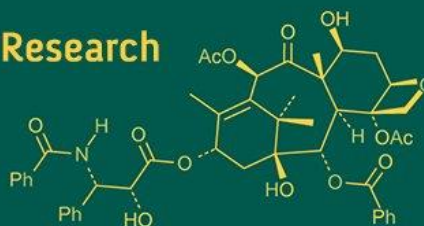


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(6): 97-103
www.biochemjournal.com
Received: 05-05-2026
Accepted: 07-06-2026

RJ Nikam

Ph.D. (Hort) Scholar,
Department of Fruit Science,
College of Horticulture, Dapoli,
Dr. B. S. K. K. V., Dapoli,
Maharashtra, India

PM Haldankar

Former Director of Extension
Education and Director of
Research, Dr. B. S. K. K. V.,
Dapoli, Maharashtra, India

YR Parulekar

Vegetable Specialist, Vegetable
Improvement Scheme, Central
Experimental Station,
Wakawali, Ratnagiri,
Maharashtra, India

KV Malshe

Argonomist, Regional Coconut
Research Station, Bhatye,
Ratnagiri, Maharashtra, India

MC Kasture

Head of Department,
Department of Soil Science and
Agri. Chemistry, College of
Agriculture, Dapoli, Ratnagiri,
Maharashtra, India

Corresponding Author:**RJ Nikam**

Ph.D. (Hort) Scholar,
Department of Fruit Science,
College of Horticulture, Dapoli,
Dr. B. S. K. K. V., Dapoli,
Maharashtra, India

Comparative efficacy of tip pruning, girdling and basin exposure on the reproductive performance of mango cv. Alphonso

RJ Nikam, PM Haldankar, YR Parulekar, KV Malshe and MC Kasture

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i6Sb.8562>

Abstract

The present investigation was carried out to evaluate yield and yield attributing parameters of mango (*Mangifera indica* L.) cv. Alphonso, at Centre of Excellence for Mango, College of Horticulture, Dapoli (MS), Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli, Dist. Ratnagiri during year 2022-23 and 2023-24. The experiment was laid out in Randomized Block Design (RBD) with ten treatments namely, T₁ (Tip pruning), T₂ (Girdling), T₃ (Basin exposure), T₄ (Tip pruning + Girdling + Basin exposure), T₅ (Tip pruning + Girdling), T₆ (Tip pruning + Basin Exposure), T₇ (Girdling + Basin Exposure), T₈ (Basin Exposure + Tip Pruning below bud on mature wood), T₉ (Control with Paclobutrazol application) and T₁₀ (Control without Paclobutrazol application) which were replicated thrice. The minimum days required from flowering to harvesting (118.21 days) was recorded in treatment T₁ (Tip pruning). Similarly, yield parameters like fruit length (10.21 cm), fruit diameter (8.95 cm), average fruit weight (298.89 g), pulp weight (264.60 g) and pulp to stone ratio (6.08) was superior in treatment T₄ (Tip pruning + Girdling + Basin exposure). The highest number of fruits per plant (161.50) was recorded in treatment T₁ (Tip pruning). Fruit yield per plant (47.39kg/plant) and yield (4.74 t/ha) was found highest in treatment T₄.

Keywords: Mango, Alphonso, yield attributes, yield

Introduction

Mango (*Mangifera indica* L.) is referred as the “King of Fruits” in the Indian subcontinent due to its exceptional taste, rich flavour, appealing colour, high nutritional value, and wide range of uses. It originated in South and Southeast Asia and spread across the globe, becoming one of the most widely cultivated and highly preferred fruits in tropical and subtropical regions. Botanically, mango is a dicotyledonous plant belonging to the family Anacardiaceae and the genus *Mangifera*. In India, almost all commercially grown varieties belong to the single mono-embryonic species i.e *Mangifera indica* L.

India ranks first among the world's largest mango producing countries accounting for about 45% of the world's total mango production. Other major mango producing countries include China, Thailand, Mexico, Philippines, Indonesia, Brazil, Nigeria and Egypt. Worldwide production is mostly concentrated in Asia accounting for 75% followed by South and Northern America with 10% share. Major producing states in India are Andhra Pradesh, Uttar Pradesh, Bihar, Gujrat, Karnataka, Maharashtra, Odisha, Tamil Nadu and West Bengal (NHB 2024) [3].

In 2023, the global production of mangoes including mangosteen and guava reached approximately 61 million tonnes (NHB 2024) [3]. Total area under cultivation of mango in India is 2393.86 thousand hectares with an annual production of 22662.89 thousand MT (NHB 2024) [3]. The country has exported 32,104.09 MT of mangoes of worth Rs. 495.46 crores/60.14 USD millions during the year 2023-2024. Other major producers of mango are China (4.1 million tonnes), Thailand (3.9million tonnes), Indonesia (2.7 million tonnes) and Mexico (12.6 million tonnes) (FAOSTAT 2024). In India, the major mango growing states are Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh and Gujarat. The acreage in mango cultivation is increasing in north Indian states also due to potential of late season market (NHB 2024) [3].

