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AN IN VITRO ANALYSIS AND ETHNOBOTANICAL PROFILE OF JASMINUM SAMBAC L.

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ABSTRACT

The use of herbal drugs for prevention and treatment of various health ailments hasbeen in practice since time immemorial. The main beauty and uniqueness of jasmineis its fragrance, which cannot be imitated by any known synthetic aromatic chemicaland has a unique status in the perfume world. Apart from that inhaling Jasmine scentincreases beta waves in the brain, which are associated with increases states of alertness. Various diseases like conjunctivitis, diarrhoea, abdominal pain and dermatitis are treated with its flowers along with roots and leaves are also utilized for curing pain, diarrhoea and fever. The present research is the highlight of varioustraditional uses as well as in vitro analysis reported till date from J. sambac. Regeneration of Maid of Orleans through direct and indirect organogenesis has been investigated.

Keywords: *Organogenesis, in vitro, ethnobotanical*

INTRODUCTION

Jasminum sambac Linn. Family- Oleaceae grown in tropical and subtropical parts of the world which has scandent or sub- erect shrub with young pubescent branches, broadly ovate or elliptic,opposite leaves. Commonly known as Motia or lily jasmine. Flowers are annually used for the extraction of perfumed oils and 250ml for the preparation of attar (Kusuma *et al.,* 2012). The plantis considered cool and sweet used as a remedy in case of insanity, bitter, pungent cooling, tonic to brain, purgative cure tridosha, biliousness, itching sensation, allays fever, stop vomiting. For thousands of years nature has been a source of medicinal agents and an impressive number of modern drugs have been derived from natural resources from ancient times, based on the uses ofthe agents in traditional medicine many of these isolations were based on it. The disruption of soil structure increases mineralization rates in loams and clays more than in sandy soils and thatthis increase can be used (*Bhatt et al.,* 2015). Jasmine is a climbing, trailing and erect flowering shrub. There are both deciduous and evergreen species in jasmine (Almeida *et al.,* 2006). The main beauty and uniqueness of jasmine is its fragrance, which cannot be imitated by any knownsynthetic aromatic chemical and has a unique status in the perfume world. The taxonomic description of 23 species as well as key for identification. (Turker *et al.,* 2008) gave taxonomic description of 21 species of jasmine with elaborate description of *Jasminum sambac, Jasminum grandiflorum and Jasminum auriculatum.* The harvesting of flowers is done from 2nd year after planting and the commercial yields commence from third year onwards (Hajhashmi *et al.,* 2003)(Hamilton 2001). **Leaves** are opposite and alternate, simple, trifoliate or pinnate; leaflets are entire. One of the earliest accounts of descriptive studies in 43 jasmine species was accomplishedby Hooker, who divided *Jasminum* into two main groups as: - (1) With simple leaves, calyx pubescent or glabrous, subulate or short. ii.) With compound leaves, either trifoliate or imparipinnate. About 160 species of jasmine in the tropical and sub-tropical regions of Asia, Africa and Australia and over 40 in India. (2) Leaves contain sambacosides A, E and F
(Tanahashi, 1988). **Flowers** are white, yellow or rarely reddish, sometimes solitary, more often in cymose clusters of three to many, usually fragrant; 2 loculed with 1 to 4 erect ovules. **Fruit** isa berry, rarely with separate capsules and each having 2 seeds. **Uses:** (1) Flowers in bean oil or coconut oil for hair, facial or body use or as a perfume oil or Perfume base. (2)

