Studies on Effect of Different Levels of Pruning on Quality of Custard Apple (Annona squamosa L.)

S. R. Kadam, R. M. Dheware and P. S. Urade*

Dept. of Horticulture, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth Parbhani, Latur, M. S. (431 402), India

Pruning and defoliation are essential operations for inducing off-season flowering and fruiting to yield better quality and quantity of fruits in custard apple. A study was undertaken to investigate the effect of different levels of pruning on growth and quality of custard apple (Annona squamosa L.), cultivar Dharur-6 of eight years old plants spaced at 4×4 m². studied at custard apple, Research Station, Ambajogai, district Beed during the year 2016–2017. The data has been statistically analyzed by using Randomized Block design. In this experiment, six pruning treatments (5 cm, 10 cm, 15 cm, 20 cm, 25 cm and control) were taken after harvesting of previous year fruits. Shoot emergence was found earlier, in pruned trees as compared to unpruned trees. The statistical analysis revealed that, the treatment Pruning at 20 cm shows maximum weight of fruit (263 g), weight of pulp (110.7) and weight of peel (131.23 g) ware recorded. Maximum total soluble solid (23.80%) was recorded in the treatment pruning at 20 cm. Maximum reducing sugar (18.50%) was recorded in treatment pruning at 15 cm. Significantly maximum non-reducing sugar 1.88% was observed in treatment Pruning at 15 cm. Significantly maximum total sugar 20.38% was recorded in the treatment Pruning at 15 cm. Hence, it is therefore suggested that treatment pruning at 20 cm can be used to maintain growth and quality of custard apple.

1. Introduction

Pruning is one of the horticultural practices followed in deciduous & temperate fruit crops like apple, pear, peach, plum and in the sub-tropical fruits such as custard apple, grape, fig, pomegranate and phalsa to bring a balance between vegetative & reproductive functions of the plant (Singh and Bal, 2008). The major purpose of pruning is to control canopy size & improves fruit quality. Custard apple (Annona squamosa L.) a member of annonaceae family is a tropical and subtropical fruit tree which is widely distributed in Asia, Africa & The America. (Nakasone and Paul, 1998). Among annonaceous fruit custard apple is most commercial in India. Custard apple is useful for medicinal purpose, also used in Ayurvedic and Yunani system of medicine. Seed contains 30% oil, seed cake contains nitrogen to the tune of 4% is valued as manure. Flesh of the fruit is used for preparation of milk shakes and ice cream. Custard apple has many health and nutritional benefits. Rich source of dietary fiber which helps in indigestion. The plant spread in east-west direction was highest in treatment T₄ (pruning at 20 cm) and south-north in treatment T₁ (pruning at 5 cm after previous harvest) than the other treatment. The increase in length and diameter of subsequent new shoots produced after pruning is directly proportional to the severity of pruning. Average fruit size and weight are also increased in pruned trees as compared to those in un pruned once (Ghum, 2011). The study was undertaken to provide exact and correct removal of plant parts in terms of length (distance) instead of percentage.

2. Materials and Methods

The present investigation was carried out at Custard apple research station, Ambajogai, district Beed during 2016-17. The experimental material consist of 8 years old uniform plants of custard apple Cv. Dharur-6. The trees were mentioned under uniform cultural practices during the entire course of investigation. The pruning was done 1st week of April 2016 andtreatment consist of 6 pruning levels, i.e. T₁ (pruning at 5 cm), T₂ (pruning at 10 cm), T₃ (pruning at 15 cm), T₄ (pruning at 20 cm), T₅ (pruning at 25 cm) and control. And observations on growth and quality were recorded at monthly interval in randomly selected uniform healthy plants which were labeled. The different time and level of pruning were used are given below.

2.1. Treatment details

Treatment T₁ (Pruning at 5 cm), T₂ (Pruning at 10 cm), T₃ (Pruning at 15 cm), T₄ (Pruning at 20 cm), T₅ (Pruning at 25 cm) and control.
cm) and T₆ Control (Without pruning).

2.2. Quality characters

Physical characters - The observation like period required for number of shoots per branch, days required for flowering & plant spread were recorded on randomly selected plant. The other observations like, number of fruit per plant, average weight of fruit, weight of pulp, weight of peel, percent of pulp, number of seed per fruit.