The low productivity is mainly attributed to several factors including environmental, physiological as well as biological changes. But over the years, environmental changes play a significant role like erratic rainfall, snowfall, droughts, increase in temperature, hail storms resulting fluctuations in the fruit production. A significant change in climate at global and national level is certainly impacting horticulture and affecting our fruit production and quality as well. Increase in temperature is likely to impact the atmospheric processes, and the occurrence of weather abnormalities like floods, droughts, cold and heat waves is likely to increase in ensuing decades under the projected climate change scenarios, (Reddy *et al.*, 2017) ^[41].

Mango orchards in India are facing declining trends in recent time leading to decrease in yield and productivity. Low productivity in mango is mainly due to low plant population per unit area, rainfed farming, inadequate nutrient management, improper orchard management practices, low percentage of hermaphrodite flowers, heavy fruit drop due to recurrent flowering and losses due to pests like hoppers, fruit fly and diseases like powdery mildew, anthracnose (Kumar, 2013) ^[22]. Further, the physiological disorders such as spongy tissue, alternate bearing plays vital role. Early flowering in mango helps for early development of fruit which ultimately result in early harvesting. Such

fruits get attractive price in the market as compared to late maturing fruits in the season. Weather during initiation of flowering in the month of September to November play an important role in induction of flowering at appropriate time. Recently, it is often observed that climatic fluctuations during September-November especially unseasonal rains led to production of vegetative flush instead of flowering flush. This new vegetative flush requires another 80-100 days to become capable of flowering. Therefore, flowering is considerably delayed. The delayed flowering leads to late fruit development and harvesting. Further it is often noticed that many of these new shoots do not produce flowers resulting into sparse flowering and produce poor yield (Soudagar *et al.*, 2018) ^[40]. The present experiment aimed towards mitigating ill effects of climatic abbreviation on induction of flowering in mango cv. Alphonso.

Materials and Methods

The present experiment was conducted at Centre of Excellence for mango, College of Horticulture, Dapoli. The experiment was conducted during the year 2022-23 and 2023-24. During the investigation, the effect of tip pruning, basin exposure, girdling and paclobutrazol on days required from flowering to harvesting, yield and yield attributing parameters in mango cv. Alphonso was studied.

Table 1: Treatment details

Sr.	Treatment details			Time of treatment exposure
1.	T ₁	:	Tip pruning	After initiation of new vegetative flush. 2 nd week of November.
2.	T ₂	:	Girdling	1 st fortnight of October.
3.	T ₃	:	Basin exposure	After withdrawal of rains. 2 nd week of October.
4.	T ₄	:	Tip pruning + Girdling + Basin exposure	In combination treatments the exposure of particular treatment was done as in case of T ₁ , T ₂ , T ₃ .
5.	T ₅	:	Tip pruning + Girdling	In combination treatments the exposure of particular treatment was done as in case of T ₁ , T ₂ .
6.	T ₆	:	Tip pruning + Basin Exposure	In combination treatments the exposure of particular treatment was done as in case of T ₁ , T ₃ .
7.	T ₇	:	Girdling + Basin Exposure	In combination treatments the exposure of particular treatment was done as in case of T ₂ , T ₃ .
8.	T ₈	:	Basin Exposure + Tip Pruning below bud on mature wood	In combination treatments the exposure of particular treatment was done as in case of T ₁ , T ₃ .
9.	T ₉	:	Control with Paclobutrazol application	3 rd week of August
10.	T ₁₀	:	Control without Paclobutrazol application	-----

*The removal of new shoots (tip pruning) was done after the emergence of new vegetative flush in November. Girdling was done during October-November and basin exposure was done after withdrawal of rains.

Tip pruning was done to make a tree more productive and to bear quality fruits with increased longevity to achieve more manageable shape and to get maximum returns from the orchard. This practice is useful where trees have a vegetative flush just prior to flowering. The young flushes are cutback to mature wood; the resulting flush should be floral one. The new shoots emerged after monsoon was allowed to grow fully till their growth ceased. At this stage the colour of this new shoot was light green. Removal of new shoots was performed on these shoots as per the treatment details. Total 200 shoots were tip pruned in each experimental plant of respective treatment.

Girdling was done as per treatment details on tertiary branches having 3 to 4 cm circumference by giving a deep circular cut penetrating cambium layer with the help of sharp knife as per the treatments. Total 50 percent branches were girdled per experimental plant.

Basin exposure was done by loosening the soil around tree trunk upto radius of 2cm upto 20 to 30 cm depth. This will

help in evaporating excess moisture and imparting stress which is prerequisite for flower initiation.

Application of paclobutrazol is @ 0.75 ml active ingredient per meter average canopy diameter during 15th July-15th August is advocated and its application methodology has been standardized.

Results and Discussion

The data pertaining to yield and yield attributing parameters are represented in Table 2, Table 3 and illustrated with figure 1 and figure 2. The results revealed significant differences among all the treatments.

