Resource use Efficiency of Groundnut Production in Mahasamund and Raigarh Districts of Chhattisgarh in India

ABSTRACT

Groundnut is an important oilseed in Mahasamund and Raigarh District of Chhattisgarh and plays a crucial role, both in area and production. This study investigates the resource use efficiency of groundnut production using data from 145 farmers through personal interviews and survey method the 2020-2021 cropping year. The input output relationship of groundnut production was examined using the Cobb-Douglas production function. It was found that Marginal value product of groundnut to price ratio (MVP/Pi) was less than unity human labour, seed, manure, fertilizer and plant protection chemicals. Tractor cost (X3) significantly contributed to production of groundnut. However human labour (X1), seed (X2), manure (X4) and fertilizer (X5) were non-significant. Groundnut production in the study area was profitable.

Keywords: Cobb-Douglas production function; resource use efficiency; marginal value product; price ratio.

1. INTRODUCTION

"Oilseed crops have been the backbone of several agricultural economies, and play an important role in agricultural industries and trade throughout the world" [1]. "India is fortunate to have a variety of oilseed crops grown in its distinctively rich agro-climatic zones. India ranks fifth in the world vegetable oil economy, next to the United State of America (USA), China, Brazil and Argentina. Recently, oilseeds have attracted more attention due to an increasing demand for their healthy vegetable oil, livestock feeds, pharmaceuticals, biofuel and other industrial uses. India ranks 1st in the production of groundnut, 3rd in rapeseed-mustard and 5th in soybean. The Indian vegetable oil economy is the 4th largest economy in the (world). The country accounts for 12-15% of the global oilseed area ,6 -7% of vegetable oils production (next to USA, China and Brazil) and 9-10% of total edible oil consumptions" [2]. "Currently, India accounts for 6.8% of the oil meal production, 5.9% of the oil meal export, 6.1% of the vegetable oil export, 9.00% of the vegetable oil import and 9.3% of the edible oil consumption of the world studied" [3]. "India rank 1st in the production of castor, Niger safflower and sesame. In the case of major oilseeds groundnut, rapeseed-mustard and soybean account for about 80% of area and 87% of production of oilseed in the country found the" [4]. "Oilseed crops accounts for 13% of gross cropped area, 3% of gross national product, 10% of total value of output from agricultural crops and 6.0% of value of output from agriculture and allied sector. The per capita consumption of edible oils had 19.30 kg per person per annum in 2019 -20 (Department of Sugar and Vegetable Oils; DG, CI and S, Dept of Commerce, Kolkata). States ranking of oilseeds in 2019-20 are Madhya Pradesh (6244 thousand metric tons), Rajasthan (5711 thousand metric tons) Gujarat (4102 thousand metric tons) and Maharashtra (2375 thousand metric tons)" [5] "During the financial year 2021 over 36 million metric tons of oilseeds were produced in the south Asian country of India. Soybean was the highest produced oilseed with nearly 13 million metric tons produced in the country that year" [5].

"Groundnut is an important oilseed crop in India and also an important agricultural export commodity. Globally, groundnut covers 295 lakh hectares with the production a 487 lakh tonnes and productivity of 1647 kg/hectare" [6]. "With annual all-season coverage of 55.6 lakh hectares, Globally, India ranks first in Groundnut

acreage and is the second largest producer of Groundnut in the world with 101 lakh tonnes and a productivity of 1816 kg per hectare in 2020/2021" [7]. "Groundnut is a major oilseed crops, contributing around 37 percent of the total oilseed production in the country during 2020-2021. The area under groundnut constitutes approximately 3.3 percent of the net sown area in India. In India Gujarat was the largest producer accounting for 25 percent of the total production followed by Tamil Nadu (22.48%), Andhra Pradesh (18.81%), Karnataka (12.64%), and Maharashtra (10.09%) during 2006-2007" [8-10].

"Total area of groundnut in Chhattisgarh is 67.7 thousand ha $^{-1}$ with the production of 70.2 thousand tones and the productivity of 103 kg ha^{-1} respectively. The term resource use efficiency in agriculture may be broadly defined to include the concepts of technical efficiency, allocative efficiency and environmental efficiency. An efficient farmer allocates his land, labour, water and other resources in an optimal manner, so as to maximize his income, at least on a sustainable basis. However there are countless studies showing that farmers often use their resources sub-optimally. While some farmers may attain maximum profit per unit of inputs used, also in the process of achieving maximum yield and return some farmers may ignore the environmentally adverse consequences, if any of their resource use intensity" [11].

1.1 Objective

To analysis the resources use efficiency in production of groundnut in Mahasamund and Raigarh districts of Chhattisgarh.

2. MATERIALS AND METHODS

The study focused exclusively on Chhattisgarh, specifically gathering primary data on groundnut. Groundnut were selected purposively based on the contribution of the highest area under oilseed crops in Chhattisgarh. Since Raigarh and Mahasamund have the largest areas under esteemed oilseed crops, they were specifically chosen for this study's. There were 145 respondents in total when the primary data were gathered in 2020–2021 through personal interviews schedule.

