INTERACTION EFFECT OF DIFFERENT GENOTYPES AND SPACING ON GROWTH AND YIELD OF ELEPHANT FOOT YAM (*AMORPHOPHALLUS COMPANULATUS DECNE*.) UNDER AGRO-CLIMATIC CONDITIONS OF CHHATTISGARH PLAINS

***Kawach Bhagat, VijayKumar,Karan Sonkar and Jitendra Singh**

Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Krishak Nagar, Raipur-492012 (C.G.)
**Email-sonkar.karan@gmail.com*

Abstract: The experiment was conducted at Research and Instructional Farm, Department of Horticulture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during*kharif* season of year 2010-11. The experiment was laid out in factorial randomized block design with 18 treatment combinations which were replicated three times. The treatment consisted of six genotypes of elephant foot yam *viz;* IGAM-1, IGAM-2, IGAM-8, NDA-2, TRC-Badama and Sree Padma which were planted at different spacing of 50 x50 cm, 60 x50 cm and 60 x 60 cm. The results revealed that the combination G_4 x S_3 (NDA-2) x (50 x 50 cm) recorded maximum sprouting per cent, girth of stem, canopy spread, number of cormels/plant, weight of cormels/plant (kg), corm yield (kg/plant) and total corm yield (q/ha.). The treatment combination G_4 x S_1 (NDA-2) x (60 x 60 cm) recorded maximum size of corm and dry matter per cent of corm. The treatment combination G_2 x S_3 (IGAM-2) x (50 x 50 cm) recorded maximum plant height. The maximum days to first emergence, days to 50% emergence and number of stems/plant was recorded under G_5 x S_1 combination (TRC-Badama) x (60 x 60 cm). The treatment combination G_2 x S_2 (IGAM-2) x (60 x 50 cm) recorded maximum average weight of corms and highest days to senescence was recorded under G_6 x S_1 combination (Sree Padma) x (60 x 60 cm).

Keywords: Genotype, elephant foot yam, spacing

INTRODUCTION

Elephant Foot Yam (*Amorphophallusco-mpanulatus* Decne.) is one of the important tuber crops of the tropical and sub-tropical countries because of its yield potential and culinary properties.The tubers are believed to have blood purifying characteristics and are used in medicines for the treatment of piles, asthma, dysentery and other abdominal disorders. Elephant foot yam is a potential new cash crop because the tuber contains high starch (O'hair and Asokan, 1986).Major growing states are Andhra Pradesh, West Bengal, Gujarat, Kerala, Tamil Nadu and Bihar (Anon., 2010).In Chhattisgarh, it is cultivated in an area of around 3000 hectares with a production of 17760.80 metric tonnes (Anon., 2008). It has high photosynthetic efficiency as well as capability to yield economically under poor and marginal soil and harse climatic conditions (Sushan and Suja, 2006).Inspite of the suitable agro-climatic conditions of the state for cultivation of this crop the production and productivity is not increasing due to several production constraints.The quantum of growth and yield of elephant foot yam depend upon local climatology and edaphology and its benefits can be achieved under optimum plant spacing in relation to a particular crop and varieties.

Since only a few works has been done on the effect of plant spacing in local/desi genotypes particularly under agro climatic conditions of Chhattisgarh,hence the investigationwas conductedwith an objective to asses the interaction effect of different genotypes and spacing on growth and yield of Elephant Foot Yam.

MATERIAL AND METHOD

The experiment consisted of six genotypes and three spacing of Elephant foot yam with 18 treatments which was laid out in factorial randomized block design with three replications, received from AICRP on tuber crops, Department of Horticulture, IGKV Raipur which were used in investigation. The corms (plating material) of different genotypes of elephant foot yam of size 100gm at different plant spacing were planted, during July on 13/07/2010 and the data were analyzed following Factorial randomized block design.

