Tropical Agricultural Research Vol. 19: 170 - 180 (2007)

Growth of Nursery Plants in Tea as Affected by Type of Cutting and Planting Media

K.W.L.K. Weerasinghe, M.A. Wijeratne[1] and U.R. Sangakkara[2]

Postgraduate Institute of Agriculture
University of Peradeniya
Peradeniya, Sri Lanka

ABSTRACT. *Conventional tea nurseries have limitations such as procuring adequate soil, cuttings and space for propagation and practical limitations in handling produced nursery plants. Therefore, experiments were carried out to evaluate the possibility of improving the method of producing vegetative propagules of tea using alternative rooting media and different types of cuttings. Shoot cuttings from the plucking table obtained in the first and second year after pruning were compared to conventional single nodal cuttings with full and half mother leaf in the first experiment, and the best container type and potting media to raise selected cuttings in relation to the conventional method were studied in the second experiment.*

Plucking shoots taken from first and second year after prune had significantly higher numbers of leaves and leaf area compared to standard single nodal cuttings. Plucking shoots in first year after prune showed significantly higher shoot and root dry weight compared to plucking shoots in second year after prune and standard single nodal cuttings. The poorest growth was in single nodal cuttings with half mother leaf. In the second experiment, conventional nursery plants had significantly better root growth when compared to other types of media and containers. Plucking shoots grown in seedling trays with compost, refuse tea and soil had similar patterns of root growth. The results indicate the feasibility of using cuttings from plucking shoots as a replacement for conventional cuttings used for the propagation of tea.

INTRODUCTION

Nurseries are the beginning of a planned plant production program and are needed to raise healthy, vigorous and uniform plants suitable for field planting. This can only be achieved by proper nursery operations (Bond, 1994). In a nursery, the time spent by the plant is money spent in maintenance. Reducing time will lower the cost of production. If nursery plants are healthy and vigorous, they will succeed in the field and reach production stage earlier. These twin objectives will be served if procedures are evolved to obtain good quality uniformly grown plants in the shortest possible time (Kathiravetpillai and Kulasegaram, 1986).

[1] Tea Research Institute of Sri Lanka, Talawakele, Sri Lanka.

[2] Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka.

The standard polythene bag (150 gauge) used in tea nurseries of Sri Lanka is 23 cm in length and 10 cm in flat length. About 12,500 nursery plants are required to plant 1 ha of tea (Kathiravetpillai and Kulasegaram, 1986), and the soil requirement is about 25.4 m^3 to fill the bags. However, it has become extremely difficult to find suitable soil in adequate quantities on a regular basis. Since the space requirement for nursery plants is also high (1 m^2 for 120 plants), it is necessary to maintain a large area for the commercial tea nurseries.

Conventionally, propagation of shoots are obtained from mother bushes and, about 250 mother bushes are needed to obtain cuttings to plant a hectare (Kathiravetpillai and Kulasegaram, 1986). Therefore, nurserymen face difficulties in obtaining cuttings for raising plants. Furthermore, growers find it is difficult to transport large numbers of plants to fields manually as bagged plants are bulky and heavy and require vehicles.

Experiments using crop shoots from bushes under regular plucking to investigate growth showed that rooting could be induced in crop shoots harvested from bushes being plucked. Hence, crop shoots can be used for multiplication (Satyanarayan and Ilango, 1993). An experiment carried by Scarborough and Kayange (1979) using seedling trays have shown that seedling trays are easier and quicker to fill and roots developed vertically and the technique had many advantages in terms of handling.

There is a need to identify alternative methodologies to raise tea nursery plants under minimum costs due to difficulties and limitations such as finding good nursery soil in adequate quantities, problems caused by the usage of polythene nursery bags, high spacing requirement for raising nursery plants, maintaining mother bushes to obtain shoot cuttings and cost of transporting nursery plants. Therefore, experiments were carried out to ascertain the possibility of improving the method of producing vegetative propagules of tea through shortening of the nursery phase using alternative rooting media and different types of cuttings. The specific objectives of this study were to identify the best type of shoot cutting from the plucking table as an alternative to the shoot cutting taken from mother bushes and determine the best container type and potting media to raise selected shoot cuttings for successful field establishment of tea.

