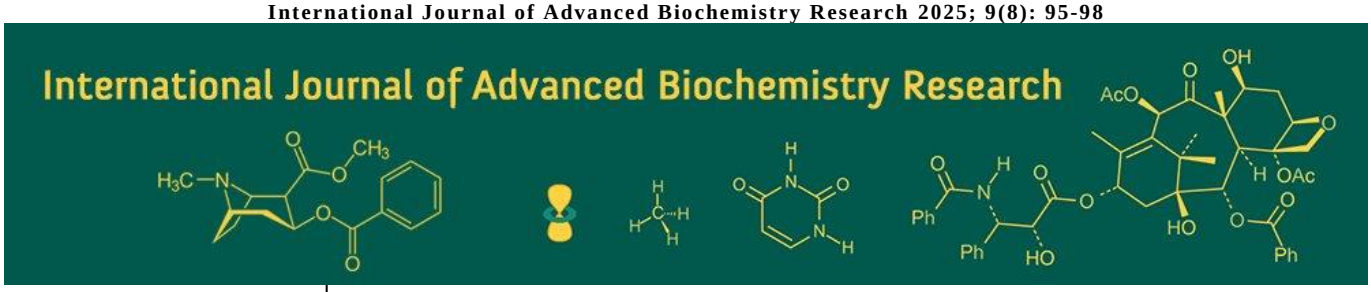

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Effect of plant growth regulators and chemical on survival of hardwood cuttings in fig *(Ficus carica* L.*)*

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Abstract
The experiment was carried out at Department of Horticulture (Fruit science) SHUATS, Prayagraj during the month of August, 2024 to November, 2024. To evaluate the "Effect of Plant Growth Regulators and Chemical on Survival of Hardwood Cuttings in Fig (*Ficus carica* L.)". The experiment was laid out in RBD (Randomized Block Design) comprising of 16 treatments *viz*., T_0 Control, T_1 IAA500+NAA500+PG500, T_2 IAA500 + NAA 1000+PG1000, T_3 IAA500+NAA1500+PG1500 T_4 IAA1500+NAA500+PG1000 T_5 IAA1500 +NAA1000+PG500 T_6 IAA1500+NAA1500+PG1500 T_7IAA1000+NAA500+PG15 00 T_8 IAA1000+NAA1000+PG500 T_9 IAA1000+NAA1500+PG1000 T_{10} PG500+NAA500 T_{11} PG1000+NAA1500 T_{12} PG1500+NAA500 T_{13} PG500+IAA500 T_{14} PG1000+IAA 1000 T_{15} PG1000+IAA1500 with three replications in shed net house The treatment in each replication will be allotted randomly. The study revealed that the treatment T_{10}: PG500 + NAA500 gave higher growth parameter such as: Plant height, no. of leaves, Plant spread, shoot diameter, no. of leaves, no. of shoots.

Keywords: Fig, Growth parameter, Benefit cost ratio

1. Introduction
Stem cuttings particularly from plants having profuse branch system are the most important means for propagating different types of plants for their numerous advantages. By this method many new plants can be started in a limited space from a single or few stock plants. It is an inexpensive, rapid, simple method and does not require special techniques as required in the case of grafting or budding. Greater uniformity is obtained by absence of variation which sometime appears as a result of variable seedlings and root stocks of grafted plants. The time required for a desired result is also shortened in these plants. The parent plant is usually reproduced exactly by a plant raised from stem cutting without any genetic change. For these advantages propagation of new plants by stem cuttings is widely practiced by farmers, foresters and horticulturists

Fig *(Ficus carica* L.) is a deciduous fruit crop in tropical and subtropical countries and belongs to family Moraceae. Fig has antipyretic, diuretic and Aphrodidiac properties are reported natural tonic for energy and vitality. Figs are often used for preparing cakes, jam and added to ice cream mix. in India POONA Fig is the most popular cultivar grown for consumption as fresh fruit. recently a variety ―DINKAR‖ an improvement over Daulatabad variety for yield and fruit quality is Ganing commercial importance. Figs are one of the richest plant sources of calcium and Fiber, copper, manganese, magnesium, potassium, calcium and vitamin k. it is propagated by both sexual and asexual method of propagation Fig plant can be propagated from seeds extracted from dried fruits. the zygotic seedling usually is not true to type and are employed only to breed new varieties. Fig is commercially propagated by cuttings in India. with cuttings vigorous saleable plants can be produced in less than one year. root promoting hormone play important role in the success of rooting of cuttings.

The most commonly used growth regulators are auxins which are essential for process of rooting, possibly because they stimuli the ethylene synthesis, thus favoring rooting. the substances most commonly used for better rooting in cuttings of various plant are indole butyric acid (IBA), indole acetic acid (IAA) and naphthalene acetic acid (NAA) with varied concentration. the problem lies in very low or undesirable percentage of success. keeping in

view, this investigation was carried out to see the role of auxins on rooting of different types of cuttings in Fig. the ability of branch cutting to sprout and root is determined by various internal and external factors. these include the type of cuttings, seasons, concentration of endogenous and exogenous phytohormones, physiological basis and various another internal basis (Arya *et al.*, 1994) [1].

