Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 351-357

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-6 pp. 351-357**
Journal homepage: http://www.ijcmas.com

Original Research Article

Resource-Use Efficiency of Groundnut Cultivation in Tamil Nadu

R. Thulasiram[1*], T. Alagumani[1], M. S. Raman[2] and G. Parthasarathi[3]

[1]Department of Trade and Intellectual Property, CARDS, TNAU, Coimbatore, Tamil Nadu, India
[2]Agricultural Economics, College of Agriculture, Padannakkad, Kaserkode – 671328, Kerala, India
[3]Department of Agricultural Economics, S. Thangapazham Agricultural College, Vasudevanallur, Tirunelveli – 627760, Tamil Nadu, India
**Corresponding author*

Keywords

Groundnut, Comparative economics, Benefit cost ratio, Resource use efficiency, Constraints.

A B S T R A C T

Groundnut, an important oilseed crop, has been losing its area on the cropping map of the state agriculture, owing to favourable production and marketing environment for other crops like maize. The study has reported the trends in area, production and yield of groundnut, its relative profitability and factors affecting productivity in the state. The area under groundnut in Tamil Nadu and India has turned negative over the years although the productivity of the crop was constantly increasing. On the comparative economics front, groundnut has been found to provide lower returns as compared to maize in the study area. The benefit cost ratio of groundnut was found to be 1.45 which shows its profitability in absolute terms, but compared with its competing crop, it is much lower. The regression analysis for resource use efficiency has brought out that groundnut productivity can be enhanced by spending more on plant protection measures and human labour for pesticide spray. To give a boost to the groundnut cultivation in the state, two dimensional efforts, *viz.*, technological upgradation and effective market support are required. Efforts should be taken by the government to procure seeds and chemicals at a lower cost to the farmers and also the middlemen involvement should be reduced.

Introduction

Ground Nut *(Arachis hypogea L.)* is an important oilseed crop which is also known as peanut, earthnut, monkeynut. It is considered as the 14th important food crop and 4th most important oilseed crop of the world. The cultivated groundnut originates from South America (Weiss, 2000). In India, Groundnut is the major oil seed crop which accounts for about 50 per cent of area under oilseed crop and 45 per cent of edible oil production. Nearly 75 per cent of the groundnut is being cultivated in a low to moderate rainfall zone. Groundnut production is concentrated in five states *viz.*, Gujarat (26.34 per cent), Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra. These five states accounted for about 86 per cent of the total area under groundnut. Monsoon variations cause major fluctuations in groundnut production in India. Groundnut is grown in different cropping systems such as sequential, multiple, and intercropping (Basu and Ghosh, 1995). The major groundnut seed producers are India, China,

United States, Nigeria, Burma, Argentina, and Indonesia. The area of groundnut was 6.74 million hectares in 2004-05. It had declined to 3.78 million hectares in 2015-16. In Tamil Nadu, the area under groundnut was 3.2 lakh hectares in 2015-16 with a production of 4 lakh tonnes.

Thiruvannamalai, Villupuram, Vellore, Namakkal, Salem, Erode and Cuddalore are the major groundnut producing districts in the state. Thaipattam (January) is the main season for cultivation. The area under Groundnut shows declining trend over the years due to various reasons. Groundnuts being the major edible oil seed crop in Tamil Nadu, planners are concerned with the declining area. Hence this study is conducted with the main objective of finding the status of groundnut cultivation and the reasons for area decline.

Materials and Methods

This study was based on the primary data collected through field survey. To achieve the objectives of the study, field survey was conducted in Villupuram, Cuddalore and Thiruvannamalai districts of Tamil Nadu. From each district 30 groundnut farmers were selected at random. The data relating to cost of cultivation of Groundnut and competing crop, economics of groundnut cultivation were collected. The data pertaining to the year 2015-16 were collected from the respondent farmers with the help of specially designed interview schedule. To estimate the growth rate, secondary data pertaining to area, production and productivity of groundnut in Tamil Nadu and India were collected.

