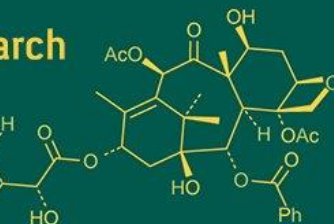
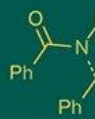
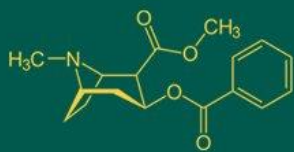


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Impact of various horticultural practices on physical and biochemical parameters during flowering and fruiting in mango cv. Alphonso

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Abstract

The present investigation was carried out to evaluate physical 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. Among all the treatments studied, treatment T₄ (Tip pruning + Girdling + Basin exposure) was found superior in physical parameters like length of panicle (29.64 cm), fruit set per panicle (9.71) and fruit retention per panicle (0.73%). Minimum days required for induction of flowering was recorded in treatment T₆ - (Tip pruning + Basin Exposure) i.e. 38.97 days. Flowering intensity (68.87%), breadth of panicle (16.60 cm), number of rachis (39.76) and hermaphrodite flower (12.81%) were found significantly superior in treatment T₁ (Tip pruning). In biochemical analysis of leaves, non-structural carbohydrates during flowering (4.35%) and after flowering (0.68%) was highest in treatment T₁ (Tip pruning) while non-significant results for non-structural carbohydrates were recorded before flowering in all other treatment in mango cv. Alphonso. C:N ratio during flowering (30.35) and after flowering (19.92) was found superior in treatment T₄ (Tip pruning + Girdling + Basin exposure).

Keywords: Mango, Alphonso, physical parameters, biochemical analysis of leaves

Introduction

The mango (*Mangifera indica* L.) is acclaimed as the King of fruits in Indian continent owing to its exquisite taste, flavour, attractive colour, nutritional value and diverse end uses. The Mango is native to South and Southeast Asia from which it was distributed worldwide to become one of the most cultivated and the choicest fruit in the tropical and subtropical world. The Mango is dicotyledonous belongs to family Anacardiaceae and genus *Mangifera*. In India almost all commercial cultivars belonging to a single mono-embryonic species i.e. *Mangifera indica* L.

It is the most important tropical fruit of the world. It can also be grown in the subtropical conditions and up to an elevations of 1400 m above the mean sea level. The optimum temperature range for its growth is 18 to 35 °C and can tolerate temperatures up to 48 °C. It can survive in areas having an average annual rainfall ranging from 250 mm to 2000 mm. Loamy, alluvial, well drained, aerated and deep soils rich in organic matter with a pH range of 5.5 to 7.5 are ideal for mango cultivation. It is originated from Indo-Burma region having 41 recognized species and originating as forest tree with fibrous and resinous fruits (Mukherjee, 1951 and 1967) ^[20, 21]. It is cross-pollinated fruit crop having chromosome number 2n=40. It has been variously called *Amra*, *Chuta*, *Sahakara*, *Rasala*, *Atisourabha* in ancient Sanskrit literature, and the tree has been described as wish-granting tree or kalpa-vriksha.

Mango crop particularly in Konkan starts its annual phenological cycle in June with onset of monsoon and ends with a rest period after harvesting of mango in May. Major new vegetative flush is expected to sprout on the tree during June-July which will take a time of

three month to get mature in low light intensity during rainy season and became mature up to September-October initiating flowering is a normal phenological cycle. These mature flushes remain dormant for next two to three month up November to December. It actively manufactures carbohydrates and then initiates the process of flowering. It takes nearly 100 to 120 days for fruit maturity from fruit set. The annual cycle ends with harvesting of mango fruits in the month of April/May followed by rest up to onset of Monsoon. So, to get early harvest tree must flower early in the season which is ultimately dependant on development of new vegetative flush. Fluctuation in the any phenological stage of the cycle directly affects the yield of crop resulting in gain or loss (Burondkar *et al.*, 2018)^[3].

