Preliminary Studies on Propagation of *Helicteres isora* (L) (Sterculiaceae)

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ABSTRACT

An experiment was conducted at Makandura to identify a suitable propagule and a potting media to propagate *Helicteres isora* to introduce as a potential landscape plant. Three types of cuttings namely softwood, semi-hardwood and hardwood of 20cm length were planted in three potting media viz, sand, sand + coir dust (1:1) , sand + coir dust + top soil (1:1:1) and factorially arranged in a completely randomized design inside a propagator in a net house. Leaf area, leaf dry weight, root dry weight and number of roots were recorded 14 weeks after planting. Significantly high leaf area (1677cm^2 and 1721.7cm^2), leaf dry weight (3.3846g and 3.6363g) and root dry weight (0.33756g and 0.34289g) were observed in semi-hardwood and hardwood cuttings compared to softwood cuttings. While significantly higher leaf area (1973.8cm^2), leaf dry weight (4.1774g) and root dry weight (0.42856g) were recorded in sand medium compared to other media. Higher mean values were obtained for growth performances in hardwood cuttings compared to semi-hardwood cuttings. Further, cuttings are available through out the year and desiccation is not a problem during transportation. Therefore, hardwood cuttings grown in sand medium can be recommended as a potential propagule to propagate *Helicteres isora*.

KEYWORDS: ***Helicterers isora*, Landscape, Native, Propagation**

INTRODUCTION

Today landscape industry depends on the introduction of new plant species or varieties and at present most is imported to Sri Lanka. Some of these plants become aggressive, once escape from the man made landscape and invade the natural ecosystem thus causing an irreversible damage to the local biodiversity (De Mel and Yakandawala, 2003). According to Millar and Libby (1989) the genetic nature of introduce stock can profoundly influence the behaviour of the individuals, which in turn may affect the dynamics of the entire community and disrupt or alter the course of co-evolution within the community.

As a solution, native plants can be introduced to the landscape industry. Most of the native plants can be integrated successfully with exotic plants and any style of landscape and gardens. However, many of the native plants were new to the landscape industry (Widrlechner, 1990). Some workers (Baetz 1998, Taylor 1988) have described cases where local authorities in western countries have been working with the local nursery industry to build markets for these plants.

According to Taylor (1988), native plants are less costly to maintain because they have evolved under local environmental conditions. Further, native plants can play an important role in modern landscaping as they are unique to a given region, support biological diversity, resistance to climatic extremes and other stresses of the local environments which include resistance to insect feeding and disease pathogens (Anon, 2005).

Sri Lanka is considered as a biological hot spot and 3400 flowering plants were recorded, of which over 24% is endemic to the island (Ashton *et al.*, 1997). This rich Sri Lankan flora can be exploited to introduce native or endemic plants to the landscape industry. In 2004 Senarathne and Yakandawala identified *Memecylon umbellatum* as a potential landscape plant which produce attractive blue to violet colour flowers.

Based on field experience *H. isora* (Sterculiaceae) locally known as Liniya is identified as a potential landscape plant. The timber of this plant has been used for construction of houses, as oars and bark provides strong fiber (Verdcourt, 1995). Some medicinal properties were also recorded in entire plant (Jayaweera, 1982). Locally, sticks were used to support vegetable and betel cultivation.

The plant is naturally distributed in Dry, Intermediate and Wet zones of Sri Lanka (Verdcourt, 1995). Therefore this plant has a potential to introduce as a landscape plant in all the climatic zones of Sri Lanka.

Therefore, the present study was conducted with the objective of identifying a suitable propagule and a growing medium to propagate *H. isora* to introduce as a potential landscape plant.

METERIALS AND METHODS

a) Location of the population

A natural population was found in Liniyakanda, Giriulla (Intermediate zone) and the exact location was recorded using a Geographical Positioning System (GARMIN, etrex summit).

Planting materials were collected from the above population for the field trial. Soil sample were collected at a depth of 30cm and air dried to determine the soil pH.

b) Field trial

The experiment was carried out at the Faculty of Agriculture and plantation Management, Wayamba University of Sri Lanka, Makandura, Gonawila in the Low Country Intermediate Zone (IL1) during the period of December 2004 to April 2005.

Vigorously growing healthy and disease free mother plants were selected. Cuttings of 20cm length were obtained from the upper part of the plant to

represent three type of cuttings viz softwood, semi-hardwood and hardwood. The leaves were removed from the bottom to the lower one-third of the cutting and the remaining leaves were cut in half to reduce water loss. The rooting media was pre-moistened and the cuttings were planted 1-2 cm deep in punched black polythene bags (8cm × 6cm and gauge 150) in three different potting mixtures namely Sand, Sand + Coir dust (1:1) and Sand + Coir dust + Top soil (1:1:1). Altogether 9 treatment combinations were used (Table 1).

