant (kg) and yield per hectare (t). The data recorded were analysed by the using statistical methods suggested by Panse and Sukhatme (1985)

Result and discussion

The data presented in Table-1 revealed that the earliest flowering (16.10.12) was recorded in T_1 i.e. ringing during Ist fortnight of May which was followed T_2 i.e. ringing during second fortnight of May i.e. on 19.10.12. It was further observed that delay in ringing also delayed the emergence of flowering. The T_{11} recorded the most delayed flowering i.e. on 03.12.12. The data presented in Table 1 also revealed that the shortest panicle was recorded in T_1 (15.80 cm) & T_4 (17.66) and was significantly superior over rest of the treatments. The longest panicle was recorded in T_{11} (23.90cm). There was no significantly difference in panicle diameter. However the maximum shoots per panicle were recorded in T_{11} (2.21) & was at par with T_8, T_9, & T_{10}. The data pertaining to hermaphrodites flower percentage revealed that maximum hermaphrodite flower (14.26%) were observed in T_1 and was at par with T_2, T_3, & T_4. The minimum hermaphrodites flowers (10.46 %) were observed in T_{11} (control)

The data presented on Table-2 revealed that a maximum fruit set was observed in T_1 (8.765) whereas minimum fruit set was observed in T_{11} (7.696). However the difference in fruit set due to various ringing treatments were non significant. The minimum days required for flowering to harvesting were recorded in T_1 (101) and was at par with T_2 (102.11) & T_3 (102.55). The highest number of days required from flowering to harvesting were recorded in T_{11} (114.11) and was inferior to all other treatments. The maximum number of fruit per plant were recorded in T_1 (154.60) and was at par with T_2 (151.20), T_3 (137.47), T_4 (127.40). All other treatments were significantly inferior to T_1. The lowest number of fruits per plant were recorded in T_{11} (47.13) and was inferior to all other treatments under study.

The yields (t/ha) recorded significant variation due to the various ringing treatments. The maximum yield per ha was recorded in T_1 (3.54) which was at par with T_2 (3.50), T_3 (3.20), T_4 (3.01), T_5 (3.0), T_6 (2.94). The lowest yield was recorded in control i.e. (1.21) t/ha.

Roper and Williams (1989), Schaper and Chacko (1993), Di Vaio *et al*. (2001) reported that its most immediate effect of ringing is to stop the basipetal movement of assimilates through the phloem, which results in an accumulation of carbohydrates above the girdle. While modeling the effect of girdling and leaf starch concentration on net photosynthesis in mango. Jose (1997) tried 5 treatments of girdling, (30, 45, 60, 75 and 90 days) before the Potassium Nitrate spray and studied the effect of on flowering and production of mango. The best effects were shown by girdling 60 and 75 days before treatment, with higher and advanced harvest in 23 days in comparison with control by girdling treatment in mango cv. Tommy Atkins. Further, ringing is better than PBZ application as it is not costly effective, pollution and residue free means. Shankara Swamy (2012).

The advantage of earlier flowering is quite important from the point of view of getting higher fruit set and yield because they fetch good price in Mumbai market. Similar results were also marked by Chacko *et.al.* (1972) under Delhi conditions and by Rath and Das (1979) under Orissa condition.

Table 1:
Effect of time of ringing on flowering of Alphonso mango *(Mangifera indica* L.*)*

Treatment	Date of emergence of flowering	Panicle length (cm)	Panicle Diameter (cm)	No. of panicle	Hermaphrodite flowers (%)
T_1	16/10/2012	15.80	0.98	0.96	14.26
T_2	19/10/2012	15.98	0.98	0.98	13.86
T_3	24/10/2012	17.26	0.81	1.11	13.33
T_4	04/11/2012	17.66	0.80	1.27	13.13
T_5	04/11/2012	20.44	0.78	1.29	12.46
T_6	07/11/2012	21.38	0.76	1.34	12.20
T_7	26/11/2012	20.89	0.69	1.84	11.86
T_8	27/11/2012	21.10	0.69	2.11	11.73
T_9	26/11/2012	21.44	0.71	2.11	11.26
T_{10}	28/11/2012	21.46	0.70	2.11	11.00
T_{11}	03/12/2012	23.90	0.68	2.21	10.46
Mean	_	19.76	0.78	1.57	12.32
S. Em ±	_	o.78	0.003	0.07	0.41
CD	_	**2.36**	**NS**	0.20	1.20

Table 2
Effect of time of ringing on fruiting and yield in Alphonso mango *(mangifera indica* L*.)*

Treatment	Fruit set at pea stage (%)	Days required for harvesting	No. of fruits/plant	Yield (kg)/tree.	Yied/ha.
T_1	8.765	101.00	154.60	35.40	3.54
T_2	8.357	102.11	151.20	35.07	3.50
T_3	8.151	102.55	137.47	32.03	3.20
T_4	8.129	103.89	127.40	30.19	3.01
T_5	8.042	105.11	123.73	30.06	3.00
T_6	7.942	106.33	123.67	29.43	2.94
T_7	7.942	106.33	114.93	28.19	2.81
T_8	7.861	107.00	112.93	28.00	2.80
T_9	7.841	109.33	91.73	22.84	2.28
T_{10}	7.732	109.66	87.27	21.89	2.18
T_{11}	7.696	114.11	47.13	12.11	1.21
Mean	8.043	106.12	115	27.75	2.77
S. Em ±	0.010	0.789	9.58	3.31	2.30
CD	NS	2.136	28.70	6.90	0.690

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