There are many factors which affects the regular flowering in mango i.e external factors due to environment like temperature, rainfall, insect-pest and diseases (bee, fruit fly, mango hopper, malformation, anthracnose, die-back), chemical and pesticides, nutrient supply, disturbed water relations. The internal factors are imperfect flower, genetic incompatibility, physical influences (premature or delayed pollination), nutritive condition of plants.

Recently it was also observed that climatic shift affects the flowering in mango (both delay and early), resulting in yield and quality of fruit, variation in temperature, unseasonal rainfall and higher humidity cause altered flowering trends, delays in panicle emergence and fruit set due to disturbance in phenophases. Very low night temperature and unseasonal

rains in sub-tropics may result in low fruit set while low day temperature reduces the pollination activities. High temperature during panicle development in mango speed up the growth due to which less number of days are available for effective pollination which may lead to low production and it also causes desiccation of stigma and poor pollination resulting in poor fruit set. Unseasonal rain coupled with variation in temperature may induce the off-season flowering in some cases but the fruit setting will be poor. Rise in carbon dioxide concentration alone increase mango production but when it is combined with high temperature and changes in solar radiation cause decrease in production. Flower buds exposed to cold temperature during night time may change into vegetative ones under warm night conditions. In tropics, cool winter days followed by hot summer days may result in poor flowering. Cool temperature at the time of inflorescence growth reduces the perfect flowers number (Subedi, 2019)^[37].

Material 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 induction of flowering, fruit set, physical parameters and biochemical composition of leaves 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 per cent branches were girdled per experimental plant.

Basin exposure was done by loosening the soil around tree trunk up to radius of 2cm up to 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.

Result and Discussion

The data pertaining of physical parameters and biochemical analysis of leaves are presented in Table 2, 3 and 4. The results revealed significant differences among all the treatments.

Days required for induction of flowering after exposure of treatment

The application of tip pruning, basin exposure, girdling and paclobutrazol were advantageous for induction of early flowering in mango cv. Alphonso. The minimum days required for induction of flowering (38.97 days) was recorded in treatment T₆ which was at par with treatment T₁ (40.12 days) and T₅ (45.57 days), whereas the maximum days required for induction of flowering was recorded in treatment T₁₀ (71.21 days). Pruning reduces the auxin synthesis at the apex of the branches, directing the transport of assimilates and cytokinin's to the axillary buds of branches, creating the favourable condition for flowering (Taiz and Zeiger, 2012). Under such conditions axillary inflorescences are formed (Srivastava, 2002). The annual shoot tip pruning in mango provides reliable synchronized flowering in selected shoots year after year in trees, which also helped to maintain the canopy size of the plants for several years (Davenport, 2006). Saste (2021) reported that the days required for induction of flowering were minimum in treatment T₆, i.e., tip pruning (32.17 days), and the maximum days required for panicle emergence were noticed in treatment control T₉ (102.50 days). According to Chacko (1991) girdling is a way to promote floral induction in mango. Shinde *et al.* (2014) demonstrated that earliest flowering was recorded in ringing during 1st fortnight of May which was followed by ringing during second fortnight of May. The considerable reduction in vegetative growth in the trees treated with paclobutrazol was reported by Hoda *et al.* (2001) in Kesari mango and Shinde *et al.* (2006) in Alphonso mango [39, 36, 7, 29, 5, 33].

Flowering intensity (%)

The maximum flowering intensity (68.87%) was recorded in treatment T₁ followed T₄ (67.01), T₆ (64.84), T₇ (62.10), T₉ (61.17), T₅ (59.35), T₃ (57.06), T₂ (56.83), T₈ (53.35), whereas the minimum flowering intensity was recorded in treatment T₁₀ (51.16%). Thus, the application of tip pruning, basin exposure, girdling and paclobutrazol were beneficial for increasing flowering intensity in mango cv. Alphonso. Removal of new shoots would bring an optimum cytokinin/gibberellin balance required for flowering (Rao and Khader, 1980). Higher percentage of flowering due to pruning treatments was attributed mainly due to better availability of photosynthetically active solar radiation to the leaves causing alteration in the IAA activities, which enhanced flowering (Lal and Misra, 2007). The greatest number of inflorescences was observed when tip pruning was used in Palmer mango trees (Oliveira *et al.*, 2015). Girdling is one of the ways to improve the earliness and intensity of flowering in mango cv. Cogshall (Urban *et al.*, 2009). Gawade (2019) observed that highest percent (69.19) of flowering intensity of panicle was observed in T₃ (Basin exposure twice in last week of September and last week of October (T₁+T₂)). Yadav *et al.* (2005) reported that paclobutrazol restricts vegetative growth and induce flowering in many fruit species including mango. The similar findings of increase in per cent flowering by application of paclobutrazol was also reported by Vijayalakshmi and Srinivasan, (2000) in mango cv.

