Influence of nodal pruning on vegetative and reproductive attributes of Sardar guava

Gurdarshan Singh and Jagdish Grover

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Abstract
Investigations on “Influence of nodal pruning on vegetative and reproductive attributes of Sardar guava” were carried out in the orchard of Amarjit Singh at village Bargari in district Faridkot of South-Western Punjab. Pruning intensities consisted of removal of shoot tip up to 0, 4th, 6th and 8th node. There were five replications and the data were analyzed using Randomized Block Design. As per university recommendation, farmers are advised to opt for light pruning in guava, i.e., removal of shoot tip up to 10 cm in first fortnight of March. However, guava orchardists are of the view that pruning levels should be in terms of number of nodes to prune as it is easier for them to guide the pruning labor in terms of number of nodes to be pruned rather than in centimeters. To ascertain the above facts, On Farm Trial was conducted to find out the effect of nodal pruning on vegetative and reproductive attributes of Sardar guava. The results of investigation revealed that with the increase in severity of pruning, there was significant increase in shoot length. Severe pruning minimized the span of flowering as severe pruning node pruning intensity recorded the shortest duration of flowering during both the rainy and winter season crops of both the years. Although, there was increment in fruit set with the enhanced severity of pruning, the results were non significant. 6-node pruning intensity recorded significantly higher fruit yield per tree during both the cropping seasons of both the years. There was significant increase in fruit weight with the increase in severity of pruning during the rainy and winter season crops of both the years. TSS/Acid ratio was not altered much by pruning intensity. On the other, there was a significant increase in ascorbic acid content of the fruits with the enhanced severity of pruning. On the whole, pruning to 6 nodes gave the highest fruit yield and accounted for production of fruits of good quality.

Keywords: Guava, nodal pruning, pruning intensity, fruit yield, TSS/Acid ratio and Ascorbic acid content.

Introduction
Guava (Psidium guajava L.), the “Apple of the tropics” or “Poor man’s apple” is one of the most popular fruit crops of tropical and subtropical climate belonging to Myrtaceae family (Radha and Mathew, 2007). It is the third richest source of Vitamin C (299 mg/100g) after Barbados cherry (1000-4000 mg/100 g pulp) and aonla (600 mg/100g of pulp). According to Gupta (2014), guava contains 2 to 5 times more vitamin C than oranges and 10 times more than tomato. Guava is hardy, prolific bearer and highly remunerative fruit crop grown on a variety of soils under varied agro-climatic conditions. In India, it is being cultivated on 2, 65,000 ha with production of 40, 54, 000 MT (Anon, 2018). In Punjab and most of the other parts of Northern India, it flowers once in April- May for the rainy season crop and again in August-September for the winter season crop. Flowers are borne solitary or in cymes of two or three flowers, on the current season’s growth which necessitates the replacing of old wood by the new one by pruning. Moreover, observations have shown that after 8-10 years of age, guava trees show considerable decline in yield with sub-optimal fruit quality owing to vigorous vegetative growth and frequent intermingling of the branches particularly in the lower half of the tree leading to unfruitfulness, as fruitful buds become blind. Such unproductive trees can be made to bear profitable crop for more years by judicious pruning. Thus, pruning influences the vigor, productivity and quality of the fruits. The results of studies have indicated that whenever pruning has been attempted in guava, there has been noticed vast improvement in yield and fruit quality, especially, with light pruning (Bajpai et al 1973). On the other hand, Jadhao et al (1998) reported that severe pruning
plants of Sardar guava planted 6 m² apart in the guava orchard of Amarjit Singh of village Bargari in district Faridkot of Punjab. The pruning treatments were applied in the first week of March 2017 and 2018, with four pruning levels, i.e., removal of shoot tip up to 0, 4th, 6th and 8th node. There were five replications. The observations on increase in shoot length, duration of flowering, fruit set and fruit yield, TSS: Acid ratio and ascorbic acid content were recorded. The TSS was recorded by Bausch and Lomb (0-32) refractometer. Per cent acidity was expressed in terms of anhydrous citric acid per 100 ml of juice by using the following formula: Per cent acidity = 0.0064 x 0.1 N NaOH used (ml)/ juice taken (ml) x 100

The ascorbic acid content was calculated by using the formula cited below:

\[
\text{Ascorbic acid (mg/ 100 g of pulp weight)} = \frac{\text{volume of standard ascorbic acid}}{\text{volume of dye used for standard ascorbic acid}} \times \frac{\text{volume of dye used for titration of juice}}{\text{volume of juice}}
\]

