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Foliar application of growth stimulants on growth, vigour and success of avocado (*Persea americana* Mill.) grafts

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ABSTRACT

Avocado is an important exotic fruit crop gaining lot of importance among the farmers in recent days due to its higher price. Hence there is huge demand for quality planting materials. Therefore, the present experiment was carried out know the effect of growth stimulants on the growth, vigour and success of avocado grafts. The experiment was carried out during the year 2022-23 under low cost polyhouse condition in the Department of Fruit Science, College of Horticulture, Mudigere. The experiment was laid out in Completely Randomized Design with seven treatments *viz*., GA_3@200 ppm, humic acid (0.5%), panchagavya (3.0%), seaweed extract (0.2%), amritpani (3.0%)and triacontanol (0.5%). The results showed that, the foliar application of GA_3 @ 200 ppm was significantly recorded maximum graft height (46.2 cm), sprout length (18.76 cm), number of leaves (28.5), leaf area (43.5 cm^2), graft success (96.14%), graft survival (93.14%), graft vigour index-I (1128.97) and graft vigour index-II (3823.97) than the control. Among the treatments, GA_3@ 200 ppm found maximum graft parameters and it will be helpful in faster multiplication of quality planting materials by improving growth, vigour and success of grafts under hill zone of Karnataka.

Key words: *Avocado, Growth stimulants, Graft success percentage, Graft vigour index*

Introduction

India, often referred to as the world's fruit basket, boasts a rich diversity of fruit crops due to its varied agroclimatic conditions, making it ideal for growing tropical, subtropical, and temperate fruits. Avocado, with its attractive price and nutritional value, is one such fruit crop gaining popularity. Avocado belongs

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to the family Lauraceae. It is native to Central and South America. In India, avocado is grown as minor fruit crop. It is grown in a limited scale and scattered in southern tropical states like Tamil Nadu, Kerala, Karnataka, Maharashtra and in the eastern Himalayan states of Sikkim, Mizoram.

Recently, avocados have been commercially propagated through softwood grafting (Tripathi *et al.*, 2014). There is a great demand for quality grafted planting material in southern parts of Karnataka as the climate here is suitable for avocado cultivation. To provide farmers with high-quality, genuine avocado grafted plants quickly, softwood grafting is essential. The present study aims to assess the impact of growth stimulants on avocado graft growth, vigour and success which ultimately accelerats the production of quality planting materials.

Materials and Methods

The experiment was carried out in a low cost polyhouse at Department of Fruit Science, College of Horticulture, Mudigere, which is situated in hilly region (Zone-9 and Region V) of Western Ghats of Karnataka State at 13^0 25′ N latitude and 75^0 57′ E longitude at an altitude of 980 m above mean sea level. Seeds were promptly sown after extraction from the mature fruits. Vigorous, uniform two-month-old rootstocks were chosen for grafting. Healthy green type scions from the current season's growth were collected from Mudigere. A vertical, 4-5 cm cleft was made in the softwood of the stock with a sharp knife, forming a 'V' shape. The wedge-shaped scion was inserted into the 'V' slit and secured with a polythene strip. To prevent drying out, the grafts were covered with small polythene caps.

Completely randomized design was adapted for the present investigation. The various treatment details are T_1- Control (Water spray), T_2- GA_3 @ 200 ppm, T_3- Humic acid (0.5%), T_4- Triacontanol (0.5%), T_5- Panchagavya (3%), T_6- Amritpani (3%), T_7- Seaweed extract (0.2%). The spray was initiated at monthly intervals on the two month old grafted plants. Thirty grafted plants were selected for each treatment and were replicated thrice. The recorded data were analyzed statistically using various techniques as described by Panse and Sukhatme (1978). The treatment means were compared with C.D. at 5 per cent level. Graft vigour index was calculated using following formula. Graft vigour index I= Mean sprout length ×Graft percentage and Graft vigour index II = Mean graft height ×Graft percentage.

Results and Discussion

The findings of the present investigation on various graft growth parameters were considerably interpreted in Table 1.

