



Canopy Management in Guava with Inorganic and Organic Fertilizer is a Boon for the Farming Community for its Continued Yield

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Guava fruit is known for its delicacy having Balance acid-base relationship, rich in minerals, salt, and vitamins. In other words, it is a poor man's apple. Krishi Vigyan Kendra Sabour Bhagalpur has established a guava orchard of 1.75 5. hectares of select and selected Allahabad safeda variety for trial in training and pruning of guava and its management in other parts of the year during 2015-16,16-17&17 -18. As per recommendation, Guava, canopy management requires three training and pruning. In KVK trial we have gone through two training pruning one deep pruning in end of January & Feburary with fertiliser and insect disease management, and in September-October, light pruning with the recommended dose of fertiliser that is 100g urea + 75g DAP + 150g NOP +

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2.5kg Compost+ 250 g Azospirillum @ 30 days of interval has shown the best result average yield 12 kg fruits/plants from four-year-old plants in rainy season harvest. Planting distance was kept at 2m x 3m i.e. plant to plant distance 2. And Row to row distance 3m that accommodate 1667 plants in one hectare of land yields 200 quintal sold at 15/kg. Light training and pruning was followed with fertilizer application yields 4.5 kg fruits per plant. Total yield obtained was 75 quintal sold @ rs 70 /kg with successive flowering that gives extra yield to the farmers at high remuneration and disease free production.

Keywords: *Guava; Canopy management; inorganic; organic fertilizer; Vitamin C.*

1. INTRODUCTION

Guava is a tropical and sub-tropical fruit grown all over India. It is known for its sweet and sour taste with the best acid-sugar combination, This fruit is a delicacy of the fruit basket, In other words, this is a poor man's apple, rich in Vitamin C, Minerals and fibre. It is one of the most exquisite and nutritional valuable remunerative crops. It is used for both table and processing purposes. Guava is claimed to be the fourth most important tropical fruit crop after mango, banana and citrus [1-4]. If guava orchard is managed properly, using technical intervention, it is the most productive and adaptable crop among all fruit. It occupies an area of 262 hectares with an annual production of 24.8 lakh M.T. Major guava growing places in India are MP, Maharashtra, UP, Bihar, Gujarat, Orissa, Punjab, Karnataka, Tamil Nadu and West Bengal.

Guava enjoys its nature of successive flowering. Guava flowering occurs on current shoots. Blooming in guava varies between 25 to 45 days of observation regarding the yield of guava-on-guava initial fruit set is very i.e. approximately 80% of the flower became fruit. Only 34-56% of the fruits reached maturity during severe fruit drop [5-7].

Training and pruning in guava aren't an easy task. First of all, the grower should know the principles of canopy management, what practices to follow after training and pruning, How to develop proper geometry of the plant, harvest maximum sunlight with aeration, and make the intercultural processes easy, Training and pruning is not an easy task [8-11]. It is a science, A grower should understand the science of training and pruning. A video that was released by the media centre of BAU Sabour has gained popularity among guava growers of India and is able to guide in the training and pruning of guava [12,13]. This type of video that explains science

should be released from time to time for guidance.

In traditional times, guava was planted 8 days * 8 nights and the plants attained huge structure. It was a period when there was no concept, abundance of land, no organised orchards of guava. But, nowadays guava is an emerging choice for the grower. They prefer to plant guava orchards in place of litchi, jamun and other subtropical and tropical fruits [14-17]. Guava is managed properly it can give significant income and fetch a high price depending on numerous factors.

Krishi Vigyan Sabour Bhagalpur has established high high-density orchard of guava on 1.5 hectares of land, it was a tough task to maintain it. Guava has the privilege that it flowers on the current shoot. Canopy management follows the following principles:-

1. Training and pruning in very early stages when we plant in June/ establish the orchard in June it goes through the first pruning in October
2. To harness maximum solar energy
3. Enhance per unit number of plants
4. Produce quantitative fruit with quality the utmost requirement of the present situation

Keeping because of management, products and marketable fruits that earn high prices of orchard of KVK was developed as a demonstration plot. This type of orchard is helpful for those farmer who are visiting KVK Sabour farm. The high density of guava can provide a solution to climate change, During experimentation, it was found that it is the most climate-resilient technology on which farmers can rely. Our farmers from IT Sectors like Mr Jagdish from Karnataka, Mr Paresh Devani from Maharashtra, and Sri Balram Patidaar from MP who managed guava orchard and expected the guava fruits.

