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Effect of Type of Cuttings and IBA Concentrations on the Propagation of Fig (*Ficus carica*) cv. Poona fig under Polyhouse Conditions

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ABSTRACT: *A study was conducted in fig in order to find out suitable cuttings and IBA concentration for propagation of fig in polyhouse conditions. Rooting and survival percent, root and shoot parameters like root and shoot length, no. of roots and shoots, number of leaves, fresh and dry weights of root and shoots were best recorded in basal cuttings. Among the IBA concentrations imposed, IBA 3000 ppm recorded highest in above said parameters. Among the interactions between type of cuttings and IBA concentrations, basal cuttings treated with IBA 3000 ppm recorded in all parameters in including field survival percentage of rooted cuttings. Days to first sprouting was less in apical cuttings treated with IBA 3000 ppm. The above rootings and shooting parameters and field establishment were least recorded in apical cuttings treated with IBA 1000 ppm. So, basal cuttings treated with IBA 3000 ppm are best for propagation of fig in polyhouse conditions.*

Key words: *Fig, IBA, Cuttings, ppm*

INTRODUCTION

The genus *Ficus*, commonly known as figs belongs to the family Moraceae and constitutes an important group of trees. Among them, *Ficus carica* is the most popular and economically important species. It is a deciduous and subtropical tree, originated in east Mediterranean region from where its cultivation expanded to the whole of the Mediterranean region. Greece is now the leading producer of fig followed by the Algeria, Morocco, Syria, and Italy. In India, it has been in cultivation since pre-historic times.

However, the area under common fig has not expanded, in spite of the prevailing favourable soil and climatic conditions. In India, fig is cultivated in an area of about 1200 ha in India and commercially grown in Pune district of Maharashtra state. Asexual propagation is the best way to maintain some species. Fig is not an exceptional, it is also propagated by asexual propagation.

Currently, commercial fig (*Ficus carica)* nursery tree production is mainly based on cuttings taken from the mother plant and are placed in a rooting or growing medium, which will eventually produce roots and shoots thus forming a new plant identical to the mother plant (Valio,1986). 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, 2000). There exists lot of contradiction with regards to optimum concentration of growth regulator treatments and type of cutting to be used in polyhouse conditions. Eventually, reports on systematic investigation on the propagation of fig from cuttings and use of growth regulators for better growth are scanty. Therefore, it necessitates undertaking the study on propagation of fig by using different concentrations of IBA and type of cuttings.

MATERIAL AND METHODS

The present investigation was carried out during 2011-2012 in polyhouse at Horticulture College and Research Institute, Dr.Y.S.R.Horticultural University, Venkataramannagudem, West Godavari District. The site is located at an altitude of 34 m (112 feet) above mean sea level. The geographical situation is 16.8°N latitude and 81.5°E longitude. The location falls under Agro-climatic zone-10, humid, East Coast Plain and Hills (Krishna-Godavari zone) with an average rainfall of 900 mm. It experiences hot humid summer and mild winters.

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The experiment was laid out in factorial randomized block design with three replications inside the polyhouse. Each treatment contains 30 cuttings. Cuttings are prepared from the shoots or the current seasons growth and each cuttings was about 20-25cm long 1-2 cm thick. From each shoot 3 cuttings are prepared from basal, middle and apical positions. Slant cut is given on bottom and round cut on the above. Base of the cuttings are dipped in IBA solutions prepared by dissolving 1g, 2g and 3g of IBA each in 1lit. water gives 1000, 2000 and 3000 ppm concentrations.

The treated cuttings are shade dried for 5 minutes and are planted in poly bags filled with potting mixture in slanting position. Potting mixture was prepared by mixing red earth, leaf mould and farm yard manure in the ratio of 3:1:1, Single Super Phosphate and Furadon 3G granules were added. Polyethylene bags of 15 × 23 cm size of 235 gauge were used for filling potting mixture. The tips of the cuttings are smeared with cow dung to protect from fungal infections and desiccation. Regular watering and plant protection operations are done manually as prescribed.

