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Article on influence of bio-regulators on guava (*Psidium guajava* L.) cv. L-49 along with crop regulation by branch bending and shoot pruning under South-East conditions of Odisha

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Abstract
The 'apple of the tropics' or 'poormans apple' is one of the most important fruit crops grown in India. The guava fruit has gained a considerable prominence on account of its high food value, a pleasant aroma, rich flavour and availability in the market at moderate prices (Bal and Dhaliwal, 2003). It is one of the most important fruit in terms of area and production after mango, banana and citrus. It is a good source of Vitamin C (260-300mg/100g of pulp) and highest fibre content 6.9%. Presently, the productivity of guava is smaller than productive potential primarily due to traditional system of wider planting and secondarily due to poor canopy management practices. The basic principle of crop regulation is to manipulate the natural flowering and fruiting of guava plant in desired season of the year that contribute to increased fruit yield, quality, profitability and sustainability of the environment by reducing the use of the frequency of the pesticides. Shoot bending is one of the ways to produce better quality fruits in the off-season.

Keywords: *Psidium guajava* L., branch bending, shoot pruning

Introduction
Guava (*Psidium guajava* L.) 'The apple of the tropics' or 'poormans apple' is one of the most important fruit crops grown in India. It belongs to the family Myrtaceae. The guava fruit has gained a considerable prominence on account of its high food value, a pleasant aroma, rich flavour and availability in the market at moderate prices (Bal and Dhaliwal, 2003). It is one of the most important fruit in terms of area and production after mango, banana and citrus. It is a good source of Vitamin C (260-300mg/100g of pulp) and highest fibre content 6.9%.

Besides its high nutritive value, it yielded a heavy crop every year and gave good economics returns involving very little inputs. In general, guava bears in three season namely rainy, winter and spring seasons in a year. Fruits of rainy season crop are insipid, poor in quality, less nutritive and are also attacked by insect pests and diseases. On the other hand fruits of winter season crop are superior in quality, comparatively free from diseases and insect pests and fetch higher prices in the market (Rathore and Singh, 1976).

Recently, shoot pruning have been reported to be successful in regulating the crop of guava inspite of that reduces the tree size and improves the fruit quality. This gives an opportunity to increase the number of trees per unit area (Lal *et al*., 2000). 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 canopy management.

Pruning not only helps to encourage new shoots after the harvest but has also been adopted for rejuvenation of orchards along with crop regulation. Pruning is one of the oldest cultural practices which are practiced in temperate and sub-tropical fruit crops to bring a balance between vegetative and reproductive growth of the plant. In guava the flowers and fruits are borne on current season's growth. A light annual pruning is considered necessary to encourage new shoots after the harvest. A better understanding of the effect of pruning is the need of an hour. The pruning of guava has not received much attention, when we see its economic importance, it can be justified. Lal (1983) indicated that the yield of guava cv. Sardar was improved by pruning. Salah and El (2005) also recorded the highest bud emergence of guava by using severe and moderate pruning. Moreover, Serrano *et al.* (2008) reported that the light pruning increased the number of productive branches and number of fruits per branch of guava cv. Paluma.

Presently, the productivity of guava is smaller than productive potential primarily due to traditional system of wider planting and secondarily due to poor canopy management practices. The basic principle of crop regulation is to manipulates the natural flowering and fruiting of guava plant in desired season of the year that contribute to increased fruit yield, quality, profitability and sustainability of the environment by reducing the use of the frequency of the pesticides. (Mahadevan and Kumar, 2014).

Plant growth regulators as foliar applications are the most powerful tools for manipulating tree growth, flowering, yield and fruit quality particularly fruit size, as well as, controlling fruit maturation. There are a number of different types of phytohormones like auxins, gibberellins, cytokinins and inhibitors, resulting in cell growth or division and which are further more involved in all the various aspects of development. The use of bio-regulators has resulted in outstanding achievements in several crops with regard to improvement in quality and yield.

Guava cultivation is drawing attention to the farmers because of the specific facts:

1. Fruiting almost all the year round
2. Simple cultivation with low cost
3. High yielding
4. High in nutritive values
5. Resistant to adverse climatic conditions
6. Wide adaptability
7. Rich source of pectin
8. Medicinal values and
9. Suitability for preservation.

