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A propagation method in *Jasminum sambac* through leaf petiole cutting in Andaman and Nicobar Islands

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INTRODUCTION

Jasmine is one of the most important ornamental flowering plants widely cultivated and esteemed for its attractive fragrant flowers. Jasmine flowers are used for making garland, adorning hair by women, religious and ceremonial functions. There is a steady demand in Andaman and Nicobar Islands for the fresh flowers of jasmine round the year. Due to the existing demand in the Islands, the commercial cultivation of jasmine is started recently. However, non –availability of year round quality planting material of the right variety is hampering its cultivation in this Islands .The conventional method of propagation of jasmine by rooted stem cuttings is a time consuming and expensive practice associated with poor rooting ability in the field. Moreover large number of mother plants is required for production of planting material through stem cuttings which is of scarcity in the Island. Keeping in view the increasing demand of jasmine planting materials, alternative methods for propagation were tried. Multiplication of jasmine using leaf culture technique is an innovative method reported by a farmer in Tamil Nadu, in which he used leaf as the propagule (Rajarathnam 2013). This method was used as a base to standardize the propagation of jasmine using minimum exploitation of the mother plants. In this experiment, with full leaf is used as the propagule and different media were tried for standardization of suitable method for maximum success. The growing media standardization is very important for propagation as it influences the growth and quality of the seedlings (Wilson *et al.*, 2001). The growth medium directly affects seedling growth, development and maintenance of the extensively functional rooting system (Agbo and Omaliko 2006). A good growth medium provides sufficient anchorage or support to the plant, serves as a reservoir for nutrients and water, allows oxygen diffusion to the roots and permits gaseous exchange between roots and the atmosphere outside root substrate (Abad *et al.*, 2002). The experiment thus initiated was aimed to develop a cost effective method of propagation for production of true to type plants within short period to meet the existing growing demand in the island.

MATERIALS AND METHODS

The present experiment was conducted in the Division of Horticulture and Forestry at Central Island Agricultural Research Institute, Port Blair during 2015-16. Healthy, regular and high yielding mother plants of jasmine were selected for collection of leaves. Recently matured leaves were harvested with petioles and were soaked in water for 5 minutes, subsequently the leaves were soaked in tender coconut water for 10 minutes. The leaves were placed in protrays containing different growing media combinations. The portrays were kept under low cost mist chamber throughout the experimentation period .The experiment was laid out in a completely randomized design (CRD) consisting of nine different treatments viz., T1- Coirdust , T2- Coirdust + Vermicompost (1:1) , T3- Soil, T4 – Soil +FYM (1:1), T5 – Soil+ Coirdust + Vermicompost (1: 1:1), T6 – Sand, T7 – Soil+

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Vermicompost + FYM (2:1:2), T8– Soil + FYM + Coirdust + Vermicompost (2:0.5:0.5:0.5), T9 – Soil +FYM + Coirdust (2:1:1) and replicated three times. Observations were recorded on shoot and root parameters. The datas were analyzed statistically for all the parameters.

RESULTS AND DISCUSSION

In the propagation experiment of using leaf petiole as explants in jasmine using different media combinations, significant results in rooting and shooting characters were observed in different treatments. Variations were observed in the rooting and shooting imitation time among the different treatments. During the propagation process, the formations of fine roots were observed from leaf petiole contacting the substrate. Once roots developed, new leaves observed on new shoots formed at the base of petiole. Similar results of root and shoot formation was observed in crops like jasmine (Rajarathnam, 2013) and in *Seemania sylvatica* by leaf cutting propagation (Pego *et al*., 2013). In *Seemania sylvatica*, larger clumps of root mass were observed in the leaf petiole or in the veins of leaves (Pego *et al*., 2013). Similarly leaf cuttings of African Violets (*Saintpaulia ionantha*) presented higher rooting in completely expanded leaves, when young leaves with petioles were used (Von Hentig, 1976). The data pertaining to various shoot and root growth characters are presented in Table 1. The data revealed that minimum number of days taken for root initiation was recorded in T5 – Soil+ coirdust + vermicompost in 1: 1:1 ratio (20 days) followed by T8– Soil + FYM + coirdust + vermicompost in 2: 0.5:0.5:0.5 ratio (27 days). This may be due to coir dust when amended with organic manure suits as the best media as coir dust has good physical characteristics (Garcia and Daverede 1994) and also successfully tested as a growing medium in ornamentals (Van Holm 1993). Vermicompost is reported to have substances with hormone and this has been hypothesized to result in greater root initiation, increased root biomass and enhanced growth and development (Bachman & Metzger 2008) and also balanced composition of nutrients (Zaller 2007). Maximum number of primary roots (15.66), root length (25.6 cm) and root diameter (1.98mm) were also recorded in T5 – Soil+ coirdust + vermicompost (1: 1:1). This could be due to availability of sufficient nutrient content in vermicompost. Coir dust, in ideal combination with soil and vermicompost created healthy rhizosphere, adequate in physico-chemical and biological properties which had a positive effect on root development. Moreover coir amended medium enhances the phosphorus exchange sites which induces maximum root growth. Similar findings were also reported in nutmeg by Abirami *et al*., (2010), in *Osteospermum* cuttings by Nowak (2004), in Salvia and viola by Pickering (1997) and in Impatiens by Smith (1995). Among all the treatments early shoot initiation was recorded in T5 – Soil+ Coirdust + Vermicompost in 1: 1:1 ratio (38 days) followed by T8– Soil + FYM + Coirdust + Vermicompost in 2: 0.5:0.5:0.5 ratio (46 days). Higher nutrient content available to plants grown in coir dust, soil and vermicompost medium could be the reason for early initiation of shoot growth. Maximum shoot length (16.8 cm) and shoot diameter (3.15 mm) was also recorded in T5 – Soil+ Coirdust + Vermicompost (1: 1:1) followed by T8 (12.8 cm & 2.79 mm). This could be attributed to higher nutrient status provided by vermicompost,and , excellent physical (water retention and aeration) and chemical properties (P^H, low EC, high CEC) of coir dust which could have resulted in higher nutrient uptake. Also coir dust amended medium are shown to have higher production or accumulation of total protein and aminoacids in their stem (Scagel, 2003).This could be a reason for high shoot growth. This finding was in accordance with those of Swetha *et al* (2014) in Aglaonema and Abirami *et al* (2010) in Nutmeg. Maximum number of leaves was recorded in T5 – Soil+ coirdust + vermicompost in 1: 1:1ratio (8.0). This may be due to the synergistic effect of both vermicompost and coir dust provides adequate nutrients and enhances both physical properties and water holding capacity (Sahni *et al,* 2008). Moreover the development of more number of leaves on the plant may reflect an earlier growth of root system. Thus, production of more leaves in this medium largely agrees with improved root development. This results are in line with findings of Campos Mota *et al* (2009) Abirami *et al* (2010) and Bhardwaj (2013) who suggested that since coir dust was low

