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Factors influencing the adoption level of farmers towards elephant foot yam (*Amorphophallus paeoniifolius*) cultivation practices in Tamil Nadu

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Abstract
Among tuberous crop, elephant foot yam (*Amorphophallus paeoniifolius*) is one of the important tropical tuber crop popular as a food security and as a remunerative cash crop (Suja *et al*., 2016) [7]. The varieties Gajendra and Sree Padma are very popular in Tamil Nadu. It is a tropical and subtropical crop. It requires well distributed rainfall with humid and warm weather during vegetative phase and cool and dry weather during the corm development period. A rich red-loamy soil with a pH range of 5.5-7.0 is preferred. It is cultivated on commercial scale in Erode, Salem, Thiruvannamalai, Thoothukudi and Thanjavur districts of Tamil Nadu in an area of about 1000 hectares.

But presently, elephant foot yam cultivation is in crisis. The growers are now facing innumerable problems in yam cultivation. With low yields, high input costs, incidence of diseases and pests, water logging and drought, the area under yam is gradually shrinking. An innovative set of agronomic practices that involves season of planting, field preparation, spacing, planting, inter cropping, irrigation, fertilizer application, pest and disease management and time of harvesting to increase the yam yields significantly.

The zero-order correlation co-efficient and linear multiple regression analysis were employed to study the relationship and contribution of characteristics with adoption level in yam cultivation. The study was taken up in the elephant foot yam predominant district of Erode in Tamil Nadu State (India) with a sample size of sixty growers selected based on the random sampling method. The findings revealed that out of fifteen independent variables only five variables were found to be positive and significant relationship with adoption level in both correlation and regression analysis.

Keywords: Elephant foot yam, yam growers, adoption level

Introduction
Elephant foot yam (*Amorphophallus paeoniifolius*) is one of the important tropical tuber crops popular as a food security and as a remunerative cash crop in India. It belongs to the Araceae family, known for the supply of famine foods. In India, it is commonly known as suran or elephant foot yam and in Tamil it is known as karak karanai. It is largely cultivated throughout the plains of India for using its corm (bulb) as food. A wide range of phytochemicals, viz. phenols, flavonoids, alkaloids, glycosides, steroids and tannins are present in elephant foot yam. It is referred to as "king of tuber crops" because of its culinary properties, therapeutic values, medicinal utility and higher yield potential.

A rich red-loamy soil with a pH range of 5.5-7.0 is preferred. It undergoes a dormancy period of 45 to 60 days. Traditionally farmers take advantage of the dormancy period by planting during February-March so that the setts would sprout with the pre-monsoon showers. April – May is the planting season. The tuber is cut into 750-1000g small bits in such a way that each bit has atleast a small portion of the ring around each bud. Whole corms of 500 g size can also be used as a planting material. Use of cormels and minisett transplants of 100 g size as planting material at a closer spacing of 45 and 30 cm is also suggested. There are also projections with tender buds called "Arumbu". These are removed before planting as they do not give vigorous growth. An ordinary sized yam gives about 6 to 8 bits for planting. The cut pieces are dipped in cow dung solution to prevent evaporation of moisture from cut surface. In some places, the small round daughter corms are also planted. The cut pieces are planted in beds at 45 cm and 90 cm spacing or pit of 60 and 60 and 45 cm size is dug and planted. The pit should be filled with top soil and farm yard manure (2kg/pit) prior to planting. The pieces are planted in such a way that the sprouting region (the ring) is kept above the soil. About 3500 kg of corms will be required to plant one hectare. Sprouting takes place in about a month.

Vegetable cowpea CO^2 is recommended as suitable intercrop in elephant foot yam. It is mostly raised as a rainfed crop. However, irrigation is required when monsoon fails, where it is grown on a large scale. Water stagnation is harmful to the crop. Wherever irrigation facility

is available, irrigation can be given once a week. Apply 25 tonnes of FYM/ha during last ploughing. The recommended dose of NPK/ha is 80:60:100 kg. Apply 40:60:50 kg NPK/ha at 45 days after planting along with weeding and intercultural operations. Top dress with 40:50 N and K one month later, along with shallow intercultural operations.

The collar rot is the major disease in yam caused by a soil borne fungus Schlerotium rolfsii. Water logging, poor drainage and mechanical injury at collar region favour the disease incidence. Brownish lesions first occur on collar regions, which spreads to the entire pseudo stem and cause complete yellowing of the plant. In severe case, the plant collapses leading to complete crop loss. Use disease free planting material, remove infected plant materials, improve drainage conditions, incorporate organic amendments like neem cake and drench the soil with carbenilazim to control the disease.

