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Original Research Article

Influence of Pruning Intensities on Growth, Yield and Fruit Attributes of Custard Apple

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A B S T R A C T

The present research programme "Influence of pruning intensities on growth, yield and of fruit attributes of custard apple" was laid out with Split Plot Design consisting of seven different intensities of pruning replicated three times. The eight year old custard apple trees and two plants per treatment were used for research programme. The pruning was done on main shoot, subsequent secondary and tertiary shoots from top to end on whole plant with seven different intensities *i.e.* tip pruning, pruning at 30 cm, pruning at 45 cm, pruning at 60 cm, pruning at 75 cm and pruning at 90 cm. Results revealed in respect to growth the maximum length of shoots (46.22 cm) and number of internodes (16.20) number of shoots (9.88) at last harvest was noticed in 90 cm pruning intensity. Minimum number of days for flowering was recorded in shoots without pruning (95.79). Highest numbers of flowers per shoot were registered due to 30 cm of pruning intensity of shoots (7.72). In case of yield and fruit attributes the highest fruit set was registered (69.47 %), highest numbers of fruits per tree (88.97), maximum fruit yield was obtained (18.82 kg) in 30 cm of pruning. Increased severity of pruning increased the fruit size, weight, pulp percentage and seed percentage. Maximum fruit polar diameter (9.02 cm) and equatorial diameter (9.28 cm), maximum fruit weight (305.21 g) and maximum pulp content (54.34 %) was found due to 90 cm of pruning intensity. Significantly minimum percentage of seed (7.68 %) was recorded in 90 cm.

Keywords

Pruning, Custard apple, Growth, yield, fruit attributes

Introduction

Custard apple is the most favourable fruit crop in India. It belongs to the family Annonaceae. It is known by different names, such as *Sitaphal* or *Sharifa* in India. However sugar apple and sweetsop in other countries. In India, custard apple is grown and mainly marketed in regional or national trade (George and Nissen, 1987). It is known for its wider adaptability to soil and climatic conditions and freedom from pest and diseases. It is popular by virtue of its spontaneous spread in forest, waste lands, rocky slope and other uncultivated places.

It is generally classified as a semi-wild fruit. 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). By adopting pruning we improve the vegetative growth and tree architecture with good aeration, light penetration and ease in cultural practices. There it require little pruning for new growth and flowering. It is very necessary to standardize the optimum

intensity of pruning for higher yield and quality of custard apple.

Materials and Methods

The present research programme 'Influence of pruning intensities on growth, yield and fruit attributes of custard apple' was carried out at Research farm, Horticulture section, College of Agriculture, Dhule during the year 2016-2017. Present research programme was laid out in Split Plot Design consisting seven different intensities of pruning. The eight year old custard apple trees (two plants per treatment) were used for research programme. The plants were pruned after leaf fall of previous season growth. The plants were pruned on different seven intensities *i.e*. tip pruning, pruning at 30 cm, pruning at 45 cm, pruning at 60 cm, pruning at 75 cm, pruning at 90 cm and no pruning on main shoot and also subsequent secondary and tertiary shoots on whole plant.

Results and Discussion

Growth and flowering parameters

The data presented in table 1 showed the significant results due to different pruning intensities on growth and flowering parameters of custard apple. The length of shoot increased significantly with increase in severity of pruning. The maximum length of shoots at last harvest was observed in 90 cm of pruning intensity (46.22 cm) and minimum length of shoot was observed in control pruning (14.86 cm). It might be due to more number of vegetative buds left on pruned shoots. Shaban and Haseeb (2009) reported that the length of new shoots of guava on severely pruned shoots was found to be longer than moderate pruning or the control. The maximum number of internodes at last harvest was observed in 90 cm of pruning intensity (16.20) and minimum number of internodes was recorded (7.48) in no pruning. Bhonsle (1972) reported almost similar results that with lighter pruning, number of internodes per vine were decreased. It was also observed that the number of shoots were increased with increasing level of pruning intensity and noticed maximum in 90 cm pruning intensity (9.88) whereas minimum number of shoots (5.59) were found in no pruning (control). The reason is that pruning might lead to peripheral buds' release due to the elimination of terminal buds and therefore elimination of apical dominance. Therefore, the number of branches formed after pruning increases. Significantly minimum number of days for flowering was recorded in shoots without pruning (95.79) which was statistically at par with tip pruning of shoots (96.00), while, maximum days were taken for flowering in 90 cm pruning intensity of shoots (104.17). The most fruitful and differentiated buds are located on distal portion of the branches. A removal of such parts by pruning would also remove these buds which are quick to cane out. It is also thought that, there exists juvenility gradient in tree. The juvenility is more at the base of a tree or branch and gets gradually reduced in acropetal manner towards the distal end (Leopold and Kriedmann, (1982). Highest number of flowers per shoot was registered with 30 cm of pruning intensity (7.72). The minimum number of flowers per shoot (4.51) was noted in 90 cm of pruning intensity.

Yield and fruit attributes

The fruit set was observed maximum (69.47 %) in 30 cm pruning intensity and decreased with increased intensity of pruning. The lowest fruit set (49.58 %) was recorded in 90 cm of pruning intensity. It was observed that with the increase in pruning severity the

fruit set was decreased, which may be due to more vegetative growth and lesser number of flowers. The above results were also in agreement with the finding of Lal and Prasad (1980) and Shahein *et al.,* (2010). Maximum polar and equatorial diameter was found in 90 cm of pruning intensity as polar diameter (9.02 cm) and as equatorial diameter (9.28 cm) and minimum fruit as polar diameter found in control pruning (6.24 cm) and equatorial diameter (6.46 cm).