Table 1: Details of cutting types and potting media used as treatment combinations.

Treatments	Potting mixtures	Type of cutting
T1	Sand	Softwood
T2	Sand+Coir dust(1:1)	Softwood
T3	Sand+Coir dust+Top soil(1:1:1)	Softwood
T4	Sand	Semi-hardwood
T5	Sand+Coir dust(1:1)	Semi-hardwood
T6	Sand+Coir dust+Top soil(1:1:1)	Semi-hardwood
T7	Sand	Hardwood
T8	Sand+Coir dust(1:1)	Hardwood
T9	Sand+Coir dust+Top soil(1:1:1)	Hardwood

The treatments were factorially combined in a Completely Randomized Design (CRD) with three replicates. Twenty-one cuttings were used for each replicate and altogether 567 cuttings were used in the experiment. The experiment was carried out inside a propagator covered with milk white polythene (gauge 500, relative humidity 90% and the temperature 32 ^{0}C) in a net house (shade level 70%).

Base of the cuttings were treated with a rooting hormone (0.3% I.B.A.) before planting and Bordeaux mixture was applied on the cut surface. Captan was applied (2g/1L) twice a week to control the fungal infection.

Sprouting and survival of the sprouted cuttings were recorded once a week. Leaf area (using portable leaf area meter model Am 100-002), leaf dry weight, number of leaves, number of roots, length of the longest root and root dry weight (oven dried at 80 ^{0}C for 48 hr) was measured after 14 weeks.

General Linear Model was used to analyze the continuous data and Count Data were analyzed using CATMOD procedure (SAS, 1998).

RESULTS

a) Details of the site

Table2: Details of the site at Liniyakanda

Location	Altitude	117m
	Latitude	07^0 22.136$^/$
	Longitude	080^0 06.184$^/$
pH		5.9

b) *Field trial*

1. Survival of cuttings

The survival of cuttings in all the treatment combinations were high and above 82% (Figure 1) and the results indicated that the type of cuttings or the potting media is not significantly influencing the survival of cuttings (Table 3). Further, there is no interaction between the type of cuttings and potting media.

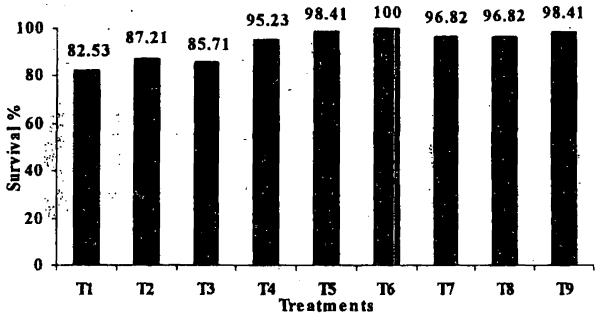

Figure 1: Survival percentages of cuttings in different treatments

2. Sprouting of cuttings

The sprouting percentages of cuttings in all the treatment combinations were above 82% and higher sprouting percentages were observed in semi-hardwood and hard wood (Figure 2). According to the results, the type of cuttings or potting media is not significantly affecting the sprouting of cuttings (table 3). Further, there is no interaction between the type of cuttings and potting media.

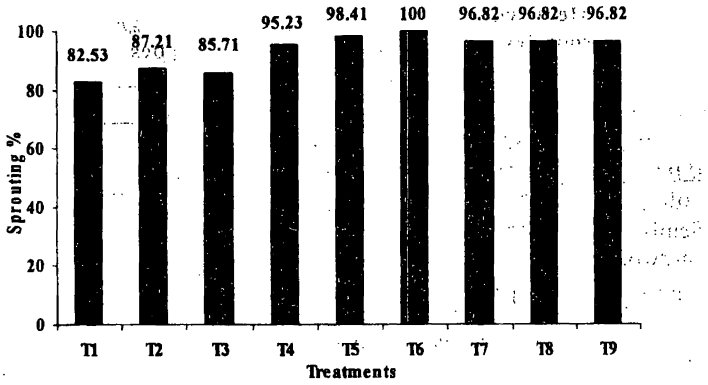

Figure 2: Sprouting percentages of cuttings in different treatments

Table 3: Effect of type of cuttings and potting media on survival and sprouting of cuttings

	Probability value	
	Survival	Sprouting
.Type of cutting	0.3528	0.3663
Potting media	0.9428	0.9538
Likelihood ratio	0.9996	0.9994

Probability values>0.05 not significantly different

3. Growth Performance

According to table 4, the type of cuttings or potting media is not significantly affecting the

presence of rooting and there is no interaction between the type of cuttings and potting media. However, the type of cuttings and potting media has a significant effect on the number of roots present in cuttings. The interaction between the type of cuttings and potting media on number of roots present was not significant (Table 4).

