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ADVENTITIOUS ROOT FORMATION IN TEA CUTTINGS PLANTED ON DIFFERENT DATES

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A study was initiated to determine the most suitable time to raise cuttings when planted under a polythene tunnel as well as in the open. Cuttings were raised at monthly intervals from pruned mother bushes. The results showed a higher percentage of survival of cuttings under the plastic cover in most months of the year. Measurements of various growth attributes revealed that better plant growth could be obtained under covered conditions during the period around October followed by the months of June/July while in the open better results could be seen again during the period September/October and to a lesser extent in May/June.

INTRODUCTION

Tea (*Camellia sinensis L.*) may be propagated either by seed or by vegetative means. Seed propagation is a traditional method of raising tea plants but it shows a wide range of variation in habit of growth, vigour, morphological characters, yield potential, leaf quality, etc. In contrast, among clones any variability in vigour of growth, yield, etc may be due to the effect of soil fertility, elevation and weather conditions (Richards, 1966).

The success of vegetative propagation depends upon the selection of mother bushes having desirable characteristics, time and techniques of planting cuttings in suitable soil media. The propagation of cuttings during the height of a dry season must be avoided as the shoots obtained during such periods are often too mature, with dormant axillary buds resulting in impeded rooting and slow growth of cuttings (Kathiravetpillai and Kulasegaram, 1986). Richards (1966) suggested that propagation should be avoided during very wet and cold spells when conditions are favourable for the incidence of blister blight while rooting is slow due to low temperatures. Kathiravetpillai and Kulasegaram (1981) are of the view that cuttings should be taken from healthy shoots that are 6-8 months old after pruning the mature bush. They also reported that in Sri Lanka, the most suitable time for raising tea plants in the nursery is during April/May in the wet up country and September/October in the drier areas. In Assam, tea cuttings are obtained from mid April to the first week of May and again in

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mid September to first week of October (Anonymous, 1972). Harler (1966) held the same view and stated that cuttings are best taken in North East India in mid April and between mid September and early October. He further pointed out that adequate shade was absolutely essential after planting the tea cuttings in the nursery. Shade protects the nodal leaf from sunshine, death or poor growth (Kathiravetpillai, Shanmugarajah and Kulasegaram, 1982).

In Pakistan tea cultivation commenced recently from seed material planted in Hazara (NWFP). Keeping in view the success of vegetative propagation the present studies were carried out with the aim to investigate the most suitable time, techniques of taking cuttings from healthy shoots and effect of low shade on the growth of tea cuttings.

MATERIALS AND METHODS

The study was conducted at the National Tea Research Station, Shinkiari, Pakistan during 1988/1989. Three year old bushes of Cinese Qi-Men (tested variety) were selected at random and pruned in February 1988 for purposes of obtaining cuttings. Shoots were obtained 8 months after pruning and cuttings taken according to standard practices were planted in raised beds in October 1988. One half of the planted bed was completely covered with polythene sheet while the other half remained open. Cuttings were similarly taken from shoots harvested at monthly intervals and planted up to September 1989. The planting of cuttings was always done on the 22nd of each month. The experiment was laid out in a Randomized Complete Block Design with 6 replicates. Measurements of growth attributes were recorded and the data analyzed statistically.

RESULTS AND DISCUSSION

Per cent plants surviving

The data presented in Table 1, indicate that a maximum of 93.00 per cent cuttings survived when planted in May under plastic tunnel as against only 16.00 per cent in the open. Following this, survival percentages of 91.00 and 89.00 per cent were seen in covered cuttings planted in March and September as against 45.00 and 97.33 per cent in the open respectively. A survival percentage of 78.67 was next noted among cuttings planted in June compared to 22.31 per cent under plastic tunnel. The mean survival percentage indicated that comparatively more cuttings survived under plastic sheet than in the open except in those planted in the months of October, June and September.

TABLE 1 – *Survival percentage of cuttings raised under covered and open conditions, 3 months after planting*

Months	*Survival percentage*			
	Covered		*Open*	
October, 1988	15.66	hfg	19.67	bc
November, 1988	22.33	efg	4.33	c
December, 1988	29.00	ef	16.67	bc
January, 1989	57.00	cd	18.67	bc
February, 1989	73.00	cd	19.67	bc
March, 1989	91.00	ab	45.67	b
April, 1989	63.00	cd	36.00	bc
May, 1989	93.00	a	16.00	bc
June, 1989	22.31	efg	78.67	a
July, 1989	36.00	cd	19.00	bc
August, 1989	57.00	cd	22.00	bc
September, 1989	89.00	abc	97.33	a
S.E.	4.52		8.46	

Number of roots

The data presented in Table 2, show that the cuttings planted under the plastic tunnel produced more roots per cutting compared to those raised in the open from November to July except for those planted in August, September and October. This implies that planting of cuttings under semi-controlled atmospheric conditions is more successful than in the open except in the months of August, September and October.