Days required from flowering to harvesting

The minimum days required from flowering to harvesting (118.21 days) was recorded in treatment T₁ which was at par with the treatment T₄, T₉ (119.23, 120.12 days). It was followed by treatment T₅ (120.42), T₂ (121.55), T₆ (123.10), T₃ (122.37), T₇ (124.43), T₈ (124.85). The maximum days

registered from flowering to harvesting was recorded in treatment T₁₀ (125.97 days). Pruning increases photosynthates translocation to flower buds causing them to earlier fruit set which lead to early harvest compared to control (Lal *et al.*, 2000) [24]. Srilatha and Reddy (2015) [41] reported that pruning of current season growth and application of paclobutrazol recorded early harvesting of fruits in mango cv. Raspuri. Soudagar *et al.* (2018) [40] observed the minimum number of days required for harvesting in tip pruning by retaining 2 leaves. The findings are also accordance with Warang *et al.* (2019) [45] in mango cv. Alphonso and Nachare (2020) [26] in mango cv. Ratna. Saste (2021) [31] reported that the minimum days required for harvesting were recorded in T₆ treatment (117.17 days) and maximum number of days required for harvesting was observed in T₉ (143.13 days) control. Bhuwad (2021) [5] also noticed that treatment T₁-removal of shoots (127.67 days) required minimum number of days for harvesting over control. Application of paclobutrazol minimized the number of days taken for harvesting from panicle initiation. The paclobutrazol minimizes the number of days taken for harvesting may be by providing more heat units for maturity which helped to pollen tube germination and early fruit set (Krishna *et al.*, 2017) [19]. The advancement of harvesting time in case of paclobutrazol application in mango cv. Banganpalli was reported in India (Singh and Ranganath, 2006) [36].

Length and diameter of fruit (cm)

The highest fruit length (10.21 cm) was recorded in treatment T₄. It was followed by treatment T₁ (10.01 cm), T₆ (9.57 cm), T₅ (9.52 cm), T₇ (9.40 cm), T₃ (9.39 cm), T₂ (9.37 cm), T₈ (9.27 cm), T₉ (9.25 cm), whereas the lowest fruit length was recorded in treatment T₁₀ (9.17 cm). The highest fruit diameter (8.95 cm) was recorded in treatment T₄. It was followed by treatment T₁ (8.75 cm), T₆ (8.24 cm), T₅ (7.92 cm), T₇ (7.90 cm), T₂ (7.86 cm), T₃ (7.86 cm), T₈ (7.85 cm), T₉ (7.82 cm), whereas the lowest fruit diameter was recorded in treatment T₁₀ (7.71 cm). The removal of new shoots significantly increased fruit length and diameter in both the years of mango cv. Alphonso. The higher fruit length and diameter in pruned trees might be due to better microclimate in canopy and higher photosynthetic rate which might have diverted more assimilates towards the fruit development (Kumar *et al.*, 2014) [21]. According to Gupta and Gill (2015) [13] the fruit size in terms of fruit length and fruit diameter increased with the increase in intensity of pruning in ber cv. Umran. The results in the present investigation are in confirmation with findings of Gopu *et al.* (2014) [12] in mango cv. Alphonso; Warang *et al.* (2019) [45] in mango cv. Alphonso; Saste (2021) [31] in mango cv. Alphonso; Bhuwad (2021) [5] in mango cv. Alphonso; Kumar *et al.* (2002) [23] in ber cvs. Gola, Umran and Baranasi Karaka. However, Soudagar *et al.* (2018) [40] reported non-significant effect of tip pruning on mango on fruit length and diameter cv. Alphonso.

Fruit weight (g) at harvest stage

The maximum fruit weight (298.38 g) was recorded in treatment T₄ which was at par with the treatment T₅ (296.65 g), T₁ (295.30 g) and T₆ (289.91 g), whereas the minimum was recorded in treatment T₁₀ (256.82 g). The removal of new vegetative shoots significantly increased average fruit

weight in both the years of mango cv. Alphonso. The higher fruit weight in pruned trees may be due to an improve microclimate as well as higher rate of photosynthesis (Sharma and Singh, 2006) [33]. Variation of the radiation interception in the plant canopy can affect the fruit size through variation in supply of assimilated carbon (Buwalda, 1994) [7]. The results are also in agreement with Singh (2007) [38] in mango cv. Amrapalli, Mallika and Dashehari; Asrey *et al.* (2013) [4] in mango cv. Amrapalli; Chauhan *et al.* (2013) [8] in mango cv. Mallika; Sundararajan and Muthuswamy (1996) in guava cv. Nagpur seedless. Kumar *et al.* (2017) [20] reported that girdled branches retained more carbohydrate reserve and necessary hormones which were essential to increase the fruit weight. Ghadage *et al.* (2017) [11] reported significantly maximum fruit weight (g) with 1.50 cm of girdling width (301.66 g). The girdling during 15th July (T₁) produced significant maximum fruit weight (293.49 g) in mango cv. Alphonso.

Pulp weight (g) and pulp to stone ratio at harvest stage

The highest pulp weight (264.60 g) was recorded in treatment T₄ which was at par with the treatment T₁ (257.86 g) and T₅ (257.32 g). The treatment T₆ (249.92 g), T₂ (243.04 g) T₃ (242.55 g), T₇ (239.47 g), T₈ (234.99 g), T₉ (224.72 g) recorded intermediate pulp weight, whereas the lowest was recorded in treatment T₁₀ (209.64 g). The highest pulp to stone ratio (6.05) was recorded in treatment T₄ which was at par with the treatment T₁ (6.03), T₅ (5.99) and T₆ (5.99), whereas the lowest pulp to stone ratio was recorded in treatment T₁₀ (5.46). Khalkho *et al.* (2015) [18] concluded that removal of shoot and girdling markedly improved seed-pulp ratio and juice percentage in litchi cv. Shahi. Similar results with respect to pulp weight (g) and pulp stone ratio were also reported by Pratap *et al.* (2009) [28] in mango cv. Amrapalli; Singh *et al.* (2010) [39] in mango cv. Amrapalli; Gopu *et al.* (2014) [12] in mango cv. Alphonso and Gupta and Gill (2015) [13] in ber cv. Umran. However, Soudagar *et al.* (2018) [40] concluded that the pulp weight and pulp to stone ratio did not vary due to tip pruning treatments. Mahajan and Dhillon (2002) [25] stated that pruning did not have any effect on pulp weight and pulp to stone ratio of fruit in peach cv. Shan-I-Punjab. Bhuwad (2021) [5] observed that removal of shoots recorded highest pulp weight (264.17 g) with highest pulp stone ratio. Saste (2021) [31] noticed the highest pulp weight in girdling (178.00 g) with (5.32) pulp stone ratio over control.

