Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 2386-2391

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7692 **Special Issue-6 pp. 2386-2391**
Journal homepage: http://www.ijcmas.com

Original Research Article

Effect of Plant Growth Regulators on Rooting and Survival of Hard Wood Cuttings in Fig

Megha Dahale*, Ekta P. Ningot and N. Muske Deepa

Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India
**Corresponding author*

A B S T R A C T

The experiment was conducted at 'Main garden of Department of Horticulture" Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The experiment was laid out in Completely Randomized Design with 10 treatments of plant growth regulator with one control, replicated three times. the growth regulator treatment comprised of 500 ppm IBA, 750 ppm IBA, 1000 ppm IBA, 500 ppm NAA, 750 ppm NAA, 1000 ppm NAA, 500 ppm IBA + 500 ppm NAA, 750 ppm IBA + 750 ppm NAA, 1000 ppm IBA + 1000 ppm NAA and control. The result of the investigation indicated that among different plant regulator treatments 1000 ppm IBA + 1000 ppm NAA treatment gave maximum shoot growth, root growth, percentage of rooted cuttings, survival percentage of rooted cuttings and root to shoot ratio over rest of the treatments. The formulation of 1000 ppm IBA + 1000 ppm NAA helped in better induction in rooting 58.66 per cent as against 32.80 per cent in the control. Similar treatment exhibited high survival percentage of rooted cuttings 82.50 per cent as against 64.26 per cent in the control.

Keywords

Growth Regulators on Rooting and Survival of Hard Wood Cuttings in Fig

Introduction

The common fig (*ficuscarica)* is subtropical and large, deciduous shrub or small tree 10 to 30 ft (3-9m) high, with short and twisted trunk with leaves deeply 3 to 5 lobed. It contains copious milky latex. The fig is a native of Asia Minor and spread early to Mediterranean region. Fig is consumed fresh or in processed form. The dried form being the most popular. The dry fig has a high nutritive value. Fresh figs are delicious and nutritious which is rich in calorie, protein, calcium and iron. Figs have a laxative effect and contain many antioxidants. 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 gaining commercial importance.

Fig is propagated by asexual propagation, which is very useful for replicating true to type clonal planting material for multiplication of elite plants for plantation purpose, germplasm conservation and introduction of fast growing species. In comparison to other methods of asexual propagation in fig, propagation by stem cutting has been the modern commercial nursery practices as a rule (Aminove, 1972) Fig is hard to root. Although fig can strike

roots but rooting is not appreciable. Growth regulators are to be used to improve its rooting ability. Plant growth regulators usually auxin have an important role in stimulation and initiation of roots to cutting. Auxin induces root formation by breaking root apical dominance induced by cytokinin (Cline, M.G., 2000). There exists lot of contradiction with regards to optimum concentration of growth regulator treatments. Hence, it is possible that by use of optimum use of growth regulators would help for rapid multiplication in propagating of fig cuttings possible that by use of optimum use of growth regulators would help for rapid multiplication in propagating of fig cuttings. Now a days many of the difficult-to-root plants are made to root easily by applying plant growth substances. In cuttings, growth substances applied exogenously are found to enhance early and good root formation. Various classes of growth regulators such as auxins, cytokinins, gibberellin and ethylene influence root initiation in cuttings. Of these, auxins have greater effect on root formation in cuttings. The research work on rooting of fig is very much limited.

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 phytoharmones, physiological basis and various other internal basis (Arya *et al.*, 1994). Plant growth regulators improve the rooting of cutting by stimulating the production of adventitious roots. Went (1934) first postulated that, auxins initiate adventitious root formation in stem cuttings.

Materials and Methods

The experiment was carried out by planting cuttings in (22.0cmx12.5cm) size polythene bags as shown in fig1. The polythene bags were punctured to improve the drainage and filled with garden mixture which was prepared by well mixing of two parts of soil, one part of sand and one part of well-rotted FYM.

The cuttings of fig cv. Dinakar fig were used for this research work. Hardwood cuttings, selected from 8 years old mother plant. The experiment was laid out in completely randomized design.

There were 10 treatments of growth regulator formulations used at different concentrations; thirty cuttings were used for each treatment which was replicated thrice.

