www.ThePharmaJournal.com

The Pharma Innovation

**ISSN (E): 2277-7695**
**ISSN (P): 2349-8242**
**NAAS Rating: 5.23**
TPI 2023; 12(2): 894-897
© 2023 TPI
www.thepharmajournal.com
Received: 20-12-2022
Accepted: 28-01-2023

**Chandrakala D Jagdale**
M.Sc. Student, Department of Vegetable Science, College of Horticulture, Dapoli, DBSKKV, Dapoli, Maharashtra, India

**PB Sanap**
Vegetable Specialist, Vegetable Improvement Scheme, Central Experiment Station, Wakawali, Maharashtra, India

**YR Parulekar**
Assistant Professor, Department of Vegetable Science, College of Horticulture Dapoli, DBSKKV, Dapoli, Maharashtra, India

**SG Mahadik**
Vegetable Breeder, Vegetable Improvement Scheme, Central Experiment Station, Wakawali, Maharashtra, India

**KV Malshe**
Agronomist, Coconut Research Station, Bhatye, Ratnagiri, Maharashtra, India

**Corresponding Author:**
**Chandrakala D Jagdale**
M. Sc. Student, Department of Vegetable Science, College of Horticulture, Dapoli, DBSKKV, Dapoli, Maharashtra, India

# Effect of plant growth regulators and type of cuttings on propagation of little gourd (*Coccinia grandis* L.)

**Chandrakala D Jagdale, PB Sanap, YR Parulekar, SG Mahadik and KV Malshe**

**Abstract**
The present investigation entitled "Effect of plant growth regulators and type of cuttings on propagation of Little gourd (*Coccinia grandis* L.)" was carried out during 2021-2022 at the College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli, Dist. Ratnagiri. The experiment was laid out in Factorial Randomized Block Design (FRBD) with fifteen treatments and replicated thrice. In this experiment, effect of type of cuttings [basal cuttings ($C_1$), middle cuttings ($C_2$) and top cuttings ($C_3$)] and plant growth regulators [250 ppm IBA ($P_1$), 500 ppm IBA ($P_2$), 750 ppm IBA ($P_3$), Keradix powder ($P_4$) and Control ($P_5$)] on rooting and shooting parameters of little gourd cuttings were studied.
The data revealed that, the days required for sprouting, survival percentage and growth parameters of cuttings of little gourd were found to be significantly influenced by the types of cutting and different plant growth regulators. Among the interactions between types of cutting (C) and different plant growth regulators (P), it is concluded that basal cuttings treated with IBA @ 250 ppm was the most effective treatment among all treatments in all the respect of shoot parameters in little gourd under Konkan condition. The result obtained from this investigation can be used to develop a protocol for production of quality planting material of little gourd through cuttings.

**Keywords:** Little gourd, plant growth regulators, type of cuttings, sprouting and survival

## Introduction
Little gourd (*Coccinia grandis* L.) is an under-exploited vegetable crop belonging to the family Cucurbitaceae. It is commonly known as Kowai fruit, small gourd, Scarlet gourd, Baby watermelon, Ivy gourd, Gentleman's toes, Tindora and Kundru (Hindi). The nomenclature is derived from the Latin word Coccineus, meaning scarlet in reference to fruit colour. Its chromosome number is 2n=24.
It is a perennial, dioecious, herbaceous creeper with a duration of 3-4 years. The stem is herbaceous climber or perennial slender climber with occasional adventitious roots forming where the stems run along the ground. The leaves are classified as palmately simple with five lobes while the shape varies from the heart to pentagon form. The tendrils are long, elastic with coil like springy character that can wrap around the host to the entire length. It is highly cross-pollinated crop. Young leaves of little gourd are also edible and considered a good substitute for spinach in Thailand. There are certain clones which do not bear male flowers but set fruit parthenocarpically (Vegetative parthenocarpy is found). It is commercially propagated through semi-hardwood cuttings. Being a perennial plant, it can be spread vegetatively or by seeds. Propagation of little gourd through seed is avoided for its commercial cultivation due to poor seed viability and establishment of plants, resulting more than 50% non- fruiting i.e. male plants. Hence, the vegetative propagation through stem cuttings offers an excellent source for commercial cultivation. Propagation of little gourd is more profitable to farmer so the demand for little gourd rooted cuttings is at an increasing trend (Subbaiah *et al.*, 2018) [8].
Little gourd though remained as under-exploited vegetable crop, it is gaining the attention of cultivators due to high demand and attractive prices in the market. But its cultivation is limited due to scarcity of planting material. Area expansion is always dependent on availability of quality planting material. Propagation through cuttings is recognized methods of little gourd propagation. However, which type of cuttings and plant growth regulators should be used for propagation is not yet reported. Hence, an experiment was carried out to find out the suitable concentration of plant growth regulators and the suitable type of cutting for sprouting and survival of little gourd cuttings.

