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EVALUATION OF MINISETTS AS PLANTING MATERIAL FOR HOMESTEAD CULTIVATION OF TUBER CROPS

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Abstract: *The field trial on the suitability of minisetts as planting material for homestead cultivation of tubers; cassava, tannia, taro, greater yam and elephant foot yam in grow bags revealed satisfactory yields of 0.31 to 2.64 kg per plant in the different tubers. Growth, canopy development and yields were appreciable in greater yam, tannia, taro and elephant foot yam while in cassava tuber development and weights were limited by the size of the bags. Poor emergence and establishment of the minisetts also proved disadvantageous. Rating the response of homestead farmers to minisett cultivation, elephant foot yam was ranked as most preferred.*
Keywords: *Corms, grow bag, homestead, minisett, tuber yields.*

Introduction: Tuber crops are highly valued among food crops in the daily balanced diet of mankind. These are presently being popularised as climate resilient crops which can cope with the unpredictable variations in the weather elements that interfere with crop performance and yields. A multitude of species constitute the group of tuber crops cultivated in Kerala. The crops fit exemplarily well in the different cropping systems especially as inter crops and are also ideal for cultivation in reclaimed paddy lands. The need for safe chemical free produce has encouraged cultivation of food crops especially vegetables and tubers in the household premises by the farm family. Homestead farming necessitates agro techniques ideal for small scale production and nutritional security. Minisett technique in tuber crops was developed as a method of propagation, nevertheless, the small size of planting material and per plant yields suited to meet the requirements of the small families have popularized the adoption of the agro technique for tuber cultivation in homesteads.

Materials and Methods

The experiment was laid out in homesteads in Kollam district, Kerala experiencing a warm humid tropical climate, during 2013-‘14. The treatments included five species of tubers, T1- Cassava (*Manihot esculenta*), T2-Tannia (*Xanthomonas sagittifolium*), T3- Taro (*Colocasia esculenta*), T4- Greater yam (*Dioscorea alata*) and T5- Elephant foot yam (*Amorphophallus paeniifolius*). Mini and conventional setts of cassava (3 and 8 noded setts) elephant foot yam (100 and 750g), taro (25 and 50g), tannia (50 and 100g) and greater yam (200 and 500g) were planted in grow bags of size 40 cm x 24cm x 24 cm filled with a potting mixture of soil and organic manure in the ratio 1:1. The analysis of the potting media revealed a pH of 5.98, EC 0.231mmohs/cm, organic carbon 1.2%, available N, 122.88 kg/ha available P, 36.8 kg/ha and available K, 198.7 kg/ha. Six bags were planted for each species in CRD with four replications. Observations were recorded for the three plants in each replication for statistical analysis and assessment of the performance of the minisett crops. The plants were manured as per the package of practices recommendations and observations on days to sprouting, plant height, number of leaves upto six MAP, tuber yield and other yield attributes were recorded. As the crops belonged to different species, the relative yields in terms of cassava were computed for comparison among species.

$$\text{Relative Cassava Equivalent Yields } (REY_C) = \frac{\text{Yield of crop (kg/plant) x Market price of the crop (per kg)}}{\text{Market price of Cassava (per kg)}}$$

Results and Discussion

The data on the initial sprouting and growth characters are presented in Table 1. Considerable variations were recorded in the time taken for 50% sprouting, germination being comparatively earlier in cassava setts followed by taro and tannia. It was delayed in elephant foot yam and greater yam minisetts, and this remained almost similar to the time taken by the conventional corms. It is inferred that the dormancy in the corms delayed sprouting and hence the longer time taken when compared to cassava setts.