Alphonso, Shinde *et al.* (2002) in mango cv. Alphonso, Kumar *et al.* (2005) in mango cv. Baneshan [25, 18, 22, 12, 42, 30, 16, 44].

Length of panicle (cm), breath of panicle (cm) and number of rachis per panicle:

The longest panicle was recorded in T₄ (29.64) which was followed by treatment T₁ (28.98 cm), T₆ (28.10 cm), T₇ (27.91 cm), T₃ (27.09 cm), T₂ (26.97 cm), T₉ (26.95 cm), T₅ (26.74 cm), T₈ (26.39 cm) and shortest panicle length was recorded in treatment T₁₀ (26.09 cm). The maximum panicle was recorded by treatment T₁ (16.60) which was followed by treatment T₄ (16.51 cm), T₆ (16.30 cm), T₉ (15.46 cm), T₂ (15.41 cm), T₇ (15.33 cm), T₃ (15.13 cm), T₅ (15.09 cm), T₈ (14.31 cm) and minimum panicle breadth was recorded in treatment T₁₀ (13.76 cm). The maximum number of rachis per panicle in mango (39.76) was recorded in treatment T₁ which was at par with treatment T₄ (39.60). It was followed by treatment T₅ (37.18), T₆ (36.92), T₉ (36.73), T₇ (35.36), T₃ (34.62), T₂ (34.61), T₈ (33.92) whereas the minimum number of rachis per panicle was recorded in treatment T₁₀ (31.15). The results are in agreement with Swaroop *et al.* (2001) who reported that the panicle length was greater in pruned trees than the unpruned trees. The reduction in panicle length, panicle width of treated trees might be due to the direct effect of cultural practices on GA biosynthesis (Gawade, 2019). The similar findings were reported by Sonawane *et al.* (2016) on mango cv. Alphonso and Samra *et al.* (2010) where pinching treatment alone induced the highest increments in total number of panicles per tree in mango cv. Zebda. Rodge and Pujari (2017) found highest length of reproductive shoot in 50 per cent current season pruning method carried out in third week of October in mango cv. Alphonso. Zaeneldeen (2014) studied effect of pinching of early developed panicles from mid- December to mid-February in mango cv. Succary Abiad [38, 12, 34, 27, 26, 43].

Hermaphrodite flower (%): The highest percent of hermaphrodite flower (12.81%) was recorded in treatment T₁ which was at par with treatments T₄ (12.77%), T₉ (12.56%), T₅ (12.46%), and T₆ (12.35%), whereas the lowest percentage of hermaphrodite flower was recorded in treatment T₁₀ (10.34%). Aghav (2021) observed that girdling on the first fortnight of November and tip pruning (T₅) exhibited the highest hermaphrodite flower per panicle (15.01%). Bhuwad *et al.*, (2022) found the highest percent number of hermaphrodite flowers in treatment T₂ (14.11%) removal of shoots as compared to control. Saste (2021) noticed the highest hermaphrodite flowers in tip pruning (14.80%) and lowest in control (11.53%). Warang *et al.* (2019) noticed higher hermaphrodite flowers in removal of new shoots (16.87%) in mango cv. Alphonso. The increased hermaphrodite flowers (%) by foliar application of paclobutrazol might be due to lower translocation of tree reserves to the vegetative growth parameters and consequently no assimilate limitations, compared with an excessive vegetative growth on the control tree (Yeshitela *et al.*, 2004). These results are in close conformity with Shinde *et al.* (2000) in mango cv. Alphonso, and Sarkar and Rahim, (2018) in mango cv. Amrapali [1, 2, 29, 41, 32, 28, 45].