Harvesting is done on 8 months after planting and particularly during January - February months. Drying of stem and leaves indicates the harvesting stage in elephant yam. The crop can yield about 30 – 35 t/ha in 240 days. For seed purpose, the yams can be left in the field itself till planting the next crop or the lifted yams can be stored in sand or paddy straw.

The personal, socio-economic and psychological characteristics of the elephant foot yam growers may play a role in determining their adoption level on recommended cultivation practices mentioned above. Keeping this in view, the present study has been made to know the relationship and contribution of characteristics with adoption level in elephant foot yam cultivation practices.

Methodology

The present study was taken up among the elephant foot yam growers in the area of Erode district. Totally 60 yam growers were selected from the district by proportionate random sampling method. The data were collected from the respondents with the help of well structured and pre tested interview schedule. Fifteen variables, viz., age, educational status, occupational status, annual income, farm size, experience in yam cultivation, social participation, extension agency contact, mass media exposure, innovativeness, risk orientation, scientific orientation, economic motivation, training undergone and decision making pattern and an dependent variable adoption were included in the study.

The statistical tools used in the study were percentage analysis, zero order correlation and multiple regression analysis.

Results and discussion

The results of the association of the characteristic with adoption level of elephant foot yam cultivation practices are being presented in subsequent tables.

Relationship between personal social-economic and psychological characteristics of respondents and their adoption level of elephant foot yam cultivation practices

The characteristics of respondents play a role in determining their adoption level of recommended elephant foot yam cultivation practices. The zero-order correlation co-efficient (r) and linear multiple regression analysis were employed to study the relationship and contribution of characteristics with adoption level in elephant foot yam cultivation practices and the results are presented in Table 1.

Table 1: Relationship between personal, social-economic and psychological characteristics of respondents and their adoption level

(n=120)

Variable No.	Independent Variables	Correlation co efficient 'r' value
X_1	Age	0.105NS
X_2	Educational status	0.141*
X_3	Occupational status	0.081NS
X_4	Annual income	0.046NS
X_5	Farm size	0.023NS
X_6	Experience in yam cultivation	0.124*
X_7	Social participation	0.051NS
X_8	Extension agency contact	0.271**
X_9	Mass media exposure	0.114*
X_{10}	Innovativeness	0.025NS
X_{11}	Risk orientation	0.047NS
X_{12}	Scientific orientation	0.014NS
X_{13}	Economic motivation	0.068NS
X_{14}	Training undergone	0.243**
X_{15}	Decision making pattern	0.047NS

** - Significant at 1% level

* - Significant at 5 % level

NS – Non-significant

The results of correlation analysis in Table 1 showed that out of fifteen independent variables studied viz., educational status, experience in yam cultivation, extension agency contact, mass media exposure and training undergone had shown positive and significant relationship with adoption behaviour of the respondents. Among the significant variables, extension agency contact and training undergone were found to be significant at one per cent level of probability whereas the remaining variables viz., educational status, experience in yam cultivation and mass media exposure were significant at five per cent level of probability.

Educational status was found to have positive and significant relationship with the adoption behaviour of respondents. Obviously, educated respondents develop a positive attitude towards every possible source of knowledge and it leads to increased adoption. This finding is in conformity with the findings of Ram sundar (2016) [4].

Positive and significant relationship was found to exist between experience in yam cultivation and adoption at 0.05 per cent level of probability. This might be due to the reason that farming experience would have influenced the respondents to looking forward to new technologies to adopt in order to increase their profit. This derives support from the findings of Sivapriyan (2018) [6].

Extension agency contact showed a positive and highly significant relationship at 0.01 per cent level of probability. To gain knowledge about a technology, one has to expose himself to different experiences provided by various extension sources. Hence, the extension agency contact would have shown positive and significant association with adoption. This finding is in agreement with the findings of Santhi (2006) [5].

The correlation co-efficient between mass media exposure and adoption behaviour showed a positive and significant relationship. This implied that mass media exposure had got direct influence on the extent of adoption of elephant foot yam cultivation practices. Farmers with high mass media exposure would have acquired more knowledge about the latest technologies and would have evinced interest for higher

level of adoption. Hence, a positive relationship had shown. This finding was in accordance with that of Jayasankar (2011) [1].