Among various auxins, IBA (Indole-3-butyric acid) and NAA (Naphthaleneacetic acid) have been found to be more effective than IAA (Indole-3-acetic acid) and 2,4-D in encouraging root development, according to Hartman and Kester (1975) [3]. These PGRs help in increasing the number of roots, root length, and also enhance shoot growth in many fruit and ornamental plants.

In some cases, using a combination of auxins has shown even better results. For example, in fig plants (*Ficus carica* L.), which are generally hard to propagate from cuttings, applying auxins led to longer roots, more root numbers, and higher survival rates of rooted cuttings, as per Reddy *et al.* (2008) [4]. Although fig is considered a difficult plant for rooting by cuttings, better success has now been achieved by using various techniques—such as selecting the right type of cuttings and applying different concentrations of PGRs.

Natural auxin levels and their effects differ depending on the species, so it's important to adjust the method accordingly (Hartman and Kester, 1989). In Maharashtra, the government is actively promoting fig cultivation by offering technical guidance and financial support under the Employment Guarantee Scheme. This support has created opportunities for developing better nursery techniques for fig propagation.

2. Materials and Methods

2.1 Geographical location and Climate condition of the of the experimental area

The experimental site is located at a latitude of 25.41º North and longitude of 81.84 º East, with an altitude of 98 meters above the mean sea level (MSL). Prayagraj comes under subtropical climate zone prevailing in the winter and summer. It is situated at latitude of 25.850C N and longitude of 81.150E. The altitude of this place is 78 m from MSL. During the winter months, the temperature drops down as low as 20C while in the summer the temperature reaches above 480C hot desiccating winds are regular feature during summers whereas there may be occasional spell of frost during the winters. The average rainfall in this area is above 1013.4 mm, mostly during the monsoon i.e. July to September, with a few occasional showers during the winter months. Meteorological data were recorded during experiment and shown in the table 3.2 The meteorological data recorded by Agro meteorological observatory unit, Sam Higginbottom Institute of Agriculture Technology and Sciences, Prayagraj during the experimental period 2024.

2.2 Experiment details

The experiment was conducted at Commercial Fruit Nursery Unit; Department of Horticulture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Prayagraj, during the year 2024.

Table 1: Experiment Details

T. No	Treatments Details
T_0	CONTROLS
T_1	IAA500+NAA500+PG500
T_2	IAA500+NAA1000+PG1000
T_3	IAA500+NAA1500+PG1500
T_4	IAA1500+NAA500+PG1000
T_5	IAA1500+NAA1000+PG500
T_6	IAA1500+NAA1500+PG1500
T_7	IAA1000+NAA500+PG1500
T_8	IAA1000+NAA1000+PG500
T_9	IAA1000+NAA1500+PG1000
T_{10}	PG500+NAA500
T_{11}	PG1000+NAA1500
T_{12}	PG1500+NAA500
T_{13}	PG500+IAA500
T_{14}	PG1500+IAA1000
T_{15}	PG1000+IAA1500

3. Results and Discussions

The maximum cutting height (cm) at 30, 60, and 90 DAS was observed in T_{10} (PG500+NAA500) (22.4, 38.1, 61.7) respectively. The minimum value of cutting height (cm) was observed in T_0 Control (9.8, 23.3, 43.5) respectively. the result obtained in this research work was found significant throughout the study. Similar results were reported by (Chopde *et al.*,1999) [2] in custard apple (*Annona squamosa* L.).

The maximum plant spread (cm) at 30, 60, and 90 DAS was observed in T_{10} (PG500+NAA500) (33.7, 35.4, 41.9) respectively. The minimum value of plant spread (cm) was observed in T_0 Control (11.3, 11.8, 22.1) respectively. the result obtained in this research work was found significant throughout the study. Similar findings were reported by Singh (2021) [6] who observed that media combinations containing organic amendments like compost and vermiculite resulted in enhanced plant growth parameters, including increased plant spread**)** in which the number of leaves was found maximum in the foliar spray of Hexaconazole.

The maximum shoot diameter (mm) at 30, 60, and 90 DAS was observed in T_{10} (PG500+NAA500) (4.1, 5.9, 7.6,) respectively. The minimum value of shoot diameter (mm) was observed in T_0 Control (1.9, 3.5, 4.9) respectively. the result obtained in this research work was found significant throughout the study. Similar results were recorded by White comb (1983), who stated that high humidity and suitable temperature, which maintained inside the plastic tunnel rather than outside provided good vegetative growth.

Data presented on table (4.4) and fig. (4.4) indicate that maximum number of leaves (no.) per plant at 30, 60, and 90 DAS was observed in T_{10} (PG500+NAA500) (13, 15.33, 16.33) respectively. The minimum value of number of leaves (no.) per plant was observed in T_0 Control (2.66, 4.0, 5.0) respectively. the result obtained in this research work was found significant throughout the study. Similar results were reported by Panwar in pomegranate.

