International Journal of Applied Life Sciences and Engineering (IJALSE)

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Vol. 1 (1) 70-73, 2014

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IJALSE

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Research Article

High frequency Multiplication of *Jasminum sambac* (L.) Aiton using Plant Growth Hormone Solutions on Stem Cuttings

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Abstract

An efficient propagation protocol was standardized for *Jasminum sambac* an important and commercially exploited plant species in floriculture and perfumery. Quick dip and grow (DNG) solutions were used throughout the experiments with different combinations and concentrations of Kinetin and Indole Acetic Acid. Combination of Kinetin (120mg/l) and IAA (80mg/l) in DNG solution gave a maximum number of 15 shoots per cutting. Rooted cuttings were successfully established in garden field. The survival percentage of cuttings in field was found to be 80 percent. The results have been interpreted and supported with necessary statistical analysis, tables and photographs.

Key words: *Jasminum sambac*, DNG Solution, Stem cuttings

Abbreviations: DNG –Dip and Grow (Dip 'n Grow) Solution, Kn-Kinetin, IAA- Indole Acetic Acid

Introduction

Jasminum sambac (L.)Aiton (Family: Oleaceae), an ornamental plant extensively used in perfumery and religious purposes, is a herb which shows shrub-like appearance after two years. It is locally known as '*Motia'* and produces white flowers with a very pleasant fragrance. The plant attains a height of 1-2 feet in later stages.

J. sambac is vegetatively propagated by ground layering and stem cuttings. As seeds are not formed, the vegetative propagation is the only reproductive method. Normally vegetative propagation is achieved through ground layering but it is not convenient for transportation purpose of germplasm and success rate is also very low. Hormonal treatment of stem cuttings shows induction of high frequency multiplication. A dip and grow[3] solution is helpful in vegetative propagation of garden plants[7]. It has been reported that softwood tissues of stems tend to form adventitious roots in plants[4]. In the structural development of plants, environment is responsible to some extent but hormones play important role in transforming cells towards formation of adventitious roots[3]. Phytohormones play important role in stress responses and adaptation[10] and the exogenous application of auxins[8], gibberellins[1] and cytokinins[6] produce some benefits by accumulating at damaged site in plants and induce formation of callus[2]. It also plays role in alleviating the adverse effects of environment as well as improve growth and development. Some researchers reported that auxins play significant role signaling for dedifferentiating plant cells[11]. The present paper describes a complete protocol for propagation of *J. sambac* using stem cuttings and DNG solutions of different plant growth regulator concentrations.

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Materials and Methods

Stem cuttings of *J. sambac* were used in the whole experiment. Various DNG solutions were prepared with different hormonal concentrations. Fresh stem cuttings having 4-5 nodes and a diameter of about 8mm were collected during the month of july. These cuttings were thoroughly washed in tap water and the upper part of the cutting was dipped in molten wax to

avoid unexpected water loss by evaporation and to check infections. All the cuttings were implanted in garden soil after dipping in DNG solutions for one minute. Cuttings under experimentation were implanted according to randomized block design. Data for number of shoot buds appeared per cutting were recorded at regular intervals and analyzed statistically.

Results and Discussion

Development of first bud was recorded after nine days of implantation in 80 percent of cuttings supplemented with various concentrations of growth regulators. The control showed the development of first bud after 31 days of implantation with very little growth compared to other hormonal formulations. This indicates that formation and development of new buds solely depends on the optimum level of growth regulator in the DNG solution. Therefore, different combinations and concentrations of Kn and IAA were tried. DNG solution with Kn and IAA combination gave significant results. The effect of various hormones, either singly or in combination, on number of buds produced are presented below.

From the results presented in the table 1 and 1a, it is evident that DNG solution with Kn only at various concentrations produced a maximum of 5 shoot buds per stem cutting. These shoots although showed a normal induction, became reduced in size and lost the identity of shoots subsequently due to poor development of roots (Fig1). But a DNG solution containing Kn and IAA at different concentrations showed better results.

Table 1. Effect of Kinetin on number of shoot buds*

Observation in days	Number of shoot buds					
	Kn concentration in DNG Solution (mg/l)					
	control	20.0	40.0	80.0	120.0	160.0
15	0.0	0.5	1.0	1.0	2.0	0.0
30	0.0	2.0	2.8	3.0	3.0	1.5
45	1.0	2.0	3.0	3.5	4.0	2.0
60	1.0	3.0	3.5	4.8	5.0	3.0

*Values represented in the table are mean of ten cuttings.

