IMPACT OF DIFFERENT GENOTYPES ON GROWTH AND YIELD PARAMETERS OF ELEPHANT FOOT YAM (*AMORPHOPHALLUS COMPANULATUS DECNE.*) UNDER CHHATTISGARH PLAINS

***Kawach Bhagat, Vijay Kumar, 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 the year 2010-11 in factorial randomized block design with 6 treatments which were replicated three times with an objective to study the effect of different genotypes on growth and yield on elephant foot yam. The treatment consisted of six genotypes of elephant foot yam *viz;* IGAM-1, IGAM-2, IGAM-8, NDA-2, TRC-Badama and Sree Padma. Data revealed that genotype G_4 (NDA-2) proved its superiority followed by G_1 (IGAM-1), G_2 (IGAM-2), G_3 (IGAM-8), G_5 (TRC-Badama) and G_6 (Sree Padma) for sprouting per cent, number of stems/plant, canopy spread (E-W and N-S), size of corm (diameter), number of cormels/plant, weight of cormels/plant, corm yield (kg/plant), total corm yield (q/ha) and dry matter per cent of corm. Genotype G_2 (IGAM-2) superior for plant height and average weight of corm, genotype G_3 (IGAM-8) superior for girth of stem, genotype G_5 (TRC-Badama) superior for days to first emergence and genotype G_6 (Sree Padma) superior for days to senescence.

Keywords: Genotype, elephant foot yam, yield

INTRODUCTION

Elephant Foot Yam (*Amorphophallus companulatus* Decne.) is one of the important tuber crops of the tropical and sub-tropical countries because of its yield potential and culinary properties. Major growing states are Andhra Pradesh, West Bengal, Gujarat, Kerala, Tamil Nadu and Bihar (Anon., 2010). 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. 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. Unavailability of good planting materials, lack of agro-techniques and improved varieties are the key factors that decisively cause hindrance in obtaining optimum yields of elephant foot yam. The less acrid genotypes like IGAM-2, IGAM-5 and IGAM-8 etc. have been found to be early bulking and high yielding under agro-climatic conditions of Chhattisgarh but their yields are yet to be exploited by use of standard package of practices. Moreover, these genotypes are less acrid desi types which are generally prefered in taste by the local inhabitants and tribal people of the state. Since only a few work has been done on the effect of plant spacing in local/desi genotypes particularly under agro climatic conditions of Chhattisgarh. Hence the present investigation was conducted with the objective to study the effect of different genotype on growth and yield of elephant foot yam (*Amorphophallus companulatus Decne*.) under agro-climatic condition of Chhattisgarh plains.

MATERIAL AND METHOD

The experiment consisted of six genotypes of Elephant foot yam 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 plant spacing were planted in factorial randomized complete block design with three replications during 2nd week of July on 13/07/2010 and the data were analayzed following Factorial randomized block design.

Before planting, sprouted corms were treated with Dithane M-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 plant spacing. 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. The treatment details are T_1 : IGAM-1,T_2 : IGAM-2, T_3 : IGAM-8, T_4 : NDA-2,T_5 : TRC Badama and T_6 : Sree Padma.

RESULT AND DISCUSSION

A. Growth and Development

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

Days to first emergence: Different genotypes showed statistically differences in days to crop emergence. The significant difference was observed between genotypes in days to first emergence. It is obvious from the data that the minimum days to first emergence were recorded under the genotype G_2 (IGAM-2), while the maximum days to first emergence were recorded under genotype G_5 (TRC-Badama). In view of the above finding, similar results were obtained by Das *et al.* (1995) in elephant foot yam.

Sprouting per cent: Maximum sprouting percentage was recorded under G_4 genotype (NDA-2) *i.e.* 97.25 followed by G_2 (IGAM-2) *i.e.* 94.97 and G_3 (IGAM-8) *i.e.* 94.92 and which are statistically at par with each other except the former. The genotype G_5 (TRC-Badama) recorded minimum values (91.11%) of sprouting followed by G_6 (Sree Padma) *i.e.* 93.27 %. The above findings are in accordance with the report of Gill *et al.* (2008) in elephant foot yam.

