EFFECT OF TIME INTERVAL, IBA AND ROOTING MEDIA ON AIR LAYERING IN GUAVA (*Psidium guajava* L.) cv. L-49

ABSTRACT

The experiment was conducted at Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during the year 2023–2024. The experiment was laid out in randomized block design with three replications, and the study consists of Twelve treatment combinations by using two different concentrations of IBA viz., 4000 and 5000 ppm and four time of layering viz., 15thJuly, 30th July, 15th August, 30th August. The result indicated that treatment T9, i.e. Air layering done on 15th July using IBA 5000 ppm was found to be the most effective for better rooting and growth parameters, and gave the best results with respect to number of days of root formation (32days), number of roots per layering (12.75), root length (7.82cm), root thickness (9.61mm), 83.33% success in rooting, number of new leaves (25.23), number of new sprouts (11.83), length of new shoot (6.67 cm) and survival percentage after transplant into polybags (94.44%), that was significantly higher as compared to other treatment combination. On the basis of result obtained in the present investigation, it can be concluded that air-layering performed during 15th July, treated with 5000 ppm IBA concentration with cocopeat and sphagnum mosshave been found bettercompared to all other treatment under subtropical condition of prayagraj, Uttar Pradesh.

Keyword:*Air layering, Guava, Cocopeat, Sphagnum moss and IBA.*

Introduction :

Guava (*Psidium guajava* L.) is one of most popular fruits grown in tropical, sub-tropical and some parts of arid regions of India that belongs to the family Myrtaceae. It is also a cheap and very rich source of vitamin-C, carbohydrate, iron and contains a fair amount of calcium and phosphorus as well. These qualities make guava an important and one of the most popular fruits of India. India is the leading producer of guava in the world. Total area and production of guava in India is about 2.68 lakh hectares and 36.67 lakh mt, respectively and productivity of guava is 13.70 MT/ha. Madhya Pradesh ranks first in productivity with 37.6 mt/ha. Uttar Pradesh is the highest guava producing state, accounting for about half of the total area of guava in the country. Allahabad has the reputation of growing the best guava of the world. The other important guava growing states are Karnataka, Bihar, Madhya Pradesh, Maharashtra, West Bengal and Andhra Pradesh. In Uttar Pradesh, Sardar (Lucknow-49), Allahabad Safeda, Allahabad Surkha, Lalit and Shwetha are the important varieties of guava.

Guava is considered as “poor man’s apple” and “apple of tropics” because of its availability for a longer time during the year at very moderate price. Guava fruits are rich in pectin content, hence are extensively used in preparation of jelly. Besides, its diabetic value, the fruit also is used in preparing cheese, butter, paste, juice, juice concentrate, powder, canned slice/shell, nectar, puree and ice cream. The major components of guava fruits are vitamin ‘C’ (250 mg/100 g fresh fruits) 4-6 times more vitamin ‘C’ than citrus fruit, carbohydrates (13%) and minerals (calcium 29 mg, phosphorus 10 mg and iron 0.5 mg/100 mg fresh fruits).

Guava is generally propagated by vegetative methods like, stooling, inarching, air layering, cutting, budding and grafting. These methods have their own merits and demerits. However, air- layering is an easy method of propagation of this crop. Layering involves an interruption of downward translocation of organic substances such as carbohydrates, auxins and other growth factors viz. protein, vitamins, hormones etc., from the leaves and shoot tips. These organic substances accumulate in the stem, where layering has been done and ultimately stimulate the rooting. The growth, establishment and survival of branches and seedling also depend on the quality of rooting media.

There are many commercial rooting media used for layering, but many are expensive and locally unavailable. Cocopeat is a multipurpose

growing medium made out of coconut husk. The fibrous coconut husk is pre washed, machine dried, sieved and made free from sand and other contaminations such animal and plant residue. Increasing demand and mounting costs for peat as a growing media horticulture have led to the search for high quality and low-cost substrates as an alternative. Cocopeat is considered as a good growing media component. It can easily be mixed with other growing media**s** like sphagnum moss which is also known as peat moss, bog moss, turf moss. In air layering Sphagnum moss is extensively used as a substrate. It may hold 16- 26 times as much water as their dry weight, the empty cells help retain water in dryer conditions.