Fruit set per panicle at pea stage

The highest fruit set per panicle (9.71) was recorded in treatment T₄ which was at par with the treatment T₁ (9.51).

It was followed by treatment T₆ (9.31), T₅ (9.30), T₉ (9.15), T₇ (8.91), T₂ (8.80), T₃ (8.73), T₈ (8.57), whereas the lowest fruit set per panicle was recorded in treatment T₁₀ (7.72). The increase in sink activity and increase in respiration or activation of enzymes or growth promoting substances increased the fruit set (Jadhav, 1996). According to Chauhan *et al.* (2013), tip pruning had highest fruit set in mango cv. Mallika. Soudagar *et al.* (2018) recorded the highest percentage of fruit set by tip pruning with two leaves in mango cv. Alphonso. Warang *et al.* (2019) reported that girdling on first fortnight of the September and removal of new shoots produced highest fruit set per panicle in mango cv. Alphonso. Similar findings were reported by Dheeraj *et al.* (2016) for better fruit set per panicle in paclobutrazol treated trees of mango cv. Alphonso. These results are in accordance to Singh *et al.* (2000) in cv. Dashehari; Cardenas and Rojas (2003) in cv. Tommy Atkins and Sonawane *et al.* (2016) in Alphonso. Kumar *et al.* (2005) found that paclobutrazol helped in obtaining greater number of perfect flowers and better fruit set as compare to control in cv. Baneshan [15, 35, 41, 9, 4, 34, 16, 46, 47].

Fruit retention per panicle (%)

The highest fruit retention (0.73%) was recorded in treatment T₄ which was at par with treatment T₁ (0.72%), T₅ (0.71%), T₉ (0.71%), T₅ (0.71%) and T₆ (0.70%), whereas the lowest fruit retention was recorded in treatment T₁₀ (0.55%). Fruit retention is influence by the level of endogenous hormones which directly relates with translocation of assimilates to competing areas of growing shoots and fruits (Jadhav, 1996). Soudagar *et al.* (2018) recorded the maximum fruit retention at harvest stage in tip pruning by retaining 6 leaves (0.95%). Warang *et al.* (2019) concluded that the maximum fruit set (8.95) and maximum fruit retention (0.83%) were found in Girdling on first fortnight of the September and first fortnight of October and removal of new shoots in mango cv. Alphonso. Ramona and Stanica (2015) noticed that girdling treatments had a significant effect on tree fruit set capacity of Chinese date. All the girdling treatments showed higher fruit set values compared to the control. The fruit retention was maximum on Alphonso mango trees treated by paclobutrazol. Higher fruit retention due to paclobutrazol application was probably due to controlled vegetative growth and higher accumulation of carbohydrates in leaves (Hoda *et al.*, 2001). Similar finding for increase in fruit retention per panicle in response to paclobutrazol application was also recorded in mango by Ram and Tripathi (1993) in cv. Dashehari; Oosthuyes and Jacobs (1997) cv. Sensation and Tommy Atkins [35, 15, 41, 24, 14, 48, 49].

Biochemical analysis of leaves at different stages

Non-structural carbohydrates (%)

The total non-structural carbohydrates in terminal shoots were analysed at different stages viz., at one month before flowering (vegetative stage, before exposure of treatment), during flowering stage and after flowering in mango varied significantly among the treatments. One month before flowering, the NSC content was non-significant. During flowering stage, treatment T₁ (4.35%) recorded highest NSC

