



EFFECT OF PLANT GROWTH REGULATORS ON PHYSIOLOGY, YIELD AND QUALITY OF GUAVA: A REVIEW

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ABSTRACT

Guava (*Psidium guajava* Linn.) commonly known for its food and nutritional values throughout the world. Guava is an economically feasible, hardy and commercial fruit crop of tropics. It is also known as the Apple of the tropics or the poor man's fruit is the fourth most widely grown fruit crop in India (Depthi *et al*, 2015) [1]. As the population of India increasing at a rapid rate and in order to meet demand for high quality guava, plant growth regulator plays a vital role. The pre-harvest spray of growth regulators and minerals are the new practices now-a-days adopted for higher fruit production and improved fruit quality (Dutta and Banik, 2007 [2] and El-Hilali *et al*, 2003 [3]). Thus, the study will be done to investigate the impact of plant growth regulators on yield and quality attributes of guava in winter season. The use of plant growth regulators has assumed an integral part of modern fruit production to improve the quality and production of fruits, and it has resulted in outstanding achievements in yield and quality (Jain and Dashora, 2011) [4]. This review describes the study of guava, its common names, various species and nutritional status. Firstly the study of guava have been described. Then a literature review concerning with advances in guava is presented in a year wise manner.

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INTRODUCTION

Guava belongs to family Myrtaceae and has its origin in tropical America. It is an ideal fruit crop, resistant to drought but sensitive to frost and water logging conditions. The crop covers about 2.60 lakh hectare area of the country with an average productivity of 14.75 metric tonnes per hectare (Annon, 2017) [5]. In Punjab, guava is cultivated on a large scale in the districts of Patiala, Amritsar, Ropar, Ludhiana and Jalandhar occupying an area of 82.25 ha with an annual production of 180775 MT (Annon 2015a) [6]. The fruit type of guava is berry and edible part is fleshy thalamus. Guava produced in Allahabad region of U.P is best in quality in the world (Chadha, 2001) [7]. Winter Guava is considered best in quality in North India because of less incidence of fruit fly. It is an indispensable source for nutritional security in India. It is a rich source of antioxidants, vitamin C, fibre, pectin, calcium, phosphorous, iron etc. It boosts immunity, maintains weight, lower the blood pressure, good for digestion, skin and oral health. It has astrigency property due to which its mature leaves, fruits, roots and bark are used in medicines to treat gastroenteritis, diarrhea and dysentery (Ojewale *et al*, 2008) [8]. Guava ripe rapidly and highly perishable, it can be stored for 2 to 3 days under ambient condition (Bassetto *et al*, 2005) [9].

All available high production technologies such as use high yielding varieties, high density orcharding, the use of PGR's has been proved as a powerful tool to meet this demand by influencing fruit production directly or indirectly (Bhardwaj *et al.*, 2005) [10].

Common Names [11]

Guava is known by distinct names in various regions of the world as mentioned in the following table.

Table 1 The common names of *Psidium guajava*

| Arabic | guwāfah |
|-------------|-------------|
| Bengali | Piara |
| Brazil | araca |
| Cambodia | trapaeksruk |
| Chinese | fan shiliu |
| English | apple guava |
| French | gouyave |
| Germany | Guavenbaum |
| India | Guavenbaum |
| Spanish | guayaba |
| Thailand | farang |
| Philippines | bayabas |

Various Species [12]

Guava belongs to genus *Psidium* and various species are mentioned below.

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Table 2 Species of guava

| <i>Psidium amplexicaule</i> | <i>Psidium friedrichsthaliun</i> | <i>Psidium incanescens</i> |
|---------------------------------|----------------------------------|-----------------------------|
| <i>Psidium arao</i> Raddi | <i>Psidium galapageium</i> | <i>Psidium montanum</i> |
| <i>Psidium araca</i> Raddi | <i>Psidium guajava</i> | <i>Psidium pedicellatum</i> |
| <i>Psidium australe</i> Cambess | <i>Psidium guineense</i> | <i>Psidium robustum</i> |
| <i>Psidium cinereum</i> | <i>Psidium harrisianum</i> | <i>Psidium rostratum</i> |

Nutritional Status [12]

Guava is an extremely good source of vitamin, minerals, protein, fat etc which is well known as a booster for vision health. The food value per 100g guava is presented in the following table.