Before planting, sprouted corms were treated with DithaneM-45 fungicide @ 2.5 gm/lit of water for 15 minutes to avoid any external and internal fungal infection and the treated corms were planted on 60 X 50 cm. The farm yard manure (FYM) was applied as basal dose 20 q/ha .The crop was fertilized with 100:60:100kg/ha N:P:K .Whole of P_2O_5 and 1/3 of N and K were applied as basal whereas rest of N & K were applied in two equal splits at 60 and 90 DAP. The observation on different growth and yield parameters were recorded on ten randomly selected plants in each replication. Thetreatment details areT_1: (IGAM-1) x (60 x 60 cm),T_2 : (IGAM-1) x (60 x 50 cm), T_3: (IGAM-1) x (50 x 50 cm),T_4: (IGAM-2) x (60 x60 cm),T_5: (IGAM-2) x (60 x 50 cm),T_6: (IGAM-2) x (50 x 50 cm), T_7: (IGAM-8) x (60 x 60 cm),T_8: (IGAM-8) x (60 x 50 cm), T_9: (IGAM-8) x (50 x 50 cm),T_{10}: (NDA-2) x (60 x 60 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_{12}: (NDA-2) x (50 x 50

cm), T_{13}: (TRC Badama) x (60 x 60 cm),T_{14}: (TRC Badama) x (60 x 50 cm), T_{15}: (TRC Badama) x (50 x 50 cm), T_{16}: (Sree Padma) x (60 x 60 cm), T_{17}: (Sree Padma) x (60 x 50 cm), and T_{18}: (Sree Padma) x (50 x 50 cm).

RESULTS AND DISCUSSION

A. Growth and Development

Data recorded on the interaction effect of different genotypes and spacing on growth and development of elephant foot yam are presented in Table 1.

Days to 50 per cent emergence: Different genotypes and spacing showed statistically differences in days to crop emergence.The significant interaction was observed between genotypes and spacing in days to 50% emergence. The longest period (51.03 days) of attainment of 50% emergence of shoot was observed under T_{13} G_5 x S_1 combination (TRC-Badama) x (60 x 60 cm) followed by T_1 : (IGAM-1) x (60 x 60 cm) and lowest period was (46.47 days) in T_3G_6 x S_3 combination (Sree Padma) x (50 x 50 cm). The treatment T_5: (IGAM-2) x (60 x 50 cm) and T_{12}: (NDA-2) x (50 x 50 cm) were statistically at par,while treatment T_2: (IGAM-1) x (60 x 50 cm) and T_9: (IGAM-8) x (50 x 50 cm)showed non-significant differences. Similarly, the treatment T_8: (IGAM-8) x (60 x 50 cm), T_3: (IGAM-1) x (50 x 50 cm), T_{18}: (Sree Padma) x (50 x 50 cm)and T_{15}: (TRC Badama) x (50 x 50 cm) were statically similar to each other. The data revealed that the treatment T_7: (IGAM-8) x (60 x 60 cm), T_4: (IGAM-2) x (60 x60 cm), T_{17}: (Sree Padma) x (60 x 50 cm)and T_{11}: (NDA-2) x (60 x 50 cm) were non-significant similarly to that of the treatment T_{14}: (TRC Badama) x (60 x 50 cm), T_1 : (IGAM-1) x (60 x 60 cm) and T_{15}: (TRC Badama) x (50 x 50 cm).In view of the above finding, similar results were obtained by Das *et al.*(1995) in elephant foot yam.

Sprouting percent: The combination effects of genotypes and various plant spacing also showed significant influence on spouting percentage. Maximum spouting percentage was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 99.07% followed by T_4: (IGAM-2) x (60 x60 cm) and T_9: (IGAM-8) x (50 x 50 cm). While the minimum sprouting percentage was recorded at $T_{13}G_5$ x S_1 combination (TRC-Badama) x (60 x 60 cm) *i.e.* 86.67% followed by the treatment T_{17}: (Sree Padma) x (60 x 50 cm).It is observed from the observation that the treatment T_1 : (IGAM-1) x (60 x 60 cm), T_7: (IGAM-8) x (60 x 60 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_5: (IGAM-2) x (60 x 50 cm), T_{16}: (Sree Padma) x (60 x 60 cm), T_{15}: (TRC Badama) x (50 x 50 cm), T_{18}: (Sree Padma) x (50 x 50 cm), T_6: (IGAM-2) x (50 x 50 cm), T_2 : (IGAM-1) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_{10}: (NDA-2) x (60 x 60 cm), T_3: (IGAM-1) x (50 x 50 cm) and T_{11}: (NDA-2) x (60 x 50 cm)were statistically at par with each other.The above findings are in accordance with the report of Gill *et al.*(2005) in taro.