The data on pulp weight and pulp to stone ratio exhibited significant variation due to foliar application of paclobutrazol. The higher pulp weight and pulp stone ratio was found more in mango trees treated with paclobutrazol foliar application as compared to control. It may be due to the increased rate of photosynthesis, food storage material and chlorophyll content etc. (Vuillaume, 1991) [41]. The results are in accordance with the findings of Tandel and Patel (2011) [43] in Alphonso and Sarkar and Rahim (2018) [30] in mango who reported that paclobutrazol applied tree resulted in higher edible portion and lowest stone weight. The results in present investigation are similar with Desai and Chundawat (1994) [9] and Karuna *et al.* (2007) [38] in mango cv. Langra. Jadhav *et al.* (2019) [14] concluded that foliar application of paclobutrazol did not have any effect on pulp weight and pulp to stone ratio in mango cv. Alphonso.

Average fruit weight (g) at ripe stage

The maximum fruit weight (287.38 g) was recorded in treatment T₁ which was at par with the treatment T₄ (286.50 g), T₅ (283.71 g) and T₆ (281.83 g), whereas it was minimum in treatment T₁₀ (242.67 g). At ripe stage the higher fruit weight was obtained in tip pruned trees in comparison with control trees during both the years. Improved source and sink condition and efficient movement of photosynthates in the pruned shoots might have increased fruit weight (Singh and Singh, 2007) [38]. According to Sharma and Singh, (2006) [33] the highest fruit weight was noticed in pruned trees due to an improved microclimate and higher photosynthetic rate. Improvement in fruit size due to pruning was observed in mango by Fivaz *et al.* (1997) [10] whereas, Stassen *et al.* (1999) [42] recorded increase in fruit weight due to pruning on 'Sensation' mango. The present similar results were also obtained by Singh (2007) [38] in mango cv. Amrapalli, Mallika and Dashehari; Asrey *et al.* (2013) [4] in mango cv. Amrapalli; Chauhan *et al.* (2013) [8] in mango cv. Mallika; Sundararajan and Muthuswamy (1996) in guava cv. Nagpur seedless and Adhikari and Kandel (2015) [1] in Guava. Kumar *et al.* (2017) [20] reported that girdled branches supplied more carbohydrate reserve and necessary hormones which were essential to increase the fruit weight. Khalkho *et al.* (2015) [18] concluded that removal of shoot and girdling markedly improved seed-pulp ratio and juice percentage in litchi cv. Shahi. Similar results with respect to pulp weight (g) and pulp stone ratio were also reported by Pratap *et al.* (2009) [28] in mango cv. Amrapalli; Singh *et al.* (2010) [39] in mango cv. Amrapalli; Gopu *et al.* (2014) [12] in mango cv. Alphonso and Gupta and Gill (2015) [13] in ber cv. Umran.

Pulp weight (g) and pulp stone ratio at ripe stage

The maximum pulp weight (203.01 g) was recorded in treatment T₄ which was at par with the treatment T₁ (201.26 g). It was followed by treatment T₅ (200.73 g), T₆ (199.33 g), T₇ (197.94 g), T₂ (195.48 g), T₃ (193.62 g), T₈ (180.98 g) and T₉ (175.47 g), whereas the minimum was recorded in treatment T₁₀ (170.41 g). The highest pulp to stone ratio (5.32) was recorded in treatment T₄, whereas the lowest pulp to stone ratio was noted in treatment T₁₀ (4.65). Khalkho *et al.* (2015) [18] concluded that removal of shoot and girdling markedly improved seed-pulp ratio and juice percentage in litchi cv. Shahi. Bhuwad (2021) [5] observed that removal of shoots recorded highest pulp weight (264.17 g) with highest pulp stone ratio. Saste (2021) [31] noticed the highest pulp weight in girdling (178.00 g) with (5.32) pulp stone ratio over control. Similar results with respect to pulp weight (g) and pulp stone ratio were also reported by Pratap *et al.* (2009) [28] in mango cv. Amrapalli; Singh *et al.* (2010) [39] in mango cv. Amrapalli; Gopu *et al.* (2014) [12] in mango cv.