2. MATERIALS AND METHODS

Guava is very important fruit of the tropical and subtropical regions. Due to population pressure in most of methodologies research-driven enthusiasm of the farmers started growing of high yield crops. Initially, it was started. Initially, it was started in Banana and pineapple and with time it was adapted to major fruit crops and vegetables. The response of guava in high density is marvellous because of its nature to flower or fruit on the current shoot. We have focused on the Allahabad Sadede variety in the instructional farm of KVK Sabour. We have selected three rows of guava variety Allahabad Safeda on the east direction, three rows in the mid and three rows on the west side of the orchard. The reason for this selection was the complaint of farmers. Mr Balram Patidar from MP always asks questions about the fruiting of the plant that was lying in mid of the orchard. So, I have planted this research. Plants are planted at 2 meters * 3-meter distance, Plant to plant distance 2 meters and row to row distance of three meters. We have adopted two times training and pruning in guava. One adopted in February is hard pruning and second that is adopted in October is light pruning. After pruning apply CCC paste on the cut end followed by irrigation. After cutting, remove all leaves from branches and incorporate it into the soil. After cutting in glance the orchard.

The key principles followed for cutting the guava plants are as listed below

1. First, clear the fifty centimetres from the ground level to make it half the standard

2. Second, select at least four or five branches in the outward direction so that the central part is clean and harnesses the maximum amount of sunlight
3. At last, cut all selected branches at half of its length and remove all the leaves.

Apply two point five kilograms of compost, two hundred and fifty grams of urea, twenty grams of DAP and thirty grams of MOP per plant after the assessment of the root level. Try to keep a weed-free plot. Apply It again after one month. Move it for the incidence of insects and pests. Again, cut it in September and October. Continue cutting and applying the fertiliser. Continue it for two years. So that it attains a circumference of 2m observations were recorded on vegetable growth, flowering and fruiting of Guava. Up to two years of vegetative character shoot length and diameter was also under consideration. First, data was collected at 30 days. Next was collected at 30 day intervals. At each thirty days interval data was recorded till harvesting. Five new emerged. Shoots were selected from eastward plant, middle plant and westside plants. Days recorded for initial flowering by visual. We have counted no. of fruits per plant in different location, how many flowers converted into fruit. Days of maturity was also counted yield per plant used to calculate the yield per hectare. Recorded data subjected for analysis prescribed by Pansa and Sukhatane . objective of study was following

1. Relvence of high density orcharding in respect of farmers
2. To standardize the extent of training and pruning
3. To produce quality yield at high price

Table 1. Different treatments

Serial no	Technology option	Treatments
01	Farmer's practice	Random, no fertilizer management
02	T1	100g urea+75 g DAP+150g MOP+2.5kg compost +250 g Azospirillum +one deep pruning in february and one light pruning in September -october
02	T2	100g urea+75 g DAP+150g MOP+2.5kg compost +250 g Azospirillum +one deep pruning in february and one light pruning in September -october
03	T3	100g urea+75 g DAP+150g MOP+2.5kg compost +250 g Rhizobium +one deep pruning in february and one light pruning in September - october

3. RESULTS AND DISCUSSION

Guava is poor man's apple is a fruit can be grown round the year by proper management can harvest disease and insect free produce . The analysed data of three years showed the effect of proper canopy management, fertilisation (organic and inorganic manures) to harvest round the year guava variety Allahabad Safeda from Krishi Vigyan kendra ,bhagalpur . Ram Awadh Ram et al.; 2007 and Virendra Singh et al. 2008 found the same reason in Sadabahar variety.