### Research Methodology

The present study was conducted on ten year-old grafted

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### Research findings and discussion

#### Effect of pruning on vegetative attributes

The data presented in Table 1 revealed that there was an enhancement in vegetative growth with the increase in pruning intensity. Trees subjected to 8-node pruning level registered the maximum shoot length during both the rainy and winter season crops of both the years and it was significantly higher than the shoot length under all other treatments. The highest net increase in shoot length in severely pruned trees might be due to the quick response of supply of food material absorbed by the roots and

### Effect of pruning on reproductive attributes

The data presented in Table 2 depicted that severe pruning minimized the span of flowering as severe pruning level of 8-node recorded the shortest duration of flowering during both the rainy and winter season crops of both the years under study. Although, there was increment in fruit set with the enhanced severity of pruning, the results were non-significant. Similar findings were reported by Sah et al. (2017) and Mahesh et al. (2016). The data presented in Table 3 showed that beyond 6-node pruning intensity, any subsequent increase in severity of pruning lead to reduction in fruit yield per tree. 6-node pruning intensity recorded significantly higher fruit yield per tree during both the cropping seasons of both the years. The lower fruit yield under 8-node pruning treatment as compared to pruning up to 6 nodes was perhaps due to reduction in the bearing area. Though the bearing area was the maximum under control trees and trees subjected to lighter pruning intensity (4-node), yet these treatments recorded lower fruit yield per tree than rest of the treatments. This might be attributed to the fact that there was more number of blind flower buds in trees subjected to such pruning intensities. The findings are found in consonance with those of Dasarathy (1951), Aravindakshan (1953) and Gill (1994). Bhagawati et al. (2015) attributed this increment in shoot length under severe pruning to relatively less number of shoots and availability of more nutrients per shoots.

### Table 1: Effect of pruning intensity on shoot length (cm) in Sardar guava

| Treatments | 1st year | 2nd year |
|------------|----------|----------|
| Shoot length | Rainy season crop | Winter season crop | Rainy season crop | Winter season crop |
| Pruning intensity | | | | |
| 0 | 9.20 | 7.40 | 9.02 | 7.30 |
| 4-node | 10.05 | 8.05 | 9.82 | 7.93 |
| 6-node | 10.20 | 8.55 | 10.41 | 8.72 |
| 8-node | 11.07 | 9.23 | 11.21 | 9.56 |
| CD (5%) | 0.81 | 0.62 | 0.78 | 0.60 |

### Table 2: Influence of pruning intensity on duration of flowering (days) and per cent fruit set in Sardar guava

| Treatments | Duration of flowering | Per cent fruit set |
|------------|-----------------------|--------------------|
|            | 1st year | 2nd year | 1st year | 2nd year |
|            | Rainy season crop | Winter season crop | Rainy season crop | Winter season crop |
| Pruning intensity | | | | |
| 0 | 37 | 38 | 37 | 39 |
| 4-node | 35 | 36 | 34 | 35 |
| 6-node | 33 | 33 | 31 | 30 |
| 8-node | 31 | 29 | 29 | 28 |
| CD (5%) | 2.79 | 1.80 | 2.26 | 2.21 |

*NS*
Table 3: Influence of pruning intensity on fruit yield per tree (kg) in Sardar guava

| Treatments | 1st year | 2nd year | 1st year | 2nd year |
|------------|----------|----------|----------|----------|
|            | Rainy season crop | Winter season crop | Rainy season crop | Winter season crop |
| Pruning intensity | 45.9 | 47.1 | 48.6 | 54.0 |
| 0          | 45.9 | 47.1 | 48.6 | 54.0 |
| 4-node     | 56.7 | 56.0 | 55.3 | 59.0 |
| 6-node     | 69.5 | 72.4 | 73.6 | 76.5 |
| 8-node     | 59.0 | 60.6 | 60.5 | 63.1 |
| CD (5%)    | 10.21 | 12.13 | 12.92 | 12.14 |

Effect of pruning on quality attributes
The data presented in Table 4 depicted that there was a significant increase in fruit weight with the increase in severity of pruning during the rainy and winter season crops of both the years. The severe pruning level, i.e. removal of shoot tip up to 8th node registered higher fruit weight over the control and other pruning levels. The production of heavier fruits by trees subjected to severe pruning might be ascribed to the lesser crop load per tree and more nutrient supply to the limited fruit number. The discussion is further strengthened by the fact that trees subjected to severe pruning might have produced more leaves/fruit ratio as compared to lightly pruned trees, thereby increasing the fruit weight. Similar results were quoted by Sundarajan and Muthuswamy (1964 b) and Bajpai et al. (1973).