Five sprouted cuttings were selected randomly from each treatment per replication. These five cuttings were labeled for recording observations throughout the study. Parameters recorded are days to first sprouting, Root parameters like rooting percent, length of the longest root, number of roots per cutting, root fresh and dry weights, shoot parameters like number of shoots, length of the longest shoot, number of leaves per cutting, leaf area per cutting, shoot fresh and dry weights, survival and field establishment percentages are recorded 90 days after planting of cuttings in poly bags. The data was analyzed using computer software programme by the method of variance outlined by Panse and Sukhatme (1978). Statistical significance was tested by F value at 5 per cent level of significance. Critical difference at 0.05 level was worked out for the effects which were significant.

RESULTS AND DISCUSSION

Type of cuttings had significant effect on all parameters. Basal cuttings recorded highest rooting (37.19) and survival percentage (85.24). Also recorded highest length of the root (16.20) and root number (21.58) per cutting. Basal cuttings also recorded highest root fresh (1.41) and dry weight (0.39) and field survival percentage in open conditions. Better performance of basal cuttings over other types may be due to the fact that increased carbohydrate storage and also presence of more preformed root initials in basal cuttings (Zalesny *et al.,* 2003). Results are in accordance with Shekharappa (1983) in pomegranate and Reddy *et al.* (2008) in fig. Basal cuttings recorded highest shoot length (18.27), leaves (9.46) and leaf area (282.07). Fresh (49.53) and dry weights (16.22) of shoots were more in basal cuttings compared to middle and apical cuttings. This may be due to the fact that basal cuttings give more number of sprouts than middle and apical cuttings because of more maturity and thickness and also contains more amount of food reserves in basal cuttings (Hartmann *et al.,* 2007). The results are in accordance with Purohit and Shekharappa (1985) in pomegranate. But days to first sprouting was less recorded in apical cuttings(21.05).

Among the IBA concentrations imposed to cuttings, IBA 3000 ppm recorded significantly best results compared to other concentrations. Days to first sprouting (11.75) was less in cuttings treated with IBA 3000 ppm. The rooting (41.05) and survival (85.25) percentages recorded highest in cuttings treated with IBA 3000 ppm. Root parameters like length of longest root (16.52), no. of roots per cutting (18.95) are recorded highest in cuttings treated with IBA 3000 ppm. This might due to the fact that root formation process in cuttings is intensified by IBA through polysaccharide hydrolysis which provide energy for meristematic tissues and thereby for root primordial for roots formation (Husen and Pal, 2007). Shootings parameters like length of the longest shoot (18.92), number of leaves (9.99) and leaf area per cutting (306.53) were recorded highest in IBA 3000 ppm treatment. Shoot fresh (49.53) and dry (18.47) weights are also recorded highest in IBA 3000 ppm. This might be attributed that auxins increase plasticity of cell wall which in turn increases permeability of cell for moisture and nutrients and resulted in enlargement of cell causing more growth of plant parts (Heyn,1931). These findings are in conformity with Sandhu and Singh (1986) in sweet lime.

Among the treatmental combinations between type of cuttings and IBA concentrations, basal cuttings treated IBA 3000 ppm recorded best in both rooting and shooting parameters. But days to first sprouting (9.67) was less recorded in apical cuttings treated with IBA 3000 ppm. Rooting parameters like rooting percent (52.79), length of longest root (23.16), root fresh (1.74) and dry (0.65) weights are recorded highest in basal cuttings treated with IBA 3000 ppm. This might due to the fact that basal cuttings contains

Table 1
Effect of Type of Cuttings and Concentration on Root & Shoot Parameters of Fig in Polyhouse Conditions (90DAP)