Alphonso and Gupta and Gill (2015) [13] in ber cv. Umran. Soudagar *et al.* (2018) [40] concluded that the pulp weight and pulp to stone ratio did not vary due to tip pruning treatments. Mahajan and Dhillon (2002) [25] stated that tip pruning did not have any effect on pulp weight and pulp to stone ratio of fruit in peach cv. Shan-I-Punjab. The higher pulp weight and pulp stone ratio was found to increase in mango trees with paclobutrazol foliar application as compared to control may be due to the increased rate of photosynthesis, food storage material and chlorophyll content (Vuillaume, 1991) [41]. These results are in accordance with the findings of Tandel and Patel (2011) [43] in Alphonso and Sarkar and Rahim (2018) [30] in mango who reported that paclobutrazol applied tree resulted in higher edible portion and lowest stone weight.

Number of fruits per tree and fruit kg per plant

The maximum number of fruits per tree (161.50) was recorded in treatment T₁ which was at par with the treatment T₄ (155.66), T₉ (155.50), T₅ (155.00) and T₆ (154.17). It was followed by treatment T₂ (146.84), T₇ (144.50), T₃ (137.00) and T₈ (88.00), whereas it was minimum in treatment T₁₀ (62.33). The maximum number of fruits (47.39 kg per plant) was recorded in treatment T₄ which was at par with the treatment T₁ (46.30 kg per plant) and T₅ (45.69 kg per plant), whereas the minimum was recorded in treatment T₁₀ (16.31 kg per plant). Thus, tip pruning was found effective in improving yield. It might be attributed to the sufficient supply of carbohydrates maintaining a proper balance which helped high percent of flowering panicle and greater fruit retention with good fruit size (Nath, 1994) [27]. According to Shaban (2005) heading back of shoots of mango tree cv. Hindi-Bi-Sinnara helped to produced highest number of fruits per tree. Adhikari and Kandel (2015) [1] concluded that 20 cm tip removal in guava enhanced the yield. Soudagar *et al.* (2018) [40] studied the effect of tip pruning on mango cv. Alphonso and concluded that tip pruning by retaining two leaves increased the yield. Srilatha and Reddy (2015) [41] recorded higher fruit yield (21.33 kg per plant) with pruning of current season's growth + soil application of PBZ @ 3 ml/m canopy diameter in mango cv. Rasputi. The present findings are in accordance with Warnag *et al.* (2019) in mango cv. Alphonso and Nachare (2020) [26] in mango cv. Ratna. Krishna *et al.* (2017) [19] reported significantly highest number of fruits per tree and yield (19.9% over control) by foliar spray of ortho-phosphoric acid @ 0.5 percent. Similar results were also reported in mango by Singh and Rajput (1990) [35] in cv. Langra; Kenzie (1994) [16] in cv. Sensation and Rojas (1996) [29] in cv. Haden; Brahmachari *et al.* (1997) [6] in litchi and Koul and Muthoo (1999) [17] in peach.





Plate 1: Various growth stages of mango cv. Alphonso at flowering and fruiting.

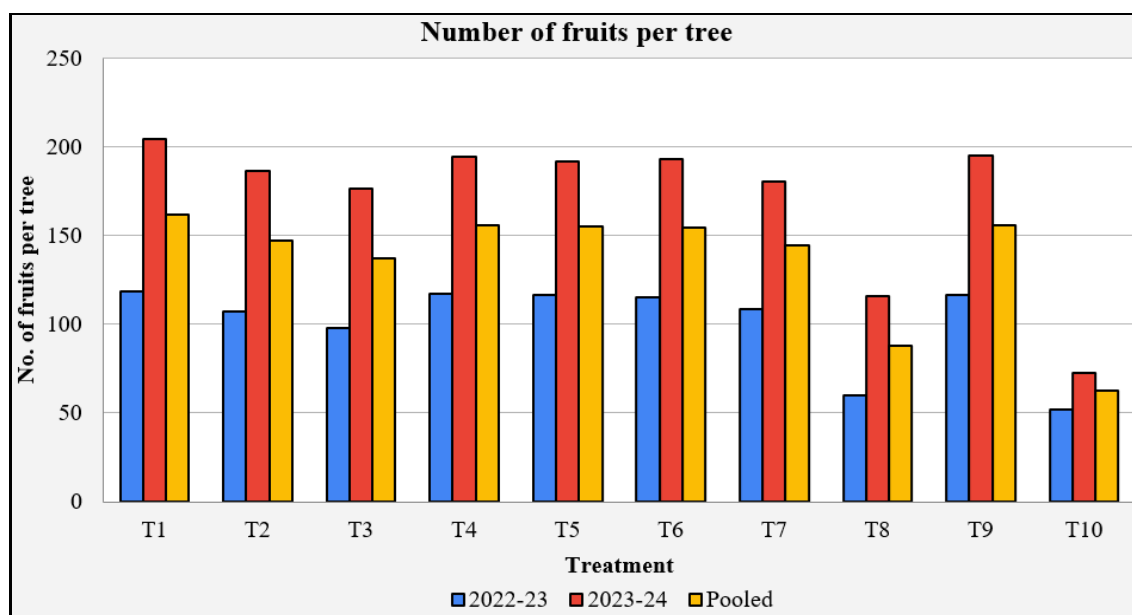


Fig 1: Effect of tip pruning, girdling and basin exposure on number of fruits per tree in mango cv. Alphonso