This may be due to more nutrient supply to less number of fruits in case of severe pruning. Reducing fruit numbers at or soon after flowering has the effect of reducing competition for resources between fruit allowing individual fruit to develop greater cell numbers. Lower fruit numbers will also give individual fruit a greater share of resources allowing cells to increase to the maximum size. Similar results were obtained by Ranpise *et al.,* (2007), Bhanu Pratap *et al.,* (2009).

The highest number of fruits obtained due to 30 cm of pruning intensity (88.97) followed by control pruning (82.53) and the minimum numbers of fruits were recorded due to 90 cm of pruning intensity (42.54). 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 (Nijjar, 1972). Therefore, one has to strike a proper balance between vegetative growth and productivity, if pruning is to be practiced. The surplus availability of other factors such as irrigation, fertilizer nutrients etc., concomitant with pruning might help in maintaining the proper C: N ratio in the left over parts of the pruned trees.

Table.1 Influences of pruning intensities (P) on growth and flowering parameters

Treatments	Length of shoot at last harvest (cm.)	Number of internodes at last harvest	Number of shoots	Days required for initiation of flower	Number of flowers per shoot
P_1- Tip pruning	18.90	12.19	6.42	96.00	6.60
P_2 -Pruning at 30 cm	23.74	13.67	6.69	97.04	7.72
P_3- Pruning at 45 cm	27.86	14.33	7.30	98.63	6.73
P_4 -Pruning at 60 cm	34.27	14.77	7.72	100.17	5.65
P_5 -Pruning at 75 cm	39.72	15.27	8.35	101.96	5.13
P_6- Pruning at 90 cm	46.22	16.20	9.88	104.17	4.51
P_7- No pruning (control)	14.86	7.48	5.59	95.79	5.73
S. E. (m) ±	0.68	0.07	0.14	0.30	0.16
C. D. at 5%	1.94	0.20	0.39	0.85	0.44

Table.2 Influences of pruning intensities (P) on yield and fruit attributes

Treatments	Fruit set (%)	Fruit diameter (cm)		Number of fruits /tree	Average weight of fruits (g)	Yield (kg/ tree)	Pulp percentage	Seed percentage
		Polar	Equatorial					
P_1- Tip pruning	59.93	6.63	6.87	77.49	175.29	15.02	48.25	10.59
P_2 -Pruning at 30 cm	69.47	7.12	7.38	88.97	195.46	18.82	49.37	10.11
P_3- Pruning at 45 cm	65.15	7.58	7.75	71.85	226.54	15.96	49.92	9.80
P_4 -Pruning at 60 cm	63.10	7.78	8.05	62.19	252.54	14.85	51.21	9.23
P_5 -Pruning at 75 cm	55.11	8.26	8.54	53.68	272.17	13.19	52.68	8.38
P_6- Pruning at 90 cm	49.58	9.02	9.28	42.54	305.21	11.50	54.34	7.68
P_7- No pruning (control)	57.72	6.24	6.46	82.53	143.00	12.31	46.84	11.48
SE ±	0.35	0.06	0.05	0.77	1.56	0.39	0.20	0.07
C.D. at 5 %	0.98	0.16	0.14	2.20	4.44	1.10	0.56	0.20

The maximum weight of fruits was recorded in 90 cm of pruning intensity (305.21 g) and minimum average weight was found in control pruning (143.00 g). The increase in number and area of leaves increases the amount of photosynthates that cause a significant increase in size and weight of fruit in the winter (Singh *et al.*, 2001). The above results were also in agreement with the finding of Bound and Summer (2001), Trevour and Steven (2009) and Gupta and Gill (2014).

The highest yield obtained (18.82 kg) due to 30 cm of pruning intensity while, the minimum yield was recorded in 90 cm of pruning (11.50 kg). This might be due to availability of more metabolite and retention of sufficient size of bearing shoot after pruning under 30 cm pruning intensity. Similar results were obtained by Bruno and Evelyn (2001), Ingle *et al.*, (2005), Gill and Bal (2006) and Dalastra *et al.*, (2015).

The pulp per cent was observed maximum (54.34 %) in 90 cm pruning intensity increase and with increase severity of pruning. It was minimum (46.84 %) in control pruning. Similar results were reported by Pawar (1993) that 0 to 60 cm pruning was quite effective for increasing juice percentage. The minimum seed percentage was found in the treatments pruning at 90 cm (7.68 %). The maximum seed percentage was observed in no pruning (11.48 %). Similar results were obtained by Teaotia and Singh (1971)

The present study shows that different pruning intensities affect the plant growth, yield and fruit attributes. With the increase in severity of pruning number of flowers per shoot was decreased, which was probably due to more vegetative growth and less number of flowering shoots and severe pruning decrease the number of fruits but gives higher quality fruits. It was observed among the different intensities that pruning of trees with 30 cm pruning intensity give highest yield with highest number of fruits, and pruning of trees with 90 cm pruning intensity gives best quality fruits as compared to other treatments.

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