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## Suitability study on elephant foot yam varieties under coconut gardens of east coast region of Tamil Nadu

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**Abstract**

An experiment on identification of suitable elephant foot yam varieties as intercrop for coconut gardens of east coastal region of Tamil Nadu was conducted at ICAR KVK, Thiruvavur during 2013 to 2015. Three varieties viz., Gajendra, Sree Padma and local check were tested in five locations of this region with seven replications as per Randomized block design (RBD). Observations on growth and yield attributes were recorded and crop economics were calculated and analysed statistically. The results revealed that, maximum plant height (72.10 cm), pseudo stem girth (13.10 cm), canopy spread E-W(81.30 cm), canopy spread N-S(83.20 cm), petiole length (55.60 cm), number of branches (5.30), number of leaflets (302.50) and Leaf Area Index (3.20) were recorded in the variety Gajendra followed by Sree Padma. The least values for the parameters studied were recorded by the local check variety. The variety Gajendra took 56.00 days only for the 50 per cent emergence of the crop stand against 62.00 and 93.00 days respectively in Sree Padma and local check variety. The yield attributes viz., tuber yield (28.90 t/ha), corm diameter (15.30 cm), corm fresh weight (1340.80g), volume of tuber (2156.00 cm<sup>3</sup>), corm dry weight (339.60 g), dry matter per cent (25.33%) and Starchcontent (17.90%) were higher in the variety Gajendra. The net returns to the farmers also found higher in the variety Gajendra. As a conclusion of the study, elephant foot yam variety Gajendrais the most suitable intercrop in the coconut gardens of East coastal regions of Tamil Nadu.

**Keywords:** East coastal region, coconut, intercropping, elephant foot yam, cultivars

**Introduction**

East coastal region of Tamilnadu is spread to a distance of 22,800 square km with 1,55,240 hectares of cultivable land. Coconut is one of the important crop of this region occupies an area of 44,437 hectares. In the study area Thiruvavur district, coconut cultivation occupies over an area of 4,675 hectare with the production of 737 lakh nuts per year. Though it is an important crop of this region, due to multitude of challenges viz., fluctuating price, outbreak of devastating pests and diseases, large stock of senile palms and natural calamities the productivity of coconut is declining which ultimately affects the returns to the farmers. A elevated spacing of 7.5 m x 7.5 m in coconut is recommended mainly to accommodate the large crown of the palms, however, several studies revealed that natural resources i.e., soil, water, air space and solar radiation are not fully utilized under this spacing and much land space is generally left unproductive throughout the long life span of palms. For the effective utilisation of these resources adopting coconut based multiple cropping system may be helpful one for improving the economic status of coconut farmers (Ghosh *et al.*, 2008) [4]. Any kind of plants can be intercropped in the interspaces available in coconut gardens. Taking into consideration the space availability and coastal humid condition of this region, an investigation was undertaken to identify the suitable variety of elephant foot yam as intercrop in coconut gardens.

**Materials and Methods**

Evaluation of elephant foot yam varieties as inter crop in coconut garden was conducted at Melanatham village, Kottur block of Thiruvavur district during 2013 to 2015. Gardens with 38 years old East Coast Tall coconut trees planted in 7.5 m x 7.5 m spacing were selected for the study purpose. The study location is positioned at 10° 57' N latitude and 79°40" E longitude at an altitude of 7 m above mean sea level. The mean annual maximum and minimum temperature of the experimental village are 39.5 °C and 22.5 °C respectively.

The average rainfall in the coastal area during the study period is 1356 mm. Two improved varieties of elephant foot yam varieties viz., Gajendra and Sree Padma along with a local variety were utilized as inter crops. The cut pieces of corms were dipped in cow dung solution to prevent evaporation of moisture from cut surface and planted in beds at 45 cm x 90 cm spacing. The pits were filled with half top soil, well decomposed farm yard manure (FYM) @ 2 to 3 kg/pit. The experiment was laid out in a randomized block design (RBD) with seven replications. Package of practices recommended by TNAU, were followed for elephant foot yam cultivation. Irrigation was done after immediate sowing and the crop is covered by mulching of grass or paddy straw. The observations on various parameters of growth and yield of elephant foot yam were recorded at prosper stage of growth and maturity during 2013-14 to 2014-15 and analyzed statistically (Panse and Sukhatme, 1985) [10].

## Results and Discussion

### Growth Characters

Significant variations on growth and yield characters were exhibited by the inter crop elephant foot yam varieties. Among the three varieties of elephant foot yam, Gajendra recorded the highest values for growth, yield and cost economics parameters than other varieties. Plant height of 72.10 cm recorded the highest in Gajendra followed by Sree Padma of 65.20 cm whereas local check recorded the lowest plant height of 62.00 cm. In case of pseudo stem girth (13.60cm) canopy spread East to west (81.30cm) and north to south (83.20cm), petiole length (55.60 cm), number of branches (5.30), number of leaflets (302.50) and Leaf Area Index (3.20%) were also recorded maximum in the variety Gajendra. Besides variety Gajendra recorded the earliest days taken for 50% emergence (56 days) followed by Sree Padma (62 days), the longer days taken for 50 per cent crop emergence was noticed in local check of 93 days. This might be due to genetic ability of varieties and adoption particular variety to diverse climatic conditions.

