Effect of Different Potting Media for Vegetative Propagation of Tippili (*Piper longum* and *Piper samentosum*)

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Introduction

Tippili is a widely used ayurvedic medicinal raw material in Sri Lanka. There are two types of tippili, known as, wal tippili and gas tippili (Personal contact ayurvedic physicians). Those two herbs were identified as separate species: *Piper longum* and *Piper samentosum*, which belong to the family Piperaceae and native to South and South East Asia. It is a dioecious, perennial herb with a thick, erect and branched rootstock and an ascending or prostrate stem (Huber, 1987). Although those plants can be grown in wet regions in Sri Lanka, tippili is highly cultivated in low country wet zone. The economic important parts are roots and dry spikes of female plant, which are generally used for its several medicinal and spicy properties. Availability of tippili as raw material in Sri Lanka is not sufficient to cater the requirement and the demand of the tippili plant has been increased. Therefore, Sri Lanka has to import tippili from South Bihar region in India (Abeywardana and Hettiarachchi, 2001). According to Department of Ayurveda (Technical branch), Sri Lanka has expended US $ 246485 for tippili spikes and US $ 43009 for tippili roots. India is a leading country which is producing ayurvedic products and they export adulterants due to high demand. Those adulterants do not have proper medicinal value. As a result final medicinal value of local ayurvedic products could be reduced. Therefore, it is better that local requirement of tippili to be produced within our country. Most of Sri Lankan tippili plants are female plants (Samuel, 1982) and the seed production is very low. Therefore, tippili plant is difficult to multiply through the seed propagation. According to Samuel (1982) it is grown as a medicinal plant to a limited extent in village homesteads in Sri Lanka. Stem cutting is a present method follows the multiplication of tippili plant. There are no recommended potting mixture, environmental requirements, cuttings and other planting materials available for vegetative propagation. The aim of this study was to find out the effective potting medium, polythene type and species for vegetative propagation of tippili for commercial scale cultivation using stem cuttings.

Methodology

This study was carried out at National Research Medicinal Plant Garden in Haldummulla using three factor factorial CRD design. The three factors considered that can be affected on vegetative propagation were two species of tippil (*P. longum* and *P. samentosum*), polythene types (Black, Transparent) and potting media (M1, M2, M3, M4). Sixteen treatment combinations were used with three replicates. Four different media: media 1 – M1 (Sand: Coir dust 1: 1), media 2 – M2 (Soil: Coir dust 1: 1), media 3 – M3 (Sand: Soil: Coir dust 1: 1: 1), media 4- M4 (Sand: Soil: Coir dust 1: 1: 1) were prepared as potting media which were sterilized using sunlight method.

Three nodal cuttings (height-about 5 inches) were taken from each species. The performance of *P. longum* and *P. samentosum* plants was evaluated by recording dry weight of plant roots after 90 days of cuttings established, length of the root (length of longest root) and shoot height. Data analysis of the experiment was conducted using an Analysis of Variance (ANOVA) procedure of the Minitab version 16.

Results and Discussion

As the results showed in table 1, there were no significant differences recorded in shoot height against species (P=0.466), polythene type (P=0.942), interaction effect of species × polythene type × media (P=0.938) interaction effect of species × polythene type (P=0.942) and interaction of polythene type × media (P=0.766) at 0.05 probability level, but significant difference recorded in shoot height against media (P=0.000) and interaction effect of species × media (P=0.045) at 0.05 probability level. Media 4 (Soil: Sand: Cow dung 1:1:1) showed higher shoot height (8.07 cm) (Table 4). Jayasinghe (1999) reported sand, top soil and farm yard manure mixed in the ratio of 1:1:1 and 2:1:1 gave significantly higher growth level, which was again proved by the present study.

Table 1. Analysis of variance for shoot height.