Digestion with vegetable oil to make oil tinctures or liniments. (3) A favourite floral offering and adornment foraltars. (4) Flowers used to make jasmine tea. Flowers yield a yellow pigment used as substitute for saffron. The nutritionally and environmentally supportive conditions (in vitro) of culture andmaintenance of plant cells or organs in sterile is known as tissue culture. All product cells have the same genotype (unless affected by mutation during culture) are the clones produced by tissueculture. It has applications in research and commerce. Tissue culture is primarily used for plant propagation and is often referred to as micro propagation in commercial settings. *In vitro* micro propagation is a complicated process requiring many steps or stages (Murashige *et al.,* 1978), proposed four distinct stages that can be adopted for overall production technology of clones commercially. Stages I-III are followed under *in vitro* conditions. Whereas stage IV is accomplished in greenhouse condition. (Debergh *et al.,* 1981) suggested an additional stage 0 forvarious micro propagation systems. The meristems are net importers rather than synthesisers of IAA in higher plants (reviewed by Baker, 2000) and seems to be in contraction to the widely accepted idea that meristems are thesites of auxin biosynthesis. Cytokinins (Gul *et al.,* 2000) produce some benefits by accumulating at damaged site in plants and induce formation of callus.Phytohormones play important role in stress responses and adaption and the exogenous application of auxins (Khan *et al.,* 2004). **Ethnobotanical Uses:** Traditionally, this plant used asan antidepressant, analgesic, sedative, anti-inflammatory, antiseptic, expectorant and aphrodisiac.Wounds and snake bites can be cured by the roots. The flowers and leaves have decongestant and antipyretic properties. Apart from that inhaling Jasmine scent increases beta waves in the brain, which are associated with increases states of alertness (Kulkarni *et al.,* 2004). Various diseases like conjunctivitis, diarrhoea, abdominal pain and dermatitis are treated with its flowers along with roots and leaves are also utilized for curing pain, diarrhoea and fever. It is also used for anaesthetic purposes (Kunming Institute of Botany, 1986; Jiangsu New Medical College, 1977). The efficiency of jasmine flowers was compared with Bromocriptine by reduction in serum prolactin level when it was put on breasts to suppress purpureal lactation. It has been reported that*Jasminum sambac* has antiulcer, antioxidant (Upaganlawar *et al.*, 2009), antibacterial andantiviral activities (Zhao *et al.*, 2008).

MATERIALS AND METHODS

The mother plants (2- month- old) were bought from the nursery (Ahmedabad- India). The freshand young leaves, were surface fertilized by using sodium hypochlorite, ethanol, distilled water and sterile water.

a) Preparation of Media

Listed below media are prepared:

1. MS basal (without hormone)

2. 1.0 mg/1 BAP + 0.5 mg/1 NAA

3. 3. 0 mg/1 BAP

4. ½MS + 3.0 mg/1 kinetin + 0.5mg/1 IAA

All chemicals of MS medium (in powdered form) is used for preparation of 1 litre medium

↓

800 ml of distilled water is filled in a

↓

All the chemicals of MS media is slowly added into the

↓

30 g of sucrose is added and pH is set at

↓

8 g agar and hormone are added to the

↓

The media is made up to 1 litre by using volumetric flask by adding 200 ml of distilledwater and then media is autoclaved

↓

The melting media is dispensed into sterile tubes and each tube is

b) Preparation of MS Basal Medium without hormone

800 ml of distilled water is filled in a beaker

↓

4.4 g of MS powdered medium (slowly added), 30 g of sucrose, and 8 g of agar technical are added accordingly to the beaker

↓

By adding 200 ml of distilled sterile water, the medium is made up to 1 litre using volumetric flask

↓

The pH of media is adjusted to 5 by using sodium hydroxide or hydrochloride acid

↓

The media is then

↓

The melting media is dispended into sterile culture tubes for about one- third tubes' height, in laminarair flow and each tube is labelled

