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# INFLUENCE OF DEFOLIATION AND DEBLOSSOMING ON THE VEGETATIVE AND REPRODUCTIVE GROWTH OF GUAVA (*PSIDIUM GUAJAVA* L.) CV. 'GOLA'

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**Abstract**

The study was undertaken to determine the influence of defoliation and deblossoming on the vegetative and reproductive growth of guava (*Psidium guajava* L.) cv. 'Gola' tree. Twenty guava trees of uniform size and age with five treatments replicated four times were selected for the experiment. Defoliation and deblossoming was done manually at different levels [0% defoliation + 0% deblossoming, 100% defoliation + 100% deblossoming, 50% defoliation + 50% deblossoming, 0% defoliation + 50% deblossoming, and 0% defoliation + 100% deblossoming] by using pruning scissor in the last week of April. The data regarding number of leaves, leaf drop percentage and fruit growth was taken at 15 days interval during the whole study period, while leaf age was recorded at the end of the experiment. Fruit yield was determined at harvest separately for summer as well as winter crop. Defoliation and deblossoming significantly affected the number of leaves and leaf drop percentage. Maximum numbers of leaves were recorded in the trees subjected to 100% defoliation + 100% deblossoming. Minimum leaf drop was observed in the trees subjected to 50% defoliation + 50% deblossoming. Leaf age was found to be significantly higher in trees treated with 0% defoliation + 50% deblossoming level in contrast to other treatments. Fruit set % was significantly higher in the control trees during summer crop. The interactions for fruit length, diameter and size between different levels of defoliation and deblossoming, and fruit growing period were significantly higher during summer crop than winter crop. Trees subjected to 0% defoliation + 50% deblossoming exhibited higher fruit length, diameter and size than other treatments. In conclusion, defoliation and deblossoming had a significant impact on the vegetative and reproductive growth of guava cv. 'Gola'. The results suggested that the defoliation has negative impact on the reproductive growth of guava and deblossoming can be used effectively without defoliation to encourage the winter crop.

## Introduction

Pakistan is blessed with diverse agro-ecological conditions which favour the production of a great variety of fruits and vegetables. Among fruits, guava *Psidium guajava* has a prominent position in the fruit industry of Pakistan and ranked 4th on the basis of area (63 thousand hectares) and production (555 thousand tons) (Anon., 2008). It belongs to family Myrtaceae and is usually known as the poor man's fruit or apple of tropics and is a popular fruit of tropical and subtropical regions throughout the world (Samson, 1986). Among different provinces, Punjab contributes the major share in guava production in Pakistan with 49 thousand hectares area and 445.5 thousand tons production (Anon., 2008). Guava has an important role in international trade and domestic economy of several countries in warmer climates (Menzel, 1985). Presently, about 34, 6.3, 6, 2.6 and 2.3 tons of guava fruit is being exported to Afghanistan, Bahrain, Saudi Arabia, Qatar and Kuwait respectively (Anon., 2008).

Under subtropical conditions, guava has two crops in a year (summer and winter season crops) and remains available for 8-9 months in the market (Samson, 1986). Guava starts flowering during the months of April-May and November-December and is harvested in the months of July-August and February-March in both summer and winter seasons, respectively. The 'Gola' and 'Surahi' are the two leading varieties of guava in Pakistan having an average yield of 19.2 and 18 tons $ha^{-1}$, respectively (Anon., 2008).

Among different tree management practices affecting the yield and productivity of guava fruit under subtropical conditions, the management of fruit fly attack is the most serious issue for summer crop. Severe fruit fly infestation by *Anastrepha striata and Bactrocera zonata* adversely affect the summer crop resulting in significant loss to most of the guava growers (Norrbom, 2001; Stonehouse *et al.*, 2002). That is why, in certain areas of Pakistan, people get rid of summer crop by physical beating of trees at flowering or at initial fruit set stage. This practice results in excessive defoliation and severe bark injury leading towards several physiological problems and diseases. Defoliation not only reduces initial and final fruit set in guava trees, but also reduces yield through smaller fruit size rather than by a smaller fruit number (Tustin *et al.*, 1997). Excessive defoliation as a result of physical beating adversely affects the tree vegetative and reproductive growth. Some time severity may lead to excessive foliage loss during hot summer results into reduced rate of transpiration and ultimately leads to heating up of plant and ending with tree drying and decline. At present in Pakistan, very little information is available about the effects of defoliation and deblossoming in relation to vegetative and reproductive physiology and productivity of guava. Hence, current study was an endeavor to elucidate the effects of defoliation along with deblossoming on the tree growth and productivity of guava cv. 'Gola' under the agro-climatic conditions of Faisalabad.

