International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2018; 6(2): 1606-1609

Received: 23-01-2018
Accepted: 25-02-2018

Dahapute VM
M.sc Student, Department of Horticulture, Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Joshi PS
Assistant Horticulturist, Commercial Fruit Nursery Unit, College of Horticulture, Kerala, India

Tayade SA
M.sc Student, Department of Horticulture, Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Nagre PK
Head of Department of Horticulture, Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Correspondence
Dahapute VM
M.sc Student, Department of Horticulture, Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Effect of severity of pruning on growth, yield and quality of custard apple

Dahapute VM, Joshi PS, Tayade SA and Nagre PK

Abstract
The experiment entitled effect of severity of pruning on growth, yield and quality of custard apple was carried out at Highway Block, CFN unit, Dr. PDKV, Akola, during year 2016-2017 with the objectives to study the effect of different severity of pruning on growth, yield and quality of custard apple and to find out the optimum severity of pruning for obtaining maximum yield and quality of custard apple. The pruning was done on main shoot, subsequent secondary and tertiary shoots from top to end on whole plant. The data obtained were analyzed using FRBD model with four different severity treatment *i.e.* P_1 -15cm, P_2 -30cm, P_3 -45cm and P_4 (control). Which were replicated three times. Results revealed in respect to plant growth, plant volume, mean of plant spread, leaf area, was recorded Significantly maximum in 30 cm pruning severity. Minimum number of days for flowering was recorded in shoots without pruning (70.18 days). Highest numbers of flowers per shoot were registered in 30 cm of pruning severity (13.07). In case of yield and fruit attributes the highest fruit set was registered (62.56%), highest numbers of fruits per tree (76.00), maximum fruit yield was obtained (16.40kg), maximum fruit weight (234.34g), Maximum fruit diameter (9.65cm) in 30 cm of pruning. Whereas, the results regarding seed weight, stem diameter and stony fruit percentage and Splitting Fruit Percentage were found to be non-significant.

Keywords: Custard apple, pruning, severity

1. Introduction

Custard apple (*Annona* squamosa L.) is tropical fruit crop, which belong to the family Annonaceae, having chromosome number 2n=14 and origin in tropical America. It is being cultivated in Philippines, West India, South Africa, Sri Lanka, Israel and Myanmar. Custard apple growing regions in India include Assam, Bihar, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Uttar Pradesh, Andhra Pradesh and Tamil Nadu. Approximately 55,000 hectares are dedicated to custard apple cultivation in India. Along with Maharashtra and Gurajat is another large custard apple growing state (Annon, 2014). In Maharashtra this fruit is mainly grown in the district Beed, Pune, Buldhana, Nagpur, Dhule, Aurangabad, Akola and Solapur. The climatic condition of Maharashtra is one of the most suitable for custard apple production in rainy season with minimum efforts and less expenditure. It is tolerant to drought, sandy loam soil but well structured clay loam are also suitable with good drainage. Also, no serious pests, diseases and disorders are found on this crop. Hence there is great scope to increase the area, production and productivity of custard apple. The custard apple tree is small, more or less shrub or tree, which sheds the leaves in winter. Young custard apple is vigorous and has poor precocity of bearing. The flowers are borne on current season growth (new emerging young shoots). Pruning in custard apple is one of the most important practice influencing the vigour, productivity and quality of fruits. Pruning improves not only the fruit quality but it also required at early stage to build up a strong framework in order to increased fruit bearing area of tree become weak and both fruit size and quality impaired. Thus regular annual pruning at bearing stage may help to induced good healthy shoots which will provide maximum fruit bearing area and good quality fruits. (Bajpai *et al.*, 1973) [4]. Pruning is essential to develop a good crown and better yields over a long period of time. Without pruning, the plants become bushy and their bearing efficiency comes down. Hence, timely removal of misplaced limbs is necessary to build a strong framework. Selective and mild pruning of deadwood and very old branches is necessary to avoid congestion and encourage well-spaced branching. Yellowing of leaves starts as the harvesting season of fruits ends. The leaves begin to drop with the onset of winter and fresh growth occurs in spring.

Therefore, considering bottleneck in the cultivation of custard apple, it is very necessary to standardize the pruning levels and time of operation to develop for increasing the pollen viability, fruit set, yield and yield contributing characters and quality traits in custard apple under prevailing climatic conditions of Maharashtra.