↓

Prepared media is observed and used after 1

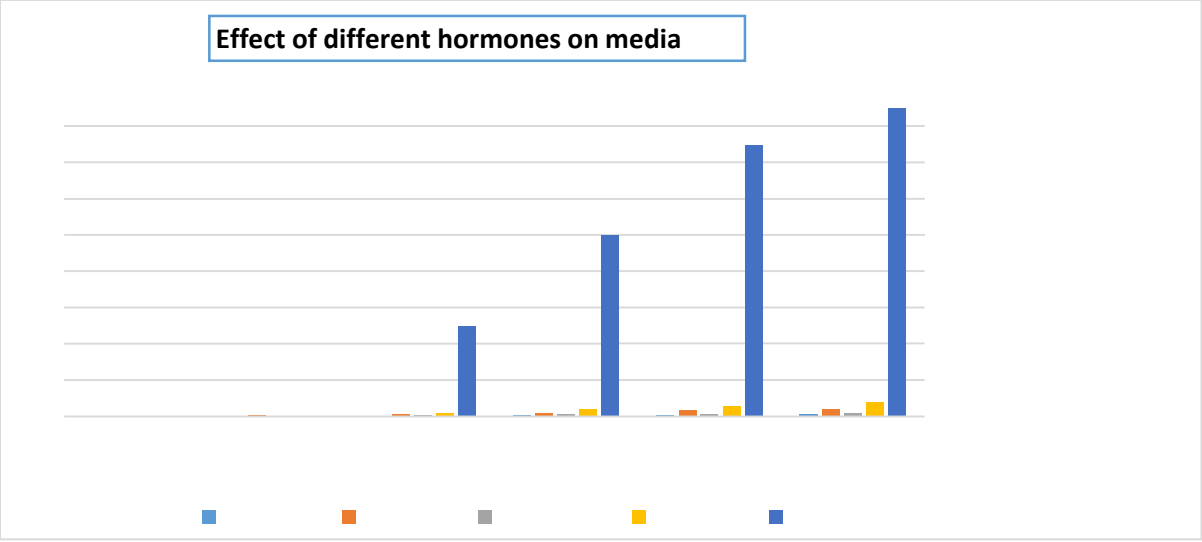
RESULTS

When in MS supplemented with NAA medium best result observed in nodal ex-plant compared toleaves. In MS supplemented BAP medium maximum number of shoots was observed in nodal ex-plant. While, MS fortified with 2, 4- D medium the growth was best for callus and shoot formation. When MS was supplemented with Adenosine sulphate, this hormone

showed the negligible effect in leaf ex-plant, while in node ex-plant the growth of callus and shoot were foundafter 9 weeks of inoculation.
In a recent research study, 2, 4- D was reported to be the most responsive combination in terms of shoot initiation, which however produced only one shoot per nodal segment (Selvakumar *et al.*, 2001). Sub-culturing of the regenerated shoots of the present study on the same medium resultedin stunted growth of the shoots having compressed inter-nodes. Lowering the concentrations of both plant growth regulators to half of their original strengths improved the growth, and elongatedshoots with 8-10 internodes could be obtained with the next three weeks of the culture. Loweringthe concentration of BAP has also been improve differentiation of shoot buds in the case of *P. indica* (Anonymous 1989). Further dissection of the *in vitro* raised shoots of the present study into each nodal segment followed by their inoculation on MS-9 medium resulted in the production of32-40 shoots/plant within the next five weeks of culture. Hence, the multiplication rate as revealed in the present study significantly exceeds that of a study (Selvakumar *et al.*, 2001) within a relatively shorter time period. The presently reported direct shoot regeneration protocol can be exploited commercially to multiply elite clones more rapidly and within a shorter time period, and can also be used for developing the useful medicinal plant for its conservation and strategies. Leaves from such *in vitro* raised plantlets served as explants for genetic transformation studies.

Table 1 - Effect of culture media (half- strength MS= Different concentrations of Auxins=2%(W/V) on shooting response of *Jasminum sambac* L.

NAA (mg/l)	BAP (mg/l)	2,4- D (mg/l)	ADS (mg/l)	Percent of shoot initiation
0	0	0	0	0
0.05	0.25	0	0	0
0.07	0.50	0.20	1	25
0.2	1.0	0.50	2	50
0.3	1.75	0.80	3	75
0.5	2.0	1.0	4	85



Graph 1- Different hormones on media

Table 2- Different concentrations of treatment affecting growth and characters

	Growth hormone (mg/l)				Characters			
					Avg. no. of	Length of Shoot		

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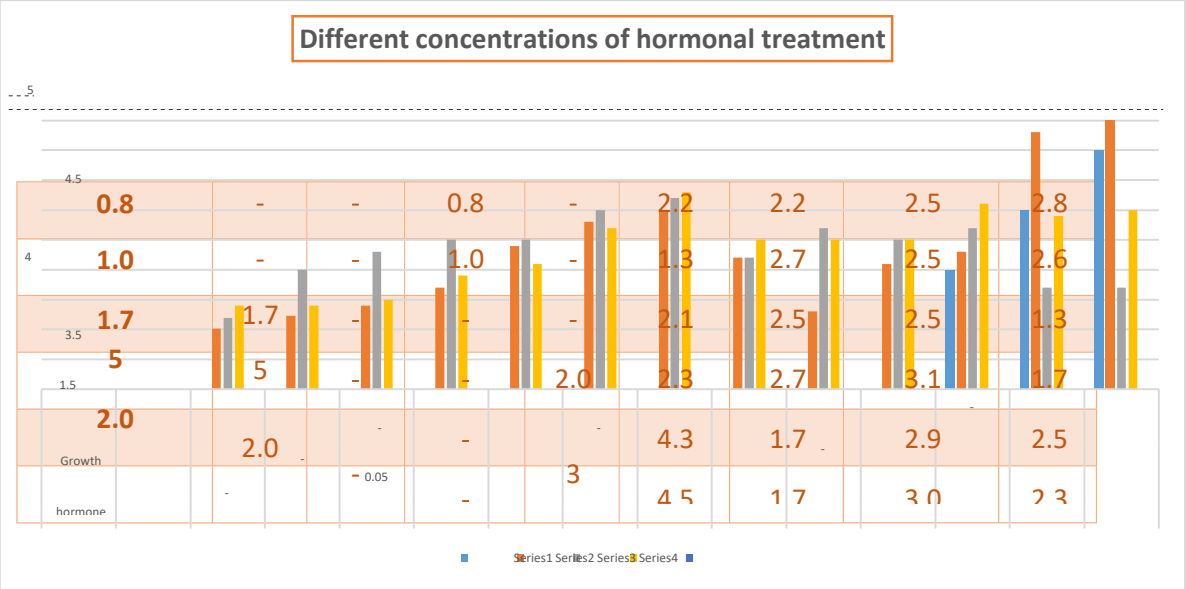
Treatment concentration	BAP	NAA	2,4-D(mg/l)	ADS	Shoots	cm)	No. of internodes	MR*
0	0	-	-	-	1.01	1.2	1.4	0.32
0.25	0.25	-	-	-	1.23	2.0	1.4	2.11
0.05	-	0.05	-	-	1.4	2.3	1.5	1.2
0.07	-	0.07	-	-	1.7	2.5	1.9	1.4
0.2	-	0.2	0.2	-	2.4	2.5	2.1	1.6
0.3	-	0.3	-	-	2.8	3.0	2.7	2.5
0.5	0.5	0.5	0.5	-	3.0	3.2	3.3	2.6