Reasons for Bending in Guava

- Shoot bending is one of the ways to produce better quality fruits in the off-season (Sarker *et al.*, 2005).
- In case of bending of branch wood tension of branch is increased and phloem formation decreased. As a result photosynthetic product pass slowly from the shoots of bent branch as to the other parts, maintaining increased C: N ratio and induce more flowering and fruit set.
- Bending forced dormant reproductive buds into growth. The upright branch produces fewer flowers and fruits than the bent branch (Ito *et al*., 1999). Considering the above facts an experiment was carried out to study the effect of bending in Guava.

Reasons to encourage shoot pruning in Guava

- Canopy management is resorted as a tool not only to control size but also maximize yields.
- Pruning not only helps to encourage new shoots after the harvest but has also been adopted for rejuvenation of orchards along with crop regulation. It is one of the oldest cultural practices which is practiced in temperate and sub-tropical fruit crops to bring a balance between vegetative and reproductive growth of the plant.
- Pruning of guava is one of the most important practices that influence the vigor, productivity and quality of the fruits (Gadgil and Gadgil, 1933) [10].
- In guava the flowers and fruits are borne on current season's growth so light annual pruning is considered necessary to encourage new shoots after the harvest. A better understanding of the effect of pruning is the need of an hour.

Plant growth regulators: As foliar applications are the most powerful tools for manipulating tree growth, flowering, yield and fruit quality particularly fruit size, as well as, controlling fruit maturation. There are a number of different types of phytohormones like auxins, gibberellins, cytokinins and inhibitors, resulting in cell growth or division and which are further more involved in all the various aspects of development. The use of bio-regulators like Triacontanal and Brassinosteroids has resulted in outstanding achievements in several crops with regard to improvement in quality and yield.

Triacontanal: Is natural plant growth regulator found in plant cuticular waxes and bee wax. This is the hormone which is active in low concentration. Increase growth,photosynthesis, transpiration and stomatal conductance, uptake of water, nutrients and other metabolic activities.

Brassinosteroids: Are a class of polyhydroxysteroids that have recognized as sixth class of plant hormones. Brassinosteroids (BRs) is a group of plant hormone, could be used in regulation of various developmental processes in plants. Importantly, applied use of brassinosteriods and its analogous could alter the ripening process, quality, chilling tolerance and postharvest diseases in various fruits. BRs also regulate the activity of defence related enzymes which could develop strong defence mechanism against different microorganisms. The detailed knowledge of this novel hormone (brassinosteroids) has become extremely important for various researchers, stakeholders and commercial growers.It promotes cell expansion and cell elongation

A Brief of Work Done In This Field: Nowadays, there is a worldwide trend in fruit producing countries to accommodate maximum number of fruit growth using canopy management and pruning techniques to control the tree growth and tree shape, ultimately limit tree size while still maintaining high fruit production of desired quality.

Effect of pruning and bending on yield parameters: In general, guava tree flowers twice a year, i.e. in April-May and August-September, of which fruits ripen in rainy and winter seasons, respectively (Gupta and Nijjar, 1978). In guava floral buds appears soon after the winter stress and new growth start in the axil of the leaves. Floral buds appear soon after first pair of mature leaves, but there is no direct association between leaf appearance and flower production (Menzel and Paxton, 1986). Flowers occur either singly or in cymose of 2-3 at leaf axils of current seasons's growth (Braganza, 1990).

A study was conducted to examine the response of pruning in canopy management and high density planting in Guava and observations revealed that with the pruning and high density with plant spacing of 3×3 m have increased in yield. (Pal *et al*, 2016) [4]

Samant *et al*. conducted an experiment in shoot pruning of Guava at 30, 50 and 70% intensity, branch bending and control. Observations recorded on shoot growth showed that, the branch bending treatment contains the growth (56.91cm) of newly emerged shoots whereas, shoot pruning resulted in production of vigorous (83.68 ±3.95cm) shoots as compare to control (68.10cm). The same treatment was found very effective in inducing flowering (46.27%) and recorded the highest yield (26.48kg plant). Fruit quality parameters, viz., total soluble solids (10.18°B) and vitamin C content (204.6 mg 100g pulp) were also improved by the branch bending.