Analysis of growth

The growth in area, production and productivity of Groundnut in India and Tamil Nadu was estimated by using the exponential growth function of the form,

$Y = ab^t e_t$ (1)

Where,

Y= Dependent variable for which growth rate is estimated

a = Intercept

b = Regression co-efficient

t = Time variable

e_t = Error term

The compound growth rate was obtained for the logarithmic form of the equation as below.

$\ln Y = \ln a + t \ln b$ (2)

Then, compound growth rate (r) in percentage was computed by using the relationship

r = [(Antilog of b) – 1] x 100

Costs and returns

The technique of tabular presentation was used to assess the costs, returns and profits of crops in the study area. The percentages and averages of variable costs and fixed costs were computed.

Regression analysis

To identify the factors affecting the productivity of groundnut, both linear and log-linear production functions were fitted. Several equations were tried by taking different explanatory variables. Best-fit function was determined on the basis of the

level of significance of the explanatory variables, the value of coefficient of multiple determinations (R^2) and the logical signs of the explanatory variables included in the model. Cobb-Douglas function of the following form was considered the most appropriate for the present investigation (Venkatesan, 1998) and (Grover, 2007).

$$Y = A \prod_{i=1}^{n} Xi^{bi} e^{u}$$

Where, Y represents the value of productivity per hectare of groundnut; Xi is the selected explanatory variables (per hectare); A is the technical efficiency parameter; and bi is the coefficient of production elasticity of the respective variable at the mean level of input used and output obtained. The 'e' is an error-term. The estimated form of the equation becomes:

$$\ln Y = \ln A + \sum_{i=1}^{n} bi \ln xi + u$$

$$\ln Y = \ln A + b1 \ln x1 + b2 \ln x2 +.....+ bn \ln xn + u \quad \ldots(3)$$

Where,

Y = Productivity of groundnut crop (kg/ha)

X1 = Education of decision - maker (No. of schooling years)

X2 = Area under groundnut crop (ha)

X3 = Value of seed (kg/ha)

X4 = Plant protection measures (no./ha)

X5 = Irrigations (no./ha)

X6 = Human labour charges (hrs/ha)

X7 = Machine labour charges (hrs/ha)

Marginal value product

Marginal value product (MVP) represents the estimated change in gross returns per hectare consequent upon a unit change in the variable under consideration, while the level of use of other variables are held constant. Marginal value product in the present study was estimated directly from the regression estimates at the arithmetic mean level of input and output (Karthik, 2010), used as follows:

$$MVP(xi) = bi \frac{\bar{Y}}{\bar{X}}$$

Where, bi is the output elasticity of variable $\bar{X}_i$, $\bar{X}$ and Y are the geometric mean of concerned variables.

Results and Discussion

Growth of area, production and productivity of groundnut in Tamil Nadu and India

For calculating the growth of area, production and productivity, the study period has been divided into two periods *viz*., pre reform (1970-1991) and post reform (1992-2016). The results are presented in Table 1.

It could be seen from the Table 1 that in Tamil Nadu, compound growth rate of area and production of groundnut was positive but not significant during pre-reform period, whereas the same were negative and significant at 10 per cent level during post reform period. This clearly indicates that groundnut area is declining that lead to decline in production of groundnut in Tamil

Nadu State. However the growth rate of productivity was positive and significant at 10 per cent level during post reform period which was negative and non -significant during the pre-reform period. This is mainly due to technology development.

It is evident from the table that for India, the area, production and productivity of groundnut were positive and significant at 5 per cent level during pre-reform period while area and production was negative during post reform period.

However productivity was positive during the same period. The overall performance clearly indicates that the area of groundnut in Tamil Nadu and India has turned negative over the years although the productivity of the crop was constantly increasing. The negative growth of groundnut area over the periods in Tamil Nadu warrants in-depth information relating to groundnut cultivation practices, substitute crops, reasons and opinions of farmers etc.

