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## A study of different concentration of IBA and NAA on rooting per cent of guava (*Psidium guajava* L.), air layering

**Bhuriya Verma, Raj Kuamr Dhakad, Poonam Bhadauriya, Usha Parmar and KS Tomar**

### Abstract

The present investigation entitled "A study of different concentration of IBA and NAA on rooting per cent of guava (*Psidium guajava* L.), air layering." was conducted at the Horticulture farm Nursery, Department of Horticulture, College of Agriculture, Rajmata Vijaya Scindia Krishi Vishwa Vidyalaya, Gwalior (M.P.) during the session 2016 - 2017. The experiment was laid out in Randomized Block Design with 16 treatment combinations consisting of three level of IBA, I<sub>0</sub> = 0 ppm (Control), I<sub>1</sub> = 5,000 ppm IBA, I<sub>2</sub> = 10,000 ppm IBA, I<sub>3</sub> = 15,000 ppm IBA and NAA, N<sub>0</sub> = 0 ppm (Control), N<sub>1</sub> = 5,000 ppm NAA, N<sub>2</sub> = 10,000 ppm NAA, N<sub>3</sub> = 15,000 ppm NAA. Maximum rooting percent was found significantly under I<sub>3</sub> (15,000 ppm IBA) treatment followed by I<sub>2</sub> and I<sub>1</sub> including control and for NAA treatments N<sub>3</sub> = 15,000ppm NAA was observed significantly higher followed by N<sub>2</sub> = 10,000 ppm.

**Keywords:** NAA, IBA, rooting percentage and air layering

### Introduction

Guava (*Psidium guajava* L.), a native of Tropical America (from Mexico to Peru), is popular fruit crop in India due to its wide climatic adaptability and availability of fruits for long period during the year. In India, the total area under guava cultivation was approximately 255 Thousand Hectares with an estimated annual production of 4048 Lakh Tonnes (Anonymous, 2016). Its fruit is rich in vitamin-C (80 mg of vitamin C in 100g of fruit), Crude fiber (0.9-1.0 g) protein (0.1-0.5 g), carbohydrates (9.1-17 mg), minerals (Ca, P, Fe etc.) and pectin (Kamath *et al.*, 2008). The guava plant comes up well even under the harsh conditions owing to its hardy nature. However, the main constraint in the popularization of guava is the preponderance of seedling progeny as seedling plants do not perpetuate the exact characters of particular superior selection in comparison to the vegetatively propagated fruit trees. Guava can be successfully propagated asexually by cutting (Kuperberg 1953)<sup>[6]</sup>, layering (Manna *et al.*, 2004), grafting (Singh *et al.*, 2005) and budding (Kaundal *et al.*, 1987)<sup>[5]</sup>. Air layering is only reliable method for guava mass multiplication has an advantage over budding and grafting because, being on its own root the suckering problem is minimized and for stem cutting it require specialized environment conditions such as mist propagation beds (Nelson 1954)<sup>[8]</sup>. The success in air layering of guava is mainly depends upon mother plant, time of layering, rainfall, humidity, temperature, rooting media, growth media, plant growth regulators and care during removal of bark from shoots. Air-layering is practiced during the month of June-July with good success rates due to the relatively low temperature (23 °C to 31 °C), high relative humidity (80 to 90%) and rainfall which provides the conducive environment for the root initiation (Ahmed, 1964)<sup>[1]</sup>. Layers prepared during these months get an additional advantage of longer duration of a favorable season for establishing the layer in the soil after preparation. The percentage of establishment and survival of rooted layers is reported to be poor, mainly due to hormonal imbalance and non-availability of standardized rooting media (Singh, 2002)<sup>[12]</sup>. Air layering with the help of plant growth regulators and rooting media is reported to stimulate root primordial in the air layers (Tyagi and Patel, 2004)<sup>[14]</sup>. Plenty of literature is available on these aspects for different fruit crops like pomegranate (Patel *et al.* 2012), litchi (Chawla *et al.* 2012; Das and Prasad, 2014)<sup>[3, 4]</sup> etc. However, there is a lack of standardization of PGR's doses and their interaction with different rooting media in the important fruit crops like guava.