Guava has a higher proportion of 'shade' to 'sun' leaves and their leaves are found photo synthetically in inactive under deeper shade and act as unproductive sink (Singh and Singh, 2007). Therefore, vegetative growth, fruit yield and quality are functions of light interception and translocation of light energy into chemical energy.

Shweta *et al.,* (2017) [9] reported that light pruning of Guava might have increased as the reproductive growth compared to unpruned plants which gave rise to more vegetative growth, further there is possibility that the zone of flowering/fruiting buds in guava may be located at this length of shoot (10-15 cm from tip of shoot) thereby resulting in more flowering and fruit set in these plants. Pruning decreased the fruit load and as the number of fruits was less, the available food material reached the individual fruit in sufficient quantity.

Shaban and Haseeb (2009) [7] opined that guava moderate pruning gave highest significant increase in the yield for the seasons, severe pruning and pinching gave a significant intermediate effect between moderate pruning and the control. Pruning of guava cv. Allahabad Safeda under high density planting and observed that the interaction between pruning intensity and fruit load has shown that maximum fruit diameter was recorded with 10 cm pruning intensity with 30 fruit load per tree. Guguloth and Matta (2018).

Effect of Growth regulators on flowering, fruiting and yield parameters: Triacontanol is reported to improve growth, photosynthesis, transpiration, stomatal conductance and uptake of water and nutrients and other metabolic activities in different crops (Krishnan and Kumari, 2008) [1].

Kanwaljit Singh *et al*. conducted an experiment on Guava cv. Allahabad Safeda by using some pre-harvest foliar application of growth promoters like NAA, GA_3 and Triacontanol used to improve yield and quality attributes of guava fruits. NAA (100-200ppm), GA_3 (25-75ppm) and Triacontanol(5-15ppm). The results of experiment revealed that foliar application of NAA 200ppm recorded maximum fruit size (53.14cm^2), fruit weight (138.53gm), specific gravity (1.17gm/cm^3) and minimum seed weight (5.19gm) followed by NAA 150ppm. The quality of fruits in terms of total soluble solids (11.47%), reducing sugar (4.48%), ascorbic acid (239.03g/100gpulp) and total sugar(7.43%) were also significantly higher with treatment NAA 200ppm followed by NAA 150ppm. Moreover, an application of NAA 200ppm significantly reduced acidity (0.20%).

References

1. Krishnan, RR. and Kumari, BDR. Effect of N-triacontanol on the growth of salt stressed soybean plants. Journal of Biosciences. 2008; 19:53-62.
2. Singh K, Sharma M, Singh KS. Effect of Plant Growth Regulators on Fruit Yield and Quality of Guava (*Psidium guajava*) cv. Allahabad *Safeda*, Journal of pure and applied Microbiology 2018; 5(23): 458-475.
3. Lakpathi G, Rajkumar M. Effect of Pruning Intensities and Fruit Load on Yield and Quality of Guava under High Density Planting System, Int. J Curr. Microbiol. App. Sci 2018; 7(5): 1853-1860
4. Pal V, Chandra N, Kumar, Kumar M. Response of pruning in canopy management & high density planting in guava orchard under western Uttar Pradesh condition. South Asian Journal of Food Technology and Environment. 2016; 2(3, 4):458-464.
5. Rathore DS, Singh RN. Flowering and fruiting in the three cropping patterns of guava. Indian J Hort. 1974; 33:331-36
6. Samant, Kundan K, Singh HS. Branch Bending for Crop Regulation in Guava under Hot and Humid Climate of Eastern India. J Indian Soc. Coastal agric. Res. 2016; 34(1):92-96
7. Shaban AEA, Haseeb GMM. Effect of Pruning Severity and Spraying some Chemical Substances on Growth and Fruiting of Guava Trees. American-Eurasian journal of Agriculture & Environmental Science. 2009; 5(6):825-830
8. Singh IS, Singh HK, Chauhan KS. Effect of high and low density plantation on yield and quality of guava under semi-arid conditions. Journal of Research-.Haryana Agric. Univ. 1980; 10:421-423
9. Shweta Hiremath, Athani SI, Kishore Kumar Das, Choudhury PR, Deepa Pujar, Shirol AM *et al*. International Journal of Chemical Studies. 2017; 5(6):289-293.
10. Gadgil DR, Gadgil VR. A survey of the marketing of fruit in Poona. Gokhale Inst. Politics and Economics Publi, 1933.