content which was at par with T₄ (4.33%) T₅ (4.30%) and T₆ (4.24%) and significantly superior over all other treatments. The lowest NSC content were noted in control T₁₀ (1.84%). Similar trend was also observed after flowering where in treatment T₁ (0.68%) had the highest NSC which was at par with T₄ (0.66%) and T₅ (0.65%). The lowest NSC content was observed in control T₁₀ (0.30%). It was also noticed that, removal of new shoots significantly increased accumulation of non-structural carbohydrates in mango cv. Alphonso. Mango flowering is predominantly influenced by the biochemical constituents present in the twig for the floral stimuli at bud break stage. The state of biochemical constituents primarily determines the synchronizing of flower stimuli which leads early flower induction. Bhuwad *et al.*, (2022) found the highest non-structural carbohydrates content in leaf at two months after treatment exposure followed by one month before treatment exposure while lowest NSC was observed at four months after treatment exposure. The highest total non-structural carbohydrates might be due to increased source sink activity and demand for assimilates (Elkhishen, 2015). Pruning induces hydrolysis and transport of reserves accumulated in the roots (Eyles *et al.*, 2009). Satoh and Ohyama (1977) observed similar results in the mulberry; Rom and Ferree (1985) in peach respectively. Leaf non-structural carbohydrates are mainly composed of soluble sugars in leaves are primarily glucose, sucrose and fructose (Hoch *et al.*, 2003) [2, 10, 11, 50, 51, 52].

C:N ratio

The C:N ratio was non-significant before flowering. During flowering, treatment T₄ (30.35) recorded highest C:N ratio. It was followed by T₁ (28.68), T₅ (27.55), T₆ (27.06), T₇ (26.13), T₉ (25.39), T₂ (25.11), T₃ (24.77) and T₈ (24.20). The lowest C:N ratio was seen in control T₁₀ (21.47). After flowering, treatment T₄ (19.92) had the maximum C:N ratio. It was followed by T₁ (19.19), T₅ (18.86), T₆ (17.52), T₂ (17.05), T₇ (16.84), T₃ (15.84), T₉ (14.45) and T₈ (13.67). The minimum C:N ratio was observed in control T₁₀ (12.10). Thus, removal of new shoots significantly increased level of C:N ratio in mango cv. Alphonso. The positive association of floral bud initiation with C: N ratio revealed that the increase in carbohydrate availability and translocation is vital to the floral initiation in mango (Prasad *et al.*, 2014). Shoots with higher carbohydrate content are expected to flower early under inductive conditions. A critical level of carbohydrate is desired to express flowering favourable activity. Pruning accelerates bud sprouting causing shoots to reach maturity early and have sufficient time to accumulate carbohydrates (Das and Jana, 2012; Gopu *et al.*, 2014) resulting in accumulation of higher C:N ratio. Similar increased in C:N ratio by paclobutrazol was reported by Kundu *et al.* (2019) in mango cv. Himsagar and Malshe *et al.* (2020) in Alphonso. Corbesier *et al.*, (2002) reported that the high endogenous ratio of carbon to nitrogen ratio in plants is stimulatory to flowering, whereas a low C:N ratio favours vegetative growth. Fruit set, fruit growth and fruit quality are also closely related with carbohydrates availability [23, 8, 13, 17, 19, 6].