Escarrone *et al.* [13] developed a simple, rapid and sensitive analytical method for the detection of TCS from Poecilia vivipara tissues. They developed a matrix solid phase dispersion (MSPD) extraction method followed by analysis with a LC tandem mass spectrometry system and applied the multivariate statistical approach to optimize the extraction conditions. The analytical method showed high extraction yields for the determination of this compound in a complex matrix such as tissue. Moreover, the extraction procedure was very fast and it was possible to perform on a small sample aliquot. The limit of quantification value in fish tissue was 0.083 mg g^{-1} and the limit of detection was 0.016 mg g^{-1}.

2. Materials and Methods

The experiment entitled "Effect of severity of pruning on growth, yield and quality of Custard Apple *(Annona squamosa* L.) will be conducted at Highway Block, CRF unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2016-2017.

3. Results and Discussion

The result obtained from the present investigation as well as relevant discussion have been summarized under following sub heads and given in Table. 1 and 2.

1. Plant Height (m)

The data presented in table 1 showed the significant results due to severity of pruning on growth and flowering parameters of custard apple. Effect of severity of pruning on the plant height was found to be significant treatment P_2 produced significantly maximum plant height (2.92 m) which was at par with treatment P_1 (2.84 m), and lowest plant height (2.53 m) was recorded with P_4 (control) treatment. It clearly indicated that, treatment P_2 *i.e.* 30 cm severity of pruning was found to be significantly maximum plant height. It is might be due to pruning shift the allocation of metabolites from rainy season crop in favors of increased vegetative growth due to flower and fruit let removal as a result of pruning. The result of present finding are agreement with the finding of Singh (2001) [18], Kumar and Rattanpal (2010) [9] in guava, Marlon *et al.* (2013) [11] in custard apple.

2. Plant Spread (m)

The data presented in Table 1 indicated that, effect of severity on the plant spread it was found to be significant treatment P_2 produced significantly maximum plant spread (2.81 m) which was followed by treatment P_1 (2.72 m) and However, lowest plant spread (2.54 m) was recorded with P_4 (control) treatment. Due to the pruning intensities showed significant results of plant spread in North–South direction and non-significant results of plant spread in East-West direction. Similar results were reported by Lal and Mishra, (2008) [10] who observed that the plant spread (E-W and N-S) was recorded greater in control which was found at par pruned trees in Mango. The result of present finding are agreement with the finding of Lal and Mishra, (2008) [10] in mango, Kumar and Rattanpal, (2010) [9] in guava.

3. Plant Volume (m^3)

The data presented in Table 1 indicated that, effect of severity on the plant volume was found to be significant treatment P_2 produced significantly maximum plant volume (18.22 m^3) which were at par with treatment P_1 (17.67 m^3) and lowest plant volume (14.25 m^3) was recorded with P_4 (control) treatment. It might be due to fact that pruned trees were unable to make up the loss of vegetative growth caused by severe pruning treatments in this short period. (Kumar and Rattanpal, 2010) [9]. The results of present findings are in agreement with the findings of Ingle *et al.* (1999) [7] in acid lime, Kaur and Dhaliwal (2001) and Dalal *et al.* (2004) in guava.

4. Leaf Area (m^2)

The data presented in Table 1 indicated that, the leaf area was significantly influenced by the severity levels treatment P_2 (30cm) produced significantly maximum leaf area (39.12 cm^2) which was at par with treatment P_3 (38.49 cm^2), P_1 (37.58cm) and However, minimum leaf area (34.33 cm^2) was recorded in treatment P_4 (control). The higher leaf area might be due to more uptake of nutrients from soil and accumulation in leaf tissues which enhances the leaf area. The result of present finding are agreement with the finding of Pilania *et al.* (2010) [13], Shaiva *et al.* (2015) [17] in guava.

5. Number of days required for first flowering

The data presented in Table 1 indicated that, the number of days required for first flowering was significant effect due different levels of severity of pruning. Significantly minimum number of days for flowering was recorded in treatment P_4 (70.18 days) and maximum number of days required for first flowering was required in treatment P_3 (91.73 days). The result of present finding are agreement with the finding of Dhaliwal and Sandhu (1982) [6] in ber, Sheikh and Hulmani (1997) and Pilania *et al.* (2010) [13], Shaiva *et al.* (2015) [17] in guava.