Table 3 Food value per 100g guava

| Name | Content |
|--------------|-------------|
| Calories | 77-86g |
| Moisture | 2.8-5.5g |
| Protein | 0.1-0.5 |
| Fat | 0.43-0.7mg |
| Ash | 9.5-10mg |
| Carbohydrate | 9.1-17mg |
| Vitamin G4 | 36-50mg |
| Vitamin B3 | 35 IU |
| Carotene | 0.046mg |
| Iron | 200-400 IU |
| Calcium | 17.8-30mg |
| Phosphorous | 0.30-0.70mg |
| Thiamine | 0.03-0.04mg |
| Crude fiber | 0.9-1.0g |
| Niacin | 40 IU |

Table 4 Review of Literature

| S.No. | Author Name | Year | Technique/ Method Used | Remarks |
|-------|---|------|---|---|
| 1 | Garasiya <i>et al.</i> [13] | 2013 | Effect of plant growth regulators on quality of winter season guava (<i>Psidium guajava</i> L.) cv L-49 | Maximum TSS, reducing sugars, non-reducing sugars, total sugars and ascorbic acid were observed under 40 and 20 ppm NAA and minimum acidity was also recorded with 40 ppm NAA |
| 2 | Shreef Mahmood <i>et al.</i> [14] | 2016 | Effect of Plant Growth Regulators on Fruit-set and Quality of Guava | The better response to fruit growth, TSS, ascorbic acid content was noticed under 200 ppm GA3 as compared to other treatment |
| 3 | Kanwaljit <i>et al.</i> [15] | 2017 | Effect of Plant Growth Regulator on Fruit Yield and Quality of Guava (<i>Psidium guajava</i> L.) cv. Allahabad Safeda | The quality of fruit in terms of TSS (11.47%), ascorbic acid (239.03 g/100g pulp), total sugar (7.43 %) and reduced acidity (0.20%) were higher with the NAA 200 ppm followed by 150 ppm NAA |
| 4 | Puneshwer Singh Paikra <i>et al.</i> [16] | 2017 | Effect of plant growth regulators on physico-chemical Changes in guava cultivars under ultra high density planting System | PGRs showed maximum plant height, plant spread, plant girth, number of fruit/plant fruit yield/plant and fruit yield/hectare. The average fruit weight, acidity, pH and TSS were also maximum with varieties Lalit |
| 5 | Narayan and Das [17] | 2017 | Effect of Plant Growth Regulator on Yield and Quality of Guava cv. <i>Psidium guajava</i> L.) cv. Allahabad Safeda | The maximum yield (37.13 kg/plant), TSS (12.50 °B), ascorbic acid (135.30 mg/100g), total sugar (10.13%) and lowest acidity (0.16%) was recorded under 50 ppm GA ₃ |
| 6 | Sandeep and Amarjeet [18] | 2017 | Effect of Growth Regulators on Yield and Quality of Winter Guava cv. Allahabad Safeda | The maximum yield (47.39 kg/tree), total sugars (10.46%), reducing (4.99%), non-reducing sugars (5.47%) and TSS (11.05 °B) was noticed with the foliar spray of 50 ppm 2,4-D |
| 7 | Jawed <i>et al.</i> [19] | 2017 | Effect of Foliar Spray of Zinc Sulphate And Gibberellic Acid on Yield And Economics of Guava [<i>Psidium guajava</i> L.] CV. G-27 | The maximum no. of fruits per plant (814.36), fruit weight (210.40 g) and yield (74.76 kg) were resulted with ZnSO ₄ (0.40%) and GA ₃ 90 ppm. |
| 8 | Dodiya <i>et al.</i> [20] | 2018 | Effect of Foliar application of plant growth regulators and boron on quality of guava (<i>Psidium guajava</i> L.) cv. 49 | Maximum TSS:Acid ratio was observed under treatment of NAA 40 ppm at 4 th day of storage and with CCC 500 at 6 th day after storage |
| 9 | Manish and Devi [21] | 2018 | Effect of Plant Growth Regulators on Flowering, Fruit Growth and Quality of Guava (<i>Psidium guajava</i> L.) cv Allahabad Safeda | Maximum fruit weight, TSS, total sugar, yield were recorded under T ₃ (200 ppm NAA) |
| 10 | Gurjar <i>et al.</i> [22] | 2018 | Effect of Crop Regulation Practices on Quality Attributes of Guava (<i>Psidium guajava</i> L.) cv G-27 | Minimum titratable acidity and maximum ascorbic acid, total sugars, reducing sugars were maximum under NAA 800 ppm |
| 11 | M. Siva Prakash <i>et al.</i> [23] | 2018 | Effect of Plant Growth Regulators on Rooting and Sprouting of Different Stem Cuttings of Guava (<i>Psidium guajava</i> L.) cv. Lucknow-49 under Mist Chamber Condition | The higher rooting percentage was recorded in softwood cutting treated with IBA 4000 ppm. Softwood cutting treated with 4000 ppm IBA exhibit better rooting and sprouting performance as compared to NAA and IAA |
| 12 | Gollagi SG <i>et al.</i> [24] | 2019 | Role of plant growth regulators in guava (<i>Psidium guajava</i> L.) cultivation: A review | The growth regulators are also used to improve the seed germination by breaking seed dormancy, root initiation in cuttings and air layers, to regulate proper canopy, flowering and fruit set |
| 13 | Parmar <i>et al.</i> [25] | 2019 | Effect of Pruning and Plant Growth Regulators on Fruit Quality of Guava (<i>Psidium guajava</i> L.) cv Allahabad Safeda | Minimum PLW (Physiological Loss in Weight), acidity and maximum TSS, total sugars, reducing sugars, non-reducing sugars and ascorbic acid were recorded with GA ₃ 150 mg/l |
| 14 | Rajkumar Dshlehra <i>et al.</i> [26] | 2019 | Studies on role of plant growth regulators and rooting media on rooting and survival of airlayers of Guava (<i>Psidium guajava</i>) var. G-27 | The maximum length (4.99 cm), diameter (3.286 mm) of primary root, number (34.08/layer), length (2.858 cm) of secondary root, rooting success (82.68 %) and survival percentage (74.39 %) was obtained maximum with the treatment combination (IBB, NAA 7500 ppm with moss grass and cocopeat) |
| 15 | G. Samlind Sujin <i>et al.</i> [27] | 2020 | Effect of pgr's on rootand shoot parameters of hard Wood cuttings in guava (<i>psidium guajava</i> L.) CV. Lucknow49 | The various shoot parameters viz., days required for bud sprouting (14.08), the number of sprouts per cuttings (3.22), fresh weight of shoot (4.17g), dry weight of shoot (1.52g) and survival percentage of rooted cuttings (90.49%), length of shoot (11.15cm) were observed maximum in the hard wood cuttings treated with IBA @ 3000 ppm as compared to the control |
| 16 | Kant Singh and Ashwini Choudhary [28] | 2020 | Effect of Foliar Spray of Plant Growth Regulators and Micronutrient on Guava (<i>Psidium guajava</i>) | The maximum fruit set (74.2%), yield (12.32 kg/plant) was noticed under SA 150 ppm |