Table 1a. ANOVA showing effect of Kinetin on the number of shoot buds appeared

Source of variation	Degrees of freedom	Sums of squares	Mean sums of squares	Calculated value of F	Table value of F
Time	3	22.031	7.344	38.25*	3.29
Treatment	5	23.688	4.738	24.67*	2.9
Error	15	2.879	0.179	-	

*Significant at 5% level of significance.

Table 2. Effect of Kn+IAA on number of shoot buds*

Observation in days	Number of shoot buds				
	Kn + IAA concentration in DNG Solution (mg/l)				
	Control	80.0+20.0	80.0+40.0	80.0+80.0	80.0+100.0
15	0.0	0.9	1.0	1.5	0
30	0.0	3.0	4.0	3.8	2.5
45	1.0	5.8	6.0	6.5	3.0
60	1.0	7.0	7.5	9.0	4.5

*values represented in the table are mean of ten cuttings.

Table 2a. ANOVA showing effect of Kn+IAA on the number of shoot buds appeared

Source of variation	Degrees of freedom	Sums of squares	Mean sums of squares	Calculated value of F	Table value of F
Time	3	74.148	24.716	20.393*	3.49
Treatment	4	58.245	14.561	12.014*	3.26
Error	12	14.547	1.212	-	

*Significant at 5% level of significance.

Kinetin applied at 80mg/l and IAA at 80mg/l in DNG solution gave the maximum number of 9 shoots per cutting (Table 2 and 2a, fig2). Further, Kn at 120mg/l and IAA at 80mg/l in DNG solution gave a maximum number of 15 shoot buds per cutting (Table 3 and 3a; fig3). This shows that addition of auxin in cytokinin containing DNG solution enhances shoot multiplication in *J. sambac.*

Table 3. Effect of Kn+IAA on number of shoot buds*

Observation in days	Number of shoot buds					
	Kn+IAA concentration in DNG Solution (mg/l)					
	control	120.0+20.0	120.0+40.0	120.0+60.0	120.0+80.0	120.0+100.0
15	0.0	2.7	3.0	3.3	4.2	3.0
30	0.0	3.1	4.6	6.2	8.3	4.5
45	0.0	4.2	6.0	9.2	11.3	7.6
60	1.0	6.9	7.2	12.0	15.0	9.1

*Values represented in the table are mean of ten cuttings.

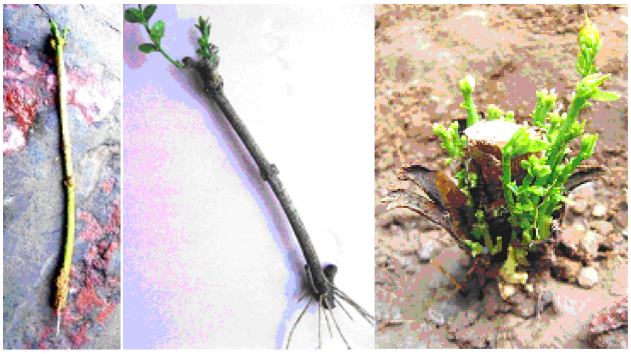
Table 3a. ANOVA showing effect of Kn+IAA on the number of shoot buds appeared

Source of variation	Degrees of freedom	Sums of squares	Mean sums of squares	Calculated value of F	Table value of F
Time	3	115.395	38.465	16.573*	3.29
Treatment	5	197.473	39.495	17.016*	2.90
Error	15	34.81	2.321	-	

*Significant at 5% level of significance.

The experiment further shows that a slight increase in the concentration of IAA(100mg/l) with Kn 120mg/l reduced the shoot number significantly (Table 3). Thus it can be inferred that Kn (120mg/l) and IAA (80mg/l) is optimum for high frequency multiplication through stem cuttings in *J. sambac.*

Protocol standardized through this study demonstrated the possibility of developing an efficient propagation system for *J. sambac* using stem cuttings.



(1) **(2)** **(3)**

Fig. 1: Shows poor rooting in the presence of only Kn 120mg/l, **Fig. 2:** Shows shoots as well as roots at Kn 80.0mg/l and IAA 80mg/l(30 Days), **Fig. 3:** Shows profuse shoot buds at Kn 120mg/l and IAA 80mg/l

Acknowledgements

The authors are highly thankful to M.R.S. Sh. Krishan Pranami Jan Kalyan Trust, Bhadra, Rajasthan, India for providing financial assistance to carry out this experiment.

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