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Effect of size of planting material on the yield of elephant foot yam intercropped in a coconut garden

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Elephant foot yam (*Amorphophallus paeoniifolius* (Densst) Nicolson) is an important tuber crop grown in tropical and subtropical regions of the world. It needs a well distributed rainfall with warm weather throughout its growing season. The corm has high carbohydrate content (about 18%) and is rich in vitamin A, minerals and protein. It is used as a medicine in Ayurveda for ailments such as piles, jaundice, diabetes and dyspepsia. The production potential of this crop is very much dependent on good management practices. Corm size is the important factor affecting the yield (Sethi *et al*. 2002). In the recent past, economy of coconut farmer had weakened due to fluctuation in the price of coconut, copra and coconut oil. Adoption of coconut based multiple cropping system is a viable option for improving the economic status of coconut farmers. Intercropping elephant foot yam is a profitable proposition without affecting the performance of coconut (Singh *et al*. 1997). The present investigation was undertaken to study the effect of size of planting material on the yield of elephant foot yam intercropped in a coconut garden and to evaluate the effect of intercrops on the yield of coconut.

The field experiment was carried out in a 20 year old plantation of AICRP on Palms at Shaheed Gundadhoor College of Agriculture and Research Station, Kumharawand, Jagdalpur (Bastar), Chhattisgarh. The soil of the experimental site is silty-loam to clay-loam, rich in silicon, prone to excessive cementing nature with low contents of organic matter, Zn, N, P, K and B. Soil pH ranged from 5.5 to 6.1. The zone received high rainfall coupled with comparatively lower temperatures and higher humidity. The average annual rainfall (mean of 50 years) ranged from 1200 to 1600 mm, mostly received from June to September with its peak in July and August. The experiment was laid out in randomized complete block design with four replications and six treatments having different corm size *viz*. T_1 - 100g, T_2 - 200g, T_3 - 300g, T_4 - 400g, T_5 - 500g and T_6 -600g. Gejendra is an acrid free variety of elephant foot yam and were used for planting. The seed corms were treated by dipping in concentrated solution of 20 kg fresh cow dung with 100 l of water for 30 min. Corms were planted in the middle of May during 2009 and 2010. All the cultural practices and plant protection measures were done as per requirement of the crop. Fertilizers were applied @ 100:80:100 kg NPK/ha. Entire P with FYM @ 20 t/ha was given as basal application. N and K were applied in two splits 30 days after planting (DAP) and 60 DAP followed by earthing up and irrigation. Scheduled agronomical management practices with NPK dose @ 400:200:750 g/palm/year was followed in coconut under both intercropped and sole plots. The observation on different growth parameters were recorded from five randomly selected plants/plot. Yield was taken on net plot basis at harvest. The projected yield/ha was calculated on the basis of yield/plot considering that 75% of the area was occupied by the intercrop. The data collected from different characters were processed and were analyzed by the method given by Gomez and Gomez (1984).

Corm size had significant effect on almost all vegetative and yield parameters of elephant foot yam are summarized in Table 1. The height of

Table. 1. Effect of size of planting material on growth and yield parameters of elephant foot yam intercropped in a coconut garden

Treatment	Height of pseudostem (cm)		Girth of pseudostem (cm)		Canopy spread (cm)		Diameter of corm (cm)		Weight of corm (kg)		Yield per plot (kg/10m^2)		Projected yield (t/ha)	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
T1	74.87	91.06	14.53	14.21	80.57	81.17	13.56	14.00	1.05	1.03	30.18	30.82	20.14	21.54
T2	85.59	95.97	14.97	15.69	84.77	81.33	14.29	14.66	1.19	1.29	32.24	35.52	23.22	24.35
T3	86.98	98.90	16.69	17.78	89.61	94.60	14.71	15.65	1.56	1.50	38.80	35.87	27.36	26.60
T4	102.29	100.42	17.95	18.03	96.44	98.80	15.37	15.88	1.69	1.54	42.51	39.85	28.32	26.82
T5	108.28	101.98	19.93	18.19	105.33	105.15	16.78	16.62	2.00	1.62	44.64	43.91	31.12	30.57
T6	108.70	104.59	20.79	19.78	106.18	107.98	18.80	18.13	2.26	1.81	45.21	45.21	31.44	32.74
SEm	0.76	1.09	0.80	0.73	1.69	1.72	0.76	0.80	0.08	0.10	1.78	1.99	0.29	0.57
CD (P=0.05)	2.29	3.29	2.49	2.19	5.11	5.21	2.30	2.42	0.26	0.29	3.55	6.01	0.89	1.72