## Material and Methodology

The present investigation entitled "Effect of plant growth regulators and type of cuttings on propagation of Little gourd (*Coccinia grandis* L.)" was carried out at College of Horticulture, Dapoli (M.H), Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth Dapoli, Dist. Ratnagiri during year 2021-2022. The experiment was laid out in Factorial Randomized Block Design with fifteen treatments and replicated thrice. It comprised of five PGRs i.e. 250 ppm IBA, 500 ppm IBA, 750 ppm IBA and Keradix powder along with control, whereas three types of cuttings i.e. basal, middle and top cuttings. 50 cuttings were planted per treatment per replication.

### Source and Selection of planting material

The cuttings were collected from a Central Experimental Station, Wakawali, Tal - Dapoli. The cuttings taken from a healthy, vigorous, high yielding and one year old plants of little gourd. The different type of cuttings like basal, middle and top cuttings having 2 nodes per cutting were taken from little gourd plant. It was ensured that the selected cuttings were free from pest and diseases.

### Preparation of cuttings

The cuttings were taken from a mature one year old shoots made into small pieces having 2 nodes. The cuttings prepared from basal 1/3$^{rd}$ portion of plant were termed as basal cuttings (Length - 25-30 cm, Diameter – 20 mm), from middle 1/3$^{rd}$ portion were termed as middle cuttings (Length - 20-25 cm, Diameter – 10 mm) and the 1/3$^{rd}$ portion were referred as top cuttings (Length - 15-20 cm, Diameter – 5 mm). A slanting cut was given at the lower node of cuttings with the help of secateur, whereas a flat cut was given at the top of each cutting, so as to identify the polarity at the time of planting.

### Preparation of potting mixture and polyethylene bags

Potting mixture was prepared by mixing soil and vermicompost in the ratio of 2:1 as well as single super phosphate and neem cake were added in small quantity. Polyethylene bags of 4"x 3" cm size was used for filling potting mixture.

### Preparation of growth regulator solutions

For preparing stock solutions of different concentrations of IBA *viz*., 250, 500, 750 ppm, IBA @ 1 g, 2 g, 3 g respectively were weighed and dissolved separately in little quantity of ethyl alcohol and the volume was made up to 1000 ml by adding distilled water.

Preparation of growth regulator solutions

| Solution of IBA/ Required concentration of IBA | Quantity of IBA required | Volume made up |
|---|---|---|
| 250 ppm | 1 g | 4 litre |
| 500 ppm | 2 g | 4 litre |
| 750 ppm | 3 g | 4 litre |

### Treatment of cuttings with growth regulators and planting

For preventing fungal infection, cuttings were first dipped in 0.1% Carbendazim + mancozeb solution for about two minutes before planting. Bags were watered before planting. Small holes were prepared with the help of small stick in moist potting mixture to facilitate easy insertion of cuttings in potting mixture and to prevent any mechanical injury to cuttings. The basal portion of cuttings (about 2 cm length, basal node) was dipped in the respective growth regulator solutions for 30 minutes and then planted in the rooting media in polyethylene bags. The planting was done in slightly slanting position with one basal node buried inside the media. For Keradix powder treatment, basal portion of cuttings with basal node was dipped in Keradix powder and then planted in polyethylene bags. In the control, cuttings were directly planted without any growth regulator treatment. After planting, the soil at base was pressed firmly and polybags were irrigated immediately with the help of rose can.