MATERIALS AND METHODS

The study was conducted at the tea nursery, Tea Research Institute's Low-country Station Ratnapura from May 2006 to April 2007 (6^0 40^1 N, 80^0 25^1 E and 60 masl.) as two experiments. The mean annual rainfall of the location is 3000 mm and the average daily temperature is 29^{o}C.

Experiment I was conducted to identify the best type of cutting taken from the plucking table as an alternative to those usually taken from mother bushes. There were four treatments namely; plucking shoots taken from the first year after pruning (T1), the second year after pruning (T2), standard single nodal cuttings with full mother leaf from mother bushes (T3) and standard single nodal cuttings with half mother leaf from mother bushes (T4) which was as the control.

Experiment II was conducted to determine the best combination of planting container and media for the selected cuttings from the 1st experiment. There were two types of planting containers (seedling tray and standard polythene bag), three media (50% soil +

50% refuse tea, 50% soil + 50% compost and 100% soil) and three types of cuttings (plucking shoots taken from first and second year after pruning and standard single nodal cuttings with full mother leaf taken from mother bushes). Six combinations made from the three factors were compared with standard type nursery plants as the control in the trial.

Each treatment was replicated five times and each replicate consisted of 20 cuttings in the experiment I and 38 plants per replicate in the experiment II. The treatments were laid according to a Completely Randomized Design.

A recently released cultivar, TRI 4042 was used for both experiments. Shoots were obtained from tea bushes under plucking and standard single nodal cuttings were obtained from the clonal mother bushes at St. Joachim Estate, Ratnapura. Tips of shoots were removed a week prior to taking the cuttings from mother bushes. Shoots from plucking table were obtained early in the morning (6.00 am – 8.00 am) using knives and the required portions were separated using a razor blade. In the experiment I, standard size polythene bags (size 23 × 10 cm, gauge 150) filled with soil was used to plant the selected cuttings.

In the experiment II, different media combinations were filled into seedling trays to a depth of 10 cm and the different cuttings were planted. Their growth was compared with those developed from the standard type nursery plants.

Recommended nursery practices as per TRI guidelines **(**Kathiravetpillai and Kulasegaram, 1986) were followed. A fungicide (Peranox/Champion a:i=77% Copper Hydroxide) was sprayed at the rate of 2.8 g/L soon after establishment to protect newly emerging shoots from black blight (caused by *Rhizoctonia solani*). The nursery bed was covered by white coloured polythene of gauge 300 and T65 (nursery fertilizer 10.9% N, 10.8% P_2O_5, 11.1% K_2O, and 3.7% MgO) was applied 6 weeks after planting at the rate of 20 g/120 plants and later increased up to 50 g/120 plants.

At four week intervals after planting, cuttings were randomly uprooted, washed without damaging the roots and shoots. The number of new leaves produced, shoot dry weight, total leaf area, time taken to develop roots in cuttings, root length and root dry weight were measured. The root length was measured using a ruler from the base of the cutting to the tip of the longest root. Roots and shoots were oven dried at 80^0C to a constant weight and weighted using a balance (Model: Mettler E-200)**.** Total leaf area was measured using leaf area meter (Model: Delta-T Area Measurement System). When fitting growth prediction models for each measured parameter, the most suitable model was selected based on the highest R^2 (Coefficient of determination).

Analysis of variance (ANOVA) procedure was followed for parametric data while the Chi-squre procedure was followed for non parametric data. Mean separation was carried out using least significant difference (LSD) values to determine the significance of observed differences at 5% probability level.

RESULTS AND DISCUSSION

Experiment I:

Number of leaves

At four weeks after planting, half mother leaf cuttings had the lowest mean leaf number (T4) and the plucking shoots from first year after pruning (T1) had the highest leaf number (Table 1). Although there was no significant difference in number of leaves thereafter, plucking shoots taken from the second year after pruning achieved the highest leaf number (T2) at 14 weeks after planting (WAP). The standard type mother leaf cuttings had the lowest leaf number (T3) at 14 WAP. All other types of cuttings had a higher leaf number when compared to standard type mother leaf cuttings at the final sampling. This suggests that plucking shoots taken from first and second year after pruning are capable of producing more leaves compared to standard type mother leaf cuttings. This may be due to the faster initial growth rates of plucking shoots when compared to the standard single nodal cuttings.