Time of layering is also an important factor for success. During the months of June, July & August had recorded good success rate. The period has an advantage of high humidity, suitable range of temperature, moderate sunshine and wind velocity. Layering prepared during these months get an additional advantage of longer duration of favourable season for establishing the layer in soil after preparation.

Material and Method

The experiment was conducted during July, 2023 to January, 2024 at Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom, University of Agriculture, Technology and Sciences, Prayagraj (Uttar Pradesh). All the facilities necessary for cultivation, including labour were made available in the department.The area is situated on the south of Prayagraj on the right side of the river Yamuna on the South of Rewa Road at a distance of about 6 km from Prayagraj city. It is situated at25.57º N latitude, 81.51º E longitude and at the altitude of 98 meter above the sea level.

The present investigation was carried out on semi-hardwood stem of guava (L-49). The time of air-layering was done in different time interval i.e. 15th July, 30 July, 15 August and 30 August with cocopeat and sphagnum moss as growing mediaand they were soaked in water over night and squeezed it before used to avoid excess water and IBA concentration used were 4000 ppm and 5000 ppm. The period of observation was 60 days after layering and 90 days after transplant into poly-bags. The selected plant was healthy, well mature, uniform and vigorous. The shoot selected was of 1.5-2 year with pencil thickness by removing a strip of bark (phloem) 2.0-2.5cm wide cut below the bud by giving two circular cuts about 30cm below from shoot tip and then the exposed portion of shoot was rubbed without causing any injury to the xylem with the help of knife. After that, the upper portion of exposed shoots was sprayed with different concentration of IBA according to the treatments. The exposed wood was covered with growing media i.e. cocopeat and sphagnum moss and wrap the growing media completely a piece of transparent polythene sheet and tie the ends tightly with threat, so that no water or air can enter and left for rooting.

Air-layering was separated from the mother plant after 45 to 60 days after see the white roots through the plastic sheet with the help of secateurs by giving horizontal cut at the end of layering with sharp secature and separate the from mother plant. Remove the threat carefully without damaging the root and transplant into poly-bags at Department of Horticulture, SHUATS.

RESULTS AND DISCUSSION

The result disclosethat IBA concentrations, time of layering and rooting mediaexhibited a significantly effect on root parameter and growth parameter are given in Table 1& Table 2.

Table 1:-Effect of time interval, IBA and rooting media on rooting and root parameter of guava air layering

Treatment symbol	Treatment combination	No. of Days for root formation	No. of roots per layering	Root length (cm)	Root thickness (mm)	Success in rooting (%)

Treatment symbol	Treatment combination	Number of new leaves	Number of new sprouts	Length of new shoot (cm)	Plant survival percentage (%)
T1	15 July + Cocopeat+ Sphagnum moss	16.11	8.08	5.00	5.08	3.63	8.00	51.83	66.67
T2	30 July + Cocopeat+ Sphagnum moss	49.22	4.57	3.87	4.50	41.67
T3	15 August + Cocopeat+ Sphagnum moss	51.35	4.16	4.13	4.33	33.33
T4	30 August + Cocopeat+ Sphagnum moss	51.16	3.22	3.00	3.38	50.00
T5	15 July + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	46.05	3.94	3.34	4.83	41.67
T6	30 July + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	33.50	10.83	6.67	8.50	75.00
T7	15 August + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	33.83	8.08	5.08	8.00	66.67
T8	30 August + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	40.89	9.02	4.86	6.11	58.33
T9	15 July + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	37.61	8.89	5.92	7.27	58.33
T10	30 July + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	32.00	12.75	7.82	9.61	83.33
T11	15 August + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	34.33	11.61	6.01	8.33	66.67
T12	30 August + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	36.44	9.67	6.27	6.94	66.67
F-Test		33.77	9.47	5.95	7.80	58.33
S.E (d) (±)		**S**	**S**	**S**	**S**	**S**
CD at 5%		2.20	1.50	0.74	1.96	10.66
		4.56	3.11	1.54	0.94	22.10

Table 2:- Effect of time interval, IBA and rooting media on growth parameter of guava air layering

