Short Communication

Evaluation of Alternative Types of Supporting Materials for Betel (*Piper betle* L.) Cultivation

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ABSTRACT

A study was conducted in Intercropping at Betel Research Station, to evaluate alternative types of supporting materials for betel (*Piper betle* L.) cultivation. Coir ropes were the most suitable supporting material to achieve higher yield and quality betel. The durability of coir ropes was high in comparison to other supporting materials and the use of coir ropes as a supporting material was the cheapest for betel cultivations.

Key Words: Supporting Materials, Coir ropes, Betel, Yield, Leaf Quality

INTRODUCTION

Betel vine (*Piper betle* Linn.) belongs to genus Piper of the family Piperaceae. It is a diocious plant grown in Sri Lanka as a cash crop (Rathnasoma and Senavirathna, 2002).

Betel leaves are used for chewing purposes (Arulmozhiyan *et al*, 1998). Sri Lankan betel industry has a long-standing history dating back to 340 A.D. (Rathnasoma and Senavirathna, 2002).

The major betel growing districts in Sri Lanka includes Kurunegala (65%) and Gampaha (22%) mainly for export (Sumanasena *et al*, 2005a). Since 1974, betel has gained a significant position in the export market in addition to well spread domestic market. Pakistan is the major market for Sri Lankan betel. Although the volume and corresponding value of exports have shown a fluctuation from 1974 to 2005, it has brought in substantial amount of foreign exchange to Sri Lanka (Anon, 2004).

Betel is a semi-woody, perennial climber. It shows dimorphic branching habit. The orthotropic vegetative branches have adventitious roots that adhere to the supports. Plageotropic axillary branches, which bear fruits, do not have roots (Rathnasoma and senavirathna, 2002). Therefore, betel vines should be trained on to supports, which should be established in the field three weeks after planting. Then the arial roots of the betel vine may climb easily (Anon, 1984).

In all betel-growing countries, both live supports and dead supports are used in betel cultivations. In India, mainly live supports such as *Sesbania grandiflora* and *Erythrina indica* are used by betel growers (Chaugule, 1960). In Sri Lanka, betel-growing farmers are using *"Varaniya, Kuratiya, Malkera, Kabella, Andara and Godapara"* which are wild bushy type trees and most of them found in natural forests or man made forests. Due to deforestation, availability of these sticks has been reduced and the scarcity has compelled the betel growers to look for alternatives. As a result, potential materials that can be used as supports for betel vines is a timely needed investigation. Hence, the use of coir ropes, teak side branches, *Kooratiya* and *Gliricidia sepium* as supports are tested in this experiment.

MATERIALS AND METHODS

The experiment was carried out at the Intercropping and Betel Research Station, Department of Export Agriculture. Dampallassa, Narammla, located in the Low Country Intermediate Zone (IL_1), from December 2004 to April 2007.

Betel stem cuttings were planted in the "flat sunken" beds in size of 240cm x 120cm. There were 24 sticks for 48 vines (two betel vines per stick) in one plot and total of 216 sticks and 72 coir rope supports for the whole experiment. The betel was planted in three rows at a spacing of 45cm between rows and 30cm within a raw. Each plot was established 150 cm (5 feet) apart. Standard cultural practices were followed. Establishment of supports were done using Teak sticks (T_1), *Kooratiyta* sticks (T_2),

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Coir rope supports (T_3) and *Gliricidia* sticks (T_4) as the treatments of the experiment.

The experiment was laid out in a RCBD with three replications.

The data recorded were,

1) Total yield/plot/harvest (Total number of leaves),
2) Percentage of large leaves/Harvest, (Leaves more than 16 cm in length and 12 cm in width were considered as large leaves)
3) Weight (g) of 100 "peedunu" leaves, and
4) Number of replacing times of supporting materials

Harvesting of leaves was commenced during the 26th week after planting. After harvesting, total number of leaves/plot was counted and fresh weight of leaves was measured using top - loading balance.

Harvested leaves were sorted according to the size of the leaves and categorized as large leaves and small leaves. Percentage of large leaves were calculated. The number of replacing times of supporting materials was also recorded. Scoring index was deviced to find out the best supporting material considering all the data recorded. The results were analyzed by using the SAS package.

RESULTS AND DISCUSSION

Effects of Supporting Materials on Betel Yield

The maximum total yield obtained from coir ropes (T_3) proved to be statistically significant from other treatments (T_1 + T_2) (Table 1). However, similar results could be expected with Gliricidia (T_4) as there is no significant difference between coir ropes and Gliricidia. This suggests that betel growers can use either coir ropes or Gliricidia as supporting material depending on their preference and availability of the materials. Higher yield with coir ropes might have resulted due to non-competitiveness, where as Gliricidia competes with betel for nutrients and water. On the Other hand, flexibility of coir ropes might have helped to induce more plageotropics resulting higher number betel leaves. Hence, it suggests that use of coir ropes, as alternative supports would cater the scarcity of supporting material while increasing the yield and farmers income.