Preparation of plant growth regulator solutions

Treatment wise plant growth regulator solutions IBA and NAA alone and in combinations were prepared as per the procedure laid down by Hartman and Kester (1989). A stock solution of 500,750 and 1000 ppm of each IBA, NAA and IBA+NAA (500,750 and 1000 mg in 1000 ml water respectively) was prepared separately. IBA and NAA was prepared by dissolving chemical first in little quantity of 80% alcohol and later the volume was made up to 1000 ml by adding distilled water.

After treatments following observations were recorded as

Shoot growth observation, Days required to sprouting, Length of sprout, Number of sprouts per cutting, Number of leaves, Leaf area, Root growth observation, Number of roots per cutting, Length of root, Percentage of rooted cuttings using standard protocol.

It can be calculated by using following formula

$$\text{Percentage of rooted cuttings} = \frac{\text{No. of cuttings rooted}}{\text{Total no. of cuttings}} \times 100$$

Total phenols

The amount of total phenols was estimated by Folin-Ciocalteau Reagent (FCR) method (Mahadevan, 1964).

Results and Discussion

The result of the investigation based on the various observations viz., shoot growth, root growth, rooting percentage and survival percentages of rooted cuttings, root to shoot ratio and phenolic compound as shown in fig 2, 3. Amongst different plant growth regulators, cuttings treated with 1000 ppm IBA+1000 ppm NAA gave significantly maximum shoot growth, root growth, percentage of rooted cuttings, survival percentage of rooted cuttings and root to shoot ratio.

The shoot growth in respect of length of sprout (11.46 cm), number of sprouts (2.97), number of leaves (7.20) and leaf area (221.66 cm^2) were recorded maximum in the treatment 1000 ppm IBA+1000 ppm NAA. Whereas, the minimum length of sprout (6.63 cm), number of sprouts (1.30), number of leaves (2.89) and leaf area (51.33 cm^2) were recorded in control treatment.

Fig.1 General View of Experimental plot

Fig.2 Effect of plant growth regulator on root length (cm)

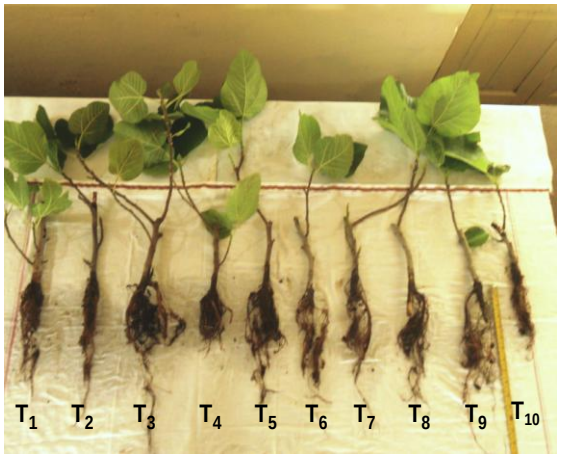

Fig.3 Effect of plant growth regulator on length of sprout (cm)

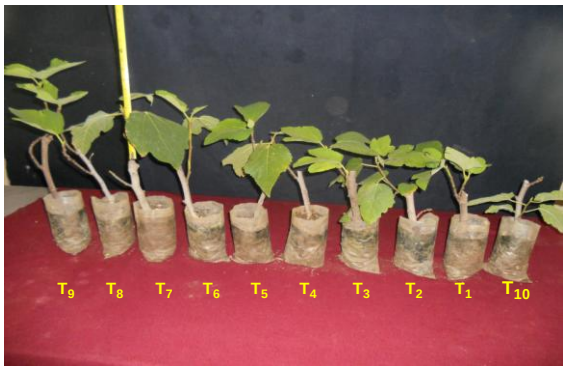

Table.1 Total phenol content of fig cutting as influenced by growth regulator

Sr. No.	Treatments	Rooted cuttings (%)
1	500 ppm IBA	(40.58)
2	750 ppm IBA	(42.32)
3	1000 ppm IBA	(45.38)
4	500 ppm NAA	(39.42)
5	750 ppm NAA	(42.99)
6	1000 ppm NAA	(42.40)
7	500 ppm IBA + 500 ppm NAA	(41.55)
8	750 ppm IBA + 750 ppm NAA	(46.30)
9	1000 ppm IBA + 1000 ppm NAA	(50.02)
10	Control.	(34.92)