Plant height (cm): The interaction effects of genotypes and spacing also showed significant influence on plant height. Maximum plant height was recorded in T_6G_2 x S_3 combination (IGAM-2) x (50 x 50 cm) *i.e.* 48.43 cm followed by T_2: (IGAM-1) x (60 x 50 cm), T_3: (IGAM-1) x (50 x 50 cm), T_7: (IGAM-8) x (60 x 60 cm), T_{12}: (NDA-2) x (50 x 50 cm), T_4: (IGAM-2) x (60 x60 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_9: (IGAM-8) x (50 x 50 cm) and T_{18}: (Sree Padma) x (50 x 50 cm). It is evident from the data that the treatment T_2 : (IGAM-1) x (60 x 50 cm), T_3: (IGAM-1) x (50 x 50 cm), T_7: (IGAM-8) x (60 x 60 cm), T_{12}: (NDA-2) x (50 x 50 cm), T_4: (IGAM-2) x (60 x60 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_9: (IGAM-8) x (50 x 50 cm) and T_{18}: (Sree Padma) x (50 x 50 cm) showed non-significant difference with each other. The minimum plant height was recorded in $T_{16}G_6$ x S_1 combination (Sree Padma) x (60 x 60 cm) *i.e.* 35.61 cm followed by the treatment T_{17}: (Sree Padma) x (60 x 50 cm), T_{13}: (TRC Badama) x (60 x 60 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_{10}: (NDA-2) x (60 x 60 cm), T_1 : (IGAM-1) x (60 x 60 cm), T_5: (IGAM-2) x (60 x 50 cm), T_{15}: (TRC Badama) x (50 x 50 cm)and T_8: (IGAM-8) x (60 x 50 cm). The treatment T_{14}: (TRC Badama) x (60 x 50 cm), T_{10}: (NDA-2) x (60 x 60 cm), T_5: (IGAM-2) x (60 x 50 cm), T_{15}: (TRC Badama) x (50 x 50 cm) and T_8: (IGAM-8) x (60 x 50 cm) were at par with each other. Similar results were reported byGeorge and Nair (1993) who observed that closer plant spacing increased plant height than wider plant spacing.

Stem girth(cm): The interaction effects of genotypes and spacing also showed significant influence on girth of stem.The maximum girth of stem was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 1.38 cm followed by the treatment T_9: (IGAM-8) x (50 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_7: (IGAM-8) x (60 x 60 cm), T_3: (IGAM-1) x (50 x 50 cm), T_{15}: (TRC Badama) x (50 x 50 cm), T_{13}: (TRC Badama) x (60 x 60 cm), T_6: (IGAM-2) x (50 x 50 cm), T_4: (IGAM-2) x (60 x60 cm), T_5: (IGAM-2) x (60 x 50 cm), T_{10}: (NDA-2) x (60 x 60 cm) and T_2: (IGAM-1) x (60 x 50 cm) which were statically at par with each other. While minimum girth of stem was recorded in $T_{17}G_6$ x S_2 combination (Sree Padma) x (60 x 50 cm) *i.e.* 0.96 cm followed by T_{16}: (Sree Padma) x (60 x 60 cm)and T_{11}: (NDA-2) x (60 x 50 cm).It is obvious from the data that the non-significant difference was seen between the treatmentT_1: (IGAM-1) x (60 x 60 cm) and T_{18}: (Sree Padma) x (50 x 50 cm).Mohan Kumar *et al* (1973) also reported the similar response of this character with the planting distance.

Number of stems/plant: The interaction effect of genotypes and spacing also showed significant influence on number of stems/plant.Due to effect of genotype and spacing the maximum number of

stems/plant was recorded in $T_{10}G_4$ x S_1 combination (NDA-2) x (60 x 60 cm) *i.e.* 5.57 followed by the treatment T_7: (IGAM-8) x (60 x 60 cm), T_{13}: (TRC Badama) x (60 x 60 cm) and T_{16}: (Sree Padma) x (60 x 60 cm). The treatment T_{12}: (NDA-2) x (50 x 50 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_5: (IGAM-2) x (60 x 50 cm), T_6: (IGAM-2) x (50 x 50 cm)and T_9: (IGAM-8) x (50 x 50 cm) were statically at par with each other. The minimum number of stems/plant was recorded in T_{15} G_5 x S_3 combination (TRC-Badama) x (50 x 50 cm) *i.e.* 2.67 followed by the treatment T_{12}: (NDA-2) x (50 x 50 cm) and T_{18}: (Sree Padma) x (50 x 50 cm). The treatment T_2: (IGAM-1) x (60 x 50 cm), T_3: (IGAM-1) x (50 x 50 cm), T_{17}: (Sree Padma) x (60 x 50 cm)and T_4: (IGAM-2) x (60 x60 cm) showed statistically non-significant differences with each other.The results are in conformity with the finding of Ravi *et al.*(2009) in elephant foot yam.