## Materials and Methods

**Plant materials:** The trial was carried out at Experimental Fruit Orchard (Sq. No. 9), Institute of Horticultural Sciences, University of Agriculture, Faisalabad, on four years old uniform size Guava cv. 'Gola' trees grown under similar agro-ecological conditions. Twenty healthy trees,

uniform in size and vigour were selected for the trial. Data regarding vegetative and reproductive growth was collected at 15 days interval throughout the growing season. All trees were subjected to the same cultural practices such as irrigation, nutrition, weeding, insect pest and disease control during the experiment. Defoliation and deblossoming was done manually by using pruning scissor to study their effects on vegetative and reproductive growth of guava trees. Following treatment combinations were applied to the experimental trees in the last week of April at fruit setting stage:
T1 = Control (0% defoliation + 0% deblossoming)
T2 = 100% defoliation + 100% deblossoming
T3 = 50% defoliation + 50% deblossoming
T4 = No defoliation + 50% deblossoming
T5 = No defoliation + 100% deblossoming

The experiment was carried out according to Randomized Complete Block Design and single tree was used as a treatment unit replicated four times.

**Vegetative growth:** Four branches, each of two inch diameters were tagged on four different directions to record the data regarding vegetative growth. On each tagged branch ten newly emerged spring flushes were tagged to study the changes in the vegetative growth during the whole study period. The average number of leaves and leaf drop was counted per flush and then average values were calculated per tree. Average leaf sizes (length × width) was measured by selecting two fully expanded leaves from every tagged flush per branch and then average was calculated and was expressed as $cm^2$.

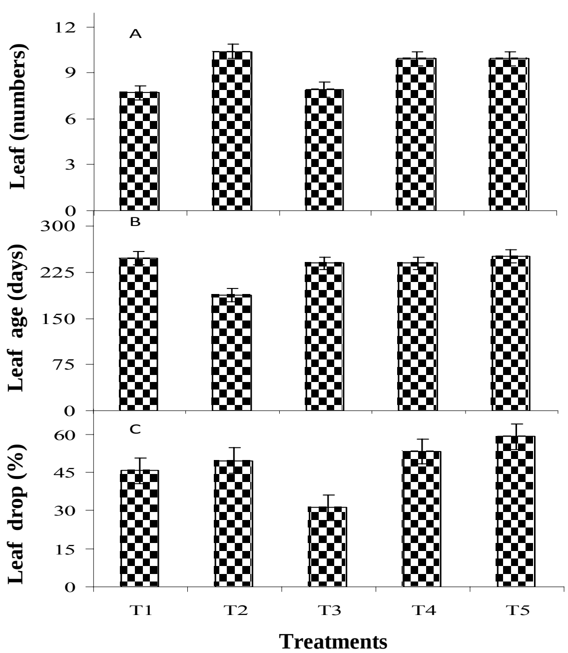


Fig. 1. Effects of defoliation and deblossoming on number of leaves per flush (A), leaf age (B) and leaf drop (C) of guava cv. 'Gola' trees. Vertical bars indicate ± S.E. of means. n = 4 replicates. T1 = Control (0% defoliation + 0% deblossoming); T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

**Reproductive growth:** The fruit set percentage of the tagged branches of the guava tree was determined by dividing total number of flowers with total number of fruit set and then multiplied by 100. To determine fruit growth, five fruit from tagged branches were tagged and their sizes (length × width) were measured by using vernier caliper fortnightly. Yield per tree was recorded by weighing and counting total number of fruit per tree at the time of harvest separately for summer as well as for winter crop.

**Statistical analysis:** The data collected were statistically analysed by using the computer software MSTAT- C (Freed, 1994). Analysis of variance techniques were employed to test the overall significance of the data, while the least significant difference (LSD) test ($P \leq 0.05$) was used to compare the treatment means (Steel *et al.*, 1997).

## Results and Discussion

**Vegetative growth:** Numbers of leaves per flush were significantly influenced by different levels of defoliation and deblossoming. Results indicated that 100% defoliation and 100% deblossoming showed better performance for leaves emergence (10.4) in comparison to control (7.7). Among the treated trees, those subjected to 50% defoliation + 50% deblossoming exhibited lowest number of leaves (7.9) than other treatments (Fig. 1A). However, for the canopy directions, no significant differences were found between different treatments at 5% level of significance.