### Yield and yield component traits

Regarding yield characters, Gajendra observed the highest

tuber yield (28.90 t/ha) followed by Sree Padma (24.80) whereas the local check registered the lowest tuber yield of 14.80 t/ha. The variety Gajendra recorded the highest corm diameter (15.30cm), corm fresh weight (1340.80g), volume of corm (2156.00cm<sup>3</sup>), corm dry weight (339.60g), dry matter per cent (25.33) and starch content (17.90%) a followed by Sree Padma. The superior yield capacity of the variety Gajendra is mainly due to the initial early establishment and growth which leads for better assimilation of photosynthates and storage of the same in the sink (tubers). Optimum growing conditions favour better accumulation of photosynthates in yam tubers was also reported by Edi Santosa *et al.*, (2004) [5]. The greater corm yield was presumably due to early sprouting and better root ramification (Sen *et al.*, 1996) [11].

### Influence of inter crop on yield of coconut and economics

Nut yield of coconut had also been influenced by adopting inter cropping. As per the observations made, the average nut yield in the post experimental period (2015) was 92.8 nuts/palm/year (6.3 per cent increase) against 86.5 nuts/palm/year in the pre-experimental period (2012). Increment of nut yield in coconut gardens due inter cropping was also reported by Chowdhury and Deka (1997) [3]; Maheswarappa *et al.*, (1998) [7]; Marimutha *et al.*, (2001) [8] and Nath (2002) [9]. This might be due to the additional supply of water and nutrients to the inter crop which was also utilized by the main crop. Besides the favourable micro-climatic conditions prevailed in the rhizosphere region of the main crop through intercrops as reported by A J Attapatu (2016) [1]. In terms of crop equivalent yield to coconut yield, among the three varieties tested Gajendra recorded highest crop equivalent value of 11.56 tonnes of coconut / ha as additional yield against the sole crop yield of 6.38 t/ha. Higher tuber yield better market preference of a crop produce always fetch better returns was observed in the variety Gajendra followed by Sree Padma. The variety Gajendra recorded the highest net profit of Rs. 156200/ha with the benefit to cost ratio of 3.10 followed by Sree padma (Rs. 124200/ha; 2.70) while the local check registered the lowest net profit of Rs. 62400/- ha and B:C ratio of 1.80.

**Table 1:** Growth characters of elephant foot yam varieties at East Coast region of Tamil Nadu

Genotype	Plant height (cm)	Pseudo stem girth (cm)	Canopy spread E-W(cm)	Canopy spread N-S(cm)	Days to 50 per cent emergence	Petiole length (cm)	Number of branches	Number of leaflets	Leaf Area Index (%)
Gajendra	72.10	13.60	81.30	83.20	56.00	55.60	5.30	302.50	3.20
Sree Padma	65.20	12.40	75.60	76.30	62.00	51.80	4.80	289.60	2.80
Local variety	62.00	9.60	62.80	71.60	93.00	45.30	3.90	263.20	2.20
Mean	66.43	11.87	73.23	77.03	70.33	50.90	4.67	285.10	2.73
SEd	2.50	0.40	1.40	1.80	1.50	0.90	0.09	6.60	0.05
CD (5%)	5.20	1.10	3.20	3.90	3.20	2.10	0.20	13.20	0.14

**Table 2:** Yield and yield attributes elephant foot yam varieties at East Coast region of Tamil Nadu

Genotype	Tuber yield (t/ha)	Corm diameter (cm)	Main crop yield (nut/palm/year)	Corm fresh weight	Volume of tuber (cm <sup>3</sup> )	Corm dry weight (g)	Dry matter per cent	Starch (%)
Gajendra	28.90	15.30	95.6	1340.80	2156.00	339.60	25.33	17.90
Sree Padma	24.80	13.50	90.3	980.60	1978.00	226.10	23.10	16.50
Local variety	14.80	12.90	92.5	720.30	1732.00	158.60	22.02	15.30
Mean	22.83	13.90	92.8	1013.90	1955.33	241.43	23.48	16.57
SEd	0.41	0.26	1.8	18.71	36.36	4.47	0.50	0.41
CD (5%)	1.15	0.72	3.9	41.90	75.60	11.36	1.20	0.85

**Table 3:** Economics of elephant foot yam varieties at East Coast region of Tamil Nadu

Genotype	Source of Technology	Production (t/ha)	Gross cost (Rs./ha)	Gross Return (Rs./ha)	Net Return (Rs./ha)	BC Ratio
Gajendra	ANGRAU (2006)	28.90	75000.00	231200.00	156200.00	3.10
Sree Padma	CTCRI (1993)	24.90	75000.00	199200.00	124200.00	2.70
Local variety	Farmers practice	14.80	66000.00	118400.00	62400.00	1.80

### Conclusion

As a conclusion remarks, among the three varieties of elephant foot yam testes as intercrop in coconut garden of East coastal region of Tamilnadu, the variety Gajendra is most suitable one and highly adoptable for the climatic conditions of this region.

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