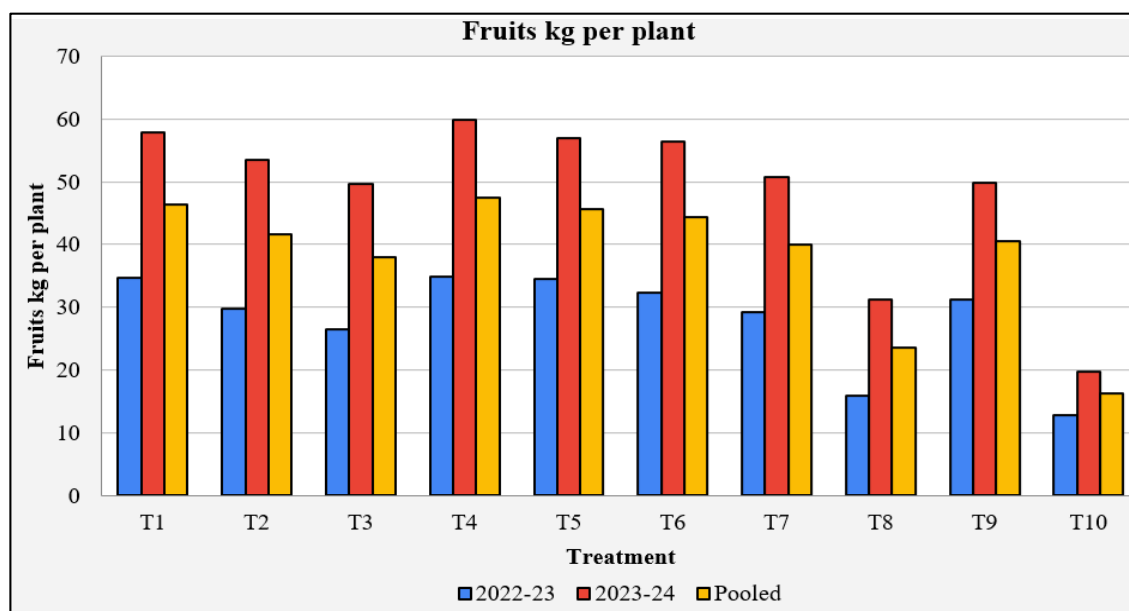


Fig 2: Effect of tip pruning, girdling and basin exposure on fruit (kg/plant) in mango cv. Alphonso

Treatment details:					
T ₁	:	Tip pruning	T ₆	:	Tip pruning + Basin Exposure
T ₂	:	Girdling	T ₇	:	Girdling + Basin Exposure
T ₃	:	Basin exposure	T ₈	:	Basin Exposure + Tip Pruning below bud on mature wood
T ₄	:	Tip pruning + Girdling + Basin exposure	T ₉	:	Control with Paclobutrazol application
T ₅	:	Tip pruning + Girdling	T ₁₀	:	Control without Paclobutrazol application

Table 2: Effect of tip pruning, girdling and basin exposure on yield attributing parameters in mango cv. Alphonso:

Treatment	Days required from flowering to harvesting	Length of fruit (cm)	Diameter of fruit (cm)	Fruit weight at harvest stage (g)	Pulp weight (g)	Pulp-stone ratio
T ₁ -Tip pruning	118.21	10.01	8.75	295.30	257.86	6.03
T ₂ -Girdling	121.55	9.37	7.86	282.89	243.04	5.76
T ₃ -Basin exposure	122.37	9.39	7.86	280.10	242.55	5.78
T ₄ -Tip pruning + Girdling + Basin exposure	119.23	10.21	8.95	298.38	264.60	6.05
T ₅ -Tip pruning + Girdling	120.42	9.52	7.92	296.65	257.32	5.99
T ₆ -Tip pruning + Basin Exposure	123.10	9.57	8.24	289.91	249.92	5.99
T ₇ -Girdling + Basin Exposure	124.43	9.40	7.90	275.57	239.47	5.81
T ₈ -Basin Exposure + Tip Pruning below bud on mature wood	124.85	9.27	7.85	266.99	234.99	5.61
T ₉ -Control with Paclobutrazol application	120.12	9.25	7.82	270.34	224.72	5.73
T ₁₀ -Control without Paclobutrazol application	125.97	9.17	7.71	256.82	209.64	5.46
MEAN	122.03	9.52	8.09	281.30	242.41	5.82
Range	118.21-125.97	9.17-10.21	7.71-8.95	256.82-298.38	209.64-264.60	5.46-6.05
S.E.±m	0.72	0.02	0.05	4.00	3.10	0.02
C.D. @ 5%	2.14	0.08	0.17	11.88	9.21	0.08

Table 3: Effect of tip pruning, girdling and basin exposure on yield and yield attributing parameters in mango cv. Alphonso:

Treatment	Fruit weight at ripe stage (g)	Pulp weight at ripe stage (g)	Pulp-stone ratio at ripe stage	Number of fruits per tree	Yield kg/plant
T ₁ -Tip pruning	287.38	201.26	5.25	161.50	46.30
T ₂ -Girdling	273.88	195.48	5.05	146.84	41.67
T ₃ -Basin exposure	271.79	193.62	5.02	137.00	38.06
T ₄ -Tip pruning + Girdling + Basin exposure	286.50	203.01	5.32	155.66	47.39
T ₅ -Tip pruning + Girdling	283.71	200.73	5.22	155.00	45.69
T ₆ -Tip pruning + Basin Exposure	281.83	199.33	5.16	154.17	44.35
T ₇ -Girdling + Basin Exposure	269.33	197.94	5.01	144.50	40.01
T ₈ -Basin Exposure + Tip Pruning below bud on mature wood	255.42	180.98	4.88	88.00	23.60
T ₉ -Control with Paclobutrazol application	253.75	175.47	4.71	155.50	40.56
T ₁₀ -Control without Paclobutrazol application	242.67	170.41	4.65	62.33	16.31
MEAN	270.63	191.82	5.03	136.05	38.39
Range	242.67-287.38	170.41-203.01	4.65-5.32	62.33-161.50	16.31-47.39
S.E.±m	2.26	0.72	0.01	3.17	0.85
C.D. @ 5%	6.73	2.16	0.04	9.43	2.55

