RESOURCE USE EFFICIENCY OF GROUNDNUT PRODUCTION IN MAHASAMUND AND RAIGARH DISTRICTS OF CHHATTISGARH, INDIA

ABSTRACT

Groundnut is an important oilseed in Mahasamund and Raigarh Districts~~district~~ of Chhattisgarh and ~~occupies~~ plays a ~~prominent position~~crucial role, both in area and production. This study investigates the resource use efficiency of groundnut production ~~Data was obtained from 145 farmers~~ using data from 145 farmers through personal interviews and survey methods ~~with the help of well prepared interview schedule for~~during the ~~crop year~~ 2020/2021 ~~-21~~ cropping year. ~~and t~~The input ~~-~~output relationship of groundnut production was examined using the ~~via~~ Cobb-Douglas production function ~~was examined in this study~~. It was found that Marginal value product of groundnut to price ratio (MVP/Pi) was less than unity for~~in the case of~~ human labour, seed, manure, fertilizer and plant protection chemicals. ~~In groundnut cultivation~~ Tractor cost (X3) ~~was the~~ significantly contribute~~dion~~ to production of groundnut. However, human labour (X1), seed (X2), manure (X4) and fertilizer(X5) were non-significant ~~in production of groundnut~~. ~~The~~ Groundnut production in the study area was~~would be~~ profitable.

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

~~Highlights:~~

- ~~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 chemical.~~
- ~~Human labour (X1), seed (X2), manure (X4) and fertilizer(X5) were non-significant in production of groundnut.~~

INTRODUCTION

Oilseed crops have been the backbone of several agricultural economies~~y~~, and play an important role in agricultural industries and trade throughout the world. India is fortunate to have~~in having~~ 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

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2. Clarify the need for this study, possibly by highlighting gaps in existing research or recent changes in groundnut production practices.

3. Clearly state the objectives of the study.

their healthy vegetable oil, livestock feeds, pharmaceuticals, ~~and~~ biofuel~~ule~~ 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~~s~~ area~~-~~, 6 -7% of vegetable oil~~s~~ production (next to the USA, China and Brazil), and 9-10% of total edible oil~~s~~ consumption~~s~~ (FAO, 2011). 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 (Sonnad *et* al, 2011). 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 Naidau and Sankar 2014. 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) (Statista Research Department 2020). 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. (Statista Research Department 2021).

Groundnut is an important oilseed crop in~~of~~ India and also an important agricultural export commodity. Globally, g~~G~~roundnut covers 295 lakh hectares with the production a ~~of~~ 487 lakh tonnes and a~~with the~~ productivity of 1647 kg/~~-~~hectare (FAOSTAT, 2019). With annual all-season coverage of 55.6 lakh hectare~~s.~~, G~~g~~lobally, India ranks first in Groundnut acreage and is the second largest producer of Groundnut in the world with 101 lakh tonnes and~~with~~ a productivity of 1816 kg per hectare in 2020/2021 ~~21~~ (Agricoop, 2021~~. nic. in~~). Groundnut is a major oilseed crop, contributing around 37 percent of the total oilseed~~s~~ 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 ~~consisting~~ 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.

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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 ~~cost~~ 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. (Devi et al 2020).

MATERIALS AND METHODS

~~**Analysis of resource use efficiency**~~

Cobb-Douglas production function

Y = a, X1b1, X2b2, X3b3, X4b4, X5b5, X6b6, ~~e~~µ

Y = Output from oilseed crops (Qtl/ha)

X1 = ~~per /ha human~~ labour (Man ~~-~~ days)

X2 = ~~per /ha~~ seed (kg)

X3 = ~~per/ ha~~ manure (qtl)

X4 = ~~per/ ha~~ fertilizer (~~in~~ rupees)

X5 = ~~per/ha~~ tractor cost (in hours)

X6 = ~~per/ha~~ insecticide cost (~~in~~ rupees)

b1 to b6 = are parameter/elasticity of coefficient of respective input or regression coefficient of factor inputs

A= constant term

~~e~~µ = Error

Calculation of MVP at factor cost

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

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 mean 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'

RESULT AND DISCUSSION

1.1 Resource use efficiency ~~of~~ in groundnut production~~major oilseeds~~

~~1.1.1 Resource use productivities 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

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the same time, the regression equation ~~which indicates the percentage change in yield associated equation which~~ indicates the percentage change in yield associated with one unit change in the ~~concerned~~ input at its geometric mean level, while~~when~~ other factors are ~~supposed to be~~ held constant. These findings are critical because~~results have of paramount importance as~~ they provide ~~information relating to probable effects of resource use provided~~ information ~~relating~~ about the most ~~to~~ probable effects of resource use change on yield. The Cobb-Douglas production function was found to be the best fit for ~~to~~ 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), ~~t~~ractor cost (X3), manure (X4), fertilizer (X5) and plant protection chemical (X6) were included in the production function. The result of the analysis indicated that ~~above~~ six variables ~~have~~ jointly explained about 48 percent of the variation in the yield of groundnut. ~~T~~The regression coefficient of tractor cost (X3) was ~~the~~ significant at 1% level of probability~~significance~~. The regression coefficient of human labour (X1), seed (X2), manure (X4) and fertilizer(X5) were no~~n~~ ~~-~~significant, ~~-~~it indicates that they have positive impact on output it is similer to findings of Zekeri and Tijjani (2013) and Abbeam *et* al (2015).

Table 1. Results of Cobb- Douglas production function for groundnut in Mahasamund and Raigarh districts ~~(per/~~ha)

S~~/.~~N.	Variables~~Particular~~		Regression coefficients	Standard Error
1	Intercept	A	1.89**	0.78
2	~~Total~~ Hhuman 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	R2		0.48	
9	Number of observations		145	

~~(Figures in parenthesis are standard errors of respective regression coefficient)~~

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~~Note~~Hint: *** = 1 % level of significance NS = Non-significant

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1.2 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 that these resources were efficiently~~. utilized of these resources~~ ~~T~~the above results also ~~found~~reported by the Choudhary *et* al (2017).

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	~~Total~~ human labour	Man Days	0.06	0.03	1	-0.89	t cal<t tab	Non-significance	Efficiently utilized
2	Seed cost	Per hours	-0.21	-0.05	1	-4.30	t cal<t tab	Non-significance	Efficiently utilized
3	Tractor cost	Kg	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

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3. Provide a detailed discussion on the implications of different MVP/Pi ratios.

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6	Cost of Pplant protection chemicals	rupees	-0.02	-0.03	1	-9.43	t cal<t tab	Non-significance	Efficiently utilized

CONCLUSION

In this study, an we attempt examined has been made to study the resource use efficiency of groundnut production in Mahasamund and Raigarh district of Chhattisgarh in India. From 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, . It indicatingmplies that efficiently utilization ed of these resources for thein groundnut production.

In groundnut cultivationHowever, tractor cost (X3) was the significantly contributedion to groundnut production, suggesting under-utilization and potential for improvement. of groundnut. However The findings highlight that human labour (X1), seed (X2), manure (X4) and fertilizer(X5) were non-significant in production of groundnut.

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