Table 1. **Number of leaves of new shoots as affected by different types of cuttings.**

Treatment	Weeks after planting					
	4	6	8	10	12	14
T1	2.89	2.90	3.33	3.67	3.80	4.60
T2	2.33	2.80	3.10	3.30	4.80	5.20
T3	1.70	1.80	2.56	3.00	3.00	3.40
T4	0.70	1.40	2.40	2.62	2.80	3.50
LSD	0.78*	1.25	0.68	0.64	0.48	0.47

Note: *Significant at p=0.05.
T1, T2: Plucking shoots taken from first and second year after pruning respectively.
T3, T4: Standard single nodal cuttings with full mother leaf and half mother leaf respectively.

Total leaf area

Shoots from first year after pruning had the highest leaf area and half mother leaf cuttings had the lowest when compared to all other three treatments (Figure 1). At four WAP plucking shoots from the first year after pruning had a significantly higher (p=0.05) total leaf area when compared to all other treatments. Thereafter plucking shoots from first year and second year after pruning developed a significantly higher (p= 0.05) total leaf area when compared to half mother leaf cuttings. Though there was a difference in total leaf area of plucking shoots from first year and second year after pruning until 12 WAP, this difference was not evident at 14 WAP. In general, plucking shoots from first year and second year after pruning had a significantly higher (p=0.05) total leaf area when compared to full and half mother leaf cuttings. This revealed that higher leaf area could be obtained by using plucking shoots taken from first year and second year after pruning.

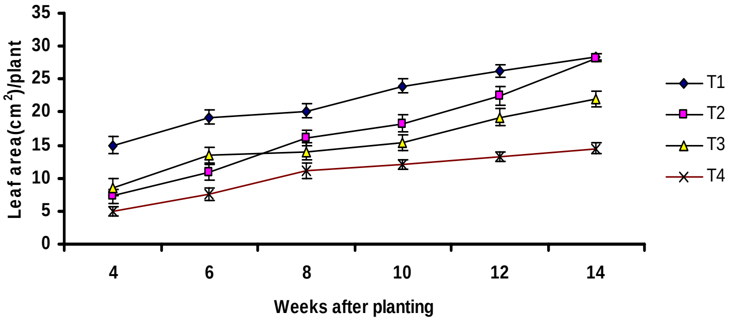

Figure 1. Total leaf area of new shoots of different types of cuttings.

Note: T1, T2: Plucking shoots taken from first and second year after pruning respectively T3, T4: Standard single nodal cuttings with full mother leaf and half mother leaf respectively

The plucking shoots taken from the second year after pruning had the highest rate of leaf area increase ($y=4.0611x+2.9648$, $R^2=0.98$). Half mother leaf cuttings had the lowest (14.5 cm^2/cutting) total leaf area among all treatments and the lowest rate of leaf area increase ($y=1.8664x+4.0467$, $R^2=0.94$) among all treatments and this may be due to loss of half of the mother leaf in the cuttings. Kathiravetpillai and Kulasegaram (1986) reported that the new growth of cuttings depend entirely on the mother leaf. The results of this study revealed that a higher leaf area could be obtained by using plucking shoots taken from first year and second year after pruning.

Shoot Dry Weight

Plucking shoots taken from the first year after pruning had the highest shoot dry weight over the experiment period while half mother leaf cuttings had the lowest (Figure 2). However, half mother leaf cuttings (T4) had the highest rate of shoot dry weight increase ($y=0.0183^{e0.3624X}$, $R^2=0.87$) when compared to T1 ($y=0.075^{e0.2184X}$ $R^2=0.97$), T2 ($y=0.0369\ ^{e0.2968X}$, $R^2=0.97$) and T3 ($y=0.0643\ ^{e0.1966X}$, $R^2=0.98$).

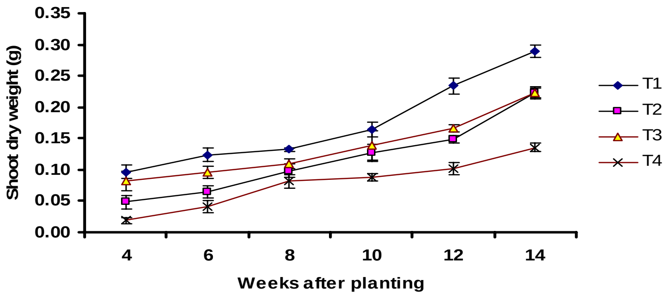

Figure 2. Dry weight of new shoots of different types of cuttings.

