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ASSESSMENT OF IBA CONCENTRATIONS AND TIME OF AIRLAYERING IN GUAVA*(Psidium guajava* L.)CV.HISSAR SAFEDA

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ABSTRACT

The present investigation was carried out at commercial fruit unit .the objective to study the effect of IBA concentration and time of air layering on rooting of guava air layer and to find out the suitable concentration of IBA and time for higher success in guava air layers. The experimental was laid out in factorial Randomized Block design (FRBD) with two factor ,IBA concentration with five levels control (I_0) 2500 ppm (I_1) 5000 ppm (I_2) 7500 ppm (I_3)and 10000 ppm (I_4) time of air layering ,15 July ,15 august and 15 September ,which were replicated for times .The result of the investigation indicated that amongst different concentration of IBA, the guava air layer treated with 10,000 ppm observed the minimum days required layer treated with 10,000 ppm observed the minimum days required for root initiation, maximum percentage of rooted layer, number of primary root ,number of secondary root ,length of primary root ,lengths of secondary root ,fresh weight of roots ,dry weight of roots ,root volume ,maximum number of sprouts ,length of sprout ,height of rooted layer ,number of leaves ,average leaf area ,fresh weight of shoots ,dry weight of shoot ,fresh weight of roots ,dry weight of roots and shoots fresh weight of roots ,dry weight of roots and survival percentage followed by IBA 7500 ppm . In respect to time of air layering, August month (M_2) was recorded maximum percentage of rooted layer, number of primary roots, number of secondary roots, length of primary and secondary roots fresh weight of roots dry weight of roots and survival percentage followed by July month.The combined effect of different IBA concentration and time of air layering indicates that, combination IBA 10,000 ppm +August month was observed significantly maximum value for percentage of rooted air layer ,number of primary and secondary roots ,length of

primary root ,fresh and dry weight of roots and survival percentage followed by the treatment combination IBA 10000 ppm +July month .

Keywords: Psidium guajava , IBA Concentration, Air layering, Analysis of Varience, Growth, Yield

Guava (***Psidium guajava*** L.) is one of the most important fruit in India. it is believed to be introduced India early in the 17th century .it belong to family **myrtaceae**and genus ***psidium*,** which contain about 150 species .This fruit Crop is native of Tropical America (Mexico –Peru).In guava ,most of the commercial cultivar are diploid (2n=22) ,while the seedless cultivar are triploid in nature .

Guava is fourth most important fruit in area and production after mango, banana and citrus in India In India, it is successfully grown in Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra, West Bengal, Orissa and Tripura. Uttar Pradesh is considered as the most important guava producing state of India, and Allahabad- Varanasi region has the reputation of growing the best quality guava in the country as well as in the world. Guava share 220.010 percent of area (0.268 million hectare) and 4.12 per cent of production (3.668 million tone) among total fruit crop with an average productivity of 13.7 MT/ha) in India .Allahabad has the reputation of growing the best guava of the world. In Maharashtra, hissar safeda -49, Allahabad safeda, Lucknow 24, Dharwar, dholka and Nasik are the important cultivated varieties of guava. Lucknow produce quality guava during rainy season.

It is a hardy tree, tall, more than 2.5 m in height and vigorous in growth. The leaves are light green in color and finely pubescent. The tree is profusely branched bearing white fragrant flowers which bear roundish to ovate fruits Climate Guava is successfully grown under tropical and subtropical climate. The quality of the fruits is better in areas having distinct winters therefore guava grown near Allahabad is famous for the best quality fruits. Although guava tolerates drought, protective irrigation facilities are required. It grows best with an annual rainfall around 1000 mm restricted between June and September.

Soil The importance of guava is due to the fact that it is a hardy plant, which can be grown on wide varieties of soils including shallow, medium black and alkaline soil. However, it grows successfully on well-drained soils with at least 0.5 to 1m in depth. The soils should not be very deep, marshy, and low lying, having hard pan or water table in the root zones. The pH should be between 5.5 to 7.5.

Air-layering is the commercial method in practice for propagation of guava. The most ideal time for air layering in guava is between April and June in the warm and humid climate, when the average temperature varies between 29.3 and 30.5°C and relative humidity between 69.0 and 80.0 per cent. A shoot from previous year's growth of 1cm in diameter is selected for air-layering. A ring of bark about 3cm long is removed. This area is covered with wet sphagnum moss and tied with polyethylene film. The rooting takes place in about 30-40 days.

