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Effect of Organic Media, Plant Growth Regulators and Different Colour of Wrappers on Success and Survival of Air Layering of Guava (*Psidium guajava* L.)

P. Barde[1]*, R. K. Pathak[2] and Riya Thakur[3]

[1]*Dr. B.R. Ambedkar University of Social Science, Mhow, M.P., India*
[2]*Department of Agriculture and Animal Husbandry, PSSCIVE, Bhopal, M.P., India*
[3]*Department of Horticulture, Krishi Vigyan Kendra, Chhindwara, M.P., India*

**Corresponding author*

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A B S T R A C T

The present investigation entitled "Effect of organic media, plant growth regulators and different colour of wrappers on success and survival of air layering of Guava (*Psidium guajava* L.)" Was carried out in Month of August during 2019 and 2020 at the Fruit Research Station Entkhedi, Bhopal, (M.P.) under the R.A.K. College of Agriculture, Sehore. The experiment was laid down in Randomized Block Design with three replication and twenty-five treatments. In these treatments five colour of Poly wrappers was used *i.e.*,White, Black, Blue, Red and Green, five concentrations of Growth regulators i.e., IBA 0 ppm, IBA 2500 ppm, IBA 5000 ppm, IBA 7500 ppm and IBA 10000 ppm and four types of media i.e., Vermicompost, Soil, Leaf manure and Sphagnum moss. Observations was recorded Survival percentage of air-layers, Average number of new sprouts per layer, Average number of leaves per air layer and Average number of branches per air layers. Result obtained that the treatment T_{21} (IBA 10000 PPM + Vermicompost + W_5) found superior in all the parameters of shoots characters and economics also during 2019-20 and 2020-21 also in pooled data.

Introduction

Guava originated from an area thought to extend from Mexico, Central America or northern South America throughout the Caribbean Region Chromosome number of guava 2n= 22 Besides, it is also a cheap and very rich source of vitamin-C (228.3) mg carbohydrate (14.32) g, iron (0.26) mg, fat (0.95) g, sugar (8.92) g, Protein (2.55) g, vitamin B_1 (0.067) mg, vitamin B_2 (0.04) mg, vitamin B_3 (0.084) mg, and contains a fair amount of calcium (18) mg and phosphorus (40) mg as well as found in 100 gm. Guava fruits are also used for preparation of salad, chutney, jam, jelly, nector etc. 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. The total area under guava cultivation and production in India is about 287 thousand hectares and 4304 thousand MT respectively (NHB, 2019-20). The average productivity of guava in India is 13.70 MT/ha. The total area and production of guava in Madhya Pradesh is 21.28 thousand hectares and (841.1 thousand MT). Madhya Pradesh ranks first in productivity with 36.67 MT/ha. Guava shares 4.5 per cent of area and 3.3per cent of production in India. The Major guava producing states are Maharashtra, Madhya Pradesh, West Bengal, Punjab, and Gujrat Major guava producing districts in Madhya Pradesh are Jabalpur, Gwalior, Bhopal, Rewa, Neemuch, Ratlam, Khandwa and Mandsaur etc.

Guava can be propagated by air-layering, ground layering, inarching, root and shoot cutting and budding. Air-layering is the most popular commercial method of vegetative propagation of guava in India. Air layering was evaluated as a commercial method of vegetative propagation of guava (Singh, 2018) Guava is generally propagated by vegetative methods like, inarching, air layering, cutting, budding and grafting are commonly practiced. These methods have their own merits and demerits. However, cutting and layering or air-layering are easy methods of propagation of this crop. 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). 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).

Plant growth regulator IBA play a important role of rooting of air layering of guava but suitable concentration be must for rooting 5000 ppm concentration is best results found for air layering rooting media coco peat absolved more water this actual volume 10 time more water socked and humidity make long time. Sphagnum mass is most important role play in rooting of guava they water socked and give moisture long time.

Materials and Methods

The experiment was carried out in Month of August during 2019 and 2020 at the Fruit Research Station Entkhedi, Bhopal, (M.P.) under the R.A.K. College of Agriculture, Sehore. The experiment was laid down in Randomized Block Design with three replication andtwenty five treatments *viz*., T_1(IBA 0 ppm + Vermicompost + W_1), T_2 (IBA 0 ppm +Soil + W_1), T_3 (IBA 0 ppm + Leaf Manure + W_1), T_4 (IBA 0 ppm + SphagnumMoss + W_1), T_5 (IBA 0 ppm +Compost + W_1), T_6 (IBA 2500 ppm + Vermi compost + W_2), T_7 (IBA 2500 ppm + Soil + W2), T_8 (IBA 2500 ppm + Leaf Manure + W_2), T_9 (IBA 2500 ppm + Sphagnum Moss + W2), T_{10} (IBA 2500 ppm +Compost + W_2), T_{11} (IBA 5000 ppm + Vermi compost + W_3), T_{12} (IBA 5000 ppm + Soil + W_3), T_{13} (IBA 5000 ppm + Leaf Manure + W_3), T_{14} (IBA 5000 ppm + Sphagnum Moss + W_3), T_{15} (IBA 5000 ppm + Compost + W_3), T_{16} (IBA 7500 ppm + Vermicompost + W_4), T_{17} (IBA 7500 ppm + Soil + W_4), T_{18} (IBA 7500 ppm + Leaf Manure + W_4), T_{19} (IBA 7500 ppm + Sphagnum Moss + W_4), T_{20} (IBA 7500 ppm + Compost + W_4), T_{21} (IBA 10000 ppm + Vermicompost + W_5), T_{22} (IBA 10000 ppm + Soil + W_5), T_{23} (IBA 10000 ppm + Leaf Manure + W_5), T_{24} (IBA 10000 ppm + Sphagnum Moss + W_5) and T_{25} (IBA 10000 ppm + Compost + W_5). Result observed that the treatment T_{21} (IBA 10000 PPM + Vermicompost + W_5) found superior in all the parameters of shoots and economics also during 2019-20 and 2020-21 also in pooled data.

