

MASS MULTIPLICATION OF THE INDIAN MEDICINAL PLANT *Tylophora indica* (Burm.f.) Merr.

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ABSTRACT : *Tylophora indica* (Burm.f.) Merr. (ASCLEPIDACEAE) is an important Indian medicinal plant. It is called “ASTHMA KODI” OR “NANJARUPPAN” IN Tamil in the Siddha system of medicine. Tamil medical literature reveal that it is an ideal plant medicine for respiratory problems and is also a cardiac tonic. For medicinal purposes it is collected only from the wild. It has not yet been brought under cultivation. Its taxonomy, morphology, ecology and medicinal uses were studied. Since, tissue-culture is a costly technology and requiring a high-tech laboratory a low-cost mass- multiplication technique has been invented through water-culture experiments, in order to make its saplings available to the interested herbal farmers in a larger scale. The results are reported in this paper, which will be of immense help and use to the herbal farmers.

INTRODUCTION

Tylophora indica (Burm.f.) Merr. (ASCLEPIADACEAE) is an important Indian medicinal plant. It is called “ASTHMA KODI” OR “NANJARUPPAN” in Tamil in the Siddha system of Indian medicine. *T. indica* is known to be an important medicinal plant capable of curing respiratory ailments, This plant is known to possess stimulant, emetic, cathartic, expectorant, stomachic and diaphoretic properties. It is capable of curing various human ailments like asthma, bronchitis, whooping cough, dysentery diarrhea and gout. Leaf powder, leaf and root decoctions are prepared and used for medicinal purposes. *T. indica* is restricted in its distribution. It is evident from the present investigation that it is distributed mostly in sandy habitats along the coastal line. It is Known to be

a sexually reproducing plant. Its capacity to reproduce vegetatively has been reported for the first time in this investigation.

MATERIAL

Tylophora indica (Burm.f.) Merr. (Asclepiadaceae) is the material of the present study. It was collected from the Veilankanni village of Nagapattinam Dt, Tamil Nadu, India.

METHODS STEM CUTTING PROPAGATION

Stem cutting were considered for the present work. Cuttings with two, three, four, five and six nodes were taken from an adult plant for the water-culture experiment.

Water-Culture Experiments

Glass bottles (500ml capacity) were taken for the experiment. Well – water was used as the culture medium. Bottles were kept in diffused sun light. Polythene bags (18cm x 8cm) were taken for culturing the rooted cutting. A mixture of garden soil and goats manure (1:1 ratio) was used the medium for culturing the rooted cuttings.

Cutting with two nodes

Six bottles were filled with well-water and in each bottle a stem cutting with two nodes was inserted with one node submerged in water and the other node above the water level.

Cutting with three nodes

Six bottles were filled with water. In each bottle a stem-cutting with three nodes was inserted with two nodes submerged in water and the other node above the water level.

Cutting with four nodes

Six bottles were filled with water. In each bottle a stem-cutting with four nodes was inserted with two nodes submerged in water and the other two nodes above the water level.

Cutting with five nodes

Six bottles were filled with water. In each bottle a stem-cutting with five nodes was inserted with three nodes submerged and the other two nodes above the water level.

Cutting with six nodes

Six bottles were filled with water. In each bottle a stem-cutting with six nodes was inserted with three nodes submerged in water and the other three nodes above the water level.

All the cutting were given daily change of water regularly in the morning. The bottles were arranged as follows:

Row 1: *Tylophora indica* 1,2,3,4,5,6, (Two nodes) (1A WL/1 BWL).

Row 2: *Tylophora indica* 1,2,3,4,5,6, (Three nodes) (2A WL/1 BWL).

Row 3: *Tylophora indica* 1,2,3,4,5,6, (Four nodes) (2A WL/2 BWL).

Row 4: *Tylophora indica* 1,2,3,4,5,6, (Five nodes) (2A WL/3 BWL).

Row5: *Tylophora indica* 1,2,3,4,5,6, (Six nodes) (3A WL/3 BWL).