6. Number of flower per shoot

The data presented in Table 1 indicated that, the number of flowers per shoot was significant effect due different severity of pruning. The pruning severity in treatment P_2 (30 cm) produced maximum number of flowers per shoot (13.07) which was found at par with treatment P_3 (11.17) and P_1 (10.96) However, minimum number of flowers per shoot (10.01) was recorded under control treatment P_4 (control). Severe pruning had much adverse effect on flowering than mild pruning. Reduction in number of flowers in severely pruned branches due to loss of potential bearing wood of tree. This might be reason for promoted number of flowers in mild pruned branches. The result of present finding are agreement with the finding of Sheikh and Hulmani (1993) and Jadhao *et al.* (2002) [8] in guava, Mohamed (2010) [12] in custard apple.

7. Fruit set (%)

The data presented in Table 1 indicated that, the fruit set was significant effect due different severity of pruning. Fruit set was found significantly maximum (78.77 %) in treatment P_2 (30 cm) which was at par with treatment P_1 (77.69) and minimum fruit set recorded in treatment P_4 (control) (72.09 %). The results of present findings are in agreement with the findings of Singh and Sandhu (1984) and Ali *et al.* (2009) [1] in guava.

8. Number of Fruit per Plant

The data presented in Table 1 indicated that, effects of severity on number of fruits per plant harvested was found significantly maximum number of fruits per plant harvested (76.00) in treatment P_2 (30 cm), which was recorded at par with P_3 (70.00) and P_1 (63.33). However, minimum number of fruits per plant (62.00) harvested with treatment P_4 (control). The useful effect of moderate severity was due to the effect that, it increased the efficiency of metabolic and physiological processes of plants and thus encouraged the yield and quality of the fruit Kumar and Rattanpal (2010) [9]. The results of present findings are in agreement with the findings of Chandra and Govind (1995), Mohamed *et al.* (2010) [12] in custard apple, Ali *et al.* (2009) [1] in guava.

9. Number of Seeds per Fruit

The data presented in Table 2 indicated that, effects of severity on number seeds per fruits was found significantly maximum in treatment P_2 (30 cm) recorded significantly the However, maximum number of seeds (36.67) which was found at par with treatment P_1 (15 cm) with treatment (34.33) and P_3 (45 cm) with treatment (31.67).however, minimum number of seeds (30.00) with treatment P_4 (control). Pruning in turn, attributed to renewal of potential fruit buds and retention of more juvenile wood as explained earlier. Although pruning encourage substantial new growth of unpruned trees than in pruned trees, suggesting that pruning is a dwarfing process. The results of present findings are in agreement with the findings of Singh and Dhaliwal (2004) Bagchi *et al.* (2008) [3] in guava.

10. Fruit Yield per Plant (Kg/Tree)

The data presented in Table 2 indicated that, effects of severity on fruit yield per plant was found significantly maximum in treatment P_2 (30 cm) produced significantly maximum yield per plant (16.40 kg/plant) which was found at par with treatment P_3 (15.10 kg/plant) and Whereas, Minimum yield per plant (11.93 kg/plant) was recorded in treatment P_4 (control). The results of present findings are in agreement with the findings of Dalal *et al.* (2004), Mohamed *et al.* (2010) [12] in custard apple, Shaiva *et al.* (2015) [17] in guava.

Table 1: Effect of severity of pruning on growth, yield and quality of custard apple

Treatment	Plant heights (m)	Plant spread (m)	Plant volumes (m^3)	Leaf area (cm^2)	No days required flowering	No of flower/shoot	Fruit set (%)	No. of fruit/plant
P_1 – 15 (cm)	2.84	2.72	17.67	37.58	91.73	10.96	77.69 (61.81)	63.33
P_2 - 30 (cm)	2.92	2.81	18.22	39.12	85.84	13.07	78.77 (62.56)	76.00
P_3 - 45 (cm)	2.54	2.64	14.37	38.49	77.26	11.17	77.68 (61.80)	70.00
P_4- no pruning	2.53	2.54	14.25	34.33	70.18	10.01	72.09 (58.11)	62.00
F Test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	0.03	0.03	0.19	0.28	1.05	0.08	0.40	0.96
CD at 5%	0.09	0.05	0.56	0.83	3.07	0.24	1.18	2.82

Note-Figures in parenthesis denote the arc sign transformations value.