## Material and methods

The experiment entitled 'A study of different concentration of IBA and NAA on rooting per cent of guava (*Psidium guajava* L.), air layering'. was carried out, during *Rabi* season of 2017-18 at the horticulture nursery, College of Agriculture, Gwalior during the year 2016-17. Gwalior is located at 26° 13' N latitude and 78° 14' E longitude and 208 meters above mean sea level. The climate of Gwalior is subtropical with hot and dry summers where maximum temperature exceeds 45 °C in May and June. The winters are cool and minimum temperature reaches as low as 2 °C in December and January; occurrence of frost is expected from the last week of December to the first week of February. Usually the monsoon arrives in the second fortnight of June and lasts till September. Occasionally light rains are expected during winter. The annual rainfall ranges between 650 to 751 mm, most of which received from end of June to end of September. Drought is the common feature due to the scanty and uneven distribution of rainfall. The total of 467 mm rainfall was received during the experimental period. In the present investigation ten healthy branches were selected under each treatment and replicated four times to form the Asymmetrical Factorial Randomized Block Design with 16 treatments and 64 plants of guava of uniform vigour and size were selected and about 1 (1-2) years old healthy branches of pencil thickness were selected for air-layering. The length of branches was 45-60 cm and diameter 1 cm approximately, 30 air-layers under

each treatment and 1920 under the whole experiment were operated. The growth regulators were prepared in talcum powder base. First of all IBA and NAA with 5,000 ppm strength was prepared. 0.5 gm of growth regulators was weighed on electrical balance and then dissolved in about 10.00 cc absolute alcohol. This solution was then thoroughly mixed with 99.5 gm of talcum powder, IBA and NAA with 10,000 ppm strength was prepared. 1 gm of growth regulators was weighed on electrical balance and then dissolved in about 10.00 cc absolute alcohol. This solution was thoroughly mixed with 99 gm of talcum powder and IBA and NAA with 15,000 PPM strength was prepared. 1.5 gm of growth regulators was weight on electrical balance and then dissolved in about 10.00cc absolute alcohol. The solution was then thoroughly mixed with 98.5 gm of talcum powder. For all treatment same rooting media were used which were prepared with (1:1) Soil+Fym and white colour polythene wrapper was used at the time of operation. After 65 days from the date of air layering prepared, air-layers were detached by making a cut just below the lowest end of the ringed surface with sharp secateurs. The air-layers were brought under shade after detachment and their polythene covers were removed gently. Care was taken to ensure that the roots were not injured at the time of removing polythene wrapper. After this, rooted air-layers were planted in polythene bags containing mixture of soil + FYM + leaf mould (2:1:1).

**Table 1:** Treatments Combination and concentration

Treatments Combination				Concentration of IBA	Concentration of NAA:
I <sub>0</sub> N <sub>0</sub>	I <sub>0</sub> N <sub>1</sub>	I <sub>0</sub> N <sub>2</sub>	I <sub>0</sub> N <sub>3</sub>	I <sub>0</sub> = control.	N <sub>0</sub> = control.
I <sub>1</sub> N <sub>0</sub>	I <sub>1</sub> N <sub>1</sub>	I <sub>1</sub> N <sub>2</sub>	I <sub>1</sub> N <sub>3</sub>	I <sub>1</sub> = IBA@ 5,000ppm.	N <sub>1</sub> = NAA@ 5,000ppm.
I <sub>2</sub> N <sub>0</sub>	I <sub>2</sub> N <sub>1</sub>	I <sub>2</sub> N <sub>2</sub>	I <sub>2</sub> N <sub>3</sub>	I <sub>2</sub> = IBA@ 10,000ppm.	N <sub>2</sub> = NAA@ 10,000ppm.
I <sub>3</sub> N <sub>0</sub>	I <sub>3</sub> N <sub>1</sub>	I <sub>3</sub> N <sub>2</sub>	I <sub>3</sub> N <sub>3</sub>	I <sub>3</sub> = IBA@ 15,000ppm.	N <sub>3</sub> = NAA@ 15,000ppm.

