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RESOURCE USE EFFICIENCY OF CHICKPEA PRODUCTION IN SAGAR DISTRICT OF MADHYA PRADESH

SATYENDRA SINGH THAKUR[1], SANTOSH KUMAR[2] & DEEPAK RATHI[3]

[1]*Research Associate, AER Centre, JNKVV, Jabalpur, Madhya Pradesh, India*

[2]*Research Associate, JICA, JNKVV, Jabalpur, Madhya Pradesh, India*

[3]*Senior Scientist, AER Centre, JNKVV, Jabalpur, Madhya Pradesh, India*

ABSTRACT

The study was undertaken to estimate the resource use efficiency of chickpea production in Sagar district of Madhya Pradesh. The Primary data was collected from sixty farmers of Rehli block of Sagar district in the year 2013-14. It was observed from analysis of data that an average grower found to use of the resources in efficiently production of chickpea, plant protection measure.Coefficient of multiple determinations (R^2) in the fitted Cobb-Douglas production was 0.96 indicating the included variables explained 96 per cent variations in dependent variable. The value of R^2 varied between 0.93 in small farm to 0.98 in case of large farm.

KEYWORDS: Resource-Use Efficiency, Marginal Value Productivity, Break-Even Analysis

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Original Article

INTRODUCTION

Role of pulses in Indian agriculture needs hardly any emphasis. India is a premier pulse growing country. The pulses are an integral part of the cropping system of the farmers all over the country because these crops fit in well in the crop rotation and crop mixtures followed by them (**Ganeshkumar et.al. 2013).** Chickpea cultivation in the world is mainly confined to India, Australia, Turkey, Myanmar, Pakistan and Ethiopia account for about 90 percent of the world chickpea production. Chickpea (*Cicer aritinum*) also known as Gram or Bengal Gram. Chickpea is a king of pulse crop consists of more than 1/3rd of area and 40 percent of the total production of pulses in India. India is the largest chickpea producing country in the world which occupied 73.7 lakh hac area, 58.9 lakh tones production with 799.9 kg/hac productivity (Rabi 2009-10). In Madhya Pradesh which covered 32.97 percent area of chickpea crop in India. It's occupied 24.30 Lakh hac. Area, 17.30 lakh tones production with 711.93 productivity (Rabi 2009-10) (www.mpkrishi.org.com). Raising productivity in agriculture will certainly lead to availability of food and reduce the real price of food.

Increased food production will have to come from increased yield. Production of chickpea in Madhya Pradesh is mainly in the hands of small scale farmers who are still using unimproved farming techniques. Actual yields of chickpea differ significantly from potential yields, and this has been attributed to low resource productivity. It is, therefore, necessary to examine resource use efficiency among chickpea farmers. In the wake of modernization of Agriculture, the Endeavour is to increase Productivity, profitability, adoptability, stability and sustainability of the farm for the efficient utilization of farm resources. Looking to the Significant of efficient utility of resources the present study has been taken into consideration with the following objectives.

- To estimate resource use efficiency of important inputs in chickpea production.
- To identify the constraints associates with production of chickpea

RESEARCH METHODOLOGY

The study was conducted in the year 2013-14 and confined to Sagar district of Madhya Pradesh. The Sagar district comprises eleven blocks viz. Sagar, Rehli, Jaisinagar, Rahatgar, Deori, Kesli, Beena, khurai, Malthon, Banda and Shahgar. Out of these 11 blocks Rehli block was selected purposively for the study having highest area under chick pea.

Five villages were selected from Rehli block on the basis of highest area under chickpea viz. Khairana, Bedwara, Kelwas, Parasai, and Sonpur.The farmer were category into three size groups based on their size of holdings viz. small (up to2 ha), medium (2.01 to 4 ha) and large size (above 4 ha). From each category 20 farmers were selected randomly, thus the total number of farmers was 60 for detail investigation. The primary data were collected from selected farmers through personal interview by survey method using pretested interview schedules.

The Cobb-Douglas production function was used for estimating the resources used in Chickpea production.

$$Y = a\, X_1 b_1 . X_2 b_2 . X_3 b_3 \, . X_4 b_4 \, . X_5 b_5$$

Where

Y = Dependent Variable (Gross income Rs./ha)

a = Constant

X_1 = Labour cost (in Rs./ha)

X_2 = Seed cost (in Rs/ha)

X_3 = Irrigation (in Rs./ha)

X_4 = Fertilizer (in Rs/ha)

X_5 = Plant protection (in Rs/ha)

From the above production function the M.V.P. of each resource was worked out. The marginal value productivity of particular input ‘’xi’ as geometric mean of input and output is expressed in following equation:-

$$MVPX_i = b_i \frac{\overline{Y}_i}{\overline{X}_i} P_{Xi}$$

Where,

MVP = Marginal Value Productivity

$\overline{Y}$i = Gross value of out- put (Rs.)