Several worker have reported successful result by the use of plant growth regulators in stimulating or root primordial in air layering of guava crops (Singh et,al., 1995 Singh and Singh ,1996 :Bhagat et,at 1999 Singh and Bhuj ,2000 Tyagi and Patel 2004 ; Kumar and Syamal ,2005 Animesh and Ghosh ,2006 and Lal et,al,2007)

Beside hormonal influence ,different season and month of air layering operation also affect rooting and survival percentage of guava air layer .Among different season ,the rainy season (august –September)proved more favorable compared to summer and winter .sixty eight per cent of the layers done during rainy season showed callus development and root initiation within a month compared to 30 and 40 per cent in spring

(Ahamed ,1964).Air layer prepared during June and July showed maximum rooting success ,number of primary and secondary roots and survival percentage (Animesh and Ghosh 2006)

The climatic and environment factors during different season also affect rooting ,root initiation and survival of guava air layers .The differences in rooting percentage ,better root character and survival of guava air layer may be also attributed to the varying in weather condition such as temperature ,relative humidity and rainfall (Chandrappa and Gowda ,1998) .Bhanda (1960) reported that air layers prepared during June month recorded the highest rooting percentage compared with layers prepared during august . Hence, the present investigation was conducted to study the effect of IBA concentration and time of air layering on rooting of air layering in guava

MATERIALS AND METHODS

A field experiment was conducted during rainy season 2019-2020 planted at a spacing of 4X4 m in square system of planting at the Shridhar University, Pilani. The experiment was laid out in factorial randomized block design (FRBD) with two factors, IBA as concentration with five levels viz., no application of IBA as Control (I_0), 2500ppm (I_1), 5000 ppm (I_2), 7500 ppm (I_3) and 10000 ppm (I_4) and time of air layering viz., July, August and September, which were replicated four times. The period of observations was 75 days after layering and for establishment percentage was taken at 60 days after transplanting. Grown at commercial fruit nursery unit were selected for air layering .On these plants, well matured and healthy branches of pencil thickness were selected for air layering .The average length of branches was 70 cm For each plants were selected and 20 air layers were taken on each plants for each treatment. A ring of bark about 2.5-3 cm in length was removes using budding knife, from selected of guava just below the bud without injuring the inner wood. The lanolin paste containing IBA in different concentrations was applied evenly above the upper portion of the cut ring with the help of glass rod. Control shoots were left as such. A sleeve of white polythene was then covered. These air layers were separated from the parent plants 75 days after layering by given three installations cut at an interval of one week, so as to reduce the shock of sudden detachment. After detachment of air layers shoot, ten of the successful rooted shoots were transplanted in the polybag (10X15 cm) containing soil; sand and FYM in the ratio of 2:1:1.Statistical analysis was done as per the method described by Panse and Sukhatme (1967). Percent values are transformed into arc sign values. All data was subjected to analysis of variance (ANOVA) to determine significant differences and comparison of mean at a significant level of 5%.

RESULTS AND DISCUSSION

Data presented in (Table 1) revealed that early root initiation was obtained under treatment I_4 (25.33 days) which was significantly superior to other treatments as well as control (46.11 days). It might be due to exogenous application

of auxin could have converted starch into simple sugars, which is required for the production of new cells and for increased respiratory activity in regenerating tissues at the time of root initiation of new root primordial (Nanda 1975). Significantly maximum percentage of rooted air layer was observed under treatment I_4(75.09%) when guava air layer were treated with IBA 10,000 ppm followed by I_3 I_2 and I_1 70.98% ,65.10% and 57 .62% Treatment I_0 recorded minimum percentage (31.74%) of rooted air layer . Maximum percentage of rooted air layer was recorded under treatment I_4 this might be due to the fact that maximum concentration of IBA may have caused mobilization and utilization of carbohydrates and nitrogen fraction with the presence of co-factor at wound site which may have helped in better root initiation .IBA at higher concentration resulted better rooting in guava air layer .These finding are in accordance with the result reported by Sharma et al(1991) and Patil et.al (2011) in guava air layer .

Table 1.Effect of IBA concentration and time of air layering on days required for root initiation and rooted air layers (1%)

Treatment	**Days required for root initiation**	**Rooted air layer (%)**
IBA Concentration (ppm)		
I_0	44.11	31.74 (33.18)
I_1	35.33	70.98(48.38)
I_2	30.48	65.10(50.21)
I_3	29.30	57.62(56.42)
I_4	25.33	75.09(60.78)
F test	sig	sig
SE(M)+-	0/35	0.33
CD at 5%	1.13	0.95
Time of air layering (month)		
M_1	33.75	53.04(50.89)
M_2	30.93	50.16.(52.46)
M_3	32.85	56.11(43.56)