Plant height (cm): Plant height was significantly affected with the genotypes. The increase in plant height was maximum under genotype G_2 (IGAM-2) *i.e.* 44.43 cm followed G_1 (IGAM-1) *i.e.* 43.29 cm and G_3 (IGAM-8) i.e.43.11 cm and which were statistically at par with each other. The genotype G_5 (TRC-Badama) recorded minimum values 39.78 cm followed by G_6 (Sree Padma) *i.e.* 38.40 cm of plant height. Similar results were reported by George and Nair (1993)

Stem girth (cm): **S**tem girth was significantly affected with the genotypes. The results indicated maximum girth of stem under genotype G_3 (IGAM-8) i.e.1.27 cm followed by G_2 (IGAM-2) *i.e.* 1.20 cm and G_4 (NDA-2) *i.e.* 1.18 cm. Minimum girth of stem was recorded under G_6 (Sree Padma) *i.e.* 1.03 cm followed by G_5 (TRC-Badama) and G_1 (IGAM-1) *i.e.* 1.16 cm in each. The results are in conformity with the finding of Mohan *et al.* (1973) in elephant foot yam.

Number of stems/plant: Number of stems/plant was affected with the genotypes. In respect of maximum number of stems/plant the results indicated under genotype G_4 (NDA-2) i.e.4.46 followed G_3 (IGAM-8) *i.e.* 3.96 and G_2 (IGAM-2) *i.e.* 3.64. Minimum number of stems/plant was recorded under G_1 (IGAM-1) *i.e.* 3.10 followed by G_5 (TRC-Badama) and G_6 (Sree Padma) *i.e.* 3.50. The above results are in good agreement with the finding of Patel *et al.* (2008) in elephant foot yam.

Canopy spread (E-W and N-S) cm: Canopy spread (E-W and N-S) was significantly affected with the genotypes and various plant spacing. It is apparent form the data that the maximum canopy spread (E-W and N-S) was under genotype G_4 (NDA-2) i.e.44.15 cm followed by G_3 (IGAM-8) *i.e.* 41.53 cm and G_2 (IGAM-2) *i.e.* 39.61 cm. Minimum canopy spread (E-W and N-S) was recorded under G_1 (IGAM-1) *i.e.* 35.90 cm followed by G_6 (Sree Padma) *i.e.* 37.35 cm. Similar trend for canopy spread was founded by George and Nair (1993) and Ghosh *et al.* (2008).

Days to senescence: The results indicated maximum days to senescence under genotype G_6 (Sree Padma) *i.e.* 172.41 days followed by G_1 (IGAM-1) *i.e.* 168.43 days and G_5 (TRC-Badama) *i.e.* 167.08 days. The data pertaining to minimum days of senescence was recorded under genotype G_4 (NDA-2) *i.e.* 160.38 day followed by G_2 (IGAM-2) *i.e.* 162.42 days because the plants emerged earlier and took less time to achieve senescence.

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): Different genotypes showed significant differences in corm yield (kg/plant). The various effect of genotype shows that the maximum corm yield (kg/plant) was reported under genotype G_4 (NDA-2) *i.e.* 1.05 kg followed by G_1 (IGAM-1) *i.e.* 0.93 kg and G_2 (IGAM-2) *i.e.* 0.84 kg. Minimum corm yield (kg/plant) was recorded under genotype G_6 (Sree Padma) *i.e.* 0.39 kg followed by G_5 (TRC-Badama) *i.e.* 0.69 kg. Similar results were found by Mannan and Rashid (1983) reported in colocasia.

Size of corm (diameter) cm: The results indicated significant effect of different varieties on size of corm. The data revealed that the maximum size of corm (diameter) was recorded under genotype G_4 (NDA-2) *i.e.* 7.75 cm followed by G_2 (IGAM-2) *i.e.* 6.29 cm and G_1 (IGAM-1) *i.e.* 6.18 cm, while minimum size of corm (diameter) was recorded under genotype G_6 (Sree Padma) *i.e.* 4.61 cm followed by G_5 (TRC- Badama) *i.e.* 5.85 cm. Similar results were corroborated with the findings of Sharma and Norzary (1999) in elephant foot yam.

Average weight of corm (kg): The data on average weight of corm (kg) is presented in Table 2. The results indicated significant effect of different varieties on this character. The maximum average weight of corm (kg) was noticed under genotypes G_2 (IGAM-2) *i.e.* 0.73 kg followed by G_4 (NDA-2) *i.e.* 0.73 kg and G_3 (IGAM-8) *i.e.* 0.58 kg. Due to effect of genotypes the minimum average weight of corm (kg) was recorded under genotype G_6 (Sree Padma) *i.e.* 0.48 kg followed by G_5 (TRC-Badama) *i.e.* 0.54 kg.

Number of cormels/plant: The data on number of cormels/plant presented in Table 2. The results indicated significant effect of different varieties on this character the maximum number of cormels/plant reported under genotype G_4 (NDA-2) *i.e.* 7.16

followed by G_2 (IGAM-2) *i.e.* 4.94 and G_3 (IGAM-8) *i.e.* 3.73. The minimum number of cormels/plant was recorded under genotype G_6 (Sree Padma) *i.e.* 2.44 followed by G_5 (TRC-Badama) *i.e.* 3.23. The findings are in line with the results of Gill *et al.* (2008) in elephant foot yam.