Canopy spread (E-W and N-S) cm: The interaction effects of genotypes and spacing also showed significant influence on canopy spread (E-W and N-S). Similarly, maximum canopy spread (E-W and N-S) was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 49.12 cm followed by the treatment T_9: (IGAM-8) x (50 x 50 cm), T_{10}: (NDA-2) x (60 x 60 cm), T_5: (IGAM-2) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_{11}: (NDA-2) x (60 x 50 cm) and T_6.It is apparent from the data that the minimum canopy spread (E-W and N-S) was recorded in T_1G_1 x S_1 combination (IGAM-1) x (60 x 60 cm) *i.e.* 31.17 cm followed by the T_{14}: (TRC Badama) x (60 x 50 cm). The treatments T_{16}: (Sree Padma) x (60 x 60 cm), T_{17}: (Sree Padma) x (60 x 50 cm), T_3: (IGAM-1) x (50 x 50 cm), T_{13}, T_7: (IGAM-8) x (60 x 60 cm), T_{18}: (Sree Padma) x (50 x 50 cm), T_4: (IGAM-2) x (60 x60 cm), and T_2: (IGAM-1) x (60 x 50 cm) were statically at par with each other. Similar trend for canopy spread was founded by George and Nair (1993) and Ghosh*et al.* (2008).

Days to senescence: The interaction effects of genotypes and various plant spacing on days to senescence indicated significantly differences.The data pertaining to effect of genotypes and various plant spacing on days to senescence increased from 162.95 days to 169.37 days with the increase in spacing from S_3 (50 x 50 cm) to S_1 (60 x 60 cm). The maximum day to senescence was recorded in T_{16} G_6 x S_1 combination (Sree Padma) x (60 x 60 cm) i.e.174.40 days followed by the treatment T_1 : (IGAM-1) x (60 x 60 cm), T_{17}: (Sree Padma) x (60 x 50 cm), T_{13}: (TRC Badama) x (60 x 60 cm), T_{18}: (Sree Padma) x (50 x 50 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_7: (IGAM-8) x (60 x 60 cm), T_2: (IGAM-1) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_4: (IGAM-2) x (60 x60 cm), T_3: (IGAM-1) x (50 x 50 cm), T_{10}: (NDA-2) x (60 x 60 cm), T_9: (IGAM-8) x (50 x 50 cm), and T_6: (IGAM-2) x (50 x 50 cm). The minimum day to senescence was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 157.37 days followed by the treatment T_{11}: (NDA-2) x (60 x 50 cm). The treatment T_5: (IGAM-2) x (60 x 50 cm) and T_6: (IGAM-2) x (50 x 50 cm) were significantly different from each other**.**

B. Yield and Yield attributing characters:

Data recorded on the effect of different genotypes on yield and yield attributing characters of elephant foot yam are presented in Table 2.

Corm yield (kg/plant): Corm yield was significantly affected due to different spacing. Maximum corm yield was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 1.26 kgfollowed by the treatment T_{10}: (NDA-2) x (60 x 60 cm), T_2: (IGAM-1) x (60 x 50 cm) and T_1 :(IGAM-1) x (60 x 60 cm). The treatment T_{11}: (NDA-2) x (60 x 50 cm), T_6: (IGAM-2) x (50 x 50 cm), T_4: (IGAM-2) x (60 x60 cm) and T_3: (IGAM-1) x (50 x 50 cm) were statically at par with each other, similarly the treatment T_5: (IGAM-2) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_{14}: (TRC Badama) x (60 x 50 cm) and T_7: (IGAM-8) x (60 x 60 cm)showed non significant difference with each other. The data revealed that the minimum corm yield was recorded in $T_{18}G_6$ x S_3 (Sree Padma) x (50 x 50 cm) *i.e.* 0.36 kg followed by the T_{17}: (Sree Padma) x (60 x 50 cm)and T_{16}: (Sree Padma) x (60 x 60 cm). The treatment T_{15}: (TRC Badama) x (50 x 50 cm), T_9: (IGAM-8) x (50 x 50 cm)and T_{13}: (TRC Badama) x (60 x 60 cm) were statically non-significant. Similar results were found by Mannan and Rashid (1983) reported in colocasia that increased spacing increased tuber yield/plat but reduce yield/ha.