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Species	1	8.33	8.33	8.33	0.54	0.466
Polythene type	1	0.08	0.08	0.08	0.01	0.942
Media	3	963.67	963.67	321.22	20.95	0.000
Species × Media	3	138.00	138.00	46.00	3.00	0.045
Species × Polythene type	1	0.08	0.08	0.08	0.01	0.942
Polythene type × Media	3	17.58	17.58	5.86	0.38	0.766
Species × Polythene type × Media	3	6.25	6.25	2.08	0.14	0.938
Error	32	490.67	490.67	15.33		
Total	47	1624.67				

The results shown in table 2, revealed that there were significant differences recorded in root length against species (P=0.008), and media (P=0.000) at 0.05 probability level but no significant differences in root length against polythene type (P=0.625), interaction effect of species × media (P=0.534), interaction effect of species × polythene type (P=1.000), interaction effect of polythene type × media (P=0.137) interaction effect of species × polythene type × media (P=0.584) at 0.05 probability level. *P. longum* species showed higher root length (22.57 cm). Media 4 (Soil: Sand: Cow dung 1:1:1) showed higher root length (24.6 cm) (Table 4). Babu et al. (1997) reported *Piper longum* requires heavy organic media.

Table 2. Analysis of variance for root length.

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Species	1	176.33	176.33	176.33	8.05	0.008
Polythene type	1	5.33	5.33	5.33	0.24	0.625
Media	3	450.50	450.50	150.17	6.86	0.001
Species × Media	3	48.83	48.83	16.28	0.74	0.534
Species × Polythene type	1	0.00	0.00	0.00	0.00	1.000
Polythene type × Media	3	129.83	129.83	43.28	1.98	0.137
Species × Polythene type × Media	3	43.17	43.17	14.39	0.66	0.584
Error	32	700.67	700.67	21.90		
Total	47	1554.67				

Table 3 shows that there was significant difference recorded in root dry weight against species (P=0.027), and media (P=0.000), interaction effect of species × media (P=0.007) at 0.05 probability level but no significant difference in root dry weight against polythene type (P=0.462), interaction effect of species × polythene type (P=0.08), interaction of polythene type × media (P=0.533) and interaction effect of species × polythene type × media (P=0.938) at 0.05

probability level. Media 4(Soil: Sand: Cow dung 1:1:1) showed higher root dry weight (0.81 g) (Table 4).

Table 3. Analysis of variance for root dry weight.

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Species	1	0.13975	0.13975	0.13975	5.39	0.027
Polythene type	1	0.01435	0.01435	0.01435	0.55	0.462
Media	3	1.05304	1.05304	0.35101	13.54	0.000
Species × Media	3	0.38087	0.38087	0.12696	4.90	0.007
Species × Polythene type	1	0.08250	0.08250	0.08250	3.18	0.084
Polythene type × Media	3	0.05797	0.05797	0.01932	0.75	0.533
Species × Polythene type × Media	3	0.11256	0.11256	0.03752	1.45	0.247
Error	32	0.82960	0.82960	0.02593		
Total	47	2.67065				

Table 4. Means of shoot height, root length, dry weight of Tippili

Media	Mean of Shoot height (cm)	Mean length of root (cm)	Mean of dry weight (g)
Media 4 (Soil: Sand: Cow dung 1:1:1)	16.9^{a}± 6.46	18.7^{a}± 5.90	0.5^{a} ± 0.31
Media 2 (Soil: Coir 1:1)	7.6^{b} ± 2.84	13.4^{b}± 4.48	0.2^{b} ± 0.16
Media 3 (Soil: Sand: Coir 1: 1: 1)	7.6^{b} ± 2.31	13.1^{b}± 6.10	0.2^{b} ± 0.15
Media 1(Sand: Coir 1:1)	5.3^{b} ± 2.22	10.2^{b}± 2.89	0.1^{b} ± 0.07

*Means that do not share a same letter are significantly different.

Conclusions

For vegetative propagation of tippili, *Piper longum* is the best species and media 4 (Soil: Sand: Cow dung) is the best media for commercial cultivation of tippili. There is no any effect of transparence polythene and black polythene for commercial cultivation of tippili in the nursery for vegetative propagation.

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