Weight of cormels/plant (kg): The data in relation to weight of cormels/plant is presented in Table 2. The results indicated significantly effect of different varieties on this character the maximum weight of cormels/plant under genotype G_4 (NDA-2) *i.e.* 0.17 kg followed by G_2 (IGAM-2) *i.e.* 0.11 kg and G_1 (IGAM-1) *i.e.* 0.07 kg. It is apparent from the data thet the minimum weight of cormels/plant was recorded under genotype G_6 (Sree Padma) *i.e.* 0.02 kg followed by G_5 (TRC- Badama) *i.e.* 0.06 kg.

Total corm yield (q/ha.): The increase in maximum total corm yield (q/ha.) was under genotype G_4 (NDA-2) *i.e.* 183.54 (q/ha.) followed by G_2 (IGAM-2) *i.e.* 171.99 (q/ha) and G_3 (IGAM-8) *i.e.* 139.17 (q/ha). The genotype G_2 (IGAM-2) *i.e.* 171.99 (q/ha) was statistically at par with G_1 (IGAM-1) for their total corm yield (q/ha). The minimum total corm yield (q/ha.) was recorded under genotype G_6 (Sree Padma) *i.e.* 74.46 (q/ha) followed by G_5 (TRC-Badama) *i.e.* 124.20 (q/ha). The above findings are in accordance with the report of Ghosh *et al* (2008) in elephant foot yam.

Dry matter % of corm: The data on dry matter % of corm is presented in Table 2. The results indicated significant effect of different varieties on the maximum dry matter % of corm was reported under genotype G_4 (NDA-2) *i.e.* 25.70% followed by G_1 (IGAM-1) *i.e.* 25.63% and G_2 (IGAM-2) *i.e.* 24.73%. Due to effect of different genotypes the minimum dry matter % of corm was recorded under genotype G_6 (Sree Padma) *i.e.* 22.77% followed by G_5 (TRC-Badama) *i.e.* 23.33 %.

Table 1: Effect of different genotypes on growth and development parameters of elephant foot yam

Treatments (Genotypes)	Days to first emergence	Sprouting %	Plant height (cm)	Stem girth (cm)	No. of stems/plant	Canopy spread (cm)	Days to Senescence
G_1-IGAM-1	21.27	94.61	43.29	1.16	3.10	35.90	168.43
G_2-IGAM-2	17.28	94.97	44.43	1.20	3.64	39.61	162.42
G_3 IGAM-8	19.66	94.92	43.11	1.27	3.96	41.53	165.19
G_4-NDA-2	17.91	97.25	42.49	1.18	4.46	44.15	160.38
G_5-TRC Badama	22.71	91.11	39.78	1.16	3.50	37.69	167.08
G_6 -Sree Padma	22.62	93.27	38.40	1.03	3.50	37.35	172.41
SEm±	0.12	1.04	0.63	0.07	0.10	0.68	0.15
CD (5%)	0.36	3.00	1.82	0.05	0.28	1.95	0.42

Table 2: Effect of different genotype on yield and yield attributing parameters of elephant foot yam

Treatments (Genotypes)	Size of corm (cm)	Average weight of corms(kg)	Number of cormels /plant	Weight of cormels/plant (kg)	Corm yield (kg/plant)	Dry matter % of corm	Total corm yield (q/ha.)
G_1-IGAM-1	6.18	0.55	3.51	0.07	0.93	25.63	127.59
G_2-IGAM-2	6.29	0.73	4.94	0.11	0.84	24.73	171.99
G_3 IGAM-8	6.14	0.58	3.73	0.07	0.75	24.70	139.17
G_4-NDA-2	7.75	0.73	7.16	0.17	1.05	25.70	183.54
G_5-TRC Badama	5.85	0.54	3.23	0.06	0.69	23.33	124.2
G_6 -Sree Padma	4.61	0.48	2.44	0.02	0.39	22.77	74.46
SEm±	0.14	0.01	0.10	2.16	0.02	0.08	4.89
CD (5%)	0.41	0.03	0.30	6.20	0.04	0.22	14.06

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.

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

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.

Patel, N.B., Chauhan, G.G., Chauhan, P.P. and Patel, B.N. (2008). Effect of time of planting, seed size and spacing on yield of Elephant Foot Yam var. Gajendra. National Seminar on Amorphophallus: *Innovative Technologies* PP. 154-155.

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

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

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