## Result and discussion

### Effect of IBA and NAA on Success in rooting percentage

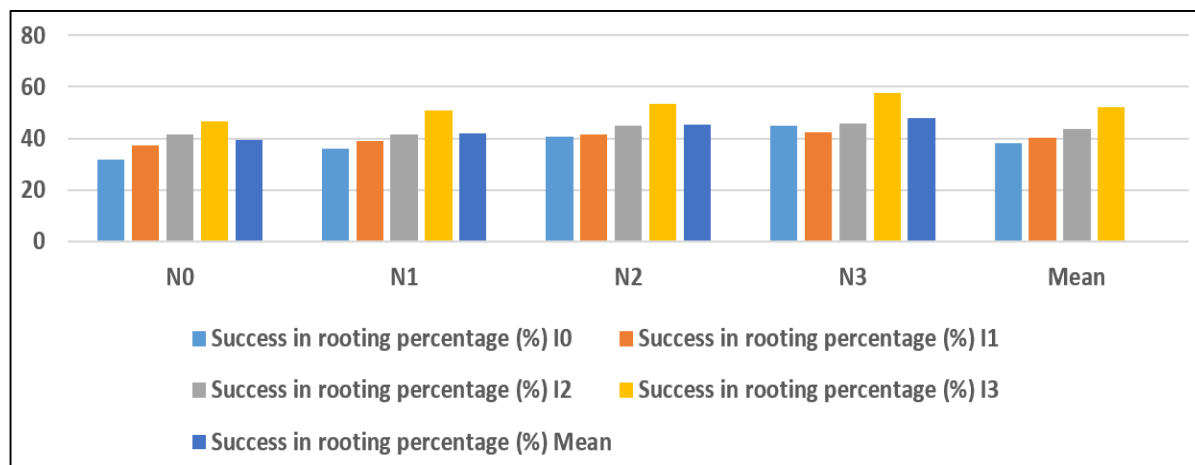
Commercial adoption of any propagation practice depends upon the rooting percentage success with the technique used. In the present experiment, the success was recorded in percentage on the basis of air-layers rooted under each treatment up of rooting per cent was calculated at the time of detachment i.e. 65 days after operation. The rooting percentage were recorded and statistically analyzed. The results are presented in Table 2 and graphically depicted in Fig.01. Clearly shows that different concentrations of IBA and NAA had significant effect on the rooting percentage. However, their combinations had non- significant effect on the rooting percentage.

The data is observed on rooting percentage was affected by different concentrations of IBA, which significantly increased the rooting percentage over the control. IBA, I<sub>3</sub> (IBA 15,000

ppm) shows maximum rooting percentage (52.08%) followed by (43.56%) in I<sub>2</sub> (10,000 ppm IBA) and (40.20%) in I<sub>1</sub> (5,000 ppm IBA) and was significantly better than all the other treatments as well as control (I<sub>0</sub>) with minimum success in rooting percentage 38.33%. In case of effect of NAA, it was observed that the maximum rooting percentage (47.73%) was observed in N<sub>3</sub> (15,000 ppm NAA) followed by (45.21%) in N<sub>2</sub> (10,000 ppm NAA) and (41.87%) in N<sub>1</sub> (5,000 ppm NAA) and was significantly better than all the other treatments as well as control (N<sub>0</sub>) with minimum success in rooting percentage 39.37%. The interaction of IBA and NAA indicate that, the maximum success rooting percentage (57.50%) were observed in I<sub>3</sub>N<sub>3</sub> (15,000 ppm IBA + 15,000 ppm NAA) were observed (53.33%) in I<sub>3</sub>N<sub>2</sub> (15,000 ppm IBA + 10,000 ppm NAA) While, the minimum rooting percentage (31.66%) were observed under I<sub>0</sub>N<sub>0</sub> (Control).