pseudostem differed significantly due to various treatments. The maximum pseudostem height (108.70 cm and 104.59 cm) was recorded in the treatment 600g corm size in both the years. However minimum pseudostem height (74.87 cm and 91.06 cm) was recorded in the treatment 100g corm size. Larger corms produced taller plant as reported earlier (Ashokan *et al.* 1984). The large corm contains higher amount of carbohydrate which enhances the protein synthesis which in turn helps in higher rate of metabolism and cell elongation and thereby stimulates apical growth. A similar finding was reported by Mandal and Sen (2004).

The pseudostem girth differed significantly due to different corm sizes. With the increase in seed corm weight, pseudostem girth increased at all growth stages. A higher pseudostem girth (20.79 cm and 19.78 cm) was obtained with 600g seed size in both the years. This is an agreement with Mandal and Sen (2004).

The canopy spread increased significantly with increase in corm weight. The maximum canopy spread (106.18 cm and 107.98 cm respectively in 2009 and 2010) was recorded in 600 g corm weight. The results are in agreement with George and Nair (1993). The increase in canopy spread was presumably due to early sprouting and better root ramification (Sen *et al.,* 1996).

Seed corm size had significant effect on almost all yield parameters. Increasing trend in both corm diameter and corm weight was observed with increase in the size of the planting material in both the years. Increase in size of planting material from 100 g to 600 g increased mean corm weight per plant from 1.05 to 2.26 kg during 2009 and 1.03 to 1.81 kg during 2010. Whereas the corm yield per plot (10 m^2) increased from 30.18 to 45.21 kg/10 m^2 during 2009 and 30.82 kg to 45.21 kg/10 m^2 (2010) and corm yield per hectare was increased from 20.14 t to 31.44 t/ha and 21.54 t to 32.74 t/ha during 2009 and 2010 respectively. The increase in corm yield was presumably due to early sprouting and better root ramification (Sen *et al.,* 1996).

The present comparative study of size of planting material suggested the use of large size corm over smaller one. Such a difference in performance of different size of corm could be due to the source-sink relationship. Translocation and mobilization of assimilates and nutrients from source are more in large size corm. Thus, the plants grown from large size corm are vigorous in the initial stage and further in the growing season with better productivity as compared to small size.

Influence of different cropping model on yield of coconut

Intercropping elephant foot yam under coconut with normal package of practices affected favorably the nut yield of coconut (Table 2). The pre-experimental (2008) nut yield from sole crop and intercrop plot was 60.65 and 58.72 nuts/palm/year respectively. The average nut yield after the experimentation (2010) was 66.23 and 67.23 nuts/palm/ year respectively from sole crop and intercrop plot. An increase in nut yield of 5.58 (8.42%) and 8.71 (12.91%) respectively were observed over initial. The observed data showed the beneficial effect of intercrop on the yield of coconut. The findings of present investigation are in agreement with Nath (2002), Marimuthu *et al.* (2001), Maheswarappa *et al*. (1998) and Chowdhury and Deka (1997).

Table. 2. Influence of cropping models on the yield of coconut

Year	Sole crop block		Intercropped block	
	Nut yield/ palm/year	Percentage increase over initial	Nut yield/ palm/year	Percentage increase over initial
2008	60.65	-	58.72	-
2009	62.84	3.48	63.95	8.17
2010	66.23	8.45	67.43	12.91
Mean of two year (2009 & 2010)	64.53	-	65.69	-
Percent Increase at the end of the experiment	5.58	-	8.71	-

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