F test	NS	Sig
SE(M)	020	0.25
CDat(5%)	-	0.74

The data in respect to percentage of rooted air layer as influenced by time of air layering were recorded and presented in .Significantly highest percentage of rooted air layer was observed in treatment M_3 (56.11%) recorded minimum percentage of rooted air layer .data presented in table 2 indicated that ,superior percentage of rooted air layer was observed in treatment M2 (august month) This may be due to variation in climatic and environment factor as reported by Chandrappa and Gowda (1998) in guava .These result are in agreement with the finding of Hore and Sen (1991) Rymbai and Reddy (2010) and Ahamed (1964) who advocated that rainy season is good for guava air layering . The interaction between different IBA concentration and time of layering was found to be significant for percentage of rooted air layer. The data revealed in table 1 indicated that significantly maximum percentage of rooted air layer was observed in treatment combination I4 M2 (70.35%) followed by I4 M1 (75.50%) AND i3 m2 (76.95%) whereas the minimum percentage of rooted air layer was recorded under I0 M3 (28.85%) The above result clearly indicated that air layer of guava treatment with treatment combination IBA 10,000 ppm +August showed maximum percentage of rooted air layer as compared to other treatment combination .this might be due to combined effect of IBA and time of air layering .higher concentration of IBA facilitate better root initiation and favorable season provided conducive environment like optimum temperature ,relative humidity and rainfall .These result are in accordance with Chandrappa and Gowda (1998) in guava air layer .

The data presented in table 2 indicated that number of primary root per air layer was significantly influenced by different IBA concentration .significantly grated number of primary root per air layer was observed in treatment I_4 (12,71) followed by I_3I_2 and I_1 11.35,9.05,5.08 .The minimum number of primary roots per air layer was recorded under control .Above result clearly indicated that ,air layer treated with IBA 10,000 ppm (I_4) showed significantly maximum number of primary roots per air layer .this may be due to hormonal effect and accumulation of other internal substance and their basipetal movement as also depicted by Mahabir Singh (2001) .The Increase in number of primary roots may also be due to the accumulation of rooting co-factor above the ringed portion under the influenced of IBA similar result were also

observed by Sharma (1991) with 10,000 ppm IBA and patil (2011) in guava with 12,000 ppm IBA in guava and barholla (1995) in jackfruit and singh (2006) with IBA 10,000 ppm in jamun . The interaction between different IBA concentration and time of air layering were found to be significant for number of primary root per air layer .The data presented in table 2 indicated that highest number of primary root per air layer was observed in treatment combination I_4M_2 (13.56) followed by I_4 m_2 (12.30) Whereas the minimum valve for the character was recorded under I_0M_1. Significantly highest number of secondary root per air layer was observed in treatment I4 (5, 30) when guava air layer were treated with IBA 10.000 ppm followed by I3 (6.00) and I2 (5.16) and I1 (3.38.) treatment I0 (2.16) recorded least number of secondary roots per air layer. above outcome clearly indicated that air layer treated with IBA 10.000 ppm showed highest number of secondary root per air layer .this may be due to hormonal effect and accumulation of other internal substance and their basi petal movement as such line reference was also reported by Singh (2010) similar result were also observed by Sharma (1991) with 10,000 ppm IBA and patil (2011) with 12,000 ppm IBA in guava air layer.

Table .2 Effect of IBA concentration and time of air layering on number of Primary and secondary roots per air layer

Treatment	Number of Primary roots(cm)	Number of secondary roots(cm)
IBA concentration (ppm)		
I_0	2.51	2.16
I_1	5.08	3.38
I_2	9.05	5.16
I_3	11.35	6.00
I_4	12.71	5.31
F test	Sig	Sig
SE (M)+-	0.09	0.11
CD at 5%	0.27	0.31
Time of air layering (month)		
M_1	8.17	4.81
M_2	8.93	5.42
M_3	7.34	7.33
F test	sig	Sig
SE(M)+-	0.07	0.08
CD at 5 %	0.21	0.24
Interaction effect (Ix M)		
I_0M_1	2.45	2.30
I_0M_2	3.00	2.65
I_0M_3	2.10	2.55
I_1M_1	5.30	3.30
I_1M_2	5.65	3.85
I_1M_3	4.30	3.00
I_2M_1	9.15	5.30
I_2M_2	9.85	5.75
I_2M_3	8.15	4.45
I_3M_1	11.25	5.75
I_3M_2	12.30	7.15
I_3M_3	10.50	5.10
I_4M_1	12.70	7.40

I_4M_2	13.56	12.30
I_4M_3	11.60	6.80
F test	Sig	Sig
SE(m)	0.169	0.192
CD at 5%	0.483	0.549

Significantly highest number of secondary root per air layer was observed in treatment M2 (5.42) followed by M1(4.81) while treatment M3 (4.18) recorded minimum number of secondary root per air layer . the data presented in table 2 indicated that, maximum number of secondary root per air layer was observed under treatment M2 (august month.) which was significantly superior over July and September month .this may be due to variation in climate and environment factor as reported by Chandrappa and Gowda (1998) in guava .similar result was also observed by Reddy and (2010) in guava. The interaction between different IBA concentration and time of layering were found to be significant for number of secondary root per air layer. The above result clearly indicated that, air layer of guava treatment with IBA 10,000 ppm +august (I4M2) showed highest number of secondary root per air layer as compared to other treatment combination, but statistically at per with treatment combination I4 M1 (7.40) This may be due to cumulative effect of IBA and more congenial environment factor during the month of august and July .These result are in accordance with the finding of Rymbai and Reddy (2010) in guava air layer.