Vegetative growth of plants mainly depend upon the nutritional status of plant body which is directly correlated with the light penetration and rate of photosynthesis and is more pronounced in newly emerged leaves (Singh & Singh, 2007). Maximum number of leaves in trees subjected to 100% defoliation and 100% deblossoming might be due to increased rate of vegetative growth which increased the net rate of photosynthesis. As vegetative and reproductive growths have antagonistic effect with each other (Leopold & Kriedemann, 1975). Hence, more the carbohydrates reserves in the branches changed the emergence of leaves.

**Leaf age (days):** Defoliation and deblossoming application exhibited significant difference in the leaf age. Trees subjected to 0% defoliation + 100% deblossoming resulted in highest leaf age (251 days) as compared to untreated trees (247.5 days). Among the other treatments, results revealed that trees subjected to 100% defoliation + 100% deblossoming showed minimum leave age (188 days) of Guava cv. 'Gola' (Fig. 1B). Defoliation and deblossoming might have effect on the leaf age in relation to maximum time of leaves retention on the flushes of guava trees. More time leaves remain attached on the shoots reflects the tendency of holding leaves for maximum time by the flushes of guava in response to defoliation and deblossoming levels. Abridged leaf age resulted in 100% defoliated and 100% deblossomed trees might be due to poor reserves of food in the tree. Probably the stress conditions prevailed after severe defoliation further depleted the tree reserves.

**Leaf drop (%):** Observations regarding leaf drop from the selected flushes of guava trees revealed significant difference at different levels of defoliation and deblossoming. Leaf drop was observed minimum (31.2%) in the trees indulged to 50% defoliation + 50% deblossoming level as compared to control trees (45.7%). However, maximum leaf drop (59.1%) was exhibited by the trees subjected to 0% defoliation + 100% deblossoming (Fig. 1C). In 50% defoliation + 50% deblossoming treated trees, low leaf drop percentage might be due to excessive light penetration as compared to 0% defoliated + 100% deblossomed trees. Earlier it has been reported that as canopy area became open and leaves got the more opportunity to absorb sunlight for higher rate of photosynthesis (Singh & Singh, 2007), consequently increased the food reserves in the plant with reduced rate of leaf fall. The retention of 50% foliage along with 50% flowers buds may have develop synergistic relationship that help to retain the leaves for longer period of time. However, further studies are required to understand the exact mechanism involved in this relationship.

**Leaf size ($cm^2$):** Trees subjected to defoliation and deblossoming did not exhibit any significant effect on their leaf size determined by the leaf length and width. However, largest leaf size was recorded in the trees treated with 0% defoliation + 50% deblossoming as compared to control (Table 1). Minimum leaf size obtained in 0% defoliation + 100% deblossoming might be due to higher leaf number and leaf age as compared to all other treatments (Fig. 1). Because these trees were not able to make their food so ultimately size of the leaves was decreased. While in 0% defoliated + 50% deblossomed plants, maximum leaf size achieved may be due to higher net food reserves which were efficiently used by the tree (Singh & Singh, 2007).

**Table 1. Effects of defoliation and deblossoming on leaves length, width and size of guava cv. 'Gola' trees.**

| Treatments | Leaf length (cm) | Leaf width (cm) | Leaf size ($cm^2$) |
|---|---|---|---|
| T1 | 8.9 | 4.1 | 37.7 |
| T2 | 9.0 | 3.7 | 33.8 |
| T3 | 8.5 | 3.9 | 33.3 |
| T4 | 9.5 | 4.4 | 42.3 |
| T5 | 7.3 | 3.6 | 26.5 |
| | NS | NS | NS |

NS = Non-significant at $p \leq 0.05$. T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

