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AN ANALYSIS OF THE DETERMINANTS OF GROUNDNUT ON FARM EFFICIENCY IN ANANTHAPURAMU DISTRICT OF ANDHRA PRADESH, INDIA

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ABSTRACT

This paper addresses the determinants that are influencing the farm efficiency of the groundnut cultivating farmers in Ananthapuramu district of Andhra Pradesh. A total of 200 groundnut cultivating farmers were selected purposively and interviewed. Multiple linear regression is used to identify the determinants. Results revealed that government seed are found to be the most important determinants. Farming experience, education qualification, land holding, cost of cultivation, type of land and government seed showed significant 0 and were identified as chief determinants. Treatment, family size, irrigation source, small farmers group, medium farmers group, own seed, private seed and variety seems to be unrelated to the farm efficiency of farmers and were not found as key factors in predicting farm efficiency of groundnut farmers.

KEYWORDS: Multiple linear regression, determinants, Efficiency, farming experience, farm efficiency.

INTRODUCTION

Groundnut is the most important oilseed crop grown in India. The annual production of groundnuts is approximately 7180.5 thousand tonnes, with nine states contributing more than 100 thousand tonnes each. Gujarat, Rajasthan, Tamil Nadu, Andhra Pradesh, Karnataka, Madhya Pradesh, West Bengal, and Telangana are the major groundnut producing states in India. Groundnut cultivation is practiced on around 85 lakh hectares of land in India (Department of science & technology, 2019). Oil seeds however contribute to the agricultural economy in India, however, they are only second in terms of value and production to food grains. Because of the importance of edible oil in one's daily diet, demand for groundnut production has increased. Consumption levels are expected to rise further as a result of increased income and population. Currently, production is insufficient to meet demand and oil is traded internationally. As a result, efforts should be made to extend groundnut production area so that numerous by products produced from them can be made available to the inevitable population.

Keeping in view of the above facts, the present study is to identify the determinants that are influencing the groundnut farmers on farm efficiency in Ananthapuramu district of Andhra Pradesh was undertaken. As Ananthapuramu district ranks first in the state of Andhra Pradesh in cultivation of groundnut 2021.

MATERIAL AND METHODS

Ananthapuramu district was purposively selected for the research study as it is predominant in groundnut cultivation, contains fertile red soils, good irrigation facility and highest groundnut seed subsidy distribution in Andhra Pradesh. Four villages in the two mandals having maximum area under groundnut cultivation were purposively chosen. The required information pertaining to cultivation of groundnut and other related parameters were collected from the sample respondents on well-structured survey schedule designed for the purpose for the year 2021 kharif season.

In order to identify the determinants of groundnut farmers on farm efficiency variables the statistical term Multiple Linear Regression Analysis was used to analyse the linear effect of two or more explanatory variables (X_1, X_2, …. X_i) on a response variable (Y) using multiple regression analysis for mathematical modelling by SPSS software 16 version.

$$Y = a + bX_1 + bX_2 \text{ ------ } + \mu$$

RESULTS AND DISCUSSIONS

The variables considered for the present study include dependent (gross returns) and 14 independent variables selected were treatment (non-subsidized seed, subsidized seed), farming experience, family size, educational qualification, type of land, land

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holding, Cost of cultivation, irrigation source, small farmers, medium farmers, government seed, own seed, private seed and variety to examine whether they were statistically significant and if yes, the direction of their mutual relationship.

Multiple regression analysis is a study focused on the combined influence of 14 independent variables up on one dependent variable using a linear model. In this study multiple linear regression analysis was used for identifying determinants of groundnut farmers on farm efficiency in the study area.

Table 1 provides the R, R^2, adjusted R^2 values, and the standard error of the estimate, which can be used to determine how well a regression- model fits the data. R^2 is a statistical measure of how close the data are to the fitted regression line. It is also called the coefficient of determination or the coefficient of multiple determination for multiple linear regression. Values 0.68 or 68 per cent indicated that the model explains all the variability of the response data around its mean. Adjusted R^2 also specifies how well the terms fit in a curve or in a line, and also adjusts for the number of terms in a model. Adjusted R^2 will always be less than or equal to R^2. A value of 0.66

Table 1. Multiple linear regression model summary

Model Summary[b]

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate	Durbin-Watson Statistic
1	0.82[a]	0.68	0.66	10049.68	2.03

a. Predictors: (Constant), treatment (non-subsidized=0, subsidized=1), farming experience, family size, educational qualification, type of land, land holding, Cost of cultivation, irrigation source, small farmers, medium farmers, government seed, own seed, private seed and variety

b. Dependent Variable: Gross returns

or 66 per cent indicates a model that perfectly predicts values in 66 per cent variation in the Gross returns. One of the assumptions of regression is that the observations are independent. If observations are collected over time, it is likely that successive observations are related. If there is no auto correlation where subsequent observations are related, the Durbin–Watson statistic should be between 1.5 and 2.5. The Durbin–Watson statistic of the present study was 2.03 and therefore the data was not auto correlated.