Economics of groundnut and its competing crop

The comparative economics of groundnut and its major competing crop in the study area *viz.,* maize is displayed in Table 2. The total variable cost per hectare on sample farms was found to be Rs. 51722.06 for groundnut and Rs. 44095.14 for maize. Gross income realised was Rs. 87320 in groundnut and Rs. 94225 in maize, while returns over variable cost were Rs. 27362.20 and Rs. 50129.86, respectively. The returns over variable cost were also comparatively higher for maize than groundnut. Thus, despite the price for groundnut is higher (Rs.4000 per quintal) than maize (Rs.1700 per quintal) maize crop was more profitable than groundnut due to higher yield and low cost. This motivated the farmers to raise Maize by reducing the area under groundnut in the study area.

Factors influencing productivity of groundnut

The results of production function analysis are presented in Table 3.

The coefficient of multiple determination was 0.78 which shows that groundnut yield depended largely on the variables included in the model. The coefficients of seed (0.42), human labour (0.32) and plant protection measures (0.26) were positive and highly significant. These indicate that one per cent increase in expenditure on seed, human labour and plant protection measures would increase the yield of groundnut by 0.47, 0.32 and 0.26 per cent respectively. These results are in in with the findings of Velavan (2000) and (Gaddi *et al.,* 2002) that there is large scope for adding more farm inputs in both irrigated and un-irrigated groundnut cultivation

Resource-use efficiency of groundnut

The resource-use efficiency was judged on the basis of marginal value productivity of the significant variables for groundnut crop and the same is given in Table 4.

It is obvious from the table 4 that the MVP for all inputs were positive. For seed it is 4.82, plant protection measures it is 15.38 and for human labour it is 1.24 (Aswathareddy *et al.,* 1997). This indicates that the additional one rupee spent on plant protection measures would add Rs. 15.38 to the returns showing that this input was considered to be major for crop production. Hence, it can be inferred that spending more on plant protection measures and human labour would be worth to further enhance the productivity of groundnut crop.

The results of the study revealed that there has been a decreasing trend in area under groundnut cultivation in Tamil Nadu. The reasons for decline in area are found to be lower returns in terms of gross returns as well as returns over variable cost as compared to its major competing crop, maize. The regression analysis has showed that there exists sufficient potential in spending on seeds, plant protection measures and human labour to further enhance the productivity of groundnut crop.

Though the yield is high, the low groundnut return is mainly due to the lower price for groundnut kernels and also fluctuations in price. Hence technological upgradation and standardization of minimum support price are generally required to make groundnut production a remunerative enterprise. The prevalence of low market prices for groundnut kernels and its fluctuations could be an important reason for the shift in production. The government should take immediate steps for the development of a network of warehouses in the rural areas which would help the farmers to retain the produce, instead of marketing them immediately after harvest.

Acknowledgements

This research was mainly conducted by Thulasiram under the guidance of Dr. T. Alagumani in Tamil Nadu Agricultural University Coimbatore.

Table.1 Compound growth rate of area, production and productivity of groundnut

Year	Tamil Nadu			India		
	Pre reform (1970-1991)	Post reform (1992- 2016)	Overall period (1970-2016)	Pre reform (1970-1991)	Post reform (1992-2016)	Overall period (1970-2016)
Area	2.04^{NS}	-5.54**	-1.09*	0.54*	-2.10*	-0.52**
Production	0.54 ^{NS}	-3.54**	0.20	3.82*	-1.99	0.73
Productivity	-1.47 ^{NS}	2.12**	1.31**	1.01*	1.34**	1.14**

Note: * - 5% significant, ** - 10% significant, NS – Non Significant

Table.2 Comparative economics of groundnut and major competing crop (maize) on sample farms during 2015-16

(Rs/ha)