$$\text{Survival percentage} = \frac{\text{Total number of established plants}}{\text{Total number of planted layered plant}} \times 100$$

$$\text{B: C ratio} = \frac{\text{Net income (Gross Income-Total cost of cultivation)}}{\text{Total cost of cultivation}}$$

Results and Discussion

The survival percentage of air-layers formation from date of layering ranges from 21.15% to 84.31%. The maximum survival percentage of air-layers

formation were recorded under the treatment T_{21} (84.31%) followed by the treatment other treatments. While the minimum survival percentage of air-layers formation was significantly find out under the treatment T_2 (21.15%). The survival percentage of air layer in poly bags were found in T_{21} in both of the year and also in pooled data. It might be due to the positive response of IBA. The closely finding are Jadhav (2009) and Reddy *et al.*, (2014). Maximum survival percentage of air layers might be better water holding capacity and a greater number of primary and secondary roots, better length, number of leaves, etc. This combination has absorption of nutrients and moisture from the growing as well as created more favorable environment for good shoot growth resulting in higher survival percentage layering in guava.

The average number of new sprouts per layer formation from date of layering ranges from 1.94 to6.60. The maximum average number of new sprouts per layer formation were recorded under the treatment T_{21} (6.60) followed by the treatment other treatments. While the minimum average number of new sprouts per layer formation was significantly find out under the treatment T_2(1.94)

The number of leaves per air layers formation from date of layering ranges from 7.27 to15.63. The maximum number of leaves per air layers formation were recorded under the treatment T_{21} (15.63) followed by the treatment other treatments. While the minimum number of leaves per air layers formation was significantly find out under the treatment T_2(7.27). The better response on number of leaves might be due to the better treatment variation and positive response of treatment T_{21}. Same findings are Rani *et al.*, (2018).

The number of new branches per air layer formation from date of layering ranges from 2.96 to 7.24. The maximum number of new branches per air layer formation were recorded under the treatment T_{21} (7.24) followed by the treatment other treatments. While the minimum number of new branches per air layer formation was significantly find out under the treatment T_2(2.96). The better response on number of leaves might be due to the better treatment variation and positive response of treatment T_{21}. Same findings are Rani *et al.*, (2018)

More number of new sprouts per plant and leaves per new sprout were found by the application of IBA at 10,000 ppm with dark colour polythene wrappers and significantly superior to other treatment combinations. It may be due to modification in physiological processes of plants and formation of more number of roots, resulting in the increase in length of the sprouts. Sprout length was significantly more with colour polythene wrappers as compared to the white one.

Similarly all the plant growth regulators significantly produced more number of leaves as compared to control. Among the plant growth regulators, their concentrations and wrappers, it was exhibited that IBA at 10000 ppm with green polythene wrappers produced more number of leaves as compared to other treatments.

The reason may be due to the earlier establishment and more sprouting of the plants under this treatment. The present obtained results conform to Bhagat *et al.*, (1999); Singh (2002) and Singh *et al.*, (2007).

Treatment T_{21}secured that highest gross profit, net return along with BCR (Rs 50586, Rs 41086 and BCR 1:4.32 treatment respectably) followed by other treatments like treatment T_{20} and T_{25}. During the investigation the treatment T_2 and T_4 performed very poor and overall treatment T_{21} found superior and it can be used for commercial production of guava layered saplings.

The treatment T_{21} (IBA 10000 PPM + Vermicompost + W_5) found superior in survival percent of air layer saplings and cost effective as well. The application of 10000 ppm Indole -3-Butyric Acid on air layer and it is wrapped with green polythene with vermicompost rooting media give superior performance.

