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Short communication

Study on effect of tip pruning on induction of flowering and harvesting in Alphonso mango

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ABSTRACT

In recent years, the climatic aberration especially during initiation of flowering in mango cv. Alphonso result in production of vegetative shoots instead of flowering panicle in spite of application of paclobutrazol, which delay harvesting. The present investigation aimed to study utility of tip pruning for induction of early flowering and early harvest in such vegetative shoots. A field trial was conducted in Randomized Block Design in five replication and four treatments, *viz*. T_1 (Tip pruning with 2 leaves), T_2 (Tip pruning by retaining 6 leaves), T_3 (Tip pruning by retaining 2 leaves) and T_4 (control). Tip pruning up to 2 leaves induced early flowering and resulted in earliest harvest (10.4 days), which was significant as compared to control. It also improved yield without affecting physio-chemical composition and sensory qualities in Alphonso mango.

Key words: *Magnifera indica*, climatic aberration, vegetative shoots.

Alphonso is a premium variety of mango known for its taste and flavour but it is shy and alternate bearer.The application of paclobutrazol is recommended to address regular flowering of mango in this variety in coastal region. Inspite of the application of paclobutrazol the weather during the point of initiation of flowering in the month of September and October play key role for induction of flowering at appropriate time. Under normal climatic conditions the rainfall in Konkan region ceases in the month of October and flowering in mango commences in the month of November. Since 2006, it is often noticed that climatic aberrations such as delayed rains overcast, high temperature and humidity in September-October lead to production of vegetative shoot instead of flowering panicle. The new vegetative flush takes another 80-100 days to mature to produce flowers. Thus, flowering is considerably delayed, which leads to further delay in fruit development and harvesting. The late harvested fruits fetch low rates in market. Further, pre-monsoon rains during May often spoil the appearance and quality of theselate maturing fruits. Importantly, it is often noticed that many of these new vegetative shoots, which are produced after monsoon shoots do not produce flowers and hence, the flowering remains sparse, which result in very poor yield. Hence, it is utmost important to develop a practical solution so as to overcome such situation and assure flowering. Use of growth regulators, nutrients and pruning are some of the approaches for induction of flowering on such shoots. Pinching is a kind of pruning where the apical portion of a plant is terminated to facilitate more growth. Suppressive as well as beneficiary effects of pinching in terms of flowering and increase in number of flowering stems, has been reported by various researchers (Pathania *et al*., 7). Present investigation was undertaken on mango cv. Alphonso to study the effect of tip pruning on new vegetative flush which is produced in the month of November instead of flowering panicle inspite of application of paclobutrazol with an aim to induce early flowering and harvesting in Alphonso Mango.

A field experiment was conducted at Department of Horticulture, College of Agriculture, Dapoli during the year 2015-16. The experimental material constituted 30-year-old mango trees of cv. Alphonso, which were uniform in growth and under appropriate management practices including soil application of paclobutrazol on 29th July@ of 3 ml per canopy diameter. The mango trees which produced vegetative flush instead of flowering in the month of November were selected. These selected trees were subjected to tip pruning treatments. The experiment was conducted in Randomize Block Design with 5 replications with unit of one tree per treatment per replication. The pruning treatments under study were T_1 (Tip pruning with 2 leaves), T_2 (Tip pruning by retaining 6 leaves), T_3 (Tip pruning by retaining 2 leaves) and T_4 (control). The pruning according to treatments was executed in the last fortnight of November when the new shoots were of pale green colour. On each experimental tree 150 new shoots were pruned. The time of panicle emergence was recorded (as date of appearance

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of first panicle) after pruning. The observation, *viz*. length of panicle (cm), width of panicle (cm), fruit set per panicle and fruit retention per panicle, days required from pruning to harvesting, yield (kg/ plant) and number of fruits/plant were recorded. Five fruits per plant per replication were randomly selected at harvest to record the physical parameters, *viz*. fruit weight (g), pulp weight (g), pulp to stone ratio, while chemical parameters like TSS (°B), acidity (%), ascorbic acid (mg/100 g), total and reducing sugars and sensory evaluation of colour, taste, flavour-based on 9 point hedonic scale was recorded at ripe stage. The data obtained was analyzed for ANOVA as per the method suggested by Panse and Sukhatme (6). The SD was estimated as per the method suggested by Rangaswamy (8).