Size of corm (diameter) cm: The maximum size of corm (diameter) cm was recorded in $T_{10}G_4$ x S_1 (NDA-2) x (60 x 60 cm) *i.e.* 9.77 cm followed by $T_{12}G_4$ x S_3 combination(NDA-2) x (50 x 50 cm) *i.e.* 7.52 cm and T_3G_1 x S_3 combination (IGAM-1) x (50 x 50 cm) *i.e.* 7.10 cm. In respect of different genotype and spacing minimum size of corm (diameter) was recorded in genotype $T_{16}G_6$ x S_1 combination (Sree Padma) x (60 x 60 cm) *i.e.* 4.45 cm followed by $T_{18}G_6$ x S_3 combination (Sree Padma) x (50 x 50 cm) *i.e.* 4.69 cm.The treatment T_{16}: (Sree Padma) x (60 x 60 cm), T_{18}: (Sree Padma) x (50 x 50 cm), T_{17}: (Sree Padma) x (60 x 50 cm) and T_1 : (IGAM-1) x (60 x 60 cm) were statically at par with each other, similarly the treatment T_{13}: (TRC Badama) x (60 x 60 cm), T_7: (IGAM-8) x (60 x 60 cm), T_{15}: (TRC Badama) x (50 x 50 cm), T_5: (IGAM-2) x (60 x 50 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm), T_2: (IGAM-1) x (60 x 50 cm) and T_4 showed non-significant differences with each other. The check variety Sree Padma was found to be inferior at all level of spacing in comparison to rest of treatment combinations of genotypes and spacing for size of corm (diameter). The above results are in

good agreement with the finding Sharma and Narzary (1999) in colocasia.

Average weight of corm (kg): The increase in maximum average weight of corm (kg/plant) was recorded in T_5 G_2 x S_2 combination (IGAM-2) x (60 x 50 cm) *i.e.* 0.83 followed by the treatment T_{10}: (NDA-2) x (60 x 60 cm), T_{12}: (NDA-2) x (50 x 50 cm) and T_{16} G_6 x S_1 (Sree Padma) x (60 x 60 cm), while the minimum was recorded in $T_{17}G_6$ x S_2 combination (Sree Padma) x (60 x 50 cm) *i.e.* 0.30 kg followed by the treatment T_{18}: (Sree Padma) x (50 x 50 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_1 : (IGAM-1) x (60 x 60 cm), T_{13}: (TRC Badama) x (60 x 60 cm) and T_7: (IGAM-8) x (60 x 60 cm). It is apparent from the data that the treatment T_3: (IGAM-1) x (50 x 50 cm), T_2: (IGAM-1) x (60 x 50 cm), T_{15}: (TRC Badama) x (50 x 50 cm) and T_8: (IGAM-8) x (60 x 50 cm) were at par with each other, similarly the treatment T_9: (IGAM-8) x (50 x 50 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_6: (IGAM-2) x (50 x 50 cm), and T_4: (IGAM-2) x (60 x60 cm) showed non-significant differences. Similar results were corroborated with the findings of Sen *et al.* (1984) in elephant foot yam.

Number of cormels/plant: The interaction effects of genotypes and various plant spacings on number of cormels/plant indicated significant differences. It is obvious from the data that the maximum number of cormels/plant was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 8.27 followed by the treatment T_{10}: (NDA-2) x (60 x 60 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_5: (IGAM-2) x (60 x 50 cm) and T_4: (IGAM-2) x (60 x60 cm). The treatment T_6: (IGAM-2) x (50 x 50 cm), T_2: (IGAM-1) x (60 x 50 cm), T_9: (IGAM-8) x (50 x 50 cm) and T_8: (IGAM-8) x (60 x 50 cm) showed non-significant difference same as that of the treatment T_1 : (IGAM-1) x (60 x 60 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_7: (IGAM-8) x (60 x 60 cm), T_{13}: (TRC Badama) x (60 x 60 cm), T_3: (IGAM-1) x (50 x 50 cm) and T_{15}: (TRC Badama) x (50 x 50 cm). The minimum number of cormels/plant was recorded in $T_{16}G_6$ x S_1 (Sree Padma) x (60 x 60 cm) *i.e.* 2.40 followed by T_{17} G_6 x S_2 (Sree Padma) x (60 x 50 cm) *i.e.* 2.43 and T_{18}: (Sree Padma) x (50 x 50 cm). The treatment were non-significant differences with respect to T_1: (IGAM-1) x (60 x 60 cm), T_{13}: (TRC Badama) x (60 x 60 cm) and T_{15}: (TRC Badama) x (50 x 50 cm).The findings are in line with the result of Gill *et al.* (2005) in Taro.