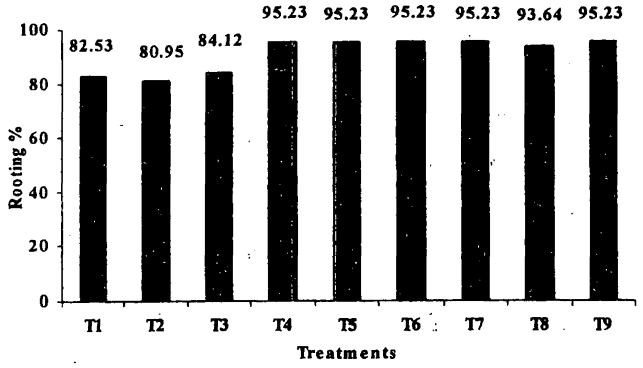

Figure 3: Rooting percentages of cuttings in different treatments

Table 4: Effect of type of cuttings and potting media on Presence and number of roots

	Probability value	
	Presence of root	**Number of root**
Type of cutting	0.3423	<0.0001
Potting media	0.9865	<0.0001
Likelihood ratio	0.9999	0.5165

Probability values>0.05 not significantly different

Table 5: Mean values of leaf area, leaf dry weight and root dry weight in different cutting types.

	Probability value		
Cutting type	**Leaf area (cm^2)**	**Leaf dry weight (g)**	**Root dry weight (g)**
Softwood	1286.3^b	2.5686^b	0.25267^b
Semi-hardwood	1677.0^a	3.3846^a	0.33756^a
Hardwood	1721.7^a	3.6363^a	0.34289^a

Treatment means in a column having common letters are not significantly different at p=0.05

Compared to softwood cuttings, significantly higher leaf areas (1677cm^2 and 1721.7 cm^2), leaf dry weights (3.3846 g and 3.6363 g) and root dry weights (0.33756 g and 0.34289 g) were observed in semi-hardwood and hardwood cuttings (Table 5).

According to table 6, significantly higher leaf area (1973.8 cm^2) leaf dry weight (4.1774 g) and root dry weights (0.42856 g) were observed in sand medium while significantly lower leaf area, leaf dry weight and root dry weight were observed in sand+ coir dust and sand+ coir dust+ top soil mediums.

Table 6: Mean values of leaf area, leaf dry weight and root dry weight in different potting media.

Treatment means in the column having common letters are not significantly different	Probability value		
Potting medium	**Leaf area (cm^2)**	**Leaf dry weight (g)**	**Root dry weight (g)**
Sand	1973.8^a	4.1774^a	0.42856^a
Sand+Coir dust (1:1)	1447.9^b	2.7321^b	0.31278^b
Sand+Coir dust+Top soil 1:1:1)	1263.2^b	2.6999^b	0.19178^c

DISCUSSION

Public interest in native plants and their perceived value in the landscape are growing in developed countries. However, it is a new concept to Sri Lanka. Field observations and experiences have shown that there are some promising native plants which can be introduced as landscape plants. However, in most native plants biology of the plant including method of propagation is not studied in detail.

Cuttings are still the most important means of propagating ornamental plants as selected genotypes can be multiplied using cuttings (Ritchie, 1994). Further, in *H. isora* seed production is seasonal. Therefore, cuttings can be considered as a potential propagule to introduce this plant in landscaping.

Here, higher sprouting and rooting percentages were observed in semi-hardwood and hardwood cuttings (Figure 2 and 3). According to Hudsen *et al* (1997), generally semi-hardwood and hardwood make best cuttings due to stored food reserves in the stem.

Though there was no significant difference among leaf area, leaf dry weight and root dry weight in semi-hardwood and hardwood cuttings, mean values were higher in hardwood cuttings. Further, desiccation is not a problem with hardwood cuttings during planting (Hudsen, *et al* 1997) and they are available through out the year. Therefore, hardwood cuttings can be recommended over semi-hardwood cuttings as a propagule for *H. isora*.

Leaf area, leaf dry weight and root dry weights were significantly higher in sand medium compared to other two mediums and similar observations were reported by Senarathne and Yakandawala (2005 in press) for another native plant *Memecylon umbelatum*. According to Guy and Fred, (2000) the enhancement of the growth performance of cuttings grown in sand media may be due to the adequate drainage and absence of decaying matter as such materials promote the development of fungi and bacteria, which may be cause the cuttings to die before root formation. Therefore, sand medium can be recommended as the most suitable media.

CONCLUSIONS

Helicteres isora can be considered as a promising native plant which has a potential to be used in landscaping as it produce attractive flowers, fruits and tolerate pruning. Further, it is naturally growing in

and tolerate pruning. Further, it is naturally growing in Wet, Intermediate and Dry zones of Sri Lanka. Therefore, can be introduced as a landscape plant in above zones. Hardwood cuttings of 20 cm in length grown in sand medium can be recommended as a propagule and potting media to propagate this plant.

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