		Days to first sprouting	*Rooting %*	*Survival %*	*No. of roots per cutting*	*Length of the longest root*	*Root fresh weight*	*Root dry weight*	*Length of longest shoot*	*No. of leaves per cutting*	*Leaf area per cutting*	*Shoot fresh weight*	*Shoot dry weight*	*Field establish ment %*
Basal cuttings	1000 ppm	28.80	23.66 (29.04)	78.50 (62.36)	15.63	8.81	0.94	0.16	12.82	7.31	186.03	39.08	11.04	66.67 (55.02)
	2000 ppm	20.53	35.32 (46.49)	81.15 (64.24)	18.72	16.65	1.54	0.36	18.74	9.21	270.52	48.49	15.10	73.33 (59.16)
	3000 ppm	13.81	52.79 (37.32)	96.07 (78.64)	30.38	23.16	1.74	0.65	23.25	11.86	389.65	61.01	22.52	93.33 (77.23)
Middle cuttings	1000 ppm	23.68	25.10 (30.33)	78.32 (62.35)	8.62	7.09	0.75	0.15	12.43	7.79	132.26	37.15	11.42	60.00 (51.14)
	2000 ppm	15.77	30.89 (37.84)	78.95 (62.68)	13.20	12.58	1.05	0.26	15.20	8.66	209.69	43.25	14.15	66.67 (54.89)
	3000 ppm	11.67	37.66 (37.32)	81.79 (64.72)	17.12	17.72	1.43	0.53	19.22	9.45	298.47	52.39	18.22	86.67 (70.03)
Apical cuttings	1000 ppm	14.68	20.77 (27.04)	69.29 (56.37)	4.87	4.49	0.63	0.09	8.09	6.78	102.43	28.79	8.08	53.33 (46.90)
	2000 ppm	12.47	27.88 (34.97)	72.29 (58.22)	9.48	6.26	0.85	0.28	10.23	7.86	166.14	38.45	12.64	60.00 (50.75)
	3000 ppm	9.67	32.89 (31.30)	77.88 (68.52)	9.35	8.69	1.16	0.51	14.29	8.67	231.48	43.52	14.65	80.00 (63.42)
CD at 5%		2.21	6.44	5.11	1.81	1.76	0.13	0.09	2.02	1.19	13.80	3.29	1.08	N.S
SEm+		0.74	2.14	1.70	0.61	0.59	0.04	0.03	0.67	0.40	4.60	1.09	0.62	5.78

more starch coupled with positive response of IBA at higher concentrations (Zalesny *et al.,* 2003). Shoot parameters like length of longest shoot (23.25), no. of leaves per cutting (11.86), leaf area per cutting (389.65) are also best recorded in basal cuttings treated with IBA 3000 ppm. This might be due to the fact that more hydrolysis of food material in basal cuttings by IBA at higher concentration leading to growth of plant parts. Percentage establishment of cuttings in open conditions was also highest in basal cuttings treated with IBA 3000 ppm.

Among the treatmental combinations, basal cuttings treated with IBA 3000 ppm in terms both rooting and shooting parameters and highest survival and establishment percentages are recorded. But days to first sprouting was recorded least in apical cuttings treated with IBA 3000 ppm.

REFERENCES

Cline M. G. (2000), Execution of the auxin replacement apical dominance experiment in temperate woody species. *American Journal of Botany* 87 (2): 182-190.

Hartmann H. T. Kester D. E. Davies F. T. Geneve R. L. (2007), plant propagation principles and practices. pp. 299.

Heyn A. N. J. (1931), Trav. Bot. Neerland., 28: 113-224.

Husen A. and Pal M. (2007), Effect of branch position and auxin treatment on clonal propagation of *Tectonia grandis* Linn. f. News Forest 34: 223-233.

Panse V. G. and Sukhatme P. V. (1978), Statistical method of Agricultural workers, ICAR Publication. New Delhi.p. 381.

Purohit A. G. and Shankarappa K. E. (1985), Effect of type of cuttings and indole butyric acid on rooting of hardwood cuttings of pomegranate. *Indian Journal of Horticulture* 42(1/2):30-36.

Reddy R. K. V. Pulla Reddy C. and Goud V. R. (2008), Role of auxins synergists in the rooting of hardwood and semi hardwood cuttings of fig *(Ficus carica* L.). *Indian J.Agric.Res*.42 (1):75-78.

Sandhu A. S. and Singh Z. (1986), Effect of auxins on the rooting and sprouting behavior of stem cuttings of sweet lime (*Citrus limettioides* Tanaka).*Indian J. Hort*. 43 (3-4): 227-229.

Shekharappa A. E. (1983), Effect of type of cuttings and IBA on the rooting of hardwood cuttings of pomegranate. M.sc (Hort.) Thesis submitted to the University of Agricultural sciences, Bangalore.

Valio I. F. M. (1986), Auxinas. P.37-72.

Zalesny R. S. Hall R. B. Bauer E. O. Riemenschneider D. E. (2003), Shoot position affects root initiation and growth of dormant unrooted cuttings of *populous.* Genet 52(8) : 273-279.