ORGANIC FARMING TECHNOLOGIES IN ELEPHANT FOOT YAM

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ABSTRACT

Elephant foot yam (Amorphophallus paeoniifolius (Dennst.) Nicolson *belongs to family Araceae is popularly known as suran. It is used for making vegetables, pickles and for ayurvedic purpose. The wild species of elephant foot yam are highly acrid which creates irritation in throat due to presence of calcium oxalate crystals. In elephant foot yam, the maximum cultivated area is occupied by local variety in Gujarat but Gajendra, a local selection from Kovvur area of Andhra Pradesh, is popular throughout the country including south Gujarat. Fertilizer is one of the most important inputs of increasing the production of crops. In order to obtain good yield, modern varieties of different crops require relatively huge quantity of fertilizer compared to the traditional cultivars. High cost, reduction in the productivity and sustainability of land through injudicious use of inorganic fertilizers, it becomes an immense need to formulate an alternative agricultural systems like organic farming that are less chemical intensive and can conserve the environment would produce satisfactory yields and would maintain soil health to ensure sustainable crop production. Tuber crops especially elephant foot yam respond well to organic manure. Therefore, as the economic point of view, this effort will draw some meaningful conclusion to the peasantry.*

Keywords : *elephant foot yam, INM, yield and economics*

INTRODUCTION

Nowadays, there is considerable interest among farmers in adopting eco-friendly farming strategies (Sonawane *et al.,* 2020, Ananthnag *et al.,* 2014). It has been repeatedly confirmed that continuous, sole and imbalanced use of chemical fertilizers deteriorates soil health and ecological balance which leads to decrease in nutrient uptake efficiency (Navya *et al.,* 2017). Though the use of chemical inputs cannot be completely avoided, their use in agriculture has to be reduced (Suja *et al.,* 2012_a). Organic farming is an alternative farming strategy that focuses on soil health, environmental protection as well as human health by largely excluding the use of synthetic chemicals and with maximum use of organic resources. Elephant foot yam has a high production potential and through organic cultivation it will benefited to health also. The high quality, nutritious and safe organic foods fetch a premium price in world market. (Suja *et al.,* 2012_b).

OBJECTIVE

To know the trend of corm yield and economics of organically cultivated elephant foot yam

METHODOLOGY

The study was conducted during the year 2017-18, 2018-19 and 2019-20 under AICRP on Tuber Crops at Regional Horticultural Research Station of ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat, India. The experiment was laid out in CRD with 3 treatments and 9 repetitions. The treatments were:

T_1- Conventional: FYM @ 25 t ha^{-1}+ NPK @ 100:50:150 kg ha^{-1}

T_2- Traditional: Existing farmers practice (FYM @ 8 t ha^{-1}+ Castor cake @ 300 kg ha^{-1} +NPK @ 90:60:30 kg ha^{-1})

T_3- Organic:

- Raise green manure cowpea (seed rate @ 20 kg ha^{-1}) prior to elephant foot yam and incorporate green matter at 45-60 days
- Use organically produced planting material
- Treat corm pieces of 500-750 g with slurry containing cowdung, neem cake (1-2 kg bucket of $slurry^{-1}$) and *Trichoderma harzianum* (5 g kg $seed^{-1}$) and dry under shade before planting
- Apply *Trichoderma harzianum* incorporated FYM @ 36 t ha^{-1} in pits at the time of planting (FYM: neem cake mixture (10:1) inoculated with *Trichoderma harzianum* @ 2.5 kg $tonne^{-1}$ of FYM neem cake mixture.

Trichoderma can be multiplied in FYM alone but it will take 15 days to form sufficient inoculam as against 7-8 days, if neem cake is also used along with FYM). This is effective against collar rot caused by *Sclerotium rolfsii*

- Apply neem cake @ 1 t ha^{-1} in pits at the time of planting
- Inter-sow green manure cowpea (seed rate @ 20 kg ha^{-1}) between elephant foot yam pits and incorporate the green matter in pits at 45-60 days. The green matter addition from the two green manure crops should be 20-25 t ha^{-1}. Apply ash @ 3 t ha^{-1} at the time of incorporation of green manure in pits

Healthy corms of elephant foot yam cv. Gajendra were used to make setts of about 500 g for planting at a distance of 75 cm between and within row.