T2	30 July + Cocopeat+ Sphagnum moss	15.22	4.17	3.50	66.66
T3	15 August + Cocopeat+ Sphagnum moss	15.05	4.33	3.70	55.55
T4	30 August + Cocopeat+ Sphagnum moss	17.50	4.67	4.06	66.66
T5	15 July + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	20.00	8.33	6.36	86.33
T6	30 July + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	21.17	8.50	6.23	83.37
T7	15 August + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	20.00	8.33	5.80	77.77
T8	30 August + Cocopeat+ Sphagnum moss+ IBA 4000 ppm	21.83	7.83	6.33	79.62
T9	15 July + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	25.23	11.83	6.67	94.44
T10	30 July + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	23.17	9.67	6.16	87.97
T11	15 August + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	23.45	9.83	6.00	85.17
T12	30 August + Cocopeat+ Sphagnum moss+ IBA 5000 ppm	22.72	10.50	6.10	81.47
F-Test		**S**	**S**	**S**	**S**
S.E (d) (±)		1.49	0.69	0.43	10.35
CD at 5%		3.09	1.44	0.90	21.47

Number of days for root formation (initial rooting)

The minimum days of root formation (32) was found in T9 (15July + Cocopeat+ Sphagnum moss+ IBA 5000 ppm) followed by 33.50 days in T5 (15July + Cocopeat+ Sphagnum moss+ IBA 4000 ppm) whereas it was maximum in T2 (30 July + Cocopeat + Sphagnum moss) which took 51.35 days.

Number of roots per layering

The maximum number of roots per layering (12.75) was found in T9 (15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by 11.61 in T10 (30July + Cocopeat + Sphagnum moss + IBA 5000 ppm) whereas it was minimum in T3 (15August + Cocopeat + Sphagnum moss) which took 3.22.

Root length (cm)

The maximum length of root (7.82cm) was found in T9 (15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by 6.67cm in T5 (15July + Cocopeat + Sphagnum moss + IBA 4000 ppm) whereas it was minimum in T3 (15August + Cocopeat + Sphagnum moss) which took 3.00cm.

Root thickness (mm)

The maximum thickness of root (9.61mm) was found in T9 (15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by 8.50mm in T5 (15July + Cocopeat + Sphagnum moss + IBA 4000 ppm) whereas it was minimum in T3 (15August + Cocopeat + Sphagnum moss) which took 33.38mm.

Success in rooting (%)

The highest 83.33% of success in rooting was recorded in T9(15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by 75% in T5 (15July + Cocopeat + Sphagnum moss + IBA 4000 ppm)whereas it was minimum in T2 (30July + Cocopeat + Sphagnum moss) which took 33.33%.

Number of new leaves

The maximum number of new leaves (25.23) was found in T9(15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by23.45 in T11(15August + Cocopeat+ Sphagnum moss+ IBA 5000 ppm)whereas it was minimum in T3 (15August + Cocopeat+ Sphagnum moss) which took 15.05.

Number of new sprouts

The maximum number of new sprouts(11.83) was found in T9(15July + Cocopeat +Sphagnum moss + IBA 5000 ppm) followed by 10.50 in T12 (30August + Cocopeat+ Sphagnum moss+ IBA 5000 ppm)whereas it was minimum in T2 (30July + Cocopeat+ Sphagnum moss) which took 4.17.

Length of new shoot

The maximum length of new shoot (6.67cm) was found in T9(15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by 6.36cm in T5 (15July + Cocopeat+ Sphagnum moss+ IBA 4000 ppm)whereas it was minimum in T2 (30July + Cocopeat+ Sphagnum moss) which took 3.50cm.

Plant survival percentage

The highest 94.44% of survival percentage was recorded in T9 (15July + Cocopeat + Sphagnum moss + IBA 5000 ppm) followed by 87.97% in T10 (30July + Cocopeat+ Sphagnum moss+ IBA 5000 ppm) whereas it was minimum in T1 (15July + Cocopeat + Sphagnum moss) which took 51.83%.

CONCLUSION

From the present investigation, it's concluded that air-layering performed during 15th July, treated with 5000 ppm IBA with cocopeat and sphagnum moss as rooting media has been found best under subtropical condition of Prayagraj, Uttar Pradesh.

Treatment T9 was best in terms of root parameters and growth parameter like minimum number of days for root formation (32days), maximum number of roots per layering (12.75), root length (7.82 cm), root thickness (9.61mm), 83.33% success in rooting, number of new leaves (25.23), number of new sprouts (11.83), length of new shoot (6.67 cm), 94.44% survival percentage.

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