(AWL : Above water level: BWL: Below Water Level)

The stem-cutting were cultured for 70 days and they were observed for the following morphometric parameters.

- Length of stem cutting (cm)
- Number of nodes/cutting
- Number of shoots per cutting
- Length of shoots (cm)
- Number of Leaves per cutting
- Maximum length of leaves (cm)
- Maximum breadth of leaves (cm)
- Number of roots per cutting
- Maximum length of rots (cm)

The morphometric performances of the stem-cutting were recorded and tabulated (tables I to IV). The cuttings were transplanted to polythene bags

containing soil mixture. The cuttings were maintained in the green house of the college botanical garden for distribution to the medicinal plant farmers.

to get the sexually/seed reproduced saplings. Therapeutically superior ecotypes for *T. indica* may be easily mass-multiplied by this method.

SUMMARY AND CONCLUSION

In the present investigation a low-cost mass-multiplication technique was considered and applied to obtain a large number of saplings of *T. indica* for plantation. The stem-cuttings were first allowed to root in a water medium. Root setting of the cutting was quick and also can be seen in this water-bottle culture technique. The rooted cutting established successfully as saplings in the polythene bag sand culture experiments.

In the water –bottle culture experiments 1/1 and 1/2 stem – cuttings showed 84% of rooting. The 2/2, 2/3, 3/3 stem-cuttings showed only 67% of rooting. It was inferred that the minimum noded cuttings were enough and suitable for mass-multiplication. It was also observed to be economical and profitable.

In the polythene bag sand culture experiment all the rooted stem-cuttings established successfully by way of producing; perfuse shoots within 30 days.

It is concluded that 1/1 stem-cuttings can be used for the water bottle culture experiments. Roots-set cuttings can be sand-cultured in polythene bags for 30 days and distributed to the medicinal plant farmer for cultivation. So, from a single mother plant numerous saplings can be mass-multiplied within 100 days. There is no need to wait for a long time

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TABLE NO -1
Morphometrics of the water-bottle cultured stem-cutting of *Tylophora indica* (Burm.f) Merr. (1/1 – 70 days)

CHARACTERS	NUMBER OF CUTTINGS						MEAN	STANDARD ERROR
	1	2	3	4	5	6		
Length of stem cutting (cm)	22.5	26.5	22.0	14.5	22.0	24.0	21.91	21.92 ± 1.54
Number of nodes/cutting	2	2	2	2	2	2	---	----
Number of nodes/cutting	1	1	1	1	---	1	0.8	----
Length of shoots (cm)	2.1	2.6	2.4	3.7	---	4.8	2.6	2.6 ± 0.09
Number of Leaves (cm)	4	4	3	3	---	4	3.6	3.6 ± 0.10
Maximum length of leaves (cm)	2.4	2.2	2.7	1.8	---	1.8	2.18	2.18 ± 0.13
Maximum breadth of leaves (cm)	1.9	1.4	1.6	1.2	---	0.9	1.4	1.4 ± 0.15
Number of roots /cutting	5	2	7	2	---	5	4.2	4.2 ± 0.87
Maximum length of roots (cm)	10.7	10.2	22.9	16.1	---	16.7	15.38	15.38 ± 2.07

TABLE NO -II
Morphometrics of the water-bottle cultured stem-cutting of Tylophora indica (Burm.f)
Merr. (1/2 – 70 days)

CHARACTERS	NUMBER OF CUTTINGS						MEAN	STANDARD ERROR
	1	2	3	4	5	6		
Length of stem cutting (cm)	36.0	35.6	29.0	20.0	19.0	27.6	27.86	27.86 ± 2.8
Number of nodes/cutting	3	3	3	3	3	3	3	----
Number of nodes/cutting	2	2	2	---	1	1	1.6	1.6 ± 0.2
Length of shoots (cm)	2.7	3.9	5.9	---	6.1	6.2	4.13	4.13 ± 0.94
Number of Leaves (cm)	5	5	5	---	4	5	4.8	4.8 ± 1.90
Maximum length of leaves (cm)	6.0	6.3	3.2	---	3.7	3.6	4.6	4.6 ± 0.52
Maximum breadth of leaves (cm)	3.0	3.4	1.7	---	1.9	1.9	2.34	2.34 ± 0.36
Number of roots /cutting	6	7	5	---	7	6	6.2	6.2 ± 0.33
Maximum length of roots (cm)	32.8	26.5	23.4	---	27.0	27.4	27.42	27.42 ± 1.37