Training undergone had showed a positive relationship with adoption behavior at 0.01 per cent level of probability. Respondents who attended the training programmes will definitely gather information on new technologies and would have enthused them to adopt technologies. This finding is in line with findings Prasanthakumar (2007).

Contribution of personal, social-economic and psychological characteristics of respondents towards their adoption level of elephant foot yam cultivation practices

In order to find out which of the independent variables explained the variation in the dependent variables and also to know the extent of contribution made by these variables, multiple regression analysis was carried out and the results are presented in this section.

The results of multiple regression analysis of the characteristics with adoption behaviour are presented in Table 2.

Table 2: Contribution of personal, social-economic and psychological characteristics of respondents towards their adoption level

(n=120)

Variable No.	Impendent Variables	Regression co-efficient	Standard error	't' value
X_1	Age	1.561	1.475	1.457NS
X_2	Educational status	0.432	0.457	2.548**
X_3	Occupational status	-0.547	0.584	-1.254NS
X_4	Annual income	0.543	0.842	1.358NS
X_5	Farm size	1.018	0.421	1.154NS
X_6	Experience in sugarcane cultivation	0.749	0.245	1.547*
X_7	Social participation	-1.004	0.687	1.298NS
X_8	Extension agency contact	0.379	0.101	2.698**
X_9	Mass media exposure	0.791	0.452	1.587*
X_{10}	Innovativeness	0.648	0.587	1.262NS
X_{11}	Risk orientation	0.254	0.325	1.054NS
X_{12}	Scientific orientation	0.684	0.589	1.1196NS
X_{13}	Economic motivation	0.745	0.745	1.165NS
X_{14}	Training undergone	2.042	1.025	1.712*
X_{15}	Decision making pattern	0.854	0.864	1.258NS

R^2 = 0.520 **F** = 7.170**

** - Significant at 1% level

* - Significant at 5 % level

NS – Non-significant

It could be observed from the Table 2 exhibited that the R^2 value was 0.520 which implied that 52.00 per cent variation in the independent variables included in the study. Since the 'F' value 7.170 was found to be significant at 0.01 per cent level of probability. The prediction equation was fitted for adoption level of the respondents as given below. There existed a linear functional contribution between the independent variables and adoption levels. The prediction equation for the respondents is as follows

$$Y = 9.149 + 1.561(X_1) + 0.432(X_2) - 0.547(X_3) + 0.543(X_4) + 1.018(X_5) + 0.749(X_6) - 1.004(X_7) + 0.379(X_8) + 0.791(X_9) + 0.648(X_{10}) + 0.254(X_{11}) + 0.684(X_{12}) + 0.745(X_{13}) + 2.042(X_{14}) + 0.854(X_{15})$$

It could be seen from the equation that the regression co-efficient of variables viz., educational status (X_2) and extension agency contact (X_8) was found to be positive and significantly contributed towards the adoption level of yam growers about elephant foot yam cultivation practices at 0.01 per cent level of probability. The regression co-efficient of variables viz., experience in sugarcane cultivation (X_6), mass media exposure (X_9) and training undergone (X_{14}) were found to be positive and had significant contribution towards the adoption level of the respondents at 0.05 per cent level of probability.

The analysis revealed as *ceteris paribus* as one unit increase in educational status (X_2) extension agency contact (X_8) and would increase the adoption by 2.546 and 2.568 units, respectively. Experience in yam cultivation (X_6), mass media exposure (X_9) and training undergone (X_{14}) would increase the adoption by 1.644, 1.769 and 1.805 respectively.

It could be inferred that, the adoption level of elephant foot yam cultivation practices could positively be influenced by the variables viz., educational status (X_2), experience in yam cultivation (X_6), extension agency contact (X_8), mass media exposure (X_9) and training undergone (X_{14}). The results of multiple regression in the case of remaining ten variables were not found to be significant.

Conclusion

Based on the salient findings of the study, the personal, socio economical and psychological characteristics of the respondents viz., educational status, experience in yam cultivation, extension agency contact, mass media exposure and training undergone had shown positive and significant relationship with adoption behaviour of the respondents. Similarly the same variables showed positive and significant contribution towards adoption level of the respondents. Other than these variables such as age, occupational status, annual income, farm size, social participation, innovativeness, risk orientation, scientific orientation, economic motivation, decision making pattern belonged to non-significant.

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