## Reproductive growth

**Flower buds (FB):** Total number of FB produced during winter seasons on guava trees responded non-significant differences among different defoliation and deblossoming levels. However, during summer, maximum numbers of FB were produced in the trees treated with 0% defoliation + 100% deblossoming followed by trees treated with 100% defoliation + 100% deblossoming as compared to control. While during the winter season crop of Guava, highest numbers of FB were produced in the control trees. Minimum numbers of FB were recorded in the trees treated with 0% defoliation + 100% deblossoming level as compared to other treatments (Table 2). The average number of FB during both seasons by hand defoliation and deblossoming reflected that maximum numbers of FB were produced in control trees. Trees subjected to 50% defoliation + 50% deblossoming, and 0% defoliation + 50% deblossoming levels produced minimum numbers of FB, respectively. However, significant differences were found for numbers of FB produced between two seasons. Maximum numbers of FB per tree were recorded in the summer crop as compared to winter crop (Table 2). Decrease in initiation of FB in response to defoliation and deblossoming levels might be due to stress conditions exposed to treated trees. After the applications of deblossoming and defoliation the newly emerging young leaves were sensitive to the outer meteorological conditions as compared to already existing mature leaves, which further delayed the process of flower bud initiation and differentiation in these trees. Strong winds prevailed during the initiation period of FB which may be one of the reasons of low number of flower buds initiation in winter. Similarly, in a previous study reduced numbers of flowers were produced in the guava trees subjected to pruning carried out in the last year (Basu *et al.*, 2007). However, in an other study new shoots emerging after May pruning were found to have high flowering and fruiting potential for winter crop of guava (Rai, 2006). While number of flower drop was highest in guava trees with 100% pruning intensity (Dubey *et al.*, 2001).

**Table 2. Effects of defoliation and deblossoming of summer buds on number of flower buds (FB) produced during winter crops of guava cv. 'Gola' trees.**

| Treatments | Summer crop (No.) | Winter crop (No.) | Means |
|---|---|---|---|
| T1 | 80.7 | 35.3 | 58.0 |
| T2 | 93.9 | 13.5 | 53.7 |
| T3 | 69.3 | 15.1 | 42.2 |
| T4 | 71.5 | 12.6 | 42.1 |
| T5 | 102.8 | 10.2 | 56.5 |
| | NS | NS | NS |
| **Means** | **83.62a** | **17.33b** | ***** |

*, NS = Significant and non-significant at $p \leq 0.05$, respectively. Any two means not sharing same letter differ significantly at 5% level of probability. T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

**Fruit set (%):** Data regarding fruit set % revealed significant differences between summer and winter crop (Table 3). During summer crop maximum fruit set (54.3%) was found in untreated trees, whereas, in winter crop highest fruit set (96.9%) was recorded in the trees subjected to 0% defoliation + 50% deblossoming treatment. For obvious reason there had not to be any fruit set during summer on completely deblossomed plants. Other than these minimum fruit set % in 50% defoliated and 50% deblossomed trees were observed in summer crop as compared to winter crop in which minimum fruit set % age was recorded in 50% deblossomed trees (Table 3). Mean fruit set % of both summer and winter season crop also showed significant differences for defoliation and deblossoming. Control trees resulted in maximum fruit set % as compared to other treatment levels. The interactive effects for mean fruit set % of summer and winter crops showed significant differences among different levels of defoliation and deblossoming. But it is clearly observed that mean fruit set %age was 40% more for winter as compared to summer season crop of guava (Table 3). Although the number of flower buds produced in winter was less than in summer, the higher level of fruit set in winter might be due to increased availability of nutrients. These nutrient reserves were easily available to the leaves during reproductive growth of the trees, which triggered the activities of enzymes involved in the formation of sucrose and carbohydrates that were available for successful fruit setting (Almaguer Vargas *et al.*, 1997).

**Table 3. Effects of defoliation and deblossoming on fruit set during summer and winter crops of guava cv. 'Gola' trees.**

| Treatments | Summer crop (%) | Winter crop (%) | Means (%) |
|---|---|---|---|
| T1 | 54.3a | 84.5 | 69.4a |
| T2 | 0.00 | 93.0 | 46.3ab |
| T3 | 24.6b | 83.7 | 54.2ab |
| T4 | 26.2b | 96.9 | 54.2ab |
| T5 | 0.00 | 78.6 | 39.3b |
| | * | NS | * |
| Means (%) | 35.0b | 88.4a | * |

*, NS = Significant and non-significant at $p \leq 0.05$. Any two means not sharing same letter differ significantly at 5% level of probability T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

**Fruit growth:** Fruit size indicated significant increase during the whole growth period in summer season as influenced by defoliation and deblossoming. The relationship between different level of defoliation and deblossoming and growth intervals was also found significant during summer season. The maximum fruit size was achieved at 0% defoliation + 50% deblossoming level followed by the trees treated at 50% defoliation + 50% deblossoming level as compared to untreated trees (Table 4). However, the interaction between treatment levels and growth interval was found non-significant for fruit size during winter season crop. Maximum fruit size of winter crop was attained at 0% defoliation + 50% deblossoming level followed by the trees subjected to 10% defoliation + 0% deblossoming level as compared to control (Table 5).