11. Fruit Weight (gm)

The data presented in Table 2 indicated that, effects of severity on fruit weight was found significantly maximum fruit weight recorded in treatment P_2 (234.34 gm) which were followed by with treatment P_3 (225.33 gm) and minimum fruit weight in treatment P_4 (208.33 gm). This is might be due to the intensity of pruning fruits produced by subjected to medium pruning had higher average weight in relation fruits produced by plants subjected to light pruning. The results of present findings are in agreement with the findings of Bagchi *et al.* (2008) [3] in guava and Shaban (2009) in mango. Mohamed *et al.* (2010) [12] in custard apple, Shaiva *et al.* (2015) [17] in guava,

12. Length of Fruit (Cm)

The data presented in Table 2 indicated that, effects of severity on fruit length was found significantly maximum fruit length recorded in treatment P_2 (7.81 cm) was found with which at par with treatment P_1 (7.45 cm) and minimum length of fruit (5.56 cm) was observed in P_4 (control).The results of present findings are in agreement with the findings of in Jadhao *et al.* (2002) [8] in guava, Mohamed *et al.* (2010) [12] in custard apple, Shaiva *et al.* (2015) [17] in guava.

13. Fruit Diameter (Cm)

The data presented in Table 2 indicated that, effects of severity on fruit length was found significantly maximum fruit breath recorded in treatment P_2 (9.65 cm) which was followed by with treatment P_1 (8.42 cm) and minimum fruit diameter of fruit (7.45 cm) was recorded in treatment P_4 (control). In present studies large sized fruits were obtained in medium pruning treatment, because of age group difference within the treatment. Hence, response to heavy pruning may be less pronounced. The results of present findings are in agreement with the findings of Dalal *et al.* (2004) and Jadhao *et al.* (2002) [8] in guava.

14. Total soluble solids (^{0}B)

The data presented in Table 2 indicated that, effects of severity on total soluble solids was found significantly maximum total soluble solids (19.43°B) were found in treatment P_2 (30 cm) which were followed by with treatment P_1 (18.73 ^{0}B) and P_4 (control). And in treatment P_3 which showed minimum total soluble solids (16.57 ^{0}B).The result of present findings are in arrangement with the finding of Bagchi *et al.* (2008) [3] in guava, Mohamed *et al.* (2010) [12] in custard apple,and Shaiva *et al.* (2015) [17] in guava.

15. Titratable Acidity (%)

The data presented in Table 2 showed that, significantly maximum acidity (0.23%) were found in treatment P_2 (30 cm) which were followed by with treatment P_3 (0.21%). P_1 (0.18%) and However, treatment which showed minimum acidity (0.17%) was found in treatment P_4 (control). Such changes in physic-chemical characters of fruit might be induced due to variation in time of pruning. Maximum fruit

weight, size, TSS, and vitamin C were observed when pruning was practiced early. The result of present findings are in arrangement with the finding of Bagchi *et al.* (2008) [3] in guava, Mohamed *et al.* (2010) [12] in custard apple, Naseem *et al.* (2016) in ber.

16. Total Sugars (%)

The data presented In Table 18 showed that, the treatment was recorded significantly the maximum total sugars content (18.75%) was recorded in treatment P_2 (30 cm) severity level of pruning, which were followed by treatment P_3 (18.38%). P_1 (16.04%) and However, minimum total sugar content (17.97%) was recorded under P_4 (15 cm) treatment. Total sugars increased with severity of pruning in the rainy as well as winter season as the higher sugars percentages was observed at the 30 cm pruning level. pruned tree had relatively higher leaves/ fruit ratio as compared to the control, which might have contributed for increased total sugars concentration due to more metabolites synthesis.The results of present findings are in agreement with the findings of Kumar and Rattanpal (2010) [9] in guava and Mohamed *et al.* (2010) [12] in custard apple.