### Statistical analysis

The experimental data were subjected to the statistical analysis by using various techniques as described by Panse and Sukhatme (1967) [5]. The method of analysis of variance for Factorial Randomized Block Design was used. The treatment differences were tested by F test of significance based on null hypothesis. The appropriate standard error was calculated in each case and critical difference (C.D.) at 5% level probability was worked out to compare the treatment means, where the treatment effects were significant.

## Result and Discussion

The results of the growth parameters of *Coccinia grandis* L. cuttings are showed in the Tables 1, 2 and 3. Significantly the maximum number of sprouts (3.97), sprouting percentage (80.40%), survival percentage (74.87%), length of main shoot (293.64 cm), diameter of shoot (4.80 mm), number of leaves (50.91), fresh shoot weight (112.62 g), dry shoot weight (19.57 g) and early sprouting (8.12 days) was recorded under $C_1$ (basal cuttings), while the minimum number of sprouts (2.28), sprouting percentage (32.20%), survival percentage (26.93%), length of main shoot (202.49 cm), diameter of shoot (3.08 mm), number of leaves (33.72), fresh shoot weight (60.48 g), dry shoot weight (7.69 g) and delayed sprouting (14.18 days) was recorded under $C_3$ (top cuttings). These findings are in the accordance with the result of Chandramouli, 2001 [1] in *Bursera penicillata*, Ghosh *et al.* (2016) [9] and Devi *et al.* (2016) [2] in Phalsa.

In case of plant growth regulators, significantly the maximum number of sprouts (3.76), sprouting percentage (71.33%), survival percentage (66.11%), length of main shoot (281.61 cm), diameter of shoot (4.35 mm), number of leaves (49.37), fresh shoot weight (107.62 g), dry shoot weight (18.74 g) and early sprouting (9.32 days) was observed under $P_1$ (250 ppm IBA), while the minimum number of sprouts (2.73), sprouting percentage (49.78%), survival percentage (43.33%), length of main shoot (228.57 cm), diameter of shoot (3.75 mm), number of leaves (39.09), fresh shoot weight (71.51 g), dry shoot weight (10.34 g) and delayed sprouting (11.43 days) was recorded under $P_5$ (Control – without PGR). Similar findings were reported by Chandramouli, 2001 [1] in *Bursera penicillata*; Jadhav *et al*. (2007) [4] and Devi *et al*. (2016) [2] in Phalsa.

**Table 1:** Effect of plant growth regulators and type of cuttings on days to sprouting, sprouting (%) and survival (%)

| Treatment | Days to sprouting | | | | | | Sprouting (%) | | | | | | Survival (%) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean |
| $C_1$ | 6.90 | 7.73 | 7.80 | 8.77 | 9.40 | 8.12 | 93.67 | 86.67 | 84.33 | 73.00 | 64.33 | 80.40 | 88.33 | 81.67 | 80.67 | 66.00 | 57.67 | 74.87 |
| $C_2$ | 7.90 | 7.10 | 8.33 | 9.03 | 9.73 | 8.42 | 82.33 | 91.67 | 84.00 | 62.67 | 59.33 | 76.00 | 77.33 | 85.67 | 76.33 | 55.33 | 52.33 | 69.40 |
| $C_3$ | 13.17 | 13.87 | 14.70 | 14.00 | 15.17 | 14.18 | 38.00 | 35.33 | 32.67 | 29.33 | 25.67 | 32.20 | 32.67 | 30.00 | 28.67 | 23.33 | 20.00 | 26.93 |
| Mean | 9.32 | 9.57 | 10.28 | 10.60 | 11.43 | | 71.33 | 71.22 | 67.00 | 55.00 | 49.78 | | 66.11 | 65.78 | 61.89 | 48.22 | 43.33 | |
| | C | | P | | C X P | | C | | P | | C X P | | C | | P | | C X P | |
| F test | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | |
| SEm± | 0.06 | | 0.07 | | 0.13 | | 0.63 | | 0.82 | | 1.42 | | 0.63 | | 0.82 | | 1.42 | |
| CD at 5% | 0.16 | | 0.21 | | 0.37 | | 1.85 | | 2.39 | | 4.13 | | 1.85 | | 2.39 | | 4.13 | |

