International Journal of Farm Sciences **2(1)** : 65-71, 2012

Effect of seed corm size and mulching material on growth and yield of elephant foot yam (*Amorphophallus campanulatus* Blume)

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ABSTRACT

The healthy seed corms of five sizes of elephant foot yam cv Karot Local viz S1: 100 g at spacing of 75 x 15 cm, S2: 200 g at spacing of 75 x 30 cm, S3: 300 g at spacing of 75 x 45 cm, S4: 400 g at spacing of 75 x 60 cm and S5: 500 g at spacing of 75 x 75 cm were planted during three consecutive years from 2004 to 2006 at the experimental farm of Regional Horticultural and Forestry Research Station, Bhota, District Hamirpur, HP in mid May at specified spacings such that with the increase in seed corm size the spacing is also increased in the same proportion so that equal quantity of seed corm weight per unit area is used. The crop was mulched with three types of mulching materials viz M1: Farm Yard Manure (FYM), M2: Dry Leaf and Grass (DLG) and M3: Pine Needles (PNL). These 15 treatment combinations were laid out in a Randomized Block Design with three replications in the plots of size 3.00 x 2.25 m every year. The recommended doses of manures and fertilizers and all agronomic practices were adopted timely for raising a healthy and normal crop. The data on gross corm yield (q/ha), corm yield per plant (g), plant height (cm) and days to maturity were recorded. Significant differences were observed for all the traits studied except days to maturity during all the three years. The maximum gross corm yield (698.3 q/ha) was produced by planting the smallest seed corms of size 100 g at the closest spacing of 75 x 15 cm and mulching the crop with FYM where the corm yield per plant was increased eight times of the seed corm size. However maximum plant height of 112.5 cm and corm yield per plant of 2474.5 g was recorded by planting the largest seed corms of size 500 g at the widest spacing of 75 x 75 cm and mulching the crop with FYM where the corm weight was increased nearly five times of the seed corm size with the same period of maturity.

Keywords: Elephant foot yam, corms, spacing, mulching material

INTRODUCTION

The elephant foot yam (*Amorphophallus campanulatus* Blume) also called Suran and Zimikand is native to India and is grown for its underground modified stem known as corm which can be stored for long periods. It has now become a very popular vegetable in certain areas of the tropical and sub-tropical

regions. It is a cheap source of carbohydrates, minerals and vitamins. The corm is used as vegetable and for preparing curry and pickle. It contains crystals of calcium oxalate accounting for acridity and irritation and also used in ayurvedic preparations for the cure of piles. It is of two types. One has smooth corms and is propagated by small pieces of corms. Its acridity causes irritation that is diluted by boiling. It gives high yields. The other type is propagated by cormels or daughter corms; is superior in quality and free from acridity. The flesh colour ranges from white to light pink. A corm used as seed may be weighing only a few grams and takes three to four years to become a few kilograms in weight. Spacing has an important role on the production of corm and the planting distance depends on the size of planting material. There is a definite advantage of mulching of the pits immediately after planting for better sprouting, conservation of moisture and reduction of the temperature around the corm. Among the various components of production technology seed corm size, spacing and mulching material to be used go a long way in increasing the area and production and boosting the popularity and adoption of this newly emerging crop in the sub-tropics of lower hills.

MATERIAL AND METHODS

The present investigations were carried out on elephant foot yam cv Karot Local during three consecutive years from 2004 to 2006 at the experimental farm of Regional Horticultural and Forestry Research Station, Bhota, District Hamirpur, HP. The healthy seed corms of five sizes viz S1: 100 g at spacing of 75 x 15 cm, S2: 200 g at spacing of 75 x 30 cm, S3: 300 g at spacing of 75 x 45 cm, S4: 400 g at spacing of 75 x 60 cm and S5: 500 g at spacing of 75 x 75 cm were planted in mid May at specified spacings such that with the increase in seed corm size the spacing was also increased in the same proportion so that equal quantity of seed corm weight per unit area was used. The crop was mulched with three types of mulching materials viz M1: Farm Yard Manure (FYM), M2: Dry Leaf and Grass (DLG) and M3: Pine Needles (PNL). These 15 treatment combinations were laid out in a Randomized Block Design with three replications in the plots of size 3.00 x 2.25 m every year. The sandy loam soil of well prepared field was incorporated with recommended doses of manures and fertilizers and all agronomic practices were adopted timely as per package of practices for raising a healthy and normal crop. The data on gross corm yield (q/ha) were recorded on plot basis whereas corm yield per plant (g) and plant height (cm) were recorded on ten randomly selected plants. Days to maturity were counted from planting to harvesting.