Table.1 Growth studies and Economics of air-layers as influenced by varied growth regulators, rooting media and wrappers

Treat.	Survival % of air-layers in 2019-20	Survival % of air-layers in 2020-21	Pooled data of survival %	Average number of new sprouts per layer In 2019-20	Average number of new sprouts per layer in 2020-21	Pooled data on average number of new sprouts per layer
T_1	34.8	37.00	35.88	2.90	4.33	3.62
T_2	21.3	21.00	21.15	1.89	2.00	1.94
T_3	34.7	35.00	34.84	3.11	3.00	3.06
T_4	25.8	22.33	24.06	2.76	4.00	3.38
T_5	30.9	31.00	30.95	3.05	6.00	4.52
T_6	52.5	51.00	51.76	4.35	3.13	3.74
T_7	43.3	43.00	43.15	3.67	4.00	3.83
T_8	51.0	50.67	50.83	4.41	6.00	5.21
T_9	44.7	49.67	47.19	4.28	4.00	4.14
T_{10}	52.2	55.00	53.61	4.36	3.67	4.02
T_{11}	63.7	65.33	64.49	5.03	6.00	5.52
T_{12}	46.7	47.33	47.04	4.00	5.27	4.63
T_{13}	59.5	56.33	57.93	4.53	3.83	4.18
T_{14}	58.0	59.00	58.52	4.79	5.00	4.89
T_{15}	63.9	64.00	63.93	5.06	4.00	4.53
T_{16}	74.7	75.00	74.83	5.56	6.67	6.11
T_{17}	54.7	55.33	55.00	4.51	5.00	4.76
T_{18}	69.1	69.67	69.37	5.49	4.00	4.75
T_{19}	74.1	70.67	72.36	5.63	6.50	6.07
T_{20}	76.7	78.67	77.67	5.54	4.33	4.77
T_{21}	82.9	85.67	84.31	5.93	7.27	6.60
T_{22}	58.6	57.67	58.12	4.64	3.20	3.92
T_{23}	74.9	79.00	76.95	5.64	4.67	5.15
T_{24}	78.6	75.00	76.80	5.69	4.67	5.18
T_{25}	80.8	82.00	81.40	5.80	5.67	5.73
SE(m) ±	1.29	2.12	1.51	0.18	0.90	0.46
SE(d)	1.82	3.00	2.14	0.25	1.28	0.65
C.D.	3.63	5.97	4.27	0.50	2.54	1.29

Table.2 Growth studies and Economics of air-layers as influenced by varied growth regulators, rooting media and wrappers

Treat.	Number of leaves per air layers in 2019-20	Number of leaves per air layers in 2020-21	Pooled data on Number of leaves/ air layers	Number of new branches per air layer in 2019-20	Number of new branches per air layer in 2020-21	Pooled data on Number of new branches/air layer	Net Return	BC Ratio
T_1	9.01	10.01	9.51	3.33	3.33	3.33	13028	1.53
T_2	6.77	7.77	7.27	2.70	3.23	2.96	4980	0.61
T_3	8.88	9.81	9.35	3.33	3.93	3.63	12404	1.50
T_4	8.57	9.70	9.13	3.63	3.70	3.67	5234	0.59
T_5	8.87	10.13	9.50	3.40	3.83	3.62	10270	1.23
T_6	10.88	11.68	11.28	3.93	4.60	4.27	22306	2.54
T_7	9.72	11.06	10.39	4.53	5.37	4.95	17540	2.10
T_8	11.30	12.43	11.86	4.10	4.20	4.15	21748	2.48
T_9	10.66	12.07	11.36	4.80	5.57	5.18	19264	2.12
T_{10}	11.18	12.11	11.65	4.00	4.46	4.23	23616	2.76
T_{11}	12.98	13.65	13.31	4.80	5.27	5.03	29694	3.29
T_{12}	10.19	11.19	10.69	5.21	5.80	5.50	19624	2.28
T_{13}	11.61	12.00	11.81	5.43	5.60	5.52	25758	2.86
T_{14}	12.72	13.39	13.06	5.07	5.69	5.38	25812	2.77
T_{15}	13.45	14.00	13.72	5.45	5.82	5.64	29558	3.35
T_{16}	14.69	15.83	15.26	6.27	6.00	6.13	35648	3.85
T_{17}	12.18	13.20	12.69	6.57	6.52	6.54	24150	2.72
T_{18}	14.39	15.23	14.81	6.23	6.50	6.37	32372	3.49
T_{19}	14.40	15.39	14.89	6.47	6.30	6.38	33866	3.54
T_{20}	14.22	15.36	14.79	6.18	6.53	6.36	37552	4.14
T_{21}	15.27	16.00	15.63	7.18	7.30	7.24	41086	4.32
T_{22}	12.37	13.03	12.70	6.48	6.37	6.43	25772	2.83
T_{23}	14.63	15.67	15.15	6.90	6.91	6.91	36670	3.86
T_{24}	13.87	15.03	14.45	6.66	6.67	6.66	36280	3.70
T_{25}	14.49	15.53	15.01	6.20	6.27	6.23	39540	4.25
SE(m) ±	0.39	0.44	0.39	0.20	0.28	0.20		
SE(d)	0.55	0.62	0.56	0.28	0.40	0.29		
C.D.	1.10	1.23	1.11	0.57	0.79	0.57		

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