Weight of cormels/plant (kg): The interaction effects of genotypes and various plant spacings on weight of cormels/plant indicated significant differences. The enhancement in maximum weight of cormels/plant was recorded in $T_{12}G_4$ x S_3 combination (NDA-2) x (50 x 50 cm) *i.e.* 21.00 kg followed by the treatment T_{10}: (NDA-2) x (60 x 60 cm), T_{11}: (NDA-2) x (60 x 50 cm), T_6: (IGAM-2) x (50 x 50 cm) and T_5: (IGAM-2) x (60 x 50 cm), while the minimum was recorded in $T_{16}G_4$ x S_1 combination (NDA-2) x (60 x 60 cm) *i.e.* 0.02 kg followed by the treatment T_{18}: (Sree Padma) x (50 x 50 cm), T_{13}: (TRC Badama) x (60 x 60 cm), T_{14}: (TRC Badama) x (60 x 50 cm), T_1 : (IGAM-1) x (60 x 60 cm), T_7: (IGAM-8) x (60 x 60 cm), T_8: (IGAM-8) x (60 x 50 cm) and T_{15}: (TRC Badama) x (50 x 50 cm).Similar results were found by Mondal and Sen (2005) that total cormel yield per unit area decrease in spacing.

Dry matter % of corm: The interaction effects of genotypes and various plant spacing on dry matter % of corm indicated significant differences. The maximum dry matter % of corm was recorded in $T_{10}G_4$ x S_1 combination (NDA-2) x (60 x 60 cm) *i.e.* 26.20% followed by T_2G_1 x S_2 combination (IGAM-1) x (60 x 50 cm) *i.e.* 26.00% and T_1G_1 x S_1 combination (IGAM-1) x (60 x 60 cm) *i.e.* 25.70%. The treatment combination T_2G_1 x S_2 (IGAM-1) x (60 x 50 cm) *i.e.* 26.00% was statistically at par for their dry matter % of corm. Minimum dry mater % of corm was noted in $T_{18}G_6$ x S_3 (Sree Padma) x (50 x 50 cm) *i.e.* 22.10% followed by $T_{15}G_5$ x S_3 (TRC-Badama) x (50 x 50 cm) *i.e.* 22.70 %.The treatment T_{11}: (NDA-2) x (60 x 50 cm), T_8: (IGAM-8) x (60 x 50 cm)and T_{13} were statistically at par with each other similarly the treatment T_5: (IGAM-2) x (60 x 50 cm) and T_4: (IGAM-2) x (60 x60 cm) showed non-significant differences. The higher dry matter % of corm in treatment combination in the present investigation could be attributed to plants which also reflected towards increased tuber yield/plant in respect to treatment combination.

Total corm yield (q/ha.): Maximum total corm yield (q/ha) was recorded in $T_{12}G_4$ x S_3 (NDA-2) x (50 x 50 cm) *i.e.* 237.96 (q/ha) followed by T_5: (IGAM-2) x (60 x 50 cm) and T_6: (IGAM-2) x (50 x 50 cm), while the minimum was recorded in T_{16}:G_6 x S_1 (Sree Padma) x (60 x 60 cm) *i.e.* 57.39 (q/ha) followed by the treatment T_{17}: (Sree Padma) x (60 x 50 cm), T_1 : (IGAM-1) x (60 x 60 cm), T_{13}: (TRC Badama) x (60 x 60 cm), T_7: (IGAM-8) x (60 x 60 cm), T_{18} and T_{14}: (TRC Badama) x (60 x 50 cm).This is in agreement with Mondal and Sen (2004) and Patel *et. al.* (2008) who reported maximum corm yield at closer spacing.Generally all the genotypes exhibited greater yields under closer spacing. The check variety Sree Padma was found to be inferior at all level of spacings in comparison to rest of treatment combinations of genotypes and spacings for total corm yield (q/ha).

Table 1: Interaction effect of different genotypes and spacing on growth and development parameters of elephant foot yam.