3.1 Growth Parameters

Maximum increase in plant height (0.44m) was with the application of 100g N, 75g P₂O₅ 150g K₂O and 2.5 kg FYM inoculated with 250g Azotobacter followed by 0.35m with application of 100g N, 75g P₂O₅, 150g K₂O and 250g Azospirillum, which was significantly superior over control. Significant variation was not observed in stem girth can but increase varied from 0.020-0.07m. Increase in plant spread was highest (0.34m) with 100g N, 75g P₂O₅, 150g K₂O, 2kg FYM inoculated with 250g Azotobacter followed by 100g N, 75g P₂O₅, 150g K₂O and 5 kg neem cake incorporated for insect control and 100g N, 75g P₂O₅, 150g K₂O and 2.5 kg FYM (0.32m). Increase in plant spread (N-S) was 0.57m with 100g N, 75g P₂O₅, 150g K₂O, 2.5kg FYM inoculated with 250g Azotobacter followed by 0.45m with 100g N, 75g P₂O₅, 150g K₂O and sesbania as green manure, whereas in untreated plants, the increase was only 0.22m. Similar to present finding positive response of N, P and K on growth characters of guava was reported earlier too but not integrated with organic sources (Singh and Rajput, 1976). Leaves were found maximum in mid row was under consideration. Smallest size of leaves was found in eastward plants . this is due to competition for light because mid row has maximum struggle for light . Plants on mid rows receive light only day time. Mid row plants showed maximum shoot length, large leave because these row receiving minimum sunlight only during day time.

3.2 Yield Attributes

Significant increase in number of flowers , fruit retainion fruit weight was recorded with application of different levels of organic and inorganic sources of nutrients . Fruit weight was maximum (0.26kg) with 100g N, 75g P₂O₅, and 150g K₂O and 5kg neem cake, 100g N, 75g P₂O

150g K₂O and sesbania as green manure and 100g N, 75g P₂O₅, 150g K₂O, 2.5kg FYM and 250g Azotobacter in comparison to only 0.17kg in untreated plants. Fruit diameter not varied significantly with various treatments but was higher (7.64 cm) with 250g N, 100g P₂O₅, 250g K₂O and 250g Azotobacter. There was difference in fruit length due to different treatment too. Number of fruitplant was differed significantly and maximum number of fruits (120 fruit/ tree) were harvested from the trees treated with 100g N, 75g P₂O₅, 150g K₂O, 2.5kg FYM and 250g Azospirillum followed by 100g N, 75g P₂O₅ 150g K₂O ,2.5kg compost and 250g Azotobacter (85) in comparison to 60 in control. Yield was also more (150.25kg tree, 135.45kg & 95 kg) with above treatments. The yield was only 54 kg plant in untreated trees in rainy season. Similar to present finding application of 800g neem coated urea, 600g each of single super phosphate and muriate of potash in two split doses (July & September) proved effective in increasing the productivity of guava cv. Sardar (Ram et al., 1998). Use of different fertilizer and light pruning in september -october showed new flush and flowering . proper fertilization and training pruning is boon for guava cultivators .

3.3 Qualitative Parameters

TSS was highest (13.50°Brix) in freshly harvested fruits from the trees with 100g N, 75g P₂O₅, 150g K₂O and 2.5kg FYM inoculated with 250g Azospirillum followed by 100g N , 75g P₂O₅, and 150g K₂O & 250 g azotobacter treated plants (13.0°Brix), which differed significantly over untreated control and other treatments. However, variation among other treatments was non-significant. Reducing sugars varied from 2.28 to 3.58 per cent in different treatments with maximum (3.58%) in 100g N, 75g P₂O₅, 150g K₂O, 2.5kg FYM and 250g Azotobacter (3.54%). It was minimal in control (2.28%). Ascorbic acid content was highest (340mg 100g fruit) with 100g N, 75g P₂O₅, 150g K₂O and 250g Azotobacter but variations were, non-significant. Acidity in freshly harvested fruit varied from 0.35 to 0.54 percent, which was maximum (0.54%) in fruits harvested from 100g N, 75g P₂O₅, 150g K₂O, 2.5kg FYM and 250g Azospirillum treated plants. Wagh and Mahajan (1985, 1987) recommended application of 25kg FYM with 600gN, 300g P and 600g K for better production of guava. Based on the different fertilizers doses in different agro-climatic zones guava trees more than 6 years age should be fertilized with integration of FYM. fruits mature

early in eastward plants colour development retention was more in mid rows and westward plants.

4. CONCLUSION

High density orcharding require care of the plants like training pruning to enhance percolation of light is very important for fruiting orchard. The most important that guava plants are not so critical in fertilizer requirement like mango and banana. If farmers are adopting high density orcharding training pruning is the most important. training pruning is not important for quality yield .It is important for crop regulation too. If farmers are going with high density orcharding crop regulation and continuous harvesting round the year is very important. Guava is a hardy plant require low fertilizer , irrigation and its climate resilience properties having capacity to harvest round the year .

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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