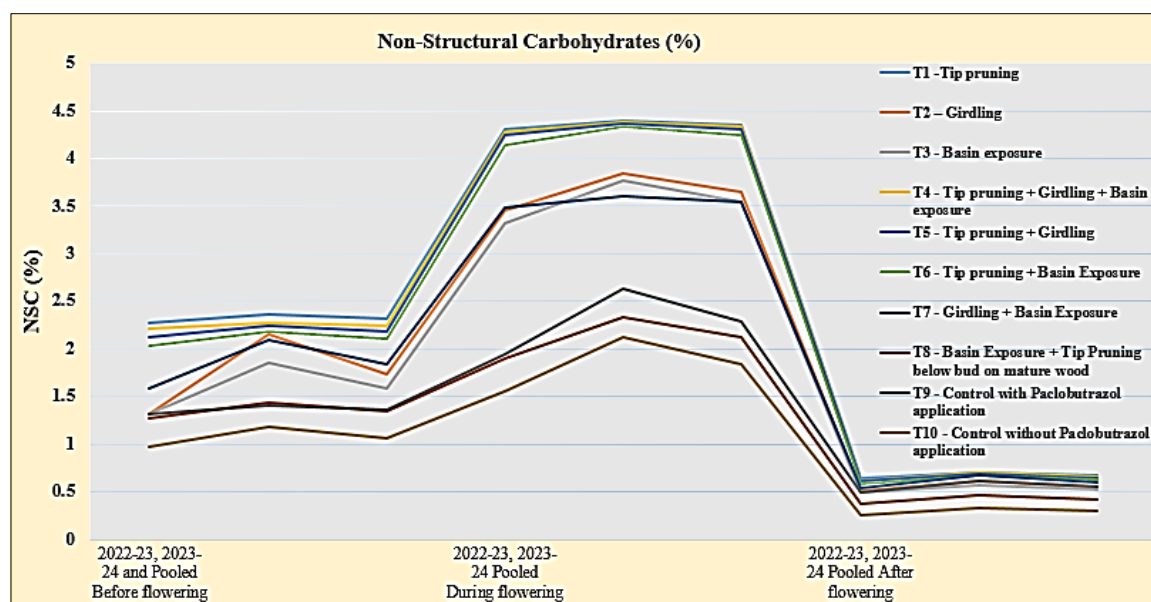


Fig 1: Effect of tip pruning, girdling and basin exposure on non-structural carbohydrates (%) in mango cv. Alphonso

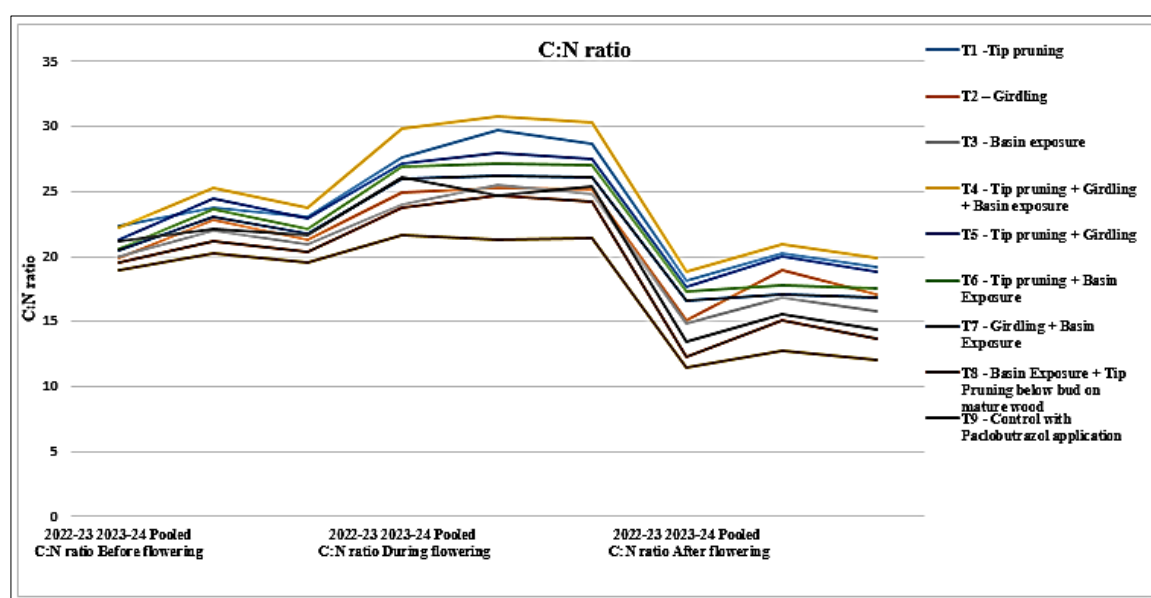


Fig 2: Effect of tip pruning, girdling and basin exposure on C:N ratio in mango cv. Alphonso

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

Treatment	Days required for induction of flowering	Flowering intensity (%)	Length of panicle (cm)	Breadth of panicle (cm)
T ₁ - Tip pruning	40.12	68.87	28.98	16.60
T ₂ - Girdling	44.50	56.83	26.97	15.41
T ₃ - Basin exposure	44.22	57.06	27.09	15.13
T ₄ - Tip pruning + Girdling + Basin exposure	40.77	67.01	29.64	16.51
T ₅ - Tip pruning + Girdling	45.57	59.35	26.74	15.09
T ₆ - Tip pruning + Basin Exposure	38.97	64.84	28.10	16.30
T ₇ - Girdling + Basin Exposure	42.83	62.10	27.91	15.33
T ₈ - Basin Exposure + Tip Pruning below bud on mature wood	62.59	53.35	26.39	14.31
T ₉ - Control with Paclobutrazol application	55.41	61.17	26.95	15.46
T ₁₀ - Control without Paclobutrazol application	71.21	51.16	26.09	13.76
MEAN	48.62	60.17	27.49	15.39
Range	38.97-71.21	51.16-68.87	26.09-29.64	13.76-16.60
S.E.± m	1.24	0.53	0.36	0.23
C.D. @ 5%	3.69	1.59	1.08	0.69

