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Mass Multiplication of *Morinda citrifolia* (Noni): A Highly Potential Medicinal Plant

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Abstract

Noni, *Morinda citrifolia* L. (Rubiaceae), is a small,fruit-bearing, evergreen shrub or tree that now grows throughout the tropics. It is a traditional source of medicine, dye, and food for indigenous peoples, and it recently has been marketed internationally as a dietary supplement. Seed propagation takes more time for germination and also variation in fruits, whereas, stem cuttings can be rooted early and with no variations in fruits. In order to overcome the problem with seeds, vegetative propagation could be tried as potential means of propagation of quality planting stock. Cutting is a method to propagate Noni by the use of detached plant parts which when placed under favourable conditions develop into a complete plant resembling in all characteristics to the parent from which it was taken. A study was conducted at Carmel College Botanical Garden to develop a standard vegetative propagation technique through cuttings. Among the different types (Tip, Semi hard wood and Hard wood cutting) with different number of nodes (2, 3 and 4), Hard wood cuttings with 4 nodes performs better and gives more success percentage and healthy planting material.

Keywords: *Morinda citrifolia*, tip cutting, semi hard wood, hard wood,propagation

Introduction

Noni is a wonder crop expecting our respect to become a commercial orchard crop under cultivation. Noni, commonly – Indian Mulberry and scientifically *Morinda citrifolia* L. belongs to the coffee family Rubiaceae . The production of large number of saplings from the limited elite pedigree tree could be possible within a short period and could meet growing demand by the farmers. The true to the pedigree plants thus produced in the country can enhance the foreign exchange earning capacity. Though it has greater demand hitherto, no efforts on its propagation have been made owing to its hollow nature of stem. Its domestication is possible only by standardizing the propagation techniques. The Noni seeds have a problem of seed dormancy/hard seed coat (water repellant) thus limiting its commercial cultivation. The primary disadvantage of seed propagation is that it takes more time for germination and also variation in fruits, whereas, stem cuttings can be rooted early and with no variations in fruits. In order to overcome the problem with seeds, vegetative propagation could be tried as potential means of propagation of quality planting stock. The goal of vegetative propagation is to get the best planting stock with highest genetic quality material (Wright, 1975). For making plants through cuttings, it is essential to know the proper techniques for vegetative propagation of this crop.
Cuttings are the very common, easy and cheapest method of vegetative propagation .Healthy parent plant, part of stem, size of the stem, length of cuttings, number of nodes, rooting media, growing structure are considered to influence success percentage and production of healthy plantlets. In this experiment we mainly considered types of cuttings and number of nodes.

Morinda citrifolia is reputed to have antibacterial, antiviral, antifungal, antitumor, anti tubercular effect,

analgesic activity, immunological activity, mental health and improve high frequency, antihelminthic, analgesic, hypotensive, anti inflammatory, immune enhancing etc., due to its beneficial effects, the fruit juice of *M. citrifolia* is widely distributed throughout the world as nutraceutical dietary supplement. The leaf of this plant is directly used on skin for ulcerations and for minor infections (Duke, et al., 2002).. The present study is focused on mass multiplication of *Morinda citrifolia* (noni): Here an attempt was made to find out specific type of stem cutting and number of nodes per cutting required for mass multiplication of *Morinda citrifolia* (Noni).

Fig.1 *Morinda citrifolia* –Habit

Morinda citrifolia flowers and fruits

Materials and Methods

In order to find specific type of stem cutting and number of nodes per cutting required, a field experiment was conducted at Carmel College, Mala.

Preparation of cuttings :

Cuttings of 15-20 cm length with uniform pencil thickness were selected and prepared from an ideal mother plant from Thiruthipuram.. Selected cuttings were carefully prepared by giving a slanting cut (45°) at the bottom to expose more cambial area to absorb more moisture and form roots. Bottom cuts were given just immediate to the nodes and planted in slanting position.

Rooting media and growing condition :

Using a mixture of sand and vermicompost (1:1) raised beds were prepared under 50% shade net with poly tunnels.

Planting of cuttings :

Prepared cuttings were planted at 10-15 cm apart with half portion of cutting inside the soil and taken care that the lower buds were not damaged. The soil was thoroughly pressed around the cuttings and watered regularly to keep it moist.

Experimental design :

Experimental design followed was Completely Randomized Block Design (CRBD). There were nine treatments with three replications. Each treatment was with 30 numbers of cuttings.