RESULTS AND DISCUSSION

Maximum corm yield ha^{-1} (39.77 t) was recorded in the treatment of T_3 (Organic) during 2017-18. During 2018-19 and 2019-20 it was also recorded maximum in T_3 treatment. As per the statistical analysis of pooled research data regarding corm yield, the highest corm yield (36.28 t ha^{-1}) was obtained in T_3 treatment. Looking to the organic point of view, organic treatment T_3 gave BCR (1.44:1). Thus, this treatment was found better for the farmers interested in cultivation of organic elephant foot yam.

Table 1: Effect of INM on corm yield (t ha^{-1}) in elephant foot yam

Treatments	Corm yield (t ha^{-1})			
	2017-18	2018-19	2019-20	Pooled
T_1	32.19	26.81	26.83	28.61
T_2	36.83	29.86	29.84	32.18
T_3	39.77	34.52	34.55	36.28
S. Em. ±	1.04	1.26	1.22	0.67
CD	3.03	3.69	3.57	1.88
S. Em.± (Y*T)	-			1.18
CD (Y*T)			NS	
CV %	8.58	12.47	12.06	10.93

Table 2: Economics (₹ ha^{-1}):

Treatments	Corm yield (T ha^{-1})	Fixed cost ₹	Variable cost ₹	Cost a ₹	Cost b ₹	Cost c ₹	Gross return ₹	Net return ₹	BCR
T_1	28.61	2,28,050	20,576	2,48,626	35,763	2,84,389	5,72,200	2,87,811	**1.01**
T_2	32.18	2,28,050	12,322	2,40,372	40,225	2,80,597	6,43,600	3,63,003	**1.29**
T_3	36.28	2,28,050	86,406	3,14,456	56,688	3,71,144	9,07,000	5,35,856	**1.44**

Input cost:

Urea-₹ 267 Bag of 45 kg^{-1} | FYM- ₹ 450 t^{-1} | Irrigation charges- ₹ 40 h^{-1}

SSP- ₹ 355 Bag of 50 kg^{-1} | Neem cake- ₹ 500 Bag of 50 kg^{-1} | Labour cost- ₹ 178 day^{-1}

MOP- ₹ 950 Bag of 50 kg^{-1} | *Trichoderma harzianum*- ₹ 60 kg^{-1} | Ploughing-₹ 400 h^{-1}

Cowpea seed - ₹ 350 kg^{-1} | Castor cake- ₹ 480 Bag of 50 kg^{-1} | Disk harrow- ₹ 300 h^{-1}

Selling price of seed corm and corm: ₹: 20 kg^{-1} for T_1 and T_2

Premium price of seed corm and corm: ₹: 25 kg^{-1} for T_3

CONCLUSION

The farmers intending to grow elephant foot yam cv. Gajendra organically are advised to raise green manure cowpea (seed rate @ 20 kg ha^{-1}) prior to elephant foot yam and incorporate green matter at 45-60 days. Take organically produced planting material of 500 g weight and treat it with bucket full of cow dung slurry containing 1- 2 kg neem cake and *Trichoderma harzianum* (5 g kg^{-1} seed corm) and then dry under shade before planting. At the time of planting, apply FYM : neem cake mixture (in 10:1 ratio) @ 36 t ha^{-1} incorporated with *Trichoderma harzianum* @ 2.5 kg $tonne^{-1}$ of FYM neem cake mixture along with neem cake @ 1 t ha^{-1} in pits. Raise green manure cowpea again with 20 kg ha^{-1} seed rate in-between fallow space of elephant foot yam plants and incorporate at 45-60 days in pits along with 3 t ha^{-1} of ash.

Majority of the people believe that future scope of sustainable agriculture will depend on organic farming and increased consciousness about health among people will enhance the demand of organic farming and consumer may prefer to pay higher prices for organic products (Prajapati *et al.,* 2018). Moreover, with organic cultivation simultaneously yield also increased due to the extra yield obtained over the conventional practice (Suja *et al*., 2012_b). So, organic farming technologies in elephant foot yam are very beneficial on the basis of economics. This experiment indicated that even with no use of chemical fertilizers, higher yield can be obtained by proper supplementation of nutrients through cheaper and easily available organic sources, based on soil testing in contrary to some of the reports that crop yield under organic management are 20-40 % lower than for comparable conventional systems (Stockdale *et al.,* 2001). However, this experiment indicated that there is a great scope for organic farming in tropical tuber crops, especially elephant foot yam (Suja *et al.,* 2012_b).

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