$\overline{Xi}$ = Factor of production

bi = Regression coefficient of Xi

Pxi = Price of Xi

Break even yield and price analysis of chickpea was also carried out to arrive at that minimum level at which optimum conditions of cost and returns is equated that is no profit no loss point.

$$\text{Break even yield (qtl./ha.)} = \frac{\text{Total Cost – Value of by product}}{\text{Output price (Rs/qt.)}}$$

$$\text{Break even cost (qtl./ha.)} = \frac{\text{Total Cost – Value of by product}}{\text{Physical production (qt/ha.)}}$$

RESULTS AND DISCUSSIONS

Table 1: Regression Coefficient of Resources used in Chickpea Production

Particulars	Size Group			
	Small	Medium	Large	Overall
No. of farmers	20	20	20	60
Constant (a)	3.50	3.50	6.80	3.90
Regression coefficient (b) of				
Labour cost (X1)	-0.31 (0.44)	0.11 (0.69)	0.13 (0.24)	-0.31 (0.56)
Seed (X2)	0.05 (0.18)	-0.36 (0.19)	0.20* (0.08)	-0.09 (0.25)
Fertilizer (X3)	-0.11 (0.24)	0.05 (0.24)	0.02 (0.06)	-0.13 (0.35)
Irrigation (X4)	0.99 (0.48)	0.09 (0.17)	0.15** (0.05)	0.16 (0.15)
PPM (X5)	0.30 (0.36)	0.95** (0.27)	0.26 (0.16)	0.32** (0.09)
∑bi	0.92	0.75	0.45	0.75
R^2	0.93	0.95	0.98	0.96

(Figures in brackets indicate standard error of regression coefficient)

* Significant at 5% level of significance,** Significant at 1% level of significance

As shown in Table 1 the values of coefficient of multiple determinations (R^2) were found to be quite high in all farm size (93 to 98%) which indicated that the selected form of the production function was best fitted. The return to scale is the sum of the elasticity of resources included in the power function, which indicates the behaviour of change of total return while changing all the inputs simultaneously. The overall sum of the regression coefficient of selected variables was 0.75 which was 0.92 on small farm, 0.75 on medium farm and 0.45 on large farm indicating decreasing return to scale in small, medium and large farm. The value of coefficient of seed (0.20*) and irrigation (0.15**) in large and PPM (0.95**) in medium farm were observed positive and highly significant. At Overall only PPM (0.32**) was found to be positive and highly significant.

Table 2: Marginal Value Productivity of Resources used in Chickpea Production

Resource	Price of Input/Unit	Size Group			
		Small	Medium	Large	Overall
Labour cost ($X_{1)}$	190	-1.98	0.82	-0.87	2.31
Seed ($X_{2)}$	26	0.96	-5.66	3.3	1.52
Fertilizer ($X_{3)}$	11	-8.26	-2.76	-1.21	-7.78
Irrigation ($X_{4)}$	13	22.5	1.47	2.73	2.62
Plant Protection Measure X_5	5	1.78	5.5	1.54	1.91

The marginal value productivity of various inputs and their ratio to their respective prices for each size of farm are given table 2. It was found that seed (0.96),Irrigation (22.5)&PPM (1.78) in small farm, Labour cost (0.82),Irrigation (1.47)&PPM (5.5) in medium farm while in large farm Seed (3.3), Irrigation (2.73)&PPM (1.54) were found to be underutilized on sample farm. The MVP of Labour cost (-1.98)& fertilizer (-8.26)in small, seed(-5.66)&fertilizer (-2.76)in medium and labour cost (-0.87)&fertilizer (-1.21)in large farm were less than the unit price of respective inputs implying over utilization of these inputs and leaving scope for their efficient use.