There was a significant differences observed among the various treatments with respect to graft height and sprout length. The significantly maximum graft height (46.20 cm) and sprout length (18.76 cm) was recorded in T_2- GA_3 @ 200 ppm, while significantly minimum graft height (35.50 cm) and sprout length (8.51 cm) was recorded in control (water spray) at 150 days after grafting. This is due to GA_3 induced cell division (Stowe and Yamaki, 1957) and cell elongation (Shanmugavelu, 1970), which in turn would have increased the graft height

Table 1. Effect of growth stimulants on the graft parameters and vigour of avocado

Treatments	Graft height (cm)	Sprout length (cm) (150 DAG)	Number of leaves (150 DAG)	Leaf area (cm^2)	Graft success (%) (120 DAG)	Graft survival (%) (150 DAG)	GVI- I (150 DAG)	GVI- II (150 DAG)
T_1- Control (Water spray)	35.50	8.51	15.12	28.50	78.33	74.33	464.34	2523.01
T_2- GA_3 @ 200 ppm	46.20	18.76	28.50	43.50	96.14	93.14	1128.97	3823.97
T_3- Humic acid (0.5%)	40.20	10.36	20.23	34.25	88.72	85.72	657.24	3101.65
T_4- Triacontanol (0.5%)	43.50	12.66	23.50	39.50	90.00	88.00	793.80	3303.00
T_5- Panchagavya (3%)	41.50	10.73	21.00	36.50	86.34	84.34	641.94	3036.58
T_6- Amritpani (3%)	41.20	10.76	21.5	35.50	84.98	82.98	634.80	2999.58
T_7- Seaweed extract(0.2%)	45.60	14.64	25.12	40.84	92.88	90.88	909.76	3694.30
S. Em ±	0.50	1.16	0.30	0.42	1.68	1.39	11.17	55.92
C.D @ 5%	1.50	3.52	0.91	1.27	5.10	5.85	33.87	169.64

*DAG- days after grafting, GVI- Graft vigour index

and sprout length. These findings are in linewith Muralidhara *et al*. (2014) in mango seedlings, Patel *et al*. (2022) in Kagzi lime seedlings.

We noticed a significant variations among the treatments with respect to number of leaves and leaf area per graft. The significantly higher number of leaves (28.50) and leaf area (43.50 cm^2) was observed in T_2- GA_3 @ 200 ppm, while the lowest number of leaves (15.12) and leaf area (28.50 cm^2) was recorded in T_{1-} control. GA_3 might stimulate cell elongation is that the hydrolysis of starch resulting from the production of gibberellins induced α-amylase, thus raising the osmotic pressure in cell sap so that water enters the cell and stretch it, thereby increasing the number of leaves and leaf area (Muralidhara *et al.*, 2014).

The graft success percentage and graft survival percentage were varied significantly among the treatments, respectively. Significantly maximum graft success percentage (96.14%) and graft survival percentage (93.14%) were recorded in treatment GA_3 @ 200 ppm, minimum graft success (78.33%) and graft survival (74.33%) were recorded in control. GA_3 can help alleviate stress by promoting faster healing of wounds and the formation of callus tissue at the graft junction. This callus tissue acts as a bridge between the scion and rootstock, further enhancing graft success. Improved vascular tissue development can enhance nutrient and water uptake by the graft, improving its success. The results were in accordance with Kumar (2007) in mango.

The significantly graft vigour index-I (1128.97) and graft vigour index- II (3823.97) was noticed in treatment GA_3- @ 200 ppm, while minimum graft vigour index-I (464.34) and graft vigour index- II (2523.01) was found in control. GA-$_3$ enhanced the vegetative parameters such as sprout length, number of sprouts and number of leaves, graft height, leaf area, rootstock diameter and scion diameter which may directly influence the graft vigour index. The comparable outcomes produced with Dalal *et al.* (2002) in rangapur lime, Surakshitha *et al*. (2014) in jamun.

Conclusion

Among the various growth stimulants, GA_3@ 200 ppm has shown best results for vegetative parameters. GA_3 treated plants showed accelerated growth, vitality, enhanced vigour and helps in rapid multiplication of quality planting material.

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Conflict of interest

The authors declare that no conflict of interest exists.

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