**Table 2**: Effect of plant growth regulators and type of cuttings on number of sprouts, length of main shoot (cm) and Diameter of shoot (mm)

| Treatment | Number of sprouts | | | | | | Length of main shoot (cm) | | | | | | Diameter of shoot (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean |
| $C_1$ | 4.90 | 3.90 | 4.13 | 3.50 | 3.43 | 3.97 | 327.85 | 307.57 | 298.38 | 274.47 | 259.93 | 293.64 | 5.72 | 4.24 | 5.08 | 4.73 | 4.23 | 4.80 |
| $C_2$ | 3.87 | 4.80 | 3.90 | 3.00 | 2.70 | 3.65 | 293.26 | 325.57 | 298.76 | 270.87 | 242.59 | 286.21 | 4.20 | 5.62 | 4.60 | 4.18 | 4.06 | 4.53 |
| $C_3$ | 2.50 | 2.40 | 2.30 | 2.13 | 2.07 | 2.28 | 223.73 | 209.89 | 205.16 | 190.48 | 183.20 | 202.49 | 3.13 | 3.09 | 3.06 | 3.13 | 2.97 | 3.08 |
| Mean | 3.76 | 3.70 | 3.44 | 2.88 | 2.73 | | 281.61 | 281.01 | 267.43 | 245.27 | 228.57 | | 4.35 | 4.32 | 4.25 | 4.01 | 3.75 | |
| | C | | P | | C x P | | C | | P | | C x P | | C | | P | | C x P | |
| F test | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | |
| SEm± | 0.03 | | 0.04 | | 0.07 | | 0.64 | | 0.82 | | 1.42 | | 0.03 | | 0.03 | | 0.06 | |
| CD at 5% | 0.09 | | 0.11 | | 0.20 | | 1.85 | | 2.39 | | 4.14 | | 0.08 | | 0.10 | | 0.17 | |

**Table 3:** Effect of plant growth regulators and type of cuttings on number of leaves, fresh shoot weight (g) and dry shoot weight (g)

| Treatment | Number of leaves | | | | | | Fresh shoot weight (g) | | | | | | Dry shoot weight (g) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | Mean |
| $C_1$ | 63.27 | 52.60 | 50.57 | 44.80 | 43.30 | 50.91 | 137.85 | 124.13 | 117.93 | 96.03 | 87.17 | 112.62 | 27.96 | 21.87 | 19.77 | 14.72 | 13.53 | 19.57 |
| $C_2$ | 48.33 | 61.60 | 46.43 | 43.60 | 42.83 | 48.56 | 115.53 | 131.93 | 114.70 | 90.90 | 77.53 | 106.12 | 17.98 | 25.61 | 16.76 | 13.03 | 11.89 | 17.06 |
| $C_3$ | 36.50 | 32.67 | 35.10 | 33.20 | 31.13 | 33.72 | 69.47 | 65.67 | 62.13 | 55.33 | 49.82 | 60.48 | 10.28 | 8.38 | 7.18 | 7.03 | 5.60 | 7.69 |
| Mean | 49.37 | 48.96 | 44.03 | 40.53 | 39.09 | | 107.62 | 107.24 | 98.26 | 80.76 | 71.51 | | 18.74 | 18.62 | 14.57 | 11.59 | 10.34 | |
| | C | | P | | C x P | | C | | P | | C X P | | C | | P | | C X P | |
| F test | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | | SIG | |
| SEm± | 0.36 | | 0.47 | | 0.81 | | 0.99 | | 1.28 | | 2.22 | | 0.32 | | 0.41 | | 0.72 | |
| CD at 5% | 1.06 | | 1.36 | | 2.36 | | 2.89 | | 3.73 | | 6.46 | | 0.94 | | 1.22 | | 2.11 | |