Biochemical characters - The T.S.S. measured by using Erma hand refractometer, titrable acidity by titration, reducing sugar, non-reducing sugar, total sugar (percent reducing sugar+percent non-reducing sugar) were recorded from randomly selected fruit.

3. Result and Discussion

3.1. Average weight of fruit, pulp and peel in (g)

From table no. 1 the data showed that, the treatment T₄ (pruning at 20 cm) recorded significantly higher average fruit weight (263 g). As compared to control and it remained at par with treatment T₂ (Pruning at 15 cm) is 251 g. While minimum average fruit weight (231 g) was recorded in the treatment T₃ control. Significantly maximum weight of pulp (111.74g) was recorded in treatment T₅ (pruning at 20 cm) and it remained at par with the treatment T₁ (Pruning at 15 cm) is 90.93 g. While the treatment T₆ control gave minimum weight of pulp (90.93 g). Result pertaining to the effect of various treatments on average weight of peel was significantly affected due to various treatments. It is evident from data that treatment T₄ (pruning at 20 cm) recorded significantly maximum weight of peel (130.21 g) as compared to other treatment and it remained at par with treatment T₅ (Pruning at 15 cm) 120.85 g. While, treatment T₃ control gave minimum weight of peel (112.56 g). This might be due to the pruning may increases absorption of water, mobilization of minerals in pruned area.

3.2. No. and weight of seeds fruit⁻¹

Data regarding the number of seeds as influenced by pruning levels are presented in Table 1. It was observed that the effect of different pruning levels on number of seeds were non-significant. However, it was minimum (30) in the treatment T₃ (Pruning at 20 cm). While it was highest (37) in treatment T₆ (no pruning). Regarding weight of seed per fruit (g), it is evident from data that treatment T₃ (no pruning) recorded maximum weight of seed (27.51 g) as compared to other treatment. However it remained at par with treatment T₅ (Pruning at 5 cm) 27.06 g, T₂ (Pruning at 15 cm) 26.64 g, T₄ (Pruning at 25 cm) 24.36 g and T₁ (Pruning at 10 cm) 23.84 g. minimum weight of seed was recorded in treatment T₆ (pruning at 20 cm). These findings are in accordance with the results obtained by Bruno and Evelyn (2001) in custard apple, Singh and Bal (2008) in guava tree.

Table 1: Effect of different levels of pruning on quality attributes of custard apple (Annona squamosa L.)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Treatment details</th>
<th>WF</th>
<th>WP</th>
<th>Weight of fruit (g)</th>
<th>Weight of pulp (g)</th>
<th>Weight of peel (g)</th>
<th>Peel %</th>
<th>Pulp %</th>
<th>NSF</th>
<th>WSF</th>
<th>TSS (%)</th>
<th>Acidity (%)</th>
<th>RS</th>
<th>NRS</th>
<th>TS</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>5 cm</td>
<td>237</td>
<td>93.71</td>
<td>116.23</td>
<td>39.54</td>
<td>49.04</td>
<td>36</td>
<td>27.06</td>
<td>20.60</td>
<td>0.26</td>
<td>15.20</td>
<td>1.53</td>
<td>16.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T₂</td>
<td>10 cm</td>
<td>243</td>
<td>99.31</td>
<td>119.76</td>
<td>40.87</td>
<td>49.28</td>
<td>31</td>
<td>23.84</td>
<td>22.50</td>
<td>0.25</td>
<td>16.98</td>
<td>1.74</td>
<td>18.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T₃</td>
<td>15 cm</td>
<td>251</td>
<td>103.51</td>
<td>120.85</td>
<td>41.24</td>
<td>48.15</td>
<td>34</td>
<td>26.64</td>
<td>23.20</td>
<td>0.24</td>
<td>18.50</td>
<td>1.88</td>
<td>20.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T₄</td>
<td>20 cm</td>
<td>263</td>
<td>110.72</td>
<td>131.23</td>
<td>42.10</td>
<td>49.90</td>
<td>30</td>
<td>21.05</td>
<td>23.80</td>
<td>0.24</td>
<td>16.65</td>
<td>1.69</td>
<td>18.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T₅</td>
<td>25 cm</td>
<td>239</td>
<td>96.07</td>
<td>118.54</td>
<td>40.20</td>
<td>49.60</td>
<td>33</td>
<td>24.36</td>
<td>21.90</td>
<td>0.25</td>
<td>16.20</td>
<td>1.59</td>
<td>17.79</td>
<td></td>
<td></td>
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<tr>
<td>Control</td>
<td>231</td>
<td>91.24</td>
<td>112.65</td>
<td>39.50</td>
<td>48.77</td>
<td>37</td>
<td>27.40</td>
<td>20.10</td>
<td>0.27</td>
<td>15.00</td>
<td>1.40</td>
<td>16.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEM±</td>
<td>-</td>
<td>6.25</td>
<td>3.80</td>
<td>3.37</td>
<td>1.24</td>
<td>1.64</td>
<td>1.64</td>
<td>1.30</td>
<td>0.82</td>
<td>0.01</td>
<td>0.65</td>
<td>0.08</td>
<td>0.70</td>
<td></td>
<td></td>
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<tr>
<td>CD (p=0.05)</td>
<td>-</td>
<td>18.86</td>
<td>11.47</td>
<td>10.16</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>3.94</td>
<td>2.49</td>
<td>NS</td>
<td>1.96</td>
<td>0.26</td>
<td>2.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WF: Weight of fruit (g); WP: Weight of pulp (g); NSF: No. of seeds fruit⁻¹; WSF: Weight of seeds fruit⁻¹ (g); RS: Reducing sugars (%); NRS: Non reducing sugars (%); TS: Total sugars (%)