Note: T1, T2: Plucking shoots taken from first and second year after pruning respectively.T3, T4: Standard single nodal cuttings with full mother leaf and half mother leaf respectively.

Standard mother leaf cuttings maintained the second highest shoot dry weight until 12 WAP and shoots taken from second year after pruning had the second highest shoot dry weight of 223.3 mg/plant at 14 WAP. At four WAP, shoots taken from first year after pruning, and standard mother leaf cuttings had significantly higher (p=0.05) shoot dry weights when compared to other treatments. At 14 WAP, shoots taken from first year after pruning (T1) achieved a significantly higher (p=0.05) shoot dry weight (289.6 mg/plant) when compared to other treatments. Shoot dry weight of plucking shoots taken from second year after pruning (T2) and full mother leaf cuttings (T3) had significantly lower (p=0.05) shoot dry weights when compared to plucking shoots taken from first year after pruning. Furthermore, T1 and T2 had significantly higher (p=0.05) shoot dry weight compared to half mother leaf cuttings. The correlations between mother leaf area and shoot dry weight(r=0.67) and mother leaf dry weight and shoot dry weight (r=0.67) were significant (p=0.05) in T1. This could induce a higher shoot dry weight in these cuttings since they posses larger mother leaves when compared to plucking shoots taken from second year after pruning.

Root length

Root initiation in T1 and T2 occurred much earlier than in T3 and T4 (Table 2). Cuttings of treatments T1, T2, T3 and T4 took 4, 4, 6 and 8 weeks, respectively for initiation of roots (data not provided). From the beginning to the end, cuttings in T1 and T2 had higher root lengths when compared to T3 and T4. At 14 WAP, cuttings in T1 had the highest root length (12.1 cm/plant) while those of T4 had the lowest (5.6 cm/plant). Cuttings of T2 and T4 had root lengths of 11.4 cm/plant and 5.75 cm/plant, respectively. Nyirenda and Mphangwe (1999) compared rooting potential of immature (apical shoots) and over mature (brown stem) cuttings with the rooting potential of green stem cuttings of tea and showed that apical shoots had a good potential for use as propagules.

Table 2. **Root length of new shoots of different types of cuttings.**

Treatment	**Weeks after planting**					
	4	**6**	**8**	**10**	**12**	**14**
T1	0.003	0.800	2.04	3.98	6.10	12.10
T2	0.203	2.025	4.36	5.06	6.70	11.40
T3	0	0.425	0.60	2	2.50	5.75
T4	0	0	2.28	3	4.12	5.60
SE(mean)	0.050	0.226	0.476	0.549	0.764	1.268

Note: T1, T2: Plucking shoots taken from first and second year after pruning respectively
T3, T4: Standard single nodal cuttings with full mother leaf and half mother leaf respectively

Root Dry Weight

At 6 WAP, the highest (p=0.05) root dry weight was recorded in cuttings in T2 (Figure 3). From 8 WAP to 12 WAP, there was no significant difference in root dry weight among treatments. However, at the 14 WAP, T1 had a significantly high (p=0.05) root dry weight (80.7 mg/plant). Plucking shoots taken first year after pruning (T1) had the highest rate of root dry weight increase (y=0.0157x-0.0278, R^2=0.85) when compared to those of T2 (y=0.0157x-0.0278, R^2=0.85), T3 (y=0.0076x-0.014, R^2=0.86) and T4 (y=0.0056x-0.0083, R^2=0.92).

Therefore, it can be concluded that plucking shoots obtained from the first and second year after pruning are more suitable of producing nursery plants, which are comparable to the standard nursery plants currently being produced by conventional methods.

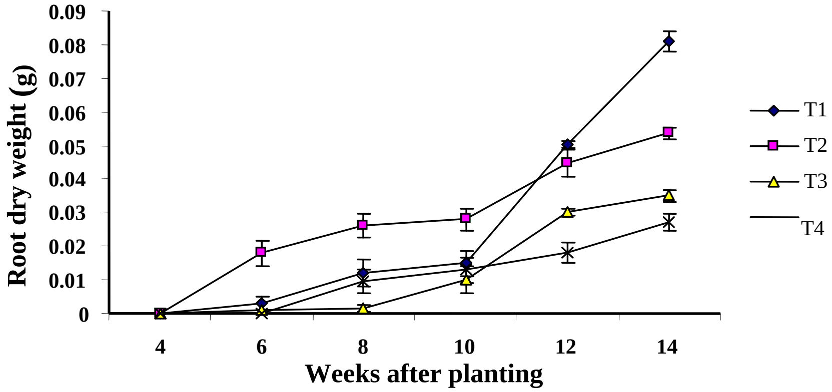

Figure 3. Dry weight of new roots as affected by different types of cuttings.