Type of cuttings
1) C1: Basal cuttings
2) C2: Middle cuttings
3) C3: Top cuttings

Plant growth regulators
1) P1: IBA @ 250 ppm
2) P2: IBA @ 500 ppm
3) P3: IBA @ 750 ppm
4) P4: Keradix powder
5) P5: Control

In interaction effect, significantly the maximum number of sprouts (4.90), sprouting percentage (93.67%), survival percentage (88.33%), length of main shoot (281.61 cm), diameter of shoot (4.35 mm), number of leaves (63.27), fresh shoot weight (137.85 g), dry shoot weight (27.96 g) and early sprouting was observed under $C_1P_1$ (Basal cuttings treated with 250 ppm IBA), while the minimum number of sprouts (2.07), sprouting percentage (25.67%), survival percentage (20%), length of main shoot (183.20 cm), diameter of shoot (2.97 mm), number of leaves (31.13), fresh shoot weight (49.82 g), dry shoot weight (5.60 g) and delayed sprouting was recorded under $C_3P_5$ (Control – without PGR). The similar findings were reported in Chandramouli (2001) [1] in *Bursera penicillata*; Singh and Singh (2011) [7] in Bougainvillea; Ratnamala *et al.* (2014) [6] and Devi (2016) [2] in Phalsa.

## Conclusion

Plant growth regulators and type of cuttings significantly influenced sprouting, survival as well as further growth of cuttings. Among the various type of cuttings, basal cuttings respond well to growth parameters of shoot. IBA @ 250 ppm found the most promising in development of shoot of basal cuttings of little gourd under protected conditions. The interaction effect revealed that IBA @ 250 ppm when used for dipping basal cuttings of little gourd exerted significant positive effect on all shoot parameters. Thus, for higher sprouting, better survival as well as better growth, basal cuttings of little gourd treated with 250 ppm IBA should be used for propagation. However, the present findings are based on one season data and requires confirmation by conducting the trials further 2-3 season.

## References


1. Chandramouli H. Influence of growth regulators on the rooting of different type of cuttings in *Bursera penicillata* (DC) Engl. M.Sc (Agri.). Thesis Submitted to university of Agricultural Sciences, Bangalore (Unpublished); 2001.
2. Devi J, Bakshi P, Wali VK, Kour K, Sharma N. Role of auxin and dates of planting on growth of cutting raised plantlets of Phalsa (*Grewia asiatica* L.). The Bio scan. 2016;11(1):535-537.
3. Ghosh A, Dey K, Mani A, Bauri FK, Mishra DK. Efficacy of different levels of IBA and NAA on rooting of Phalsa (*Grewia asiatica* L.) cuttings. Int. J Chem. Studies. 2017;5(6):567-571.
4. Jadhav AS. Studies on propagation of phalsa by cuttings. M.Sc. (Agri.) Thesis, Univ. Agric. Sci. Dharwad,

Karnataka (India); c2007.
5. Panse VG, Sukhatme PV. Statatical methods for Agricultural workers, ICAR, New Delhi; c1967.
6. Ratnamala M, Prasannakumar B, Swami DV, Salomi Sumitha DR. Effect of auxins and type of cutting on propagation of phalsa (*Grewia subinaequalis* DC.) under shade net condition. Green Farming. 2014;5(3):419-423.
7. Singh N, Singh BP. Effect of different concentrations of indole butyric acid (IBA) on sprouting, rooting and callusing potential of bougainvillea stem cuttings. The Asian J Hort. 2011;6(1):229-230.
8. Venkata Subbaiah K, Reddy RVSK, Babu JD, Raju GS, Karunasree E, Reddy AD, et al. Effect of different potting media on propagation of ivy gourd through stem cuttings. International Journal of Pure and Applied Biosciences. 2018;6(1):894-897.
9. Ghosh I, Marzo L, Das A, Shaikh R, König B. Visible light mediated photoredox catalytic arylation reactions. Accounts of Chemical Research. 2016 Aug 16;49(8):1566-77.