The tip pruning treatments induced early panicle emergence in mango cv. Alphonso (Table 1). The earliest flowering was recorded in T_3 (59.6 days) which was significantly superior over control. As the severity of tip pruning increased the period of panicle emergence shortened. The mango panicle with respect to length and width in tip pruning treatments was less vigorous as compared to unpruned control. The smallest panicle size was produced in T_3 (19.86 cm length, 14.27 cm width). However, fruit set and fruit retention in tip pruning treatments had greater magnitudes then control. The maximum fruit set was seen in T_1 (5.87) and maximum fruit retention was noticed in T_2 (0.95). The removal of apical bud in mango on terminal shoot develops axillary bud to the point of cutting which produces flowers (Reece *et al*., 9). Reduction in panicle length, panicle width due to tip pruning is for favouring the secondary rachis rather than the terminal bud (Jadhav, 4). The reduction in panicle length due to tip pruning in mango cv. Dasheri is beneficial (Mohan *et al*., 5). In mango cv. Succary Abiad pinching of vegetative shoot and application of GA_3 and urea increased the fruit set (Zaeneldeen, 14). Branch tip pruning showed higher flowering percentage and increased number of fruits in Uba mango (Girlaine Pereira Oliveira *et al*., 3). Branch tip pruning reduces the auxin synthesis at the apex branches (Taiz and Zeiger, 13) directing the transport of assimilates and cytokinins to the axillary buds of branches under flowering conditions, inducing the formation of axillary inflorenscences (Srivastava, 12).

The highest yield was obtained in T_2 which was 40.59 kg/plant and 143.60 fruits/plant (Table 2). It was significantly superior over T_4 (34.72 kg/plant, 125.40 fruits/plant) and T_1 (33.04 kg/plant, 123.60 fruits/plant) but at par with T_3 (39.76 kg/plant, 140.20 fruits/plant). In mango cv. Hindi-Bi-Sinnara heading back treatment recorded the highest number of fruits (Shaban, 10).Tip

Table 1. Effect of tip pruning on days required for panicle emergence, length and width of panicle, fruit set and fruit retention in mango cv. Alphonso.

Treatment	Days required for panicle emergence	Panicle length (cm)	Panicle width (cm)	Fruit set per panicle	Fruit retention per panicle
T_1 (Tip pruning with 2 leaves)	62.6 (62.6 ± 2.19)	25.42 (25.42 ± 3.74)	11.56 (11.56 ± 1.24)	5.87 (5.87 ± 1.88)	0.70 (0.70 ± 0.17)
T_2 (Tip pruning by retaining 2 leaves)	61.8 (61.8 ± 1.30)	23.58 (23.58 ± 6.42)	13.74 (13.74 ± 3.09)	5.38 (5.38 ± 1.22)	0.95 (0.95 ± 0.29)
T_3 (Tip pruning by retaining 6 leaves)	59.6 (59.6 ± 1.67)	19.86 (19.86 ± 4.34)	14.45 (14.45 ± 2.07)	4.72 (4.72 ± 1.50)	0.51 (0.51 ± 0.17)
T_4 (control)	64.4 (64.4 ± 2.19)	28.65 (28.65 ± 2.95)	16.52 (16.52 ± 1.64)	3.36 (3.36 ± 0.67)	0.43 (0.43 ± 0.21)
CD at 5%	2.70	6.04	2.66	1.74	0.34

Table 2. Effect of tip pruning on yield and days required from pruning to harvesting in mango cv. Alphonso.

Treatment	Yield (kg/ plant)	No. of fruits/ plant	Days required from pruning to harvesting
T_1 (Tip pruning with 2 leaves)	34.72 (34.72 ± 4.66)	125.40 (125.40 ± 5.17)	175.00 (175.00 ± 0.00)
T_2 (Tip pruning by retaining 2 leaves)	40.59 (40.59 ± 6.08)	143.60 (143.60 ± 7.09)	169.20 (169.20 ± 7.36)
T_3 (Tip pruning by retaining 6 leaves)	39.76 (39.76 ± 3.71)	140.20 (140.20 ± 6.01)	164.60 (164.60 ± 4.92)
T_4 (control)	33.04 (33.04 ± 1.77)	123.60 (123.60 ± 5.27)	175.00 (175.00 ± 0.00)
CD at 5%	5.67	8.36	6.71

Table 3. Effect of tip pruning on physical parameters at harvest stage and chemical composition at ripe stage in mango cv. Alphonso.

Treatment	Fruit weight (g)	Pulp weight (g)	Pulp: stone ratio	TSS (°B)	Acidity (%)	Ascorbic acid (mg/100 g)	Sugars		Sensory evaluation
							Reducing sugars (%)	Total sugars (%)	
T_1 (Tip pruning with 2 leaves)	264.00 (264.00 ± 18.96)	201.86 (201.86 ± 15.93)	5.25 (5.25 ± 0.63)	18.40 (18.40 ± 0.93)	0.46 (0.46 ± 0.09)	49.74 (49.74 ± 3.45)	3.07 (3.07 ± 0.53)	10.55 (10.55 ± 0.30)	7.44 (7.44 ± 1.55)
T_2 (Tip pruning by retaining 2 leaves)	275.64 (275.64 ± 12.04)	206.68 (206.68 ± 13.66)	5.28 (5.28 ± 0.33)	18.60 (18.60 ± 0.89)	0.53 (0.53 ± 0.16)	48.26 (48.26 ± 2.23)	3.30 (3.30 ± 0.55)	12.06 (12.06 ± 0.57)	7.77 (7.77 ± 0.26)
T_3 (Tip pruning by retaining 6 leaves)	280.04 (280.04 ± 18.44)	211.06 (211.06 ± 14.45)	4.89 (4.89 ± 0.93)	18.90 (18.90 ± 0.52)	0.42 (0.42 ± 0.10)	50.65 (50.65 ± 3.35)	3.21 (3.21 ± 0.67)	11.66 (11.66 ± 1.10)	7.68 (7.68 ± 0.39)
T_4 (Control)	260.66 (260.66 ± 14.21)	196.74 (196.74 ± 18.51)	4.74 (4.74 ± 0.85)	17.90 (17.90 ± 0.77)	0.56 (0.56 ± 0.17)	50.92 (50.92 ± 3.76)	3.42 (3.42 ± 0.41)	10.57 (10.57 ± 1.27)	7.60 (7.60 ± 0.43)
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS

removal of 20 cm enhanced yield in guava (Adhikari and Kandel, 1). The earliest harvesting was recorded in T_3 (164.60 days), which was 10.4 days earlier than that of control. It was followed by T_2 (169.20 days). Thus, tip pruning triggered yield and fruit development in mango cv. Alphonso. In a variety like Alphonso the early harvested fruits fetch premium price in market than late harvest.

The physical parameters of mango cv. Alphonso at harvest stage and chemical composition as well as sensory evaluation at ripe stage was non-significant due to tip pruning treatments (Table 3). However, the magnitudes for fruit weight, pulp weight and pulp to stone ratio were greater in tip pruning treatments as compare to control. In *ber* (Sunil *et al.*, 11) and Apricot (Demirtas *et al.*, 2) fruit quality remained unchanged by pruning treatments.

It can be concluded that tip pruning up to 2 leaves of new shoots emerged after monsoon instead of flowers in mango cv. Alphonso in spite of application of paclobutrazol is beneficial for early induction of flowering, early harvesting and improved yield without affecting physio-chemical composition adversely. Among the treatments resulted in earliest harvest as compared to control.

REFERENCES

1. Adhikari, S. and Kandel, T.P. 2015. Effect of time and level of pruning on vegetative growth, flowering, yield, and quality of guava. *Int. J. Fruit Sci*. **15**: 290-301.

2. Demirtas, N.M., Bolat, I., Ercisli, S., Ali Ikinci, Olmez, H.,Sahin, M., Altindag, M. and Belgin C. 2010. The effects of different pruning treatments on seasonal variation of carbohydrates in 'Hacihaliloglu' Apricot cultivar. *Not. Bot. Hort. Agrobot. Cluj*. **38** 223-27.

3. Girlaine, Pereira, Oliveira, Dalmo, Lopes de Siqueira, Luiz Carlos Chamhum Salomao, Paulo Roberto Cecon and Daniel Lucas Magalhaes Machado 2017. e- ISSN 1983-4063-www.agro.ufg.br/pat – Pesq. Agropec. Trop. Goiania. V.47, n 1, p. 7-14, Jan./Mar. 2017.

4. Jadhav, A.B. 1996. Studies on effect of pruning and paclobutrazol application on flowering, fruiting, yield and fruit quality of old mango trees (*Mangifera indica* L.) cv. Alphonso MSc. (Hort.). thesis, Dr B.S.K.K.V, Dapoli, Maharashtra.

5. Mohan Swaroop, N., Sant Ram, R. Singh, C.P. and Shukla, P. 2001. Effect of pruning on growth,

flowering and fruiting in mango. *Indian J. Hort*. **58**:303-08.

6. Panse, V.G. and Sukhatme, P.V. 1995. *Statistical Methods for Agricultural Workers*, ICAR, pp. 97-156.
7. Pathania, N.S., Sehgal, O.P. and Gupta, Y.C. 2000. Pinching for flower regulation in Sim carnation. *J. Orn. Hort*. **3**: 114-17.
8. Rangaswamy, R. 1995. *Textbook of Agricultural Statistics* (2nd edn.), New Age International Publishers.
9. Reece, P.C., Furr, J.R. and Cooper, W.C. 1946. The inhibiting effect of terminal bud on flower formation in the axillary buds of the 'Haden' mango. *Amer. J. Bot*. **33**: 209-10.
10. Shaban, A.E.A. 2005: Effect of pruning on growth, flowering and fruiting of Hindi Bi Sinnara Mango trees. *J. Agri. Sci. Mansoura Univ.* **30**:1541-51.
11. Sunil, K., Ram, S.N. and Baig, M.J. 2002. Effect of pruning levels on yield and quality of *ber* (*Zizyphus mauritiana* L.) cultivars. *Range Mgmt. Agroforestry*, **23**: 59-62.
12. Srivastava, L.M. 2002. *Plant Growth and Development Hormone and the Environment*, Academic Press, New York.
13. Taiz, L. and Zeiger, E. 2012. *Fisiological Vegetal*. (5 Ed.) Porto Alegre, Artmed, 2012.
14. Zaeneldeen, E.M.A. 2014. Effect of urea, gibberellic acid foliar application and pinching early panicles on productivity of "Succary Abiad" mango trees under desert conditions. *Middle East J. Agri. Res.* **3**: 135-43.

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