Table 2: Effect of severity of pruning on growth, yield and quality of custard apple

Treatment	No of seed/fruit	Fruit yield (kg/ tree)	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Seed weight (g)	TSS (^{0}B)	Acidity (%)
P_1 – 15 (cm)	34.33	13.07	217.33	7.45	8.42	10.96	18.73	0.18
P_2 - 30 (cm)	36.67	16.40	234.34	7.81	9.65	13.07	19.43	0.23
P_3 - 45 (cm)	31.67	15.10	225.33	7.51	8.08	11.17	18.61	0.21
P_4- no pruning	30.00	11.93	208.33	5.56	7.45	10.01	16.57	0.17
F Test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m)±	0.35	0.21	0.78	0.16	0.15	0.08	0.16	0.01
CD at 5%	1.03	0.62	2.28	0.48	0.45	0.24	0.48	0.02

Note-Figures in parenthesis denote the arc sign transformations value.

4. References

1. Ali F Sahar, Abdel-Hameed AA. Effect of pruning yield and fruit quality of guava tree, *IOSR* Journal Agriculture and Veterinary Science. 2009; 7(12)IV. www.iosrjournals.org
2. Anonymous. Area and production of Horticultural fruit crops, 2011.
3. Bagchi Torit Baran, Premasis Sukul, Bikash Ghosh. Biochemical changes during off season flowering in guava induced by pruning and bending journal of tropical agriculture. 2008; 46(1-2):64-66.
4. Bajpai PN, HS Shukla, AM Chaturvedi. Effect of pruning ongrowth, yield and quality of guava var. Allahabad Safeda Prog, Hort. 1973; 2(4):73-79.
5. Dalai SR, Ghonge VS, Moharai Anjalid. Standardization of pruning intensity in old guava trees cv. L-49 Ad plant Sci. 2004; 17(1):283-286.
6. Dhaliwai GS, IPS Sandhu. Effect of pruning on vegetative growth, flowering and fruit set in ber cv. Umran Haryana J Hort. Sci. 1982; 11(3- 4):208-212.
7. Ingle HV, RB Athawale, GS Tayade. Effect of severity and time of pruning on growth, yield and quality of old acid lime trees, 1999.
8. Jadhao BJ, Mahurkar VK, Kale VS. Effect of time and severityof pruning on growth and yield of Sardar guava. Orisa Journal of Horticulture. 2002; 30(2):83-84.
9. Kumar Y, Rattanapal HS. Effect of pruning in guava planted at different spacing under Panjab conditions. Indian J Hort. 2010; 67:155-119.
10. Lal B, Mishra D. Studies on pruning in mango for rejuvenation. Indian J Hort. 2008; 65(4):405-408.
11. Marlon Cristian Toledo Pereira, Silvia Nietsche, Victor Maia, Thiago Prates Fernandes. Growth, yield and fruit quality of atemoya trees Gefner under different pruning intensities. Ciência Rural, Santa Maria. 2013; 43(11):1932-193.
12. Mohamed FM, Shahein, Abd El-Motty EZ, Fawzi MIF. Effect of pruning, defoliation and nitrogen fertilization on growth, fruit set and quality of Abdel-Razik Annona cultivar. Nature and Science. 2010; 8(12):281-287.
13. Pilania Shalini AK, Shukla LN, Mahawer, Rajvirsharma, HL Bairwa. Standardization of pruning intensity and integrated nutrient management in medow orcharding guava Indian J Agric. Sci. 2010; 80(8):115-117.
14. Naseem Sharif, Muhammad Ishfaq, Muhammad Afzal Javaid Effect of Different pruning times on growth and yield of ber (*Zizyphus mauritiana* L.), cv.Alu-bukhara J Agric Res. 2016; 54(2):251-259.
15. Shaban AEA, GMM Haseeb. Effect of pruning severity and spraying some chemical substances on growth and fruiting of guava trees. American-Urasian J Agric. and Environ S. 2009; 5(6):825-831.
16. Shaikh MK, Hulrnani NC. Effect of pruning on growth, leaf area and yield In guava. Karnataka J Agric. Sci. 1997; 10(1):93-97.
17. Shaiva Adhikari, Tanka Prasad Kande. Effect of time and Level of pruning on vegetative growth, flowering and yield of guava, International journal of fruit science. 2015; 15:290-301.
18. Singh AK, Gorakh Singh. Influence of pruning date on fruit quality of guava under subtropics. J Appl. Hort. 2001; 3(2):100-102.