The maximum number of plant shoots (no.) per plant at 30, 60, and 90 DAT was observed in T_{10} (PG500+NAA500) (3.33, 4.66, 6.66) respectively. The minimum value of plant shoots (no.) per plant was observed in T_0 Control (1, 1.66, 2.33) respectively. the result obtained in this research work was found significant throughout the study. Similar results were reported by (Soegiman,1982) [7].

The maximum plant leaf area (cm^2) at 30, 60, and 90 DAS was observed in T_{10} (PG500+NAA500) (35.06, 74.96, 112.33) respectively. The minimum value of plant leaf area (cm^2) was observed in T_0 Control (20.76, 59.9, 98.76) respectively. the result obtained in this research work was found significant throughout the study. Siddiqui and Hussain (2007) [5] reported that the increase in leaf area is related with growth and plants with vigorous growth gave more leaf area and vice versa in *Ficus Hawaii* These results are in close agreement with the findings of Chauhan and Maheshwari in peach, Pinheiro *et al*. (1971) in Fig, Seranand Umadevi (2011) in lemon and Moreno *et al*. (2009) in cape gooseberry.

The maximum chlorophyll content (SPAD VALUE) at 30, 60, and 90 DAS was observed in treatment 10 (PG500+NAA500) (45.03, 48.46, 53.63) respectively. The minimum value of chlorophyll content (SPAD VALUE) was observed in treatment 0 Control (29.5, 32.23, 35.3) respectively. the result obtained in this research work was found significant throughout the study. Similar results were also found by Sukha want in grape.

The maximum on percent success of cuttings in Fig was observed in treatment 10 (PG500+NAA500) (99.74) respectively. The minimum value of percent success of cuttings in Fig was observed in treatment 0 Control (58.50) respectively. Similar results were also found by.

Table 1: Effect of plant growth regulators and chemical on different parameters of Fig.

T. No	Treatments Details	Cutting Height (CM)	Plant Spread(cm)	Shoot Diameter (mm)	Number of leaves per plant	Number of shoots per plant	Leaf Area (cm^2)	Chlorophyll Content (SPAD)	Percent success of cuttings (%)
T0	CONTROLS	43.50	22.10	4.90	5.00	2.33	98.76	35.30	58.50
T1	IAA500+NAA500+PG500	46.20	25.50	5.10	6.00	3.00	101.46	39.36	83.50
T2	IAA500+NAA1000+PG1000	45.30	24.10	5.10	6.66	2.66	100.83	36.73	82.67
T3	IAA500+NAA1500+PG1500	49.00	28.50	5.40	7.66	3.66	105.46	40.33	85.83
T4	IAA1500+NAA500+PG1000	58.20	37.20	6.60	11.00	4.66	109.53	47.46	97.40
T5	IAA1500+NAA1000+PG500	47.60	27.10	5.30	7.66	3.33	102.73	39.60	83.90
T6	IAA1500+NAA1500+PG1500	50.20	29.20	5.30	8.33	3.66	103.46	41.63	88.40
T7	IAA1000+NAA500+PG1500	59.20	38.60	6.80	14.33	5.66	110.46	51.00	97.50
T8	IAA1000+NAA1000+PG500	54.40	32.80	5.80	10.33	4.33	106.26	43.60	93.50
T9	IAA1000+NAA1500+PG1000	56.10	34.30	6.20	10.88	4.33	107.40	45.40	95.50
T10	PG500+NAA500	61.70	41.90	7.60	16.33	6.66	112.33	53.63	99.74
T11	PG1000+NAA1500	57.40	36.00	6.30	10.66	4.66	108.53	47.16	96.55
T12	PG1500+NAA500	51.50	30.20	5.60	9.33	4.00	104.66	42.73	90.70
T13	PG500+IAA500	60.70	40.70	6.90	14.66	5.85	111.36	51.73	98.50
T14	PG1500+IAA1000	53.10	31.30	5.80	9.66	4.33	105.63	43.03	92.50
T15	PG1000+IAA1500	44.50	23.20	4.80	5.66	2.33	99.76	36.46	81.85
F-Test		s	s	s	s	s	s	s	s
S.Ed.(±)		0.29	0.32	0.09	0.98	0.56	0.30	0.28	0.12
C.D. at 0.5%		0.59	0.65	0.18	2.00	1.14	0.61	0.56	0.24

4. Conclusion

Based on the observations recorded during the study, it can be concluded that the treatment T_{10} (Phloroglucinol 500 ppm + Naphthalene acetic acid 500 ppm) was the most effective in promoting overall plant growth and development under the agro-climatic conditions of Prayagraj. This treatment consistently outperformed others across multiple growth parameters. It recorded the growth parameters, yield parameter and chemical parameters, the combined application of (Phloroglucinol and Naphthalene acetic acid. at 500 ppm) each showed a positive synergistic effect on vegetative growth and physiological performance. Therefore, T_{10} can be recommended as the most effective treatment for enhancing plant growth under Prayagraj conditions.

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