Table.2 Effect plant growth regulators on percentage of rooted cuttings

Sr. no.	Treatments	Phenolic compound (Mg/g d.wt.)
1	500 ppm IBA	2.40
2	750 ppm IBA	2.36
3	1000 ppm IBA	2.30
4	500 ppm NAA	2.55
5	750 ppm NAA	2.45
6	1000 ppm NAA	2.51
7	500 ppm IBA + 500 ppm NAA	2.45
8	750 ppm IBA + 750 ppm NAA	2.25
9	1000 ppm IBA + 1000 ppm NAA	2.13
10	Control.	2.63

Table.3 Effect of plant growth regulators on survival percentage of rooted cuttings

Sr. No.	Treatments	Survival of rooted cuttings (%)
1	500 ppm IBA	74.20 (59.49)
2	750 ppm IBA	76.10 (60.74)
3	1000 ppm IBA	80.44 (63.77)
4	500 ppm NAA	72.90 (58.64)
5	750 ppm NAA	75.10 (60.07)
6	1000 ppm NAA	75.60 (60.41)
7	500 ppm IBA + 500 ppm NAA	74.26 (59.53)
8	750 ppm IBA + 750 ppm NAA	78.20 (62.17)
9	1000 ppm IBA + 1000 ppm NAA	82.50 (65.28)
10	Control.	64.26 (53.29)

In respect of root growth, the maximum root number (25.10), length of roots (24.54 cm), percentage of rooted cuttings (58.66%), and root to shoot ratio (0.18) were registered in cuttings treated with 1000 ppm IBA+1000 ppm NAA. Whereas, the minimum root number (10.50), length of roots (10.86 cm), percentage of rooted cuttings (32.80%) and root to shoot ratio (0.09) were recorded in control treatment.

The maximum survival percentage of rooted cuttings 82.50% recorded in the similar treatment that is in 1000 ppm IBA + 1000 ppm NAA. As against 64.26 % in control. In the overall conclusion, it may be summarized that, the fig planting material can be raised with high success by pre-treatment of cuttings with 1000 ppm IBA + 1000 ppm NAA. The results are based on the observation of experiment conducted for only one season and therefore these results are suggestive and an extensive trial may be conducted to confirm the above result in upcoming trials. The supporting data has been given as follow.

References

Aminov, K. H. L. 1972. Subtrop. Kul'tury, 6:91-107.

Antumes,L.E.S., N.N.J.Chalfun, M.Pasqual, L.F.Dutra and T.M. Cavalcante - alves.2008. Factors affecting on rooting of fig (*Ficus carica* L.) Cuttings. Acta Hort.No.605 @ www.cera.jcc.in.

Arya, S., R. Tomar, and O.P. Toky.1994.Effect of plant age and auxin treatment on rooting response in stem cuttings of *Prosopis cineraria*. J. Arid Environ. 27(1): 99-103.

Baghel, B. S. and B.K. Saraswat. 1989. Effect of different rooting media on rooting and growth of hardwood and semi hardwood cuttings of pomegranate (*Punica granatum* L.) Indian J.Hort. 46: 458-62.

Basu, R.N.1969. Effect of auxin synergists in rooting of French bean (*Phaseolus vulgaris* L.) cuttings. Curr. Sci., 38: 533-535.

Hartman, H.T., D.E. Kester and F.T.Davies.1990.Plant propagation principal and practices. (5th Edition), Prentice Hall. Inc.

Hegde, S.S.1988. Propagation studies in some ornamental shrubs by cuttings. M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad.

Hore, J.K. and S.K. Sen. 1992.Propagation of sapota (*Achrassapota* L.) by stem cuttings. Indian Agrist, 36:101-105

Kumar, D.P., N.V. Vijayakumar and

U.V.Sulladmath.1984.Propagation of *Ficuselastica* from single leaf two-node semi hardwood cuttings under intermittent mist. South Indian Hort.32 (3): 177-179.

Kumar, R., D.S. Gill and R.A. Kaushik.1995.Effect of Indole Butyric Acid, P-Hydroxybenzoic acid and season on the propagation of lemon Cv. Baramasi from cuttings. Haryana J. Hort. Sci. 24(1): 13-18.

Lakhani, R.N. and N.N. Gajipara. 1998. Effect of plant growth substances on rooting and survival of stem cutting of pomegranate (*Punica granatum*) var. Ganesh and Dholka. J. Applied Hort.4 (1-2): 52.

Went, F.W. 1934. A test method for rhizocaline, the root forming substances. A. Akad. Wastenchap Amsterdan, Proc. Sect. Sci., 37: 445-455.