Treatments (Genotypes)	Days to 50% first emergence	Sprouting %	Plant height (cm)	Stem girth (cm)	No. of stems/plant	canopy spread (cm)	Days to Senescence
$T_{1.}$(IGAM-1) x (60 x 60 cm)	50.63	92.00	40.51	1.06	2.83	31.17	174.17
$T_{2.}$(IGAM-1) x (60 x 50 cm)	44.07	95.55	44.88	1.18	3.17	39.20	166.57
$T_{3.}$(IGAM-1) x (50 x 50 cm)	46.47	96.29	44.48	1.24	3.30	37.35	164.57
$T_{4.}$(IGAM-2) x (60 x 60 cm)	47.27	97.33	43.84	1.20	3.43	38.91	165.43
$T_{5.}$(IGAM-2) x (60 x 50 cm)	42.70	92.22	41.01	1.19	3.77	39.09	160.40
$T_{6.}$(IGAM-2) x (50 x 50 cm)	40.10	95.37	48.43	1.20	3.73	40.84	161.43
$T_{7.}$(IGAM-8) x (60 x 60 cm)	47.17	92.00	44.46	1.25	4.37	37.89	167.57
$T_{8.}$(IGAM-8) x (50 x 50 cm)	46.33	95.55	42.22	1.26	3.80	41.83	165.47
$T_{9.}$(IGAM-8) x (50 x 50 cm)	44.23	97.22	42.65	1.30	3.70	44.85	162.53
$T_{10.}$(NDA-2) x (60 x 60 cm)	45.23	96.00	40.13	1.19	5.57	42.09	164.23
$T_{11.}$(NDA-2) x (60 x 50 cm)	47.70	96.66	43.46	1.02	3.87	41.23	159.53
$T_{12.}$(NDA-2) x (50 x 50 cm)	43.37	99.07	43.87	1.38	3.93	49.12	157.37
$T_{13.}$(TRC Badama) x (60x60 cm)	51.03	86.67	38.05	1.21	4.33	37.66	170.40
$T_{14.}$(TRC Badama) x (60x50 cm)	50.23	92.22	39.30	1.07	3.50	33.43	168.50
$T_{15.}$(TRC Badama) x (50x50 cm)	46.53	94.44	41.98	1.21	2.67	41.98	162.33
$T_{16.}$(Sree Padma) x (60x 60 cm)	49.47	93.33	35.61	0.99	4.20	36.64	174.40
$T_{17.}$(Sree Padma) x (60 x 50 cm)	47.40	91.11	37.12	0.96	3.43	36.69	173.37
$T_{18.}$(Sree Padma) x (50 x 50 cm)	46.47	95.37	42.46	1.14	2.90	38.71	169.47
SEm±	0.29	1.81	1.10	0.03	0.17	1.18	0.25
CD (5%)	0.84	5.20	3.16	0.08	0.49	3.38	0.73

Table 2: Interaction effect of different genotypes and spacing on yield and yield attributing parameters of elephant foot yam.