**Table 4. Effects of defoliation and deblossoming on fruit size ($cm^2$) at different growth intervals in summer crop of guava cv. 'Gola'.**

| Intervals (DAFS) | Treatments | | | | | Means |
|---|---|---|---|---|---|---|
| | T1 | T2 | T3 | T4 | T5 | |
| 15 | 4.4hi | 0.0 | 3.5i | 4.0i | 0.0 | 4.0f |
| 30 | 6.2h | 0.0 | 5.3hi | 6.0h | 0.0 | 5.8e |
| 45 | 8.3g | 0.0 | 9.3g | 9.8g | 0.0 | 9.1d |
| 60 | 9.9g | 0.0 | 12.4f | 12.4f | 0.0 | 11.6c |
| 75 | 15.0e | 0.0 | 19.8d | 20.7d | 0.0 | 18.5b |
| 90 | 26.4c | 0.0 | 32.5b | 37.7a | 0.0 | 32.2a |
| | * | | * | * | | * |
| **Means** | **11.7a** | **0.00** | **13.8b** | **15.1c** | **0.00** | ***** |

*, NS = Significant and non-significant at $p \leq 0.05$, respectively. DAFS = Days after fruit set. Any two means not sharing same letter differ significantly at 5% level of probability. T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

**Table 5. Effects of defoliation and deblossoming on fruit size ($cm^2$) at different growth intervals in winter crop of guava cv. 'Gola'.**

| Intervals (DAFS) | Treatments | | | | | Means |
|---|---|---|---|---|---|---|
| | T1 | T2 | T3 | T4 | T5 | |
| 15 | 2.0 | 2.6 | 3.1 | 3.8 | 3.3 | 2.9f |
| 30 | 4.3 | 5.7 | 5.7 | 6.9 | 5.5 | 5.6f |
| 45 | 8.8 | 11.2 | 11.1 | 12.8 | 8.7 | 10.5e |
| 60 | 10.3 | 11.7 | 12.6 | 14.0 | 11.0 | 11.9de |
| 75 | 13.1 | 14.5 | 14.3 | 15.3 | 13.8 | 14.2d |
| 90 | 17.7 | 19.2 | 17.1 | 17.9 | 20.5 | 18.5c |
| 105 | 19.6 | 21.7 | 19.0 | 19.7 | 24.7 | 20.9c |
| 120 | 35.2 | 35.6 | 32.5 | 40.6 | 39.0 | 36.6b |
| 135 | 38.0 | 37.4 | 38.0 | 45.3 | 45.1 | 40.7a |
| | NS | NS | NS | NS | NS | * |
| **Means** | **16.5c** | **17.7abc** | **17.0bc** | **19.6a** | **19.1ab** | ***** |

*, NS = Significant and non-significant at $p \leq 0.05$, respectively. DAFS = Days after fruit set. Any two means not sharing same letter differ significantly at 5% level of probability. T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

Increase in the fruit size during winter crop after the summer application of defoliation and deblossoming might be due to maximum food reserves available to the fruits during their growth and development. In summer, due to different levels of defoliation and deblossoming the treated trees were under stress, so fruits were not able to attain maximum size as compared to winter crop. In a previous study double spray of 15% urea followed by hand deblossoming in summer crop of guava had been found to significantly increase the fruit size during winter season compared to the fruit harvested from untreated trees (Sanjay & Sanjay, 2001). However, these results are not confirming the findings of Njoroge & Rieghard (2008) who reported that fruit size in terms of diameter decreased linearly with increasing the time to thin and increased linearly with increasing fruit spacing in peach cv. 'Contender'. These differences might be due to variation among different species and other growing conditions.