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

Treatment	Number of rachis per panicle	Hermaphrodite flowers (%)	Fruit set per panicle	Fruit retention (%)
T ₁ - Tip pruning	39.76	12.81	9.51	0.72
T ₂ - Girdling	34.61	12.06	8.80	0.67
T ₃ - Basin exposure	34.62	11.59	8.73	0.69
T ₄ - Tip pruning + Girdling + Basin exposure	39.60	12.77	9.71	0.73
T ₅ - Tip pruning + Girdling	37.18	12.46	9.30	0.71
T ₆ - Tip pruning + Basin Exposure	36.92	12.35	9.31	0.70
T ₇ - Girdling + Basin Exposure	35.36	12.22	8.91	0.70
T ₈ - Basin Exposure + Tip Pruning below bud on mature wood	33.92	11.98	8.57	0.64
T ₉ - Control with Paclobutrazol application	36.73	12.56	9.15	0.71
T ₁₀ - Control without Paclobutrazol application	31.15	10.34	7.72	0.55
MEAN	35.99	12.11	8.97	0.68
Range	31.15-39.76	10.34-12.81	7.72-9.71	0.55-0.73
S.E.± m	0.43	0.17	0.10	0.01
C.D. @ 5%	1.28	0.51	0.31	0.03

Table 4: Effect of basin exposure, girdling and tip pruning on biochemical analysis of leaves in mango cv. Alphonso:

Treatment	NSC (%) during flowering	NSC (%) after flowering	C:N ratio during flowering	C:N ratio after flowering
T ₁ - Tip pruning	4.35	0.68	28.68	19.19
T ₂ - Girdling	3.65	0.56	25.11	17.05
T ₃ - Basin exposure	3.55	0.53	24.77	15.84
T ₄ - Tip pruning + Girdling + Basin exposure	4.33	0.66	30.35	19.92
T ₅ - Tip pruning + Girdling	4.30	0.65	27.55	18.86
T ₆ - Tip pruning + Basin Exposure	4.24	0.63	27.06	17.52
T ₇ - Girdling + Basin Exposure	3.55	0.60	26.13	16.84
T ₈ - Basin Exposure + Tip Pruning below bud on mature wood	2.12	0.42	24.20	13.67
T ₉ - Control with Paclobutrazol application	2.29	0.56	25.39	14.45
T ₁₀ - Control without Paclobutrazol application	1.84	0.30	21.47	12.10
MEAN	3.42	0.56	26.07	16.54
Range	1.84-4.35	0.30-0.68	21.47-30.35	12.10-19.92
S.E.± m	0.07	0.01	0.24	0.17
C.D. @ 5%	0.21	0.04	0.74	0.51

NSC: Non-structural carbohydrates

Conclusion

From Present investigation concluded that among all treatments under study, T₄ comprising tip pruning, girdling, and basin exposure recorded superior performance in key physical parameters, including panicle length, fruit set per panicle, and fruit retention per panicle. Minimum days required for induction of flowering was recorded in treatment T₆ (Tip pruning + Basin exposure). Flowering intensity, breadth of panicle and no. of rachis were found significantly superior in treatment T₁ (Tip pruning). Biochemical analysis like non-structural carbohydrates and C:N ratio was observed highest in treatment T₄ (Tip pruning + Girdling + Basin exposure) during and after flowering in mango cv. Alphonso. Highest C:N ratio and accumulation of more NSC in Alphonso mango trees should be expressed with combination of Horticulture practices like tip pruning, basin exposure and girdling.

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