S.No	Particulars	Groundnut	Maize	Difference
A.	**Variable cost**			
i	Human labour charges	29670.00	22952.00	6718
ii	Machine hours charges	4346.00	6024.00	-1678
iii	Value of Seed	8150.00	3504.00	4646
iv	Organic/FYM	6583.00	9110.00	-2527
V	Plant protection chemicals	980.00	887.00	93
vi	Irrigation	194.00	57.00	137
vii	other expenses	50.00	70.00	-20
viii	Interest on working capital (@ 3.5 %) (7/2 %)	1749.06	1491.14	257.92
	Total Variable cost	51722.06	44095.14	7626.92
B	**Fixed cost**	2785.00	4815.00	-2030
	Total cost	54507.06	48910.14	5596.92
	Managerial cost @10%	5450.71	4891.01	559.70
C	**Total cost of cultivation**	59957.76	53801.15	6156.61
D	Yield of Main Product Q/ha	21.83	54.25	-32.42
E	Price of Main product Rs/Q	4000.00	1700.00	2300
F	Value of Main product	87320.00	92225.00	-4905
G	Fodder Value	0.00	2000.00	-2000
H	Gross Income	87320	94225	-6905
I	Net Income	27362.2	50129.86	-22767.70
J	Benefit-cost ratio	1.45	1.75	-0.30

Table.3 Regression coefficients of Cobb-Douglas type functions for groundnut crop on sample farms: 2015-16

(N = 30)

S.No	Particulars	Regression Coefficient
1	Intercept	-2.1730
2	Education	0.0269 (0.0221)
3	Area under groundnut (ha)	-0.0810 (0.0574)
4	Value of seed (kg/ha)	0.4726** (0.1604)
5	Plant protection measures (no./ha)	0.2741** (0.1206)
6	Irrigation (no./ha)	0.1085 (0.0827)
7	Human labour charges (hrs/ha)	0.4572** (0.1487)
8	Machine labour charges (hrs/ha)	0.1767 (0.1009)
9	Coefficient of determination (R^2)	0.78
10	Adjusted R^2 $(\overline{R})$	0.75

Figures within the parentheses are standard errors of regression coefficients

Note: **,* indicate significance at 1 per cent and 5 per cent levels, respectively.

Table.4 Marginal value productivities of significant inputs in groundnut crop

Particulars	Regression Coefficient	MVP (bi * $\bar{Y}/\bar{X}$)
Seed	0.4726	4.82*
Plant Protection Measures	0.2741	15.38*
Human Labour	0.4572	1.24*

References

Aswathareddy, K.P., Chandrashekar, K.S., and Srinivasa Gowda, M.V., 1997. Resource Use Efficiency in Groundnut Production under Rainfed Condition – A Study in Challekar Taluk of Karnataka. *Agricultural Situation in India*, 53(6): 829-831.

Basu, M.S. and Ghosh, P.K., 1995. The Status of Technologies used to Achieve High Groundnut Yields in India", *In Achieving High Groundnut Yields*, Patancheru, India, ICRISAT.

Gaddi, G.M., Mundinamani, S.M. and Hiremath, G.K., 2002. Resource-use Efficiency in Groundnut Production in Karnataka: An Economic Analysis, *Agricultural Situation in India*, 56:517-22.

Government of India, 2012. Report on Evaluation of Major rainfed crop production programmes for increasing the productivity in Dry land Agriculture.

Grover, D.K and Singh, J.M., 2007. Sesamum Cultivation in Punjab: Status, potential and constraints", *Agricultural Economic Research Review*, 20(2): 299-313.

Karthik, V., 2010. An Economic Analysis of Production, Processing and Marketing of Turmeric in Dharmapuri District, *Unpublished PG. (Ag) thesis* submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Madurai.

Velavan, C., Balakrishnan, V., 2000. Resource Use Efficiency in Canal Groundnut Cultivation of Salem District, Tamil Nadu. *Agricultural Situation in India*: 755-757, 2000.

Venkatesan, P., Naidu, M.R., and Venkateswarlu, V., 1988. Resource Use Efficiency on Maize Farms in Karimnagar District of Andhra Pradesh. *The Andhra Agricultural Journal*, 33(2), 111-114.

Weiss, E.A., 2000 Oilseed Crops, London: Blackwell Science.