Note: T1, T2: Plucking shoots taken from first and second year after pruning respectively
T3, T4: Standard single nodal cuttings with full mother leaf and half mother leaf respectively

Experiment II

Number of leaves

There was no significant difference in numbers of leaves among the treatments over the experimental period (Table 3). Standard single nodal cuttings (T7) had the highest rate of leaf development and the highest leaf number (6.3 leaves/plant) at end of the experiment. Kathiravetpillai and Kulasegaram (1986) reported that the mother leaf of the cuttings play a major role during the growth and this could induce leaf development and expansion in standard single nodal cuttings.

Table 3. Number of leaves of new shoots as affected by different planting containers, growing media and types of cuttings.

Treatment	Growing Medium	Type of Cutting	Rates of leaf development
T1	50% refuse tea	PS – 1YAP	y =0.6114x + 2.427, R^2=0.98
T2	50% refuse tea	PS – 2 YAP	y =0.47x + 2.830, R^2=0.93
T3	50% compost	PS – 1YAP	y =0.3129x + 2.702, R^2=0.95
T4	50% compost	PS – 2 YAP	y =0.3395x + 3.275, R^2=0.92
T5	100% soil	PS – 1 YAP	y =0.3576x + 3.229, R^2=0.95
T6	100% soil	PS – 2 YAP	y =0.5543x + 2.627, R^2=0.95
T7	100% soil	Standard single nodal	y =0.6262x + 2.722, R^2=0.96

Note: YAP = Years after pruning
Planting containers: T1-T6 = Seedling tray, T7 = Polythene bag
PS = Plucking Shoots

Total leaf area

There was a significant difference in the total leaf area among treatments at 4 WAP (Table 4). The lowest leaf area was recorded in the second treatment (T2), which had a leaf area of 18 cm^2/plant. However, significant (p=0.05) differences in the total leaf area was found only at 4 WAP among the treatments. At 24 WAP, T1 had the highest leaf area (60 cm^2/plant) followed by T4 (58.25 cm^2/plant) and T7 (58 cm^2/plant). T2 had the highest rate of leaf area development ($y = 13.538\ e^{0.2401x}$, R^2=0.95) while T6 had the lowest rate of leaf area development ($y = 17.282\ e^{0.1356x}$, R^2=0.94).

In this study, addition of organic matter to the planting medium did not increase the leaf area of tea cuttings significantly, in contrast to the experiment of Chong (2000) who stated the benefits of this practice on plant growth. This may be attributed with the relative short time at which the samples were taken in this study, when compared to the life cycle of tea plants.

Table 4. Total leaf area of new shoots as affected by different planting containers, growing media and types of cuttings.

Treatment	Growing Medium	Type of Cutting	Total Leaf Area (cm^2) - WAP		
			4	12	24
T1	50% refuse tea	PS – 1 YAP	24.25[ab]	30.25	60.00
T2	50% refuse tea	PS – 2 YAP	18.00[c]	24.80	54.80
T3	50% compost	PS – 1 YAP	27.00[a]	32.00	49.67
T4	50% compost	PS – 2 YAP	28.33[a]	32.75	58.25
T5	100% soil	PS – 1 YAP	24.00[ab]	30.00	45.50
T6	100% soil	PS – 2 YAP	20.40[bc]	27.40	37.00
T7	100% soil	Standard single nodal	25.50[a]	35.25	58.00
	LSD		4.55*	9.41	20.67

YAP = Years after pruning
Planting containers: T1-T6 = Seedling tray, T7= Polythene bag
PS = Plucking Shoots, WAP= Weeks after planting, YAP = Years after prune
Note:* Significant at p=0.05
Means in the same column for a given parameter with same superscripts are not significantly different at p=0.05