**Table 2:** Effect of different concentration of IBA, NAA on success in rooting percentage

Treatment	Success in rooting percentage (%)				Mean
	I <sub>0</sub>	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	
N <sub>0</sub>	31.66	37.50	41.66	46.66	39.37
N <sub>1</sub>	35.83	39.16	41.66	50.83	41.87
N <sub>2</sub>	40.83	41.66	45.00	53.33	45.21
N <sub>3</sub>	45.00	42.50	45.91	57.50	47.73
Mean	38.33	40.20	43.56	52.08	
		I	N	I*N	
SE(m)±		0.816	0.816	1.632	
CD(5%)		2.326	2.326	NS	



**Fig 1:** Effect of different concentration of IBA, NAA on success in rooting percentage

It might have been due to good drainage and high porosity that helped in the development of excellent root system. Such media enhances apical meristematic activities and also triggers cambial cell division. It also reflects that these combinations might have provided favorable physical conditions for sufficient nutrients access which are needed for activating enzymatic and biochemical processes. The present investigations are in conformity with the results of Shrivastava *et al.* (1998), Rajput and Senjaliya (2015)<sup>[9]</sup> and Sinish *et al.* (2005) in citrus, and Singh *et al.* (2007)<sup>[13]</sup>, Maurya *et al.* (2012)<sup>[7]</sup> and Rymbai *et al.* (2012)<sup>[10]</sup> in guava.

### Conclusion

In general, it was concluded that the media I<sub>3</sub>, IBA (15,000 ppm IBA) followed by I<sub>2</sub> comprising of (10,000 ppm IBA) was superior over rest of the IBA under study, which significantly influenced the rooting, growth and survival of air layers of guava.

As regards NAA treatment N<sub>3</sub> = 15,000ppm NAA was observed superior followed by N<sub>2</sub>= 10,000 ppm NAA showed significant effect on rooting, growth and survival of air layers of guava.

### References

- Ahmed R. Propagation of guava by aerial layering. W. Pakistan J Agri. Res. 1964; 2:62-74.
- Bhagat BK, Jain BP, Singh C, Choudary BM. Studies on the propagation of guava (*Psidium guajava* L.) by ground layering in poly bags. Orissa J of Horticulture. 1999; 27(1):19-21.
- Chawla W, Mehta K, Chauhan, Neena. Influence of plant growth regulators on rooting of litchi (*Litchi chinensis* Sonn.) air layers, Asian J Hort. 2012; 7(1):160-164.
- Das, Ajay Kumar, Prasad, Birendra. Effect of plant growth regulators on rooting survival of air layering in litchi. Adv. Res. J Crop Improv. 2014; 5(2):126-130.
- Kaundal GS, Gill SS, Minhas PP. Budding techniques in clonal propagation of guava. Punjab Hort. J. 1987; 27:208-11.
- Kuperberg, Joel. Rooting Guava (*Psidium guajava* c. supreme) Stem Cutting in a Hydroponic mist type plant propagator. Fla. State Hort. Soc. Proc. 1953, 220-223.
- Maurya RK, Ray NR, Chavda JC, Chauhan VB, Patil AK. Evaluation of different Organic media and water holding materials with IBA on rooting and survival of layering in guava (*Psidium guajava* L.) cv. Allahabad Safeda. Asian Journal of Horticulture. 2012; 7(1):44-47.
- Nelson RO. Propagation of guavas by graftage. In Proc. Fla. State Hort. Soc 1954; 67:231.
- Rajput RP, Senjaliya GS. Effect of various plant growth regulators on yield and quality of guava (*Psidium guajava* L.) cv. Lucknow 49 International journal Of agri. Science. 2015; 11(1):179-182
- Rymbai H, Sathyanarayana, Reddy G, Reddy KCS. Effect of cocopeat and sphagnum moss on guava air-layers and plantlets survival under open and polyhouse nursery. Agric. Sci. Digest. 2012; 32(3):241-243.
- Shrivastva PK. Effect growth regulators in combination and different rooting media on rooting and survival of air layers of guava (*Psidium guajava* L.). var. G-27. unpublished thesis submitted to J.N.K.V.V. Jabalpur for the degree of MSc. (Ag), 2000.
- Singh M. Response of plant growth regulators and wrappers on air-layering of guava (*Psidium guajava* L.). Advances in Plant Sciences. 2002; 15(1):153-157.
- Singh P, Chandrakar J, Singh AK, Jain V, Agrawal S. Effect on rooting in guava cv. Lucknow-49 through PGR and organic media under Chhattisgarh condition. Acta. Horticulture. 2007; 7(35):197-200.
- Tyagi SK, Patel RM. Growth regulators on rooting of air layering of guava (*Psidium guajava* L.) cv. Sardar. The Orissa Journal of Horticulture. 2004; 32(1):58-62.