Treatments (Genotypes)	Days to Senescence	Size of corm (cm)	Average weight of corms(kg)	Number of cormels/plant	Weight of cormels/plant (kg)	Corm yield (kg/plant)	Total corm yield (q/ha.)	Dry matter % of corm
$T_{1.}$ (IGAM-1) x (60 x 60 cm)	174.17	5.15	0.51	3.03	0.06	0.96	90.66	25.70
$T_{2.}$ (IGAM-1) x (60 x 50 cm)	166.57	6.27	0.59	4.20	0.09	0.96	137.55	26.00
$T_{3.}$ (IGAM-1) x (50 x 50 cm)	164.57	7.10	0.56	3.30	0.07	0.84	154.62	25.20
$T_{4.}$ (IGAM-2) x (60 x 60 cm)	165.43	6.29	0.70	4.90	0.09	0.87	135.09	24.80
$T_{5.}$ (IGAM-2) x (60 x 50 cm)	160.40	5.72	0.83	5.57	0.12	0.81	191.94	25.00
$T_{6.}$ (IGAM-2) x (50 x 50 cm)	161.43	6.85	0.68	4.37	0.13	0.87	188.88	24.40
$T_{7.}$ (IGAM-8) x (60 x 60 cm)	167.57	5.69	0.53	3.17	0.06	0.75	101.55	24.60
$T_{8.}$ (IGAM-8) x (50 x 50 cm)	165.47	6.26	0.60	3.87	0.07	0.81	139.41	25.30
$T_{9.}$ (IGAM-8) x (50 x 50 cm)	162.53	6.47	0.64	4.17	0.08	0.66	176.61	24.20
$T_{10.}$ (NDA-2) x (60 x 60 cm)	164.23	9.77	0.78	7.17	0.17	0.99	149.22	26.20
$T_{11.}$ (NDA-2) x (60 x 50 cm)	159.53	5.97	0.65	6.03	0.13	0.87	163.47	25.40
$T_{12.}$ (NDA-2) x (50 x 50 cm)	157.37	7.52	0.76	8.27	0.21	1.26	237.96	25.50
T_{13} (TRC Badama) x (60 x 60 cm)	170.40	5.68	0.52	3.17	0.05	0.72	92.82	23.40
T_{14} (TRC Badama) x (60 x 50 cm)	168.50	6.17	0.50	3.07	0.05	0.75	116.64	23.90
T_{15} (TRC Badama) x (50x50 cm)	162.33	5.69	0.59	3.47	0.07	0.63	163.11	22.70
T_{16} (Sree Padma) x (60x 60 cm)	174.40	4.45	0.75	2.40	0.02	0.39	57.39	22.80
T_{17} (Sree Padma) x (60 x 50 cm)	173.37	4.70	0.30	2.43	0.02	0.39	60.57	23.40
T_{18} (Sree Padma) x (50 x 50 cm)	169.47	4.69	0.38	2.50	0.03	0.36	105.39	22.10
SEm±	0.25	0.25	0.02	0.18	3.74	0.02	8.47	0.13
CD (5%)	0.73	0.72	0.05	0.53	0.74	0.07	24.35	0.39

REFERENCES

Anonymous (2008). Directorate of Horticulture State Government, Chhattisgarh.

Anonymous (2010). Central Tuber Crop Research Institute, Sreekariyam Thiruvananthapuram.

Das, P.K., Sen, H., Banerjee, N.C. and Panda, P.K. (1995). Effect of spacing and size of corm sett on growth and whole seed corm production of elephant foot yam.*Hort. J*.**8**(2): 131-139.

George, J. and Nair, G.M. (1993). Influence of spacing and seed corm size on yield and yield attributes of elephant foot yam. *J.Root Crops*, **19**(1): 57-59.

Ghosh, D.K., Hore, J.K. and Bandopadhyay, A. (2008). Standardization of spacing and size of planting material of elephant foot yam grown as intercrop in coconut plantation.*Indian J. Hort.***65**(1): 44-47.

Gill, B.S., Randhawa, G.S. and Saini, S.S. (2005). Optimizing the agronomic requirement of taro (*Colocasia esculenta*) for Punjab.*Indian Journal of Agronomy*, **50**(2): 170-172.

Mondal, S. and Sen, H. (2005). Growth and productivity of eddoe taro (*Colocasiaesculenta* var. antiquorum) as influenced by fertilizer levels and spacings. *J. Root Crops*, **31**(1):50-53.

Mohan, C. R., Mandal, R. C. and Singh, K. D. (1973). Effect of mulching and plant density on growth, yield and quality of Amorphophallus. Indian J. Agron., 18: 62 – 66.

Mannan, M.A. and Rashid, M.M. (1983). Effect of spacing and mulching on the yield and profitability of PanchamukhiKachu (*Colocasia esculenta*).*Bangladesh J.Agric.*, 8(2): 69-73.

O'Hair, S.K. and Asokanm M. P. (1986). Edible aroids: botany and horticulture. *In* J. Janick (ed.). Horticultural Reviews Vol. 8. ASHS, AVI Publ. Co., Westport, Connecticut. p. 34-99.

Ravi, V., Ravindran, C. S. and Suja, S. (2009). Growth and productivity of Elephant Foot Yam (*Amorphophalluspaeoniifolius*) (Dennst, Nicolson): an Overvien. *J. Root Crops*, 35(2): 137-142.

Sharma, I. and Narzary, B.D. (1999). Effect of cultivar and spacing on the yield andprofitability of Colocasia. *Journal of the Agricultural Science Society of North East India*, **12**(1): 131-135.

Sen, H., Roychudhury, N. and Bose, T.K. 1984. Effect of seed cormweight and spacing on the total corm yield of Amorphophallus. *J.Root Crops*, 10: 37-39.

Sushan John, K. and Suja, G. (2006). Nutritional Disorders in tropical tuber crops. CTCRI, Thiruvanthapuram, Keral.