Graph 2- Graph showing different concentrations of hormonal treatment

Though NAA at its high level induces more multiplication rate, it also induces the callus indicating imbalance of Auxin-Cytokinin ratio with basal medium reported rapid and reproducible regeneration *in vitro* protocol with BAP for *Jasminum sambac* (L.) via nodal shoot multiplication. Similar observation was also reported by (Hossain, M. A. *et al.,* 2008).
Observations and statistical analysis
Each treatment had 20 replications and each experiment was repeated three times. The data pertaining to mean percent of cultures producing multiple shoots and mean number of shoots perculture were recorded after 4- weeks intervals. The data were analysed statistically by the Duncan's multiple range test (Harter, 1960) (P0.05).

DISCUSSION

Auxins are the most likely candidates in the regulation of developmental switches (Nomura and Komamine, 1985 and Feher *et al.,* 2003). The influences of exogenously applied auxins particularly 2,4-D on the induction of leaf are well documented (Kim *et al.,* 2003). It is suggestedthat 2,4-D above certain concentration has a dual effect in the culture medium asan auxin directly(Michalczuk *et al.*, 1992a and 1992b) and as a stress inducing agent (Feher *et al.*, 2001, 2002 and 2003). However, at higher concentrations of auxins the number and frequency of callus inductiondecreased. The results were obtained has many differences with in amount of using 2,4-D hormone.Their results in compare with our research have significant in diameter and weight of callus. Therefore, we can introduce these hormone concentrations for jasminum callus induction. As auxins are indole or indole-like compounds that stimulate cell expansion, particularly cell elongation. Auxins also promote adventitious root development. Indole Acetic Acid (IAA), a naturally occurring auxin, and Napthalene Acetic Acid (NAA). While BAP, increases resistance to disease, high salt levels increases flowering

and fruit set (Yeung, 1995). Cytokinins promote shoot formation, but need auxins as well to promote mitosis. 2,4-D is used in plant cell cultures asa dedifferentiation (callus induction) hormone. (Bibi Latifeh Davallo *et al.,* 2014) reported that callus induction was noticed in MS medium, which consisted of different auxins using leaf ex- plant. Among the one auxin investigated 2,4-D was more effective than the other auxins with the highest percentage (68 %) of callus initiation. However, used 2,4-D at mid-level concentrations gave best percentage of organic callus induction.

CONCLUSION

Plant origin received much attention in recent years in terms of ethnobotanical and traditional uses as they were tested for their efficacy and they were concluded to be non-toxic for human usage. Investigation of molecular mechanism of actions of isolated phytoconstituents , toxicity studies in phytochemical investigations, biological evaluation on experimental and animal models obviously deserve scrutiny. Multiplication of *Jasminum sambac* L. through *in vitro* propagation, various ex-plants (leaf and node) were inoculated on Murashige and Skoog (revised)medium supplemented with different plant hormones PGR's like NAA, BAP, 2,4-D and Adenosine Sulphate (ADS) in different concentrations. Maximum multiplication was observed from nodal ex-plant, while average multiplication was observed in leaf ex-plant.

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