The F- ratio in the ANOVA tests (Table 2) whether the overall regression model is a good fit for the data. The sum of squares column, the degrees of freedom column (d.f), the mean sum of square column (MSS), the F column, and the p- value or observed significance of F were shown. From the d.f column, it was grasped that k= 14, the fourteen predictor variables and that n =200, sample size of the study. The MSS was 10099.60 which means that s^2= 10099.60. The F ratio given under column F was 28.48 and p-value was 0.000 which was given under the significant column. Since p-value was less than 0.05, it implies that the calculated regression coefficient was significant and the variance in the independent variable contributes to the change in the dependent variable. Therefore, it was inferred that the farmers farm efficiency depends on the some of the selected explanatory variables. Hence, variance in any one of the explanatory variables really contributes to change in performance of the farmers.

Looking at the p-value of the t-test for each predictor in table 3 it was observed that p value of farming experience, education qualification, land holding, cost of cultivation, type of land and government seed have approximately zero value or closer to 0.05 (5% level of significance). The effect of these explanatory variables was found to be positively significant and were the chief determinants. But explanatory variables viz., treatment, family size, irrigation source, small farmers group, medium farmers group, own seed, private seed and variety were found to be positively non-significant. This may indicate that respondents with greater groundnut farming experience, education qualification, land holding, cost of cultivation, type of land and government seed could afford to take risk in adoption of subsidies

Table 2. The F- ratio in the ANOVA tests

ANOVA[a]						
	Model	Sum of Squares	d.f	Mean Sum of Square	F	Significance (p-value)
1	Regression	4026857.88	14	287632.35	28.48	0.000[b]
	Residual	1868429.28	185	10099.60		
	Total	5895287.17	199			

a. Dependent Variable: Gross returns

b. Predictors: (Constant), treatment (non-subsidized=0, subsidized=1), farming experience, family size, educational qualification, type of land, land holding, Cost of cultivation, irrigation source, small farmers, medium farmers, government seed, own seed, private seed and variety

Table 3. t-statistic and the p-value from SPSS

	Model	Regression coefficients (β)	t-test	p-value
β_0	(Constant)	-9567.36	-0.408	0.684
X_1	Treatment (non-subsidized seed = 0, subsidized seed = 1)	167.02	1.581	0.116
X_2	Farming experience	3.87***	4.383	0.000
X_3	Family Size	-1.47	-0.257	0.797
X_4	Education qualification	30.22**	3.414	0.001
X_5	Type of land	-65.09**	-2.572	0.011
X_6	Land holding	163.52***	8.145	0.000
X_7	Cost of cultivation	0.005***	5.397	0.000
X_8	irrigation source	34.73	1.332	0.184
X_9	Small farmers group	14.74	0.839	0.402
X_{10}	Medium farmers group	4.48	0.098	0.922
X_{11}	Government seed	-215.113*	-1.955	0.052
X_{12}	Own seed	-12.03	-0.298	0.766
X_{13}	Private seed	-0.19	-0.005	0.996
X_{14}	Variety	-0.18	-0.006	0.996

and attain benefit from them. Finally, the effect of treatment, family size, irrigation source, small farmers group, medium farmers group, own seed, private seed and variety seems to be unrelated to the farm efficiency of farmers and were not key factors in predicting farm efficiency of groundnut farmers.

Hence, the multiple regression equation was formulated by (Equation):

$$Y = -9567.362 + 167.02X_1 + 3.87X_2 - 1.47X_3 + 30.22X_4 - 65.09X_5 + 163.52X_6 + 0.005X_7 + 34.73X_8 + 14.74X_9 + 4.48X_{10} - 215.113X_{11} - 12.03X_{12} - 0.190X_{13} - 0.127X_{14} + \mu$$

A similar regression model was employed by Bhatta *et al.* (2009). They estimated the determinants of farmers' willingness to pay for organic agriculture inputs and found that the total variation of unlabelled and labelled organic vegetables was explained to the extent of 58 per

cent and 63 per cent by the selected independent variables like education, age, family income and family size.

The study on analysis of the determinants of groundnut on farm efficiency in Ananthapuramu district of Andhra Pradesh brought out the following conclusions: To identify the determinants of the groundnut farmers regression analysis was used, farming experience, education qualification, land holding, cost of cultivation, type of land and government seed had a significant impact influencing the farm efficiency of farmers. But explanatory variables viz., for treatment, family size, irrigation source, small farmers group, medium farmers group, own seed, private seed and variety were found to be non-significant and were not key factors in predicting farm efficiency of groundnut farmers.

It was suggested that as main component of cost of cultivation in groundnut is seed cost for increased farm efficiency among small and marginal groundnut farmers, government needs to take measures for increased supply of groundnut seed on subsidy for increased farm efficiency.

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