TABLE 2 – *Growth attributes of plants raised under covered and open conditions*

	Covered (12 Months)						*Open (12 Months)*					
Months	No. of roots	Root length (cm)	No. of leaves	Length of shoot (cm)	Dry wt. of root (g)	Dry. wt. of stem (g)	No. of roots	Root length (cm)	No. of leaves	Length of shoot (cm)	Dry wt. of root (g)	Dry wt. of stem (g)
October, 1988	15.00 ab	9.52 ab	13.00 ab	28.88 a	0.09 a	2.34 a	16.66 a	8.07 ab	11.20 a	23.31 a	0.32 a	2.75 a
Novermber, 1988	16.03 a	7.95 abcd	9.73 abcde	18.70 e	0.40 a	1.69 c	12.10 ab	5.78 abcde	6.86 abc	14.86 ec	0.37 a	1.11 bcdef
December, 1988	9.83 abcdefg	7.87 abcde	9.83 abcd	17.00 f	0.28 a	1.46 d	7.26 ab	4.01 cdef	4.10 abc	4.71 efg	0.13 a	0.41 efg
January, 1989	11.70 abcde	5.96 bcdefg	8.70 abcdefg	16.18 g	0.27 a	1.25 e	3.83 b	2.10 ef	2.83 bc	2.61 efg	0.04 a	0.27 g
February, 1989	8.26 cdefg	5.68 cdefg	7.93 bcdefg	12.06l	0.29 a	1.11 efg	4.13 b	1.73 f	2.10 bc	1.33 g	0.03 a	0.20 g
March, 1989	10.63 abcdefg	5.49 cdefg	6.30 cdefghij	9.90 j	0.18 a	1.10 efg	3.56 b	1.23 f	1.70 bc	1.83 efg	0.03 a	0.10 g
April, 1989	5.23 efg	2.86 g	4.5 cdefghijk	6.93 k	0.14 a	0.40l	4.66 b	3.04 cdef	4.30 abc	5.50 efg	0.18 a	0.49 efg
May, 1989	11.43 abcdef	6.59 bcdef	7.23 bcdefghi	15.09 h	0.07 a	1.22 ef	9.56 ab	4.72 abcdef	3.13 abc	6.1 efg	0.07 a	1.11 bcde
June, 1989	12.96 abc	8.39 abc	10.5 abc	19.13 d	0.20 a	1.96 b	10.26 ab	8.21 a	6.10 abc	13.39 cd	0.18 a	1.34 bc
July, 1989	11.83 abcd	10.56 a	14.46 a	23.73 b	0.33 a	2.07 b	8.23 ab	5.94 abcd	5.60 abc	8.46 cdef	0.17 a	0.72 bcdefg
August, 1989	4.40 g	5.35 cdefg	7.93 bcdefgh	12.43l	0.10 a	0.88 h	12.00 ab	3.30 cdef	5.80 abc	8.56 cde	0.21 a	1.30 bcd
September, 1989	9.80 abcdefg	5.91 bcdefg	8.76 abcdef	19.92 c	0.29 a	1.71 c	11.36 ab	6.59 abc	9.46 ab	19.91 ab	0.20 a	1.76 b
S. E.	1.41	0.81	1.32	0.12	0.22	0.04	2.11	0.89	1.75	1.51	0.30	0.17

Root length

The root length of the cuttings planted under plastic sheet was higher compared to the root length of the cuttings planted in the open except in the months of April and September.

Number of leaves

More leaves per cutting were produced under the plastic tunnel compared to those planted in the open except in the month of September. This probably indicates that more leaves will be unfolded when cuttings are planted under controlled atmospheric conditions. It was also seen that significantly more leaves (14.46) were obtained in cuttings planted in July than in those planted in February, March, April, May and August under plastic sheet.

Length of shoot

The length of shoots of the cuttings planted under plastic cover were higher than those planted in the open in all months of the year. Under covered conditions, a maximum shoot length of 28.88 cm was observed in October which was highly significant compared to the shoot length of the cuttings planted in the other months of the year. The mean shoot length of the cuttings planted in different months under plastic sheet was significantly different from one another except the shoot length of the cuttings planted in February (12.06 cm) and August (12.43 cm).

Similarly in the case of cuttings planted in the open highly significant shoot lengths of 23.31 cm followed by 19.91 cm were observed in October and September respectively.

Dry weight of roots and stem

No significant difference in the dry weight of roots was observed both in the cuttings planted under the plastic tunnel as well as in the open. However, in general comparatively more dry weight of roots was observed in the former than in the latter.

More dry weight of stem was seen in cuttings planted in October both under plastic sheet and in the open. Again the dry weight of stem was higher in most months of the year under plastic tunnel. The variable data obtained in this study is due to the fact that the cuttings were obtained in a succession at monthly intervals from heterogeneous tea bushes pruned in February, 1988.

This study broadly favours the period around October as the most suitable time for raising cuttings under a plastic tent followed by the months of June/July. If cuttings are to be raised in the open, better results can be obtained again during the period September/October and to a lesser extent in May/June. Best results could be obtained when cuttings are raised under a polythene tent as this helps to maintain a high humidity and affords better growing conditions (Green, 1964; Eden, 1976).

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