**Fruit yield**

**Numbers of fruit per tree:** Application of different defoliation and deblossoming levels in summer and winter season crops did not significantly affect the yield. However, defoliation and deblossoming of guava trees caused the harvest period to be advanced by an average of 30 days compared to the control trees. The maximum numbers of fruit per tree was recorded for control trees. While in winter, highest numbers of fruit were obtained in the trees subjected to 0% defoliation + 50% deblossoming level followed by the trees treated at 50% defoliation + 50% deblossoming level as compared to untreated ones. Among different treatments, trees subjected to 50% defoliation + 50% deblossoming in summer season and at 100% defoliation + 100% deblossoming level in winter season produced fewer numbers of fruits per tree as compared to control trees (Table 6). Mean numbers of fruit harvest during summer and winter crop showed that, control trees produced highest yield followed by trees responded to 0% defoliation + 50% deblossoming level. However, trees treated at 100% defoliation + 100% deblossoming produced minimum fruit as compared to control ones. Less numbers of flower buds were produced in winter which reduced the fruit set and yield as compared to summer crop. This might be due to the fact their more food reserves were available for less number of flower buds. However, Hussein (2006) reported significantly greater total yield of guava in association with 20% twig pruning compared to the other treatments. Similarly, about 75-80% increase in yield had been found in rejuvenated guava orchards as compared to control (Singh & Singh, 2007). Spraying guava trees with 12% urea (as a defoliant) advanced the harvesting date and increased the yield with late winter application (Amador *et al.*, 1992). While fruit thinning practices responded maximum fruit numbers (501) in guava trees (Hojo *et al.*, 2007).

**Table 6. Effects of defoliation and deblossoming on yield (no. of fruit tree$^{-1}$) of guava cv. 'Gola' trees in summer and winter crops.**

| Treatments | Summer crop (No.) | Winter crop (No.) | Means |
|---|---|---|---|
| T1 | 119.3 | 57.5 | 88.4 |
| T2 | 0.0 | 18.3 | 9.1 |
| T3 | 24.5 | 46.5 | 35.5 |
| T4 | 28.5 | 65.5 | 47.0 |
| T5 | 0.0 | 19.3 | 9.6 |
| | NS | NS | NS |
| **Means** | **57.41** | **56.49** | **NS** |

NS = Non-significant at $p \leq 0.05$. T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

**Weight of the fruit per tree (Kg):** Different levels of defoliation and deblossoming did not reveal any significant differences for both summer and winter yield in terms of fruit weight. Data about summer yield showed maximum fruit weight in control trees. However, in winter maximum weight of fruits was obtained at treatment level of 0% defoliation + 50% deblossoming followed by the fruit weight of trees subjected to 50% defoliation + 50% deblossoming. Lowest fruit weight was exhibited by trees subjected to 50% defoliation + 50% deblossoming in summer season and at 100% defoliation + 100% deblossoming level in winter season crop as compared to the fruit harvested from control tree (Table 7).

Maximum mean value of summer and winter yield in terms of fruit weight was exhibited by control trees followed by trees subjected to 0% defoliation + 50% deblossoming level. Whereas, trees treated at 100% defoliation + 100% deblossoming yielded minimum fruit weight as compared to control. The interaction between summer and winter fruit weight was also found non-significant. However, winter crop produced 66% more fruits as compared to summer crop (Table 7). Tree yield was lower in summer as compared to winter because trees were of small age up to 3-4 years old and might have became stressed at high defoliation and deblossoming levels. In an earlier study the highest yield in winter crop of guava was recorded by the application of 250 ppm NAA as a fruit thinning agent during the rainy season (Dubey *et al.*, 2002). Similarly, the highest guava fruit yield during the rainy season crop (54.2 kg tree$^{-1}$) was recorded for 15% urea as a defoliant while the highest yield in winter (53.6 kg tree$^{-1}$) was attributed to 10% urea application (Dhaliwal *et al.*, 2002).

**Table 7. Effects of defoliation and deblossoming on yield (weight of fruit tree$^{-1}$) of guava cv. 'Gola' trees in summer and winter crops.**

| Treatments | Summer crop (kg) | Winter crop (kg) | Means |
|---|---|---|---|
| T1 | 7.7 | 6.0 | 6.9 |
| T2 | 0.0 | 2.5 | 1.3 |
| T3 | 2.2 | 6.9 | 4.5 |
| T4 | 3.0 | 8.3 | 5.6 |
| T5 | 0.0 | 3.1 | 1.5 |
| | NS | NS | NS |
| **Means** | **4.29b** | **7.1a** | ***** |

*, NS = Significant and non-significant at $P \leq 0.05$, respectively. Any two means not sharing same letter differ significantly at 5% level of probability. T1 = Control; T2 = 100% defoliation + 100% deblossoming; T3 = 50% defoliation + 50% deblossoming; T4 = 0% defoliation + 50% deblossoming; T5 = 0% defoliation + 100% deblossoming.

In conclusions, defoliation and deblossoming significantly affected the vegetative and reproductive growth of guava cv. 'Gola'. Defoliation had negative impact on the vegetative and reproductive growth of guava, whilst, deblossoming can be used effectively to encourage the winter crop. However, further studies are required to standardize best level of deblossoming in summer for consistency of guava productivity.

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