Effects of supporting Materials on Percentage of Large Betel Leaves/Harvest

The variations in the production of large leaves when different supporting materials are used shown in Table 2. The percentage of large leaves per harvest is also an important parameter to be considered as bigger leaves can fetch a higher market price. The maximum percentage of 55.734 for large leaves was observed with teak sticks suggesting that export quality can be increased with the use of teak supports. Since there is no significant difference among coir ropes, *Kooratiya* and *Gliricidia* for large leaves, any of those can be used to obtained large leaves when the availability of teak is scarce.

Betel farmers always try to maximize percentage of large leaves, as the price of betel leaves is determined based on leaf size and weight.

Effects of Supporting Materials on Betel Leaf Weight

The maximum mean weight (625.87) of 100 leaves was achieved with *Gliricidia* and the recorded minimum (496.13) was with *Kooratiya* (Table 3). However, possibility of getting higher leaf weight with coir ropes and Teak sticks are apparent, as significant difference among *Gliricidia*, Coir ropes and Teak was not found. Hence, the use of other three supporting materials except *Kooratiya* will help to produce betel leaves with high weight.

Leaf weight is considered as one of the important parameters, as price of export leaves is determined by the leaf weight too. The real quality of "Black betel" is reported

to be correlated to weight (Sumanasena *et al.*, 2005b).

Durability of Different Supporting Materials

Among the four treatments, *Gliricidia* sticks had to be replaced 4 times while *Kooratiya* sticks had to be replaced 5 times after establishment in the field (Table 4). However, Teak sticks and coir ropes recorded to last for about 28 months. Therefore, durability of teak sticks and coir ropes is proved to be high as they could stand over two years without replacement.

Total cost for different supporting materials

The use of *kooratiya* sticks as a supporting material increased the cost in comparison to other three supporting materials owing to number of replacement (Table 5). The use of coir ropes as a supporting material was the cheapest.

Devising a Scoring Index

A scoring index devised, according to the results obtained in the experiment is shown in table 6. The marks given to all the treatments were 4, 3, 2 and 1, as best, 2nd best, 3rd best and the last respectively according to their performance level under each parameter scored.

Coir ropes scoring highest score proved to be the best while the *Kooratiya* showing the lowest marks. However, Teak and *Gliricidia* can also be used depending on the preference and availability.

CONCLUSION

The results of this experiment have shown that Coir ropes are the most suitable supporting material to achieve higher yield and quality of betel. Furthermore, the durability of coir ropes is high in comparison to other supporting materials and the use of coir ropes as a supporting material is the cheapest for betel cultivations.

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Table 1. Effects of Supporting Materials on Betel Yield

Treatment	Mean Total Yield/ Plot (24 sticks)/Harvest
T_1- Teak sticks	894.61[b]
T_2- *Kooratiyta* sticks	923.56[b]
T_4-*Gliricidia* sticks	947.31[ab]
T_3- Coir ropes	1085.97[a]
LSD	155.73
CV%	19.47

Figures denoted by different letters are significantly different by LSD (P<0.05).

Table 2. Effects of supporting Materials on Percentage of Large Betel Leaves /Harvest

Treatment	Percentage of large Leaves/ Harvest
T_1	55.734[a]
T_2	54.847[ab]
T_3	47.556[b]
T_4	46.863[b]
LSD	8.0648
CV%	14.01278

Figures denoted by different letters are significantly different by LSD (P<0.05).

Table 3 Effects of Supporting Materials on Betel Leaf Weight

Treatment	Mean Weight of 100 "*Peedunu*" Leaves (g)
T_1	535.43[ab]
T_2	496.13[b]
T_3	542.47[ab]
T_4	625.87[a]
LSD	102.69
CV%	16.62634

Figures denoted by different letters are significantly different by LSD (P<0.05).

Table 4. Durability of Different Supporting Materials

Treatment	Number of replacement
T_1- Teak	0
T_2-*Kooratiya*	5 Times
T_3-Coir ropes	0
T_4-*Gliricidia*	4 times

Table 5. Total cost for different supporting materials

	Teak	**Kooratiya**	**Coir ropes**	**Gliricidia**
Cost for supporting materials (Rs./100 sticks)	800.00	1300.00	700.00	900.00

Table 6. Total Score achieved by each treatment

Treatment	**Total marks**
T_1- Teak	14
T_2-*Kooratiya*	09
T_3-Coir ropes	17
T_4-*Gliricidia*	13