Cobb-Douglas production function

$$Y = a.- X_1b_1, X_2b_2, X_3b_3, X_4b_4, X_5b_5, X_6b_6, \mu$$

Where,

Y = Output from groundnut crop (Qtl/ha)
X1 = labour (Man-days)
X2 = seed (kg)
X3 = manure (qtl)
X4 = fertilizer cost (Kg)
X5 = tractor cost (per hours)
X6 = insecticide cost (rupees)
b1 to b6 = are parameter/elasticity of coefficient of respective input or regression coefficient of factor inputs
A= constant term
μ = Error

Calculation of MVP at factor cost

$$MP= b1\ \bar{Y}\bar{X}i$$

Where,

B1 = production elasticity
Y and Xi are the geometric mean of the variable
I = 1,2,3…….

$$MVP = Mp.\ Py$$

Where,

Py = price of y
$MVPx1 = b1\ \bar{Y}/\bar{X}i$ * Py
MVP = marginal value product of Xi
B1 = regression coefficient of Xi
Xi = geometric men of Xi inputs
Y= geometric mean of output
Py = per unit price of output
t-test
$t = b/S.E._{(b)}$
b = partial regression coefficient
S.E. (b) = standard error of 'b'

3. RESULTS AND DISCUSSION

3.1 Resource use Efficiency in Groundnut Production

The Cobb-Douglas production function was used for estimating resource use efficiency in groundnut production on the basis of goodness of fit (R^2). The R^2 which indicates the proportion of total variation of the dependent variable jointly explained by the independent variables, and at the same time, the regression equation indicates the percentage change in yield associated with one unit change in the input at its geometric mean level, while other factors are held constant. These findings are critical because they provide information about the most probable effects of resource use change on yield. The Cobb-Douglas

production function was found to be the best fit the data.

The results of resource use efficiency for groundnut are presented in the Table 1. The results revealed that the six resource variables, viz;- human labour (X1), seed (X2), tractor cost (X3), manure (X4), fertilizer (X5) and plant protection chemical (X6) were included in the production function. The result of the analysis indicated that six variables jointly explained about 48 percent of the variation in the yield of groundnut. The regression coefficient of tractor cost (X3) was significant at 1% level of probability. The regression coefficient of human labour (X1), seed (X2), manure (X4) and fertilizer(X5) were not-significant, it indicates that they have positive impact on output it is similer to findings of Zekeri and Tijjani [12] and Abbeam et al. [13].

Table 1. Results of Cobb- Douglas production function for groundnut in Mahasamund and Raigarh districts

(ha)

S.N.	Variables		Regression coefficients	Standard Error
1	Intercept	A	1.89**	0.78
2	Human labour	X1	0.05	0.04
3	Seed	X2	-0.20	0.16
4	Tractor cost	X3	0.35***	0.03
5	Manure	X4	0.01	0.04
6	Fertilizer	X5	0.13	0.12
7	Plant protection chemical	X6	-0.01	0.04
8	R^2		0.48	
9	Number of observation		145	

*Hint: *** = 1 % level of significance; ** 5% level of significance; * 10% level of significance; NS = Non-significant*

Table 2. Resource use efficiency for groundnut production in Mahasamund and Raigarh district

(per/ha)

S.N.	Resources	Units	Bi	MVP	Pi	T calculated value	Comparison between T tabulated value	Significant/Non-significant	Remarks
1	Human labour	Man Days	0.06	0.03	1	-0.89	t cal<t tab	Non-significance	Efficiently utilized
2	Seed	Kg	-0.21	-0.05	1	-4.30	t cal<t tab	Non-significance	Efficiently utilized
3	Tractor cost	Per hours	0.35	0.74	1	1.56	t cal>t tab	significance	under utilized
4	Manure	Qtl	0.02	0.01	1	-2.85	t cal<t tab	Non-significance	Efficiently utilized
5	Fertilizer	Kg	0.14	0.01	1	-1.21	t cal<t tab	Non-significance	Efficiently utilized
6	Cost of Plant protection chemical	rupees	-0.02	-0.03	1	-9.43	t cal<t tab	Non-significance	Efficiently utilized

3.2 Resource use Efficiency in Groundnut Production

The resource use efficiency in groundnut production on the sample farm in the Mahasamund and Raigarh districts and the results of resource use efficiency are presented in Table 2. The marginal value product to price ratio (MVP/Pi) was less than unity in the case of human labour, seed, manure, fertilizer and plant protection chemicals. It implies these resource were efficiently. The above results also reported by the Choudhary et al. [14].

4. CONCLUSION

In this study, we the resource use efficiency of groundnut production in Mahasamund and Raigarh district of Chhattisgarh in India. The Marginal value product of groundnut to price ratio (MVP/Pi) was less than unity in the case of human labour, seed, manure, fertilizer and plant protection chemicals. Indicating efficient utilization of these resources in groundnut production.

However, tractor cost significantly contributed to groundnut production, suggesting under-utilization and potential for improvement. The findings highlight that human labour, seed, manure and fertilizer were non-significant.

5. RECOMMENDATION POLICY IMPLICATION

1. Labour is a major factor of production for the cultivation of groundnut crop. Looking to need of labour for the production of groundnut, some specify policy such as deployment of MGNREGA laboures during the peak period of crop production and small scale intervention mechanization for groundnut cultivation should be encourage by government.
2. To increase the yield level, there is need to increase adoption of recommended technologies like use of HYV and hybrid varieties, fertilizers, plant protection and other technologies given by the Universities for increasing the groundnut productivity.
3. Some schemes should be launched by the government to support small scale mechanization for groundnut production.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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