Table 3: Break even yield (qtl./ha) and Price (Rs./qtl.) of Chickpea on Sample Farm

Particulars	Size group			
	Small	Medium	Large	Overall
I. Yield (qtl./ha) (i) Break even	11.95	10.04	9.62	10.54
II. Actual	17	16	15	16
III. Gap	5.05 (42)	5.96 (59)	5.38 (55)	5.46 (51)
I. Price (Rs./qtl.) (i) Break even	1302	1255	1282	1279
II. Actual	2000	2000	2000	2000
III. Gap price (Rs./qtl.)	698 (54)	745 (59)	718 (56)	721 (56)

(Figure in parentheses shows percentage change over break- even)

The table 3 Reveal that on an average small, medium, large and overall level the farmer will not be at lost if their yield of chickpea will reduce by 0.05, 5.96, 5.38 and 5.46 q./ha respectively. It shows that existing the cost of cultivation and physical out-put of crop yield it sufficient profit to all the categories of farmers.

Similarly actual market price of chickpea obtained by sample farmers is 2000 which is higher than breakeven price ranged between 54 to 59 per cent in different size farms. Thus, sample farmers are in profitable position in existing yield and price obtained in the study area.

CONSTRAINTS

The Analysis of costs and returns for chickpea production of sample farmers discussed in the previous section reveal the fact that many farmers have not used recommended levels of inputs and level of chickpea production was also than what is expected under recommend package of practices of chickpea. Therefore, it was thought proper to find out the constraints, which do not allow reaching goal as shown under scientific management. The technological economic and institutional constraints were reported by the respondents which have been presented in Table 4.

Table 4: Constraints in Chickpea Production

S. No.	Constraints Relating to	Size Group				Ranking
		Small (N=20)	Medium (N=20)	Large (N=20)	Overall (N=60)	
1.	Lack of capital	19 (95)	17 (85)	15 (75)	51 (85)	I
2.	Non availability of new variety seed	15 (75)	17 (85)	16 (80)	48 (80)	II
3.	Unfavorable product price	15 (75)	13 (65)	17 (85)	45 (75)	III
4.	Higher cost of cultivation	17 (85)	14 (70)	13 (65)	44 (73)	IV
5.	Low plant population	11 (55)	10 (50)	09 (45)	43 (71)	V

Table 4: Contd.,						
6.	Attack of disease and pest	14 (70)	13 (65)	15 (75)	42 (70)	VI
7.	Unfavorable climate condition	11 (55)	13 (65)	15 (75)	39 (65)	VII
8.	Non awareness of NPK dosage	15 (75)	13 (65)	10 (50)	38 (63)	VIII
9.	Shortage of labour	09 (45)	09 (45)	11 (55)	29 (48)	IX
10.	Preferred home produce seed	12 (60)	10 (50)	03 (15)	25 (42)	X

(Figures in brackets indicate percentage to the total)

It is clear from Table 4 that due to lack of capital and non-availability of new varieties of seed, more than 80 percent of respondents were not able to apply recommended dose of crucial inputs. More than 70 percent farmers reported that there was unfavorable price of chickpea at the time of harvest, higher cost of cultivation; low plan population and attack of disease and pest were found to be other major constraints in chickpea production. By other constraints reported by almost 50 Percent of the farmers were shortage of labour non-awareness of NPK doses and Unfavorable climatic condition. These identified constraints need to be minimized for increasing the adoption of production technology and production level of chickpea on sample farmers.

CONCLUSIONS

Coefficient of multiple determinations (R^2) in the fitted Cobb-Douglas production was 0.96 indicating the included variables explained 96 per cent variations in dependent variable. The value of R^2 varied between 0.93 in small farm to 0.98 in case of large farm. The sum of regression coefficients of selected variable on different farm was less than unity indicating decreasing return to scale. Labour cost and fertilizers on medium and large farm, seed in small and large, irrigation and plant protection measure on all the three farms were found positive indicating further scope of applying these inputs for augmenting production and profitability from chickpea production on sample farm. The MVP of Irrigation, PPM in small, medium and large farm was found to be under utilization on sample farm. The MVP of labour cost and fertilizer in small farm, seed & fertilizer in medium farm and labour cost & fertilizer in large farm were less than the unit of respective input implying over utilization of these inputs showing their increased use (**Ganeshkumar**et.al 2013, found The value of MVP in respect of Seed rate (4.39) and phosphorus fertilizer (1.29) ,were more than unity level and the MVP value of human labour (0.43), Machine labour (0.37), Bullock labour (0.87) and Nitrogen fertilizer (-3.57) were found to be less than unity level). At overall level chickpea yield would remain in proposition of no profit and no loss if actual yield will higher by 5.46 qt/ha. Similarly actual market price of chickpea obtained by sample farmers is 2000 which is higher than breakeven price ranged between 54 to 59 per cent in different size farms. Thus, sample farmers are in profitable position in existing yield and price obtained in the study area. The major constrains attributed for not followings the recommended package of practices of chickpea by the sample farmers.

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