Table 4: Effect of pruning intensity on fruit weight (g) in Sardar guava

| Treatments | 1st year | 2nd year | 1st year | 2nd year |
|------------|----------|----------|----------|----------|
|            | Rainy season crop | Winter season crop | Rainy season crop | Winter season crop |
| Pruning intensity | 122.9 | 126.3 | 115.6 | 123.6 |
| 0          | 122.9 | 126.3 | 115.6 | 123.6 |
| 4-node     | 127.4 | 133.9 | 125.3 | 133.7 |
| 6-node     | 134.4 | 143.3 | 137.5 | 144.6 |
| 8-node     | 145.4 | 154.4 | 149.5 | 157.7 |
| CD (5%)    | 10.81 | 10.10 | 10.11 | 12.90 |

Further, data presented in Table 5 on fruit TSS/Acid ratio depicted that TSS/Acid ratio exhibited an increase with the increase in pruning intensity during both the years. 6- node and 8-node pruning levels recorded significantly higher TSS/Acid ratio during the winter season crop of first year and rainy season crop of second year. On the whole, pruning to 8 nodes produced the fruits with higher TSS/Acid ratio.

Table 5: Effect of pruning intensity on fruit TSS/Acid ratio in Sardar guava

| Treatments | 1st year | 2nd year | 1st year | 2nd year |
|------------|----------|----------|----------|----------|
|            | Rainy season crop | Winter season crop | Rainy season crop | Winter season crop |
| Pruning intensity | 30.00 | 27.02 | 30.26 | 31.13 |
| 0          | 30.00 | 27.02 | 30.26 | 31.13 |
| 4-node     | 30.10 | 28.58 | 30.61 | 32.19 |
| 6-node     | 34.53 | 34.07 | 35.64 | 34.72 |
| 8-node     | 34.69 | 34.72 | 37.82 | 35.79 |
| CD (5%)    | NS | 2.06 | 4.03 | NS |

The data presented in Table 6 showed that there was a significant increase in ascorbic acid content of the fruits with the enhanced severity of pruning. 8- node pruning level along with pruning to 6-nodes recorded significantly higher Vitamin C than other pruning levels during the rainy season and winter season crops of both the years. On the whole, pruning to 8 nodes produced the fruits with higher Vitamin C. Similar results were quoted by Gill (1994), Sheikh and Hulmani (1996) and Kaur (1999).

Table 6: Effect of pruning intensity on Ascorbic acid content (mg/100 g of pulp weight) in Sardar guava

| Treatments | 1st year | 2nd year | 1st year | 2nd year |
|------------|----------|----------|----------|----------|
|            | Rainy season crop | Winter season crop | Rainy season crop | Winter season crop |
| Pruning intensity | 122.52 | 181.63 | 122.50 | 184.70 |
| 0          | 122.52 | 181.63 | 122.50 | 184.70 |
| 4-node     | 126.81 | 190.20 | 126.75 | 187.20 |
| 6-node     | 133.16 | 199.95 | 132.25 | 197.70 |
| 8-node     | 134.59 | 201.84 | 134.30 | 203.20 |
| CD (5%)    | 5.61 | 4.89 | 3.94 | 10.25 |
Conclusions
There was enhancement in vegetative growth with the increase in pruning intensity. Severe pruning minimized the span of flowering as severe pruning level of 8-node pruning intensity recorded the shortest duration of flowering during both the rainy and winter season crops of both the years under study. Although, there was increment in fruit set with the enhanced severity of pruning, the results were non significant. 6-node pruning intensity recorded significantly higher fruit yield per tree during both the cropping seasons of both the years. There was significant increase in fruit weight with the increase in severity of pruning during the rainy and winter season crops of both the years. TSS/Acid ratio was not altered much by pruning intensity. On the other, there was a significant increase in ascorbic acid content of the fruits with the enhanced severity of pruning. On the whole, pruning to 6 nodes gave the highest fruit yield and accounted for production of fruits of good quality.

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