RESULTS AND DISCUSSION

Data on gross corm yield, corm yield per plant and plant height besides days

to maturity were statistically analyzed and the mean values for three years along with the pooled means are presented in Table 1 for seed corm size and mulching material and for interaction of seed corm size and mulching material in Table 2.

Effect of seed corm size

All the characters were significantly influenced by seed corm size during all the three years except days to maturity (Table 1). The corm yield per plant and plant height showed an increasing trend with increase in seed corm size and spacing and the highest values were recorded at the maximum seed corm size of 500 g planted at the widest spacing of 75 x 75 cm. Such response must have been due to the initial vigour of the corm at the time of planting playing a major role in increasing corm yield per plant and plant height. 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. Moreover the planting at wider spacing made the availability of more space providing more nutrients, air and sunlight per plant which led to vigorous growth by way of plant height and corm yield per plant. However days to maturity did not show significant response to seed corm size and spacing. On the other hand maximum gross corm yields of 482.7 q/ha (2004), 471.6 q/ha (2005) and 467.6 q/ha (2006) were recorded from the smallest seed corm size of 100 g planted at the closest spacing of 75 x 15 cm closely followed by seed corm size of 200 g at spacing of 75 x 30 cm with an average of 438.9 q/ha which might be due to the higher plant density at closer spacing. The corm yield per plant increased by 5.36 and 3.29 times of seed corm size of 100 g and 500 g respectively. It reveals that the maximum corm yield per plant from largest seed corm size of 500 g planted at the widest spacing of 75 x 75 cm did not compensate the reduction in per hectare yield caused by decreasing plant density in the wider spacing. These results are in agreement with those of Soumik and Sen (2004) who also reported that the largest sett size resulted in highest average corm weight and it was also increased while gross corm production decreased with increase in planting distance. However the highest corm yield was obtained from a closer spacing of 45 x 30 cm. Decrease in corm yield with wider spacing was also observed by George and Nair (1993). Das et al (1995) recorded highest corm yield with 250 g sets grown at a spacing of 30 x 25 cm.

Effect of mulching material

The variation in mulching material significantly influenced yield and its attributes except days to maturity during all the three years (Table 1). The highest yield of 562.4 q/ha (2004), 539.1 q/ha (2005) and 532.6 q/ha (2007) obtained by mulching the crop with Farm Yard Manure during all the three years were significantly superior to all other mulching materials. Maximum corm weight

Table 1. Effect of seed corn size and mulching material on growth and yield of elephant food yam cv Karot local

Traits	Gross corm yield (q/ ha)				Corm yield per plant (g)				Plant height (cm)				Maturity (days)
Treatments	2004	2005	2006	Pooled	2004	2005	2006	Pooled	2004	2005	2006	Pooled	2004-06
Seed corm size													
S1: 100 g	482.7	471.6	467.6	474.0	550.7	528.6	529.1	536.1	51.0	54.7	52.5	52.7	210
S2: 200 g	442.0	437.0	437.6	438.9	996.7	952.4	961.2	970.1	60.7	63.3	60.1	61.4	210
S3: 300 g	358.7	361.9	364.9	361.8	1242.0	1220.5	1263.6	1242.0	70.3	75.5	72.1	72.6	210
S4: 400 g	299.0	286.6	602.8	296.1	1337.3	1259.3	1262.2	1286.3	80.0	78.9	78.6	79.2	210
S5: 500 g	295.7	291.8	277.3	288.3	1666.0	1657.3	1605.0	1642.8	99.3	107.3	103.5	103.4	210
Mean	375.6	369.8	370.0	371.8	1158.5	1123.6	1124.2	1135.5	42.3	75.9	73.4	73.9	210
$CD_{0.05}$	42.2	39.8	37.2		152.4	147.7	135.9		11.2	14.5	12.6		
Mulching material													
M1: FYM	562.4	539.1	532.6	544.7	1701.0	1626.8	1613.4	1647.1	77.6	82.5	79.4	79.8	210
M2: DLG	340.6	334.1	336.1	336.9	1088.0	1076.6	1086.1	1083.6	72.8	76.8	74.5	74.7	210
M3: PNL	223.8	236.2	241.4	233.8	686.6	667.4	673.2	675.7	66.4	68.6	66.3	67.1	210
Mean	375.6	369.8	370.0	371.8	1158.5	1123.6	1124.2	1135.5	72.3	75.9	73.4	73.9	210
$CD_{0.05}$	49.7	52.5	46.8		121.4	138.1	127.9		6.1	5.2	5.9		