TABLE NO -III
Morphometrics of the water-bottle cultured stem-cutting of Tylophora indica (Burm.f)
Merr. (2/2 – 70 days)

CHARACTERS	NUMBER OF CUTTINGS						MEAN	STANDARD ERROR
	1	2	3	4	5	6		
Length of stem cutting (cm)	35.0	33.9	30.0	29.0	34.2	31.4	32.91	32.91 ± 2.58
Number of nodes/cutting	4	4	4	4	4	4	4	----
Number of nodes/cutting	1	1	---	---	1	1	0.66	----
Length of shoots (cm)	4.3	5.1	---	---	6.2	6.1	3.61	3.61 ± 1.1
Number of Leaves (cm)	5	5	----	----	4	4	4.5	4.5 ± 0.25
Maximum length of leaves (cm)	3.0	3.2	----	----	3.4	3.7	3.32	3.32 ± 0.15
Maximum breadth of leaves (cm)	1.9	2.0	---	---	1.9	1.9	1.9	1.9 ± 0.15
Number of roots /cutting	4	8	---	---	7	7	6.5	6.5 ± 0.75
Maximum length of roots (cm)	16.8	30.5	---	---	23.4	27.0	24.42	24.42 ± 2.54

TABLE NO -IV
Morphometrics of the water-bottle cultured stem-cutting of Tylophora indica (Burm.f)
Merr. (2/3 – 70 days)

CHARACTERS	NUMBER OF CUTTINGS						MEAN	STANDARD ERROR
	1	2	3	4	5	6		
Length of stem cutting (cm)	29.0	35.2	22.4	24.5	33.7	30.4	23.34	23.34 ± 1.66
Number of nodes/cutting	5	5	5	5	5	5	----	----
Number of nodes/cutting	1	1	1	1	1	1	0.66	----
Length of shoots (cm)	3.9	4.8	----	----	4.7	6.2	3.26	3.26 ± 1.0
Number of Leaves (cm)	6	4	---	---	5	5	5	5 ± 0.35
Maximum length of leaves (cm)	6.4	3.9	---	---	4.2	3.8	4.57	4.57 ± 0.57
Maximum breadth of leaves (cm)	3.0	2.0	---	---	2.1	2.0	2.27	2.27 ± 0.22
Number of roots /cutting	9	8	---	---	7	8	8	8 ± 0.44
Maximum length of roots (cm)	26.7	27.8	---	---	25.0	18.2	24.42	24.42 ± 0.94

TABLE NO -V
Morphometrics of the water-bottle cultured stem-cutting of Tylophora indica (Burm.f)
Merr. (3/3 – 70 days)

CHARACTERS	NUMBER OF CUTTINGS						MEAN	STANDARD ERROR
	1	2	3	4	5	6		
Length of stem cutting (cm)	19.2	28.5	34.1	27.6	31.6	30.4	28.56	28.56 ± 0.19
Number of nodes/cutting	6	6	6	6	6	6	---	---
Number of nodes/cutting	1	1	1	---	---	1	0.66	---
Length of shoots (cm)	4.1	3.8	4.2	---	---	6.7	3.13	3.13 ± 1.0
Number of Leaves (cm)	6	4	5	----	----	5	5	5 ± 0.35
Maximum length of leaves (cm)	6.4	3.9	4.2	---	---	3.8	4.57	4.57 ± 0.57
Maximum breadth of leaves (cm)	3.0	2.0	2.1	---	---	2.0	2.27	2.27 ± 0.22
Number of roots /cutting	6	8	7	----	----	8	8	8 ± 0.44
Maximum length of roots (cm)	26.7	27.8	25.0	---	---	18.2	24.42	24.42 ± 0.94