LITERATURE SURVEY

In the following, we review literature that we believe is relevant in the context of Guava. The progress in the Guava is given in table. In the literature survey, the researcher investigated Effect of Plant Growth Regulators on Physiology, Yield and Quality Attributes of Guava.

Research Objectives

1. To improve the quality standards of guava fruit.
2. To increase the shelf life or longevity of guava.
3. To reduce the spoilage losses after harvesting.
4. To give characteristics grade to fruit variety.
5. To acquire the knowledge about the best PGR for guava.

CONCLUSION

Guava is the stupendous fruit available thrice in a year because the climate of India is best suited for its cultivation. The winter guava is considered of excellent quality due to less incidence of fruit fly in winter as compared to other seasons. It has high nutritional value and immature fruit is rich in pectin content. The objective of this paper is to provide an overview of the research and development work.

This paper basically summarized the study of guava, its common names, various species, nutritional status and various advances that comes from time to time. Every plant growth regulator has different impact on tree physiology, yield and fruit quality. From the above literature, it is concluded that GA₃, NAA and 2,4-D has foremost impact on the quality and yield of the guava. The use of plant growth regulators has assumed an integral part of modern fruit production to improve the quality and production of guava fruit and it has resulted in outstanding achievements in yield and quality (Jain and Dashora, 2011) [29]. This study can be further extended to investigate the impact of plant growth regulators on yield and quality attributes of guava and researchers are able to take this factor into consideration for research in guava fruit.

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