Table 1. Effect of interaction of seed corn size and mulching material on growth and yield of elephant food yam cv Karot local

Traits	Gross corm yield (q/ ha)				Corm yield per plant (g)				Plant height (cm)				Maturity (days)
Treatments	2004	2005	2006	Pooled	2004	2005	2006	Pooled	2004	2005	2006	Pooled	2004-06
100g & FYM	728.0	694.3	672.5	698.3	822.0	792.0	786.7	800.2	56.0	62.8	58.2	59.0	210
100g & DLG	434.0	416.4	438.8	429.7	518.0	502.4	522.5	514.3	52.0	54.2	55.8	54.0	210
100g & PNL	286.0	304.2	291.6	293.9	312.0	291.3	278.2	293.8	45.0	47.1	43.5	45.2	210
200g & FYM	642.0	619.1	589.2	616.8	1390.0	1295.1	1268.3	1317.8	65.0	68.7	64.8	66.2	210
200g & DLG	424.0	403.7	411.1	412.9	988.0	970.8	978.5	979.1	61.0	64.5	62.1	62.5	210
200g&PNL	260.0	288.2	312.4	286.9	612.0	591.4	636.8	613.4	56.0	56.8	53.3	55.4	210
300g & FYM	521.0	492.7	507.1	506.9	1771.0	1752.7	1849.5	1791.1	74.0	81.7	78.9	78.2	210
300g & DLG	335.0	356.6	332.5	341.4	1236.0	1210.2	1194.6	1810.6	71.0	75.6	72.7	73.1	210
300g & PNL	220.0	236.3	255.2	237.2	719.0	698.5	746.7	721.4	66.0	69.3	64.8	66.7	210
400g & FYM	454.0	434.5	457.8	448.8	1982.0	1804.3	1768.3	1851.5	85.0	82.2	82.6	83.3	210
400g & DLG	272.0	262.4	278.7	271.0	1218.0	1178.8	1256.1	1217.6	82.0	82.8	78.8	81.2	210
400g & PNL	171.0	162.9	171.9	168.6	812.0	794.7	762.2	789.6	73.0	71.6	74.5	73.0	210
500g & FYM	467.0	454.8	436.6	452.8	2540.0	2490.0	2394.0	2474.7	108.0	117.1	112.3	112.5	210
500g & DLG	238.0	231.3	219.3	229.5	1480.0	1520.7	1478.8	1493.2	98.0	106.9	102.9	102.6	210
500g & PNL	182.0	189.2	176.0	182.4	978.0	961.1	942.1	960.4	92.0	98.0	95.3	95.1	210
Mean	375.6	369.8	370.0	371.8	1158.5	1123.6	1124.2	1135.5	72.3	75.9	73.4	73.9	210
$CD_{0.05}$	64.6	52.8	47.7	55.0	102.4	118.2	104.2	108.3	7.8	11.5	9.8	9.7	-

and plant height were also recorded by mulching the crop with FYM during all the years with an average of 1647.1 g and 79.8 cm respectively whereas pine needle mulch was found to be most inferior. However days to maturity were not influenced by the mulching material. Hore et al (2003) also reported that yield, corm weight and growth increased with higher application of FYM. Increased corm yield with FYM was also observed by Manu (1997), Patel and Mehta (1987) and Patel and Mehta (1984). However Kumar et al (1973) reported that yield, size of the individual corms and height were significantly increased by leaf mulching whereas out of the six mulches tried banana leaves were found the best by Pankaj et al (2006).

Effect of seed corm size and mulching material interaction

The interaction effect of seed corm size and mulching material was found to be significant for all the characters except days to maturity during all the three years (Table 2). The maximum yield (698.3 q/ha) was produced by planting the smallest seed corms of size 100 g at the closest spacing of 75 x 15 cm and mulching the crop with FYM where the corm yield per plant increased eight times of the seed corm size. However maximum plant height of 112.5 cm and corm yield per plant of 2474.5 g was recorded by planting the largest seed corms of size 500 g at the widest spacing of 75 x 75 cm and mulching the crop with FYM where the corm yield per plant increased nearly five times of the seed corm size with the same period of maturity. It may be concluded that small seed corms of size 100 g planted at a close spacing of 75 x 15 cm and mulched with FYM are most suitable for the highest yield of elephant foot yam.

ACKNOWLEDGEMENTS

The financial assistance rendered by the Agricultural Technology Management Agency, Hamirpur, HP under National Agricultural Technology Project of Indian Council of Agricultural Research is duly acknowledged.

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Received : 2,5,2011 *Accepted: 9.7.2011*