

Studies of Physico-chemical Changes Due to Fruit Thinning in Guava (*Psidium guajava* L.)

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Abstract: Present studies were carried out to observe the effect of two types of fruit thinning (complete and partial) of the summer crop of guava on physico-chemical changes and leaf NPK status during winter crop. As a result of fruit thinning, the fruit quality of the winter crop got improved producing more sugars, TSS and ascorbic acid whereas acidity of the fruit was decreased. Fruit set, fruit size, fruit weight and organoleptic value were also found improved as compared to control. Flowers and fruits of thinned plants showed less drop than control. Leaves of treated plants possessed higher level of NPK. Complete thinning showed more promising results.

Key words: Guava, summer crop, fruit thinning, winter crop, fruit quality, leaf NPK status

Introduction

Guava (*Psidium guajava* L.) is one of the major fruit crops of Pakistan. It is very popular especially among small growers because it bears twice in year and thus a source of more income. It can also be grown in variable soil and climatic conditions. But unluckily, the summer crop is severely attacked by fruit fly and does not remain marketable. Some people do the practice of flower or fruit thinning from whole of the plant during summer to get good winter crop but this practice deprives the growers completely of summer crop and thus the expenditure of the inputs can't be fulfilled. Jacob (1950) from his experiments on grapes concluded that both quantity and quality of grapes can be improved by early thinning of bunches. Size of the grapes was also favourably affected Biswas *et al.* (1989) noted that the thinning in guava significantly increased weight of individual fruits but the yield was reduced with increasing degree of thinning. Bergh (1990) noted the effect of hand thinning in apple cultivars starking, starkrimson and golden delicious. He reported that late thinning compared with early thinning progressively reduced fruit size when similar number of fruit was present on the tree. Sheikh and Hulmani (1993) reported that fruit thinning was found effective in guava to increase individual fruit weight. Singh *et al.* (1996) observed that when flowers were removed from 11-year old guava tree in summer, winter crop was largest and fruit were of best quality. Troup and Knoll (1996) found that hand thinning of fruits in apple with different intensities affected greatly fruit size and the fruit size was largest with severe thinning. Present studies were initiated to find out the effect of fruit thinning from one branch (completely or partially) only and not from the whole tree. By this practice the unthinned branches produced some crop of better quality during summer and thus is a source of income to the farmers.

Materials and Methods

These studies were carried out in Experimental Fruit Garden sq. No. 9 and Postgraduate Pomology Research Laboratory, Department of Horticulture, University of Agriculture, Faisalabad during 2000-2001. Fifteen years old healthy guava plants growing under similar agroclimatic conditions were selected for these studies. There were three treatments as detailed below:

- T₁ = control
- T₂ = partial thinning
- T₃ = complete thinning

Just after fruit setting in June, one healthy branch on each plant was selected. Complete and partial fruit thinning was carried out by hand separately from the branches of different plants. At full ripening of the fruits during winter samples of leaves and fruits were taken from treated and control plants. Then these samples

were analyzed chemically to observe the effect of fruit thinning on fruit quality and leaf nutrient contents.

For fruit quality, size and weight of the fruit were measured. Organoleptic value included colour, taste and flavour of the fruit, which was determined by a panel of five judges. Total soluble solids were determined by Abbe's stage refractometer as Brix unit. Sugars and acidity of the fruit was calculated by the method given by Hotwitz (1960) as percentage. Flower and fruit drop as well as fruit set was determined by visual counting. Yield at harvesting was noted by weighing the fruit. Estimation of NPK were determined by following Chapman and Parker (1961). Data were arranged according to randomized complete block design and means of various treatments were compared using DMR test as described by Steel and Torrie (1980).

Results and Discussion

As a result of fruit thinning during summer, a significant difference was found in the fruit quality and leaf nutrient status in treated and control plants during winter (Table 1).

Maximum fruit set percentage (65.19) was observed in T₃ where complete thinning was practiced and this % age was reduced in partial thinning and even less in control. The same trend was noted for size of fruit. T₃ was at the top by producing 125.39 cm² fruit and size of fruit was found decreased in case of partial thinning and control. Weight of fruit in both the treatments (T₂, T₃) was found statistically at par with a slight more weight in complete thinning control produced fruits of less weight. Depending on the size and weight of fruit, highest yield (56.24 kg) was noted in T₃ which was found decreased in partial thinning and even more decreased in control. Organoleptic evaluation of the fruits of winter crop also gained highest score (3.67) in case of complete thinning which was found 2.52 in partial thinning and 1.54 in control plant. Data on flower and fruit drop also revealed less drop in case of plants thinned (complete or partial) than control. Maximum flower drop (67.1%) and fruit drop (76.07) was noted in control and both of these drops were reduced in treated plants.

Fruit of winter crop was also analyzed to find the effect of fruit thinning on its quality. Result reveals that the complete thinned plants produced highest amount of TSS, total sugars and vitamin-C in their fruits whereas acidity percentage was found decreased (0.79) in case of complete thinned plant whereas in case of partially thinned and control plants acidity percentage was increased being 0.89% in control plants (Table 1).

Alongwith the fruit analysis, leaves of the control and treated plants were also analyzed to find the difference in their level of NPK contents. It is evident from the data that maximum nitrogen contents (1.67%) was observed in the leaves of the plants where complete thinning was observe. In case of partial thinning nitrogen percentage was 1.51 and least nitrogen (1.31%) was exhibited in

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Table 1: Effect of complete and partial fruit thinning on physico-chemical characters in guava

Treatments	Fruit set (%)	Fruit size (cm ²)	fruit wt. (gm)	Yield (kg)	Organo-leptic value mean score	Drop (%)	Flower drop (%)	TSS (%)	Fruit acidity (%)	Vit-C mg /100ml	Total sugar (%)	N (%)	P (%)	K (%)
Control (T ₁)	46.15	91.21c	100.67b	31.43c	1.54c	67.1a	76.07a	8.51c	0.89a	247.12c	5.21c	1.31bc	0.12c	0.71c
Partial thinning (T ₂)	56.86	110.40b	130.28a	49.37ab	2.52b	51.92b	54.12b	9.04ab	0.82ab	278.33ab	5.71ab	1.51ab	0.22ab	0.95ab
Complete thinning (T ₃)	65.19	125.39a	132.71a	56.24a	3.67a	38.42c	40.13c	9.29a	0.79bc	296.90a	5.92a	1.67a	0.29a	1.08a

Significant level = 0.05 %, TSS = Total soluble solids

the leaves of the control plants. Similarly percentage of phosphorous and potassium was also found higher in complete thinning and was found decreasing in case of partial thinning and least in the leaves of the control plant.

Fruit thinning in guava during summer crop just after fruit setting was found favourable to improve the fruit quality of the next winter crop and also to increase the yield. This was happened because as a result of fruit thinning, the tree did not become exhausted due to use of energy in the fruit development and ripening, the prepared food remained reserved which helped to increase the yield and to improve the fruit quality during next winter crop. During summer, the problem of fruitfly in very serious, which damages almost all the fruit and it cannot remain marketable. At the same time stored food of the plants is used for fruit setting, development and ripening. As a result, the trees become weaker and they cannot bear bumper winter crop. During winter there is no problem of fruitfly and thus by adopting this practice, the farmers can get a reasonable profit from winter crop. Similarly Biswas *et al.* (1989) reported that due to fruit thinning, fruit size was increased but severe thinning reduced the yield. Same results were reported by Sheikh and Hulmani 1993. According to Singh *et al.* (1996), flower thinning from guava plants during summer, improved fruit quality and increased yield during next winter.

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