Conclusion

It can be concluded from present investigation that among all treatments, the length and diameter of fruit, average weight of fruit, pulp weight and pulp to stone ratio was observed best in treatment T₄ (Tip pruning + Girdling + Basin exposure). In yield attributes number of fruits per tree, fruit kg per tree and yield t/ha was found greatest in treatment T₄ (Tip pruning + Girdling + Basin exposure). The result of present investigation concluded that for early induction of flowering and early harvesting as well as higher yield in Alphonso mango trees should be followed combination of Tip pruning + Girdling + Basin exposure.

References:

- Adhikari S, Kandel TP. Effect of time and level of pruning on vegetative growth, flowering, yield, and quality of guava. *Int J Fruit Sci.* 2015;15(3):290-301.
- Anonymous. Food and Agriculture Organization Corporate Statistical Database. Global peach and nectarines producing countries in 2023. 2024. Available from: <https://www.fao.org/faostat/en/#data>
- Anonymous. Area and production of horticulture crops: All India National Horticulture Board. 2024. Available from: <https://nhb.gov.in/>
- Asrey R, Patel VB, Barman K, Pal RM. Pruning affects fruit yield and postharvest quality in mango (*Mangifera indica* L.) cv. Amrapali. *Fruits.* 2013;68:367-380.
- Bhuwad AV. Studies on effect of chemical and non-chemical means on induction of flowering, fruit set and yield of mango (*Mangifera indica* L.) cv. Alphonso [PhD thesis]. Dapoli (India): Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth; 2021.
- Brahmachari VS, Yadav GS, Kumar N. Effect of foliar feeding of calcium, zinc and boron on yield and quality attributes of litchi (*Litchi chinensis* Sonn). *Orissa J Hortic.* 1997;25(1):49-52.
- Buwalda JG. The impact of canopy growth and temporal changes in radiation on the dynamics of canopy carbon acquisition for kiwifruit (*Actinidia deliciosa*) vines during spring. *Environ Exp Bot.* 1994;34(2):145-151.
- Chauhan VK, Joshi AK, Chauhan N. Rejuvenation of frost affected mango orchard through pruning treatments. *Int J Farm Sci.* 2013;3(2):32-40.
- Desai MM, Chundawat BS. Regulation of flowering in mango by paclobutrazol. *Indian J Hortic.* 1994;51(1):9-15.
- Fivaz J, Stassen PJC, Grove HG. Pruning and training strategies for Tommy Atkins and Sensation mango trees in higher density hedgerow systems. *S Afr Mango Growers Assoc Yearb.* 1997;17:37-40.
- Ghadage NJ, Patil SJ, Khopade RY, Shah NI, Hiray SA. Effect of time and width of girdling on flowering and yield of mango (*Mangifera indica* L.) cv.