Shoot Dry weight

At 4 WAP, standard type tea nursery plants raised in polythene bags (T7) had the highest shoot dry weight (227.5 mg/plant) and plants produced by cuttings taken from the second year after pruning, grown on seedling trays with 50% soil and 50% compost as the medium (T4) had the lowest (120 mg/plant) (Table 5). Standard type tea nursery plants raised in polythene bags had a significantly (p=0.05) higher shoot dry weight (260 mg/plant) at 12 WAP when compared to other treatments. At 20 WAP, except in T7, all other treatments had constant values for shoot dry weight. No significant difference in shoot dry weight was found beyond 20 WAP. These results revealed that cuttings planted in seedling trays could not continue growth due to limitations in the environment and the medium in the planting hole. It is thus suggested that growing tea plants be removed from the seedling trays at this stage.

During the growing period, the highest rate of shoot dry weight increase was found in T4 (y = 0.1052 e $^{0.1922x}$, R^2= 0.94) followed by T1 (y = 0.1157 e $^{0.1736x}$, R^2= 0.79). Leaf area of T1 and T2 had significantly positive correlations (r =0.96 and r = 0.90) with shoot dry weight. The higher leaf areas of T1 and T2 thus could lead to higher shoot dry weights of T1 and T2.

Table 5. Dry weight of shoots as affected by different planting containers, growing media and type of cuttings.

Treatment	Growing Medium	Type of Cutting	Shoot Dry Weight (g) - WAP			
			4	12	20	24
T1	50% refuse tea	PS–1YAP	0.1567^{cd}	0.1717^{b}	0.3382	0.3400
T2	50% refuse tea	PS–2 YAP	0.1667^{bc}	0.1833^{b}	0.2646	0.2660
T3	50% compost	PS– 1YAP	0.1800^{b}	0.2000^{b}	0.2433	0.2661
T4	50% compost	PS–2YAP	0.1200^{f}	0.1853^{b}	0.3040	0.3207
T5	100% soil	PS–1 YAP	0.1450^{de}	0.1882^{b}	0.2520	0.2653
T6	100% soil	PS–2 YAP	0.1300^{ef}	0.1580^{b}	0.2450	0.2485
T7	100% soil	Standard single nodal	0.2275^{a}	0.2600^{a}	0.3600	0.3933
LSD			0.185*	0.0404*	0.1355	0.1392

YAP = Years after pruning
Planting containers: T1-T6 = Seedling tray, T7= Polythene bag
PS = Plucking Shoots, WAP= Weeks after planting, YAP = Years after prune
Note:* Significant at p=0.05.
Means in the same column for a given parameter with same superscripts are not significantly different at p=0.05.

In the second experiment, the growth of standard type nursery plants (T7) and plucking shoots taken from the first year after pruning and grown in tea refuse was greater than in all other treatments though there were no significant differences among treatments with respect to number of leaves, total leaf area and dry weight.

Mphangwe (1999) found that different mixtures of decomposed tea waste with top soil could be very good alternative growing media for rooted tea plants or cuttings in places it was difficult to find suitable top soil. Shoot dry weights revealed that cuttings planted in seedling trays could not develop well beyond 20 WAP, which may be due to the limitations in the medium and the restricted space. Therefore, this could be an ideal stage to use such plants for field planting.

Root Length

At 4 WAP, root growth was observed in all treatments except in cuttings of the 1st treatment (Table 6). Until at 20 WAP, all cuttings did not show any significant differences in root length. At 24 WAP, nursery plants raised in polythene bags using soil as the medium (T7) had a significantly (p=0.05) high root length (20.33 cm/plant) and no significant difference was recorded between other treatments. At 24 WAP, cuttings of T7 had the highest rate of root length development (y=3.519x-1.744, R^2=0.98) followed by those of T1(y= 2.596x+1.251, R^2=0.78).

Table 6. Root Length as affected by different planting containers, growing media and type of cuttings.