Treatment details :

Three different types of cuttings with 3 different node numbers were used. The treatment details are presented in Table 1.

Table 1. Details of treatment

Treatments	Type of cutting	Number of nodes
T1	Tip cutting	2
T2	Tip cutting	3
T3	Tip cutting	4
T4	Semi hard wood	2
T5	Semi hard wood	3
T6	Semi hard wood	4
T7	Hard wood	2
T8	Hard wood	3
T9	Hard wood	4

Results and Discussion

The results on success percentage in relation to type of cuttings and number of nodes revealed significant differences among treatments (Table 1). It was observed that the success percentage was maximum (83%) in T 9 (Hardwood cuttings with 4 nodes) and the minimum (2%) in T 1 (Tip cuttings with 2 nodes). Type of cuttings influenced more effectively than number of nodes.

Table 2. Percentage of success in different treatments

Treatments	Days after planting					Transplanted successfully in polybags (%)
	10	20	30	40	45	
T1	15	10	7	2	2	--
T2	14	13	9	5	3	--
T3	15	13	11	7	4	--
T4	20	14	14	12	10	33
T5	23	20	18	17	16	53
T6	20	18	17	17	17	56
T7	23	21	20	20	20	66
T8	25	24	23	23	23	76
T9	28	26	25	25	25	83

.**Fig 2 Mass multiplication of *Morinda citrifolia***

Type of cuttings are influenced by the factors like nutritional status of stem, age of the plant, etc . Hard wood stems with high amount of carbohydrate and less Nitrogen lead to better success. According to Kumar (2000) factors influencing shoot and root growth in cuttings are food supply (ratio of carbohydrate to nitrogen in the stems), age of the plant, type of cuttings and environmental conditions (water, temperature, relative humidity, light and rooting media). Noni is the perennial plant, in which stored energy is more in hard wood stem than in other parts. This is the plant with typical hollow stem, which is weaker and with less cambial tissue wherever the stem is not well matured. Cambium is the primary tissue for the development of vascular tissue and root system. So the hard wood stem is with less hollow and with more cambial tissue when compared to soft wood and tip cuttings. Stored energy is more in hard wood cuttings to enhance shoot sprout and root initiation.

Gill *et al*. (1998) reported that very common type of cutting propagation in perennial plant is hard wood cutting. Hard wood cuttings are prepared from the trees when tissues are fully mature. The shoots of about one year old or more can easily be used for preparing hard woodcuttings. It is now recognized that the nutrition–status of stock plants exerts a strong influence on the development of roots and shoots from the cutting. Cuttings from plants with high C/N ratio produce more roots but feeble shoots as against those containing ample carbohydrate and higher nitrogen that produce fewer roots but stronger shoots. Cuttings from succulent stems with very low carbohydrate and high nitrogen do not succeed (Singh, 2000).The type of stem cutting is arbitrary, but 20 to 40 cm cuttings are manageable and effective in Noni (Nelson, 2003).The results of the above study revealed that the hard wood cuttings with four nodes are the best method to propagate Noni through cuttings. This can be applied at field level for mass multiplication of ideal true to type plants through stem cuttings.

Summary and Conclusion

The fruit juice of *M. citrifolia* L. is in high demand in alternative medicine for various illnesses, such as arthritis, diabetes, high blood pressure, muscle aches and pains, menstrual difficulties, headaches, heart disease, Acquired Immune Deficiency Syndrome (AIDS), cancer, gastric ulcers, sprains, mental depression, senility, poor digestion, atherosclerosis, blood vessel problems and drug addiction.

The Noni seeds have a problem of seed dormancy/hard seed coat (water repellant) thus limiting its commercial cultivation. Seed propagation takes more time for germination and also variation in fruits .The results of the above study revealed that the hard wood cuttings with four nodes are the best method to propagate Noni through cuttings. Hard wood stems with high amount of carbohydrate and less Nitrogen lead to better success. Noni is the perennial plant, in which stored energy is more in hard wood stem than in other parts. Cambium is the primary tissue for the development of vascular tissue and root system. So the hard wood stem is with less hollow and with more cambial tissue when compared to soft wood and tip cuttings. Stored energy is more in hard wood cuttings to enhance shoot sprout and root initiation. Hard wood cuttings can be applied at field level for mass multiplication of ideal true to type plants through stem cuttings.

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