Table 1. Growth characters of tuber crops grown with minisett and conventional planting materials

Treatments	Days to 50% sprouting	Plant height 2MAP	Plant Height 4 MAP	Plant height 6 MAP	No. of leaves 6MAP
T1- minisett Cassava	2.67	37.97	76.67	131.83	103.67
T2- minisett Tannia	35.00	47.23	72.97	100.77	7.67
T3- minisett Taro	21.67	28.03	45.50	58.17	5.00
T4- minisett Greater yam	37.67	35.10	57.00	147.90	88.33
T5- minisett EFY	49.00	25.97	49.00	110.60	19.33
T6- conventional Cassava	4.33	40.07	77.80	173.90	113.33
T7- conventional Tannia	29.00	51.53	77.70	99.73	8.00
T8- conventional Taro	20.67	29.23	35.90	65.80	5.00
T9-conventional Greater yam	35.00	39.10	80.77	147.07	85.00
T10- conventional EFY	43.67	32.83	64.00	107.17	23.67

In Cassava, germination was earlier in minisetts than in the 8 noded setts used. However, the further growth was slow and the vegetative mass put forth was comparatively lower than the normal setts. On closer examination of the plants it was seen that though the setts were to put forth roots from the two ends, in most plants root growth was restricted to one end alone and this significantly reduced the biomass production in the plants.

Vegetative growth in taro, tannia and greater yam was rapid and appreciable compared to the conventional corms, but in elephant foot yam, early growth (upto 2 months) was slow, but picked up later to record satisfactory yields at harvest. Large sized corms had more storage of food material and water content and as such plants from these corms could withstand more adverse conditions by way of less mortality and showed a tendency to be taller than plants from smaller corms [1].

The observations on the yield and yield attributes are presented in Table 2.

Table 2. Yield and yield characters of the different tubers in grow bags

Treatments	No. of tubers/ plant	Length/ height of tuber (cm)	Girth of tuber (cm)	Yield/plant (kg)	Seed: Yield Multiplication ratio
T1- minisett Cassava	3.33	12.53	9.20	0.68	-
T2- minisettTannia	6.00	9.43	6.77	0. 50	10.10
T3- minisett Taro	7.33	3.80	2.47	0.29	11.72
T4- minisett Greater yam	1.33	16.33	13.97	0.95	9.53
T5- minisett EFY	3.00	13.00	29.90	2.64	13.22
T6- conventional Cassava	4.00	18.43	9.97	2.18	-
T7- conventional Tannia	6.33	8.83	6.77	0.71	7.10
T8- conventional Taro	8.00	3.70	2.57	0.31	6.20
T9- conventional Greater yam	1.00	19.57	26.47	1.45	2.16
T10- conventional EFY	4.33	13.17	32.87	3.23	4.31

Statistical comparison of the data on the growth (2, 4 and 6 MAP) and yield attributes could not be made as the crops belonged to different genera and the comparison would be irrelevant. However, the yields were converted to equivalent yields of cassava and for statistical analysis.

Perusal of the data revealed that tuber yields were more in the larger conventional corms compared to minisetts in all the five species. These results are in agreement with those of earlier workers[2,3,4,5] who also reported that the larger size corms always yield higher than smaller sized corms. Maximum yields among minisett planted tubers was for elephant foot yam (2.64 kg) followed by greater yam (1.45 kg). Taro yielded least but was only 6.9% lower than in the conventional corms. Yields per plant in the grow bags in taro was not that different under both corm sizes. The pattern of higher tuber yield with increase in sett size was manifested in the study conducted [6]. The yields recorded are appreciable from the homestead point of view as this would be sufficient for the farm family of urban and peri urban areas. From the perspective of a commercial farmer, the technique has its advantage as smaller planting materials require lesser spacing and the higher plant density would definitely lead to comparable yields as to that of larger corms. It should be borne in mind that when conventional corms are used in tuber cultivation, the planting materials constitute atleast 33 per cent of the production cost [7]. The use of larger corms also limits the quantum of produce that the farmers can sell for revenue, as a major share has to be retained as planting material for the next season. Reports to the effect that yields in cocoyam under minisett technology could range from 15–20t/ha which is higher than yields obtained with 100 g sett or more used by farmers have been documented[8]. This variation, nevertheless, was not recorded in the present study.