Treatment	Growing Medium	Type of Cutting	Root Length (cm) - WAP		
			4	12	24
T1	50% refuse tea	PS – 1 YAP	0.00	10.20	14.67 [b]
T2	50% refuse tea	PS – 2 YAP	1.40	6.00	14.60 [b]
T3	50% compost	PS – 1 YAP	3.30	6.90	11.30 [b]
T4	50% compost	PS – 2 YAP	2.80	6.33	15.20 [b]
T5	100% soil	PS – 1 YAP	5.00	8.90	13.50 [b]
T6	100% soil	PS – 2 YAP	2.50	10.60	14.00 [b]
T7	100% soil	Standard single nodal	1.60	9.75	20.33 [a]
	LSD		3.68	7.71	4.83*

YAP = Years after pruning
Planting containers: T1-T6 = Seedling tray, T7= Polythene bag
PS = Plucking Shoots, WAP= Weeks after planting, YAP = Years after prune
Note:* Significant at p=0.05.
Means in the same column for a given parameter with same superscripts are not significantly different at p=0.05

Root Dry Weight

Although all treatments did not show any significant differences until at 12 WAP, standard type tea nursery plants raised in polythene bags using soil as the medium had a comparatively higher root dry weight (Table 7). At the final stage, plants of T7 had the highest root dry weight (0.128 g/plant) when compared to other treatments except in plants raised by plucking shoots taken from the second year after pruning, grown in seedling trays with 50% compost and 50% soil as the medium (T4). Chong (2000) reported that compost amended media have a positive influence on rooting. During the growing stage, T7 had the highest rate of root dry weight increase (y=0.0631Ln(x)+0.0065, R^2=0.95) followed by T4 (y=0.0427Ln(x)-0.0031, R^2=0.89).

Standard type nursery plants had significantly higher root lengths and dry weights except in plants grown in T4. Plants of all other treatment combinations had similar growth to those of standard type tea nursery plants. Growth of plants in treatments with 50% soil + 50% refuse tea, 50% soil + 50% compost and 100% soil as the medium was similar. This could be attributed to the low volume of the media present in the planting point of seedling trays and consequently the volume may not be enough to make a significant difference among the combinations.

Table 7. Root dry weight as affected by different planting containers, growing media and type of cuttings.

Treatment	Growing Medium	Type of Cutting	Root dry weight (g) - WAP		
			4	12	24
T1	50% refuse tea	PS – 1 YAP	0.000	0.037	0.049 [b]
T2	50% refuse tea	PS – 2 YAP	0.001	0.032	0.060 [b]
T3	50% compost	PS – 1 YAP	0.005	0.022	0.043 [b]
T4	50% compost	PS – 2 YAP	0.004	0.036	0.090 [ba]
T5	100% soil	PS – 1 YAP	0.006	0.038	0.042 [b]
T6	100% soil	PS – 2 YAP	0.005	0.032	0.051 [b]
T7	100% soil	Standard single nodal	0.004	0.080	0.128 [a]
	LSD		0.0076	0.041	0.0571*

YAP = Years after pruning
Planting containers: T1-T6 = Seedling tray, T7= Polythene bag
PS = Plucking Shoots, WAP= Weeks after planting, YAP = Years after prune
Note:* Significant at p=0.05
Means in the same column for a given parameter with same superscripts are not significantly different at p=0.05

CONCLUSIONS

The study indicated that the growth of cuttings obtained from plucking shoots was comparable to that of conventional nursery raised tea plants. This suggests that the cuttings obtained from plucking shoots which are easily available in tea fields could be used to raise healthy propagules for tea planting programs.

REFERENCES

Bond, J. (1994). Seedling and cuttings, Tea Quarterly xvii: pp. 20 - 21.

Chong, C. (2000). Media and Rooting for evergren cuttings. Compost Science and utilization. 8: 29 - 39.

Kathiravetpillai, A. and Kulasegaram, S. (1986). Nursery and nursery practices. In Handbook on Tea. Sivapalan, P., Kulasegaram, S. and Kathitavetpillai, A.(eds.), The Tea Research Institute of Sri Lanka. pp. 20 - 35.

Mphangwe, N.I.K. (1999). Growing media for rooted cuttings. Tea Research Foundation (Central Africa) Quarterly Newsletter, 134: 18 - 21.

Nyirenda, H.E. and Mphangwe, N.I.K. (1999). Progress with using plucking shoots as VP material. Tea Research Foundation (Central Africa) Quarterly Newsletter, 134:9.

Satyanarayan, N. and Ilango, R.V.J. (1993). Plucking shoots for multiplication. The Planters Chronicle, pp. 225 - 226.

Scarborough, I.P. and Kayange, C.W. (1978). Annual Report, Tea Research Foundation of Central Africa. pp. 45 - 46