Table 1
Influence of growing media on rooting and growth parameters of jasmine through leaf petiole propagation

Treatments	*Days taken for root initiation*	*Number of primary roots*	*Root length (cm)*	*Root Diameter (mm)*	*Days taken for shoot initiation*	*Shoot length (cm)*	*Shoot diameter (mm)*	*Number of leaves*	*Leaf length (cm)*	*Leaf width (cm)*
T1: Coir dust	38.0	5.0	13.6	1.1	77.3	7.4	1.9	2.6	4.1	3.8
T2: Coir dust + Vermicompost (1:1)	31.0	7.6	19.2	1.5	59.0	10.3	2.4	5.3	5.5	4.7
T3: Soil	36.3	5.6	16.2	1.2	75.0	8.2	2.1	3.3	4.5	4.0
T4: Soil + FYM (1:1)	34.0	5.6	16.9	1.3	71.0	8.6	2.1	4.0	4.8	4.2
T5: Soil + Coir dust + Vermicompost (1:1:1)	20.0	15.6	25.6	1.9	38.0	16.8	3.1	8.0	6.8	5.7
T6: Sand	41.0	4.6	12.4	1.1	82.0	6.3	1.7	2.0	3.8	3.7
T7: Soil + Vermicompost + FYM (2:1:2)	33.0	6.6	18.2	1.4	66.0	9.8	2.3	4.6	5.1	4.5
T8: Soil + FYM + Coir dust + Vermicompost (2:0.5:0.5:0.5)	24.0	13.0	22.4	1.7	46.0	12.8	2.7	6.6	6.1	5.2
T9: Soil + FYM + Coir dust (2:1:1)	27.0	11.3	21.3	1.6	51.0	12.1	2.6	6.0	5.7	5.0
C. D (0.05)	1.8	1.7	0.1	0.1	1.6	0.2	0.1	1.4	0.2	0.2
CV	3.9	12.2	2.1	0.8	1.5	1.0	1.5	18.1	1.9	3.1

in nutrients, mixed with vermicompost it provides a better growth medium for plant establishment. However, air filled porosity, easily available water and aeration .of vermicompost and FYM were not at the recommended level which, in turn, limited root growth and lowered water holding capacity in the particular treatment combination of vermicompost and FYM. Therefore, medium with vermicompost and coir dust is better suited than vermicompost alone, because of its better physical properties and higher nutrient levels. Maximum leaf length (6.8 cm) and leaf width (5.7cm) was also recorded in T5 – Soil+ coirdust + vermicompost (1: 1:1) followed by T8 (6.1 cm & 5.2c m). Coir dust allows air, nutrients and water to reach the root surface, which may be one of the reasons for the rapid and vigorous growth of leaves.

Among all the treatments T1- Coirdust has not performed well in all the traits like days taken for root initiation(38 days), number of primary roots (5.0), root length (13.6cm), root diameter1.19 mm), days taken for shoot initiation(77.33days), shoot length (7.4 cm), shoot diameter (1.93mm), number of leaves (2.0), length of leaf (4.1cm) and width of leaf(3.8cm). This may be due to low nutrient status and leaching of the available nutrients of the media which may have led to improper growth.

Thus it can be concluded that propagation of jasmine through leaf petiole as propagule is an efficient method for large scale production of planting material in an amended media combination of Soil+ Coirdust + Vermicompost (1: 1:1)

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