The multiplication ratio of planting material to yields are also depicted in Table 2. Comparison of the values of minisett (9.53 to 13.22) against conventional planting materials (2.18 to 7.10) also highlight the significance of minisett technique in tuber cultivation. Minisett technology resulted in increased multiplication ratios of cocoyam from 1: ≤ 15 under farmers' farms to1: 18 – 23 [9].

Relative equivalent yields for comparison among species are illustrated in Fig.1. Significantly superior yields were recorded in elephant foot yam and this, along with the better market prices led to higher relative yields in terms of cassava revealing it to be most ideal crop for minisett cultivation in grow bags.

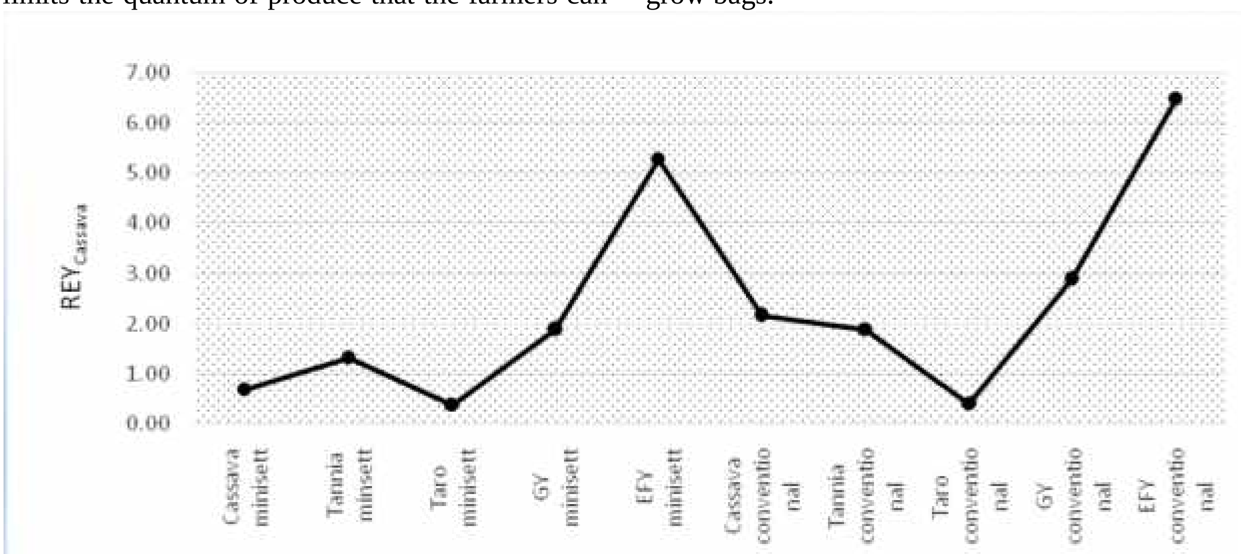

Fig.1 Relative Equivalent Yields of tubers grown in grow bags (CD: 0.72)
Price (Rs/kg) Cassava: 15/- Tannia: 40/- Taro: 20/- Greater yam: 30/- EFY: 30/-

Table 3. Response of farmers to the minisett technology in tubers crops **N=50**

Technology	*Farmer's response*			
	Very good	*Good*	*Satisfactory*	*Not good*
Cassava	*2*	*13*	*23*	*12*
Tannia	*5*	*20*	*24*	*1*
Taro	*7*	*23*	*20*	*0*
Greater yam	*4*	*8*	*35*	*3*
Elephant foot yam	*20*	*26*	*4*	*0*

The analysis of the response of farmers (Table. 3) concluded that the minisett production and cultivation technique in grow bags is appreciable in elephant foot yam, tannia, taro and to a certain extent in greater yam, but not acceptable in Cassava. The per plant yields recorded are satisfactory for homestead cultivation and management is easier.

The study has brought to light the suitability of the different tuber species to minisett cultivation in grow bags for homestead farming. Elephant foot yam, tannia and taro were most suited for grow bag cultivation and minisett technology could well be popularized in the homesteads as these require only smaller planting materials, lesser space and fit well in the small gardens of even urban, peri urban homesteads.

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