The data presented in table 3 indicated that, length of primary root was significantly influenced by different IBA Concentration. the data from table 3 revealed that ,significantly maximum length of primary root (8.28 cm) per air layer was noticed ,when guava air layer was treated with IBA 10,000 ppm (I_4) followed by treatment I_3 ,I_2 and I_1 .7.07 cm, 5.83 cm and 3.45 cm respectively treatment I_0 recorded lowest length of primary root (1.48 cm) per air layer . table3 Significantly maximum length of primary root per air layer was observed in treatment M2 (5.60)cm) followed by M1(5.26 cm) while treatment M3 (4.81 cm) recorded minimum length of primary root per air layer .The data presented in table 3indicated that maximum length of primary root per air layer was observed under treatment M2 (August month) which was significantly superior over July and September month , this may be due to variation in climate and environment factor as reported by Chandrappa and Gowda (1998) in guava air layer .similar result are in conformity with the finding of Rymbai and Reddy (2010) in guava air layer .

Table 3 Effect of IBA Concentration and time of air layering on length of primary and secondary root (cm) per layer

Treatment	Length of primary root (cm)	Length of secondary root (cm)
IBA Concentration		
I_0	1.48	1.34cm
I_1	3.45	1.94
I_2	5.83	2.47
I_3	7.07	3.40
I_4	8.28	3.88
F test	Sig	Sig
SE(m)	0.08	0.04
CD at 5+	0.25	0.13
Time of air layering (month)		
M_1	5.26	2.57
M_2	5.60	2.93
M_3	4.81	2.31
F Test	sig	Sig
SE(m)+-	0.06	0.02
CD at 5%	0.19	0.05
Interaction effect (IxM)		
I_0M_1	1.50	2.30
I_0M_2	1.65	2.65
I_0M_3	1.30	1.55
I_1M_1	3.40	1.95
I_1M_2	3.75	2.25
I_1M_3	3.30	1.60
I_2M_1	5.70	2.20
I_2M_2	6.35	2.58
I_2M_3	5.40	2.20
I_3M_1	7.15	3.35
I_3M_2	7.45	3.75
I_3M_3	6.65	3.00
I_4M1	8.55	3.80
I_4M_2	8.85	4.30
I_4M_3	7.45	3.55
F Test	sig	Sig
SE (M)	0.153	0.083
CD at 5%	0.436	-

The data indicated that maximum length of primary root per air layer was observed in treatment combination I_4 M_2(8.85 cm) which was statistically at per with I_4 M_1 (8.55 CM) .The treatment combination ,I3m2,and I4M3 ,I2M1 and I2M3 ,I1M1 and I1M2 ,I1M1 and I3M3 were statistically at per with each other .the minimum length of primary root per air layer was recorded under I0M1 (1.50cm) which was statisacally at per with I0M3 cm) and I0M3 (1.65cm). This may be due to cumulative effect of IBA and more congenial environment factors during the month of august .these result are in agreement with the finding of Rymbai and Reddy (2010) in guava air layer ,significantly maximum length of secondary root (3.88cm) per air layer was noticed when guava air layer was treated with IBA 10.000 ppm(I_4) followed by treatment I3 I2and I1 ,3.45 cm ,2,47 cm and 1.94 cm respectively whereas least length of secondary root was recorded under treatment I_0 (1.34cm) above result clearly that air layer treated with IBA 10,000 ppm. Showed significantly maximum length of secondary root per air layer, this might be due to hormonal effect leading to accumulation of internal substance and their

downward movement with increased cell division as such line reference was also reported by Singh (2001) these result further get support from the finding of Sharma (1991) with 10,000 ppm IBA and pail 2011 with 12,000 IBA ppm in guava air layer. The data in respect to length of secondary root per air layer as influenced by time of air layering were recorded and presented in table and depicted in significantly maximum length of secondary root per air layer was observed in treatment M2 (2.93 cm) followed by M1 (2.57cm) while treatment M3 recorded minimum length of secondary root (2.31 cm) per air layer. The interaction between different IBA concentration and time of layering were found to be non significant for length of secondary root per air layer.

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