- Alphonso. Int J Chem Stud. 2017;5(6):1580-1583.
12. Gopu B, Balamohan TN, Soman P, Jeyakumar P. Canopy management in mango (*Mangifera indica* L.) cv. Alphonso with reference to flowering, yield and quality characters under ultra high-density planting. J Appl Hortic. 2014;16(1):50-53.
 13. Gupta N, Gill MS. Effect of intensity of pruning on yield and fruit quality of ber (*Ziziphus mauritiana* L.) cv. Umran. Int J Agric Environ Biotechnol. 2015;8(1):69-73.
 14. Jadhav AP, Haldankar PM, Parulekar YR, Salvi BR, Burondkar MM, Thorat SB, *et al.* Effect of foliar application of growth retardants for induction of flowering under climatic fluctuations in mango cv. Alphonso. Bull Environ Pharmacol Life Sci. 2019;8:S32-S35.
 15. Karuna K, Mankar A, Singh J. Effect of urea and growth substances on yield and quality of mango cv. Langra. Orissa J Hortic. 2007;35(1):67-70.
 16. Kenzie MC. Year Book-South African Mango Growers Association. 1994;14:24-25.
 17. Koul OP, Muthoo AK. Effect of foliar sprays of calcium nitrate, zinc sulphate and Ethrel on the fruit characteristics of Florida Sun peach (*Prunus persica* L. Batsch). 1999:577-581.
 18. Khalkho NS, Horo P, Jha KK. Effect of girdling and defoliation on physical properties of litchi fruit. J Crop Weed. 2015;11(1):200-203.
 19. Krishna GV, Bhagwa A, Kumar MR, Shankar AS. Flowering and production improvement studies of mango cv. Banganpalli in relation to plant growth regulators and chemicals. Int J Curr Microbiol Appl Sci. 2017;6(8):481-493.
 20. Kumar A, Pandey SD, Patel RK, Srivastava K, Tripathi M, Nath V. Effect of girdling on flowering and fruiting of litchi (*Litchi chinensis*) in subtropics of Bihar. Int J Agric Sci. 2017;87(3):397-401.
 21. Kumar H, Katiyar PN, Singh AK, Rajkumar BV. Effect of different pruning severity on growth and yield of ber (*Zizyphus mauritiana* L.) cv. Banarsi Karaka. Int J Curr Microbiol Appl Sci. 2014;3(5):935-940.
 22. Kumar P. Controlling post monsoon vegetative growth and enhancement of physiological maturity of shoots in relation to flowering in Alphonso mango (*Mangifera indica* L.) [MSc thesis]. Dapoli (India): Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth; 2013.
 23. Kumar S, Ram SN, Baig MJ. Effect of pruning levels on yield and quality of ber (*Ziziphus mauritiana* Lam.) cultivars. Range Manag Agrofor. 2002;23(1):59-62.
 24. Lal S, Tiwari JP, Misra KK. Effect of plant spacing and pruning intensity on fruit yield and quality of guava. Prog Hortic. 2000;32:20-25.
 25. Mahajan BVC, Dhillon BS. Effect of pruning intensities on the fruit size, yield and quality of peach cv. Shan-e Punjab. Agric Sci Dig. 2002;22(4):281-282.
 26. Nachare S. Effect of various non-chemical means on induction of flowering, fruit set and yield of mango (*Mangifera indica* L.) cv. Ratna [MSc thesis]. Dapoli (India): Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth; 2020.
 27. Nath JC. Effect of pruning on growth, yield and quality of Assam Lemon (*Citrus limon* Burm.). Haryana J Hortic Sci. 1994;23(4):281-285.
 28. Pratap B, Singh SK, Singh HK, Gaurav SS, Bala S. Effect of pruning on physico-chemical properties of mango cv. Amrapali under high density orcharding. Ann Hortic. 2009;2(1):62-64.
 29. Rojas E. Revista de la Facultad de Agronomia, Universidad Central de Venezuela. 1996;22(1-2):47-56.
 30. Sarkar BC, Rahim MA. Influence of paclobutrazol on growth, yield and quality of mango. Bangladesh J Agric Res. 2018;43(1):11-12.
 31. Saste HA. Effect of special horticultural practices, foliar application of ortho-phosphoric acid and paclobutrazol on induction of flowering in mango (*Mangifera indica* L.) cv. Alphonso [MSc thesis]. Dapoli (India): Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth; 2021.
 32. Shaban AEA. Effect of pruning on growth, flowering and fruiting of Hindi Bi Sinnara mango trees. J Agric Sci Mansoura Univ. 2005;30(3):1541-1551.
 33. Sharma RR, Singh R. Effect of pruning intensity on light penetration and leaf physiology in Amrapali mango trees under high density planting. Trop Sci. 2006;46:16-19.
 34. Shinde VV, Dubale JJ, Haldankar PM, Parulekar YR, Thorat SB. Effect of ringing on flowering and yield of mango (*Mangifera indica* L.) cv. Alphonso. Asian Reson. 2014;3(3):115-117.
 35. Singh AK, Rajput CBS. Res Dev Reporter. 1990;7(1-2):1-11.
 36. Singh DB, Ranganath HR. Induction of regular and early fruiting in mango by paclobutrazol under tropical humid climate. Indian J Hortic. 2006;63(3):248-250.
 37. Singh SK. Effect of pruning on growth, yield and fruit quality of Amrapalli, Mallika and Dashehari mango cultivars planted under high density [PhD thesis]. New Delhi (India): Indian Agricultural Research Institute; 2007.
 38. Singh VK, Singh G. Photosynthetic efficiency, canopy micro climate and yield of rejuvenated guava trees. Acta Hortic. 2007;735:249-257.
 39. Singh SK, Singh SK, Sharma RR. Pruning alters fruit quality of mango cultivars (*Mangifera indica* L.) under high density planting. J Trop Agric. 2010;48:55-57.
 40. Soudagar TP, Haldankar PM, Parulekar YR, Dalvi VV, Ghule VS. Study on effect of tip pruning on induction of flowering and harvesting in Alphonso mango. Indian J Hortic. 2018;75(4):709-712.
 41. Srilatha V, Reddy YTN. Pruning and paclobutrazol induced flowering and changes in phenols and flavonoids of mango (*Mangifera indica* L.) cv. Rasपुरi. J Eng Comput Appl Sci. 2015;4(2):43-47.
 42. Stassen PJC, Grove HG, Davie SJ. Tree shaping strategies for higher density mango orchards. J Appl Hortic. 1999;1(1):1-4.
 43. Tandel YN, Patel NL. Effect of chemicals on growth, yield and economics of mango (*Mangifera indica* L.). Karnataka J Agric Sci. 2011;24(3):362-365.
 44. Vuillaume C. Towards control of flowering in mango in Cameroon. Use of a growth regulator: paclobutrazol. Hortic Abstr. 1991;62(1):854.
 45. Warang OS, Haldankar PM, Parulekar YR, Salvi BR, Chavan SA, Dalvi NV, *et al.* Non chemical approaches for induction of appropriate flowering in mango cv. Alphonso. Bull Environ Pharmacol Life Sci. 2019;8:S58-S62.