3.3. Physical quality parameter

3.3.1. Total soluble solid and acidity (%)

From data (Table 1) Maximum total soluble solid (23.80%) was recorded in the treatment T₄ (pruning at 20 cm) and it remained at par with the treatment T₂ (Pruning at 15 cm) 23.20%, T₃ (Pruning at 10 cm) 22.50% and T₅ (Pruning at 25 cm) 21.90%. The minimum total soluble solid 20.10% was recorded in the treatment T₆ control. These results are supported by Singh et al. (2001), Sheikh et al. (2002), Lakpathi et al. (2013); Kumar et al. (2014).The effect of pruning levels on acidity percent was found non-significant. However, it was maximum 0.27% in the treatment T₆ control. While, it is minimum in T₄ (pruning at 20 cm) 0.24%. The data revealed that acidity of fruit was not significantly influenced due to different levels of pruning. However it was recorded highest in treatment T₆ (no pruning) 0.27%, This may be due to Pruning improve physiology of leaves, thereby causing better translocation of vital components in fruit and assimilation of photosynthesis by developing fruit. Similarly it may increase activity of enzymes such as amylase which hydrolyze complex polysaccharides into simple sugars which accelerates the translocation of
metabolites towards developing fruits. The results are in accordance with the findings reported by Mahajan and Dhillon (2002) in peach and Ghum (2011) in custard apple.

3.3.2. Percent reducing sugar, non-reducing sugar and total sugar

From the data (Table 1) that significantly maximum reducing sugar (18.50 %) was recorded in treatment T3 (pruning at 15 cm), which is at par with T4 (pruning at 20 cm) 19.98%. While, minimum reducing sugar (15.00%) was recorded in treatment T6 (control). Also maximum non reducing sugar 1.88% was observed in treatment T3 (Pruning at 15 cm) and it remained at par with T2 (Pruning at 10 cm) 1.74% and T4 (pruning at 20 cm) 1.69%. The minimum non-reducing sugar content 1.40% recorded in treatment (T6) control. And maximum total sugar 20.38% was recorded in the treatment T3 (Pruning at 15 cm) and it remained at par with T2 (Pruning at 10 cm) 18.72% and T4 (pruning at 20 cm) 18.34%. While, minimum total sugars 16.40 % was observed in treatment (T6) control. These results are supported by Sheikh et al. (2002), Lakpathi et al. (2013) and Kumar et al. (2014).

4. Conclusion

By considering all aspects of results obtained from this investigation. It can be concluded that light pruning at 20 cm level on plant shoots after harvesting of previous crop is beneficial for improving higher quality of Custard apple ‘Cv. Dharur-6’ these finding are based on one season data.

5. References


