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A study about resources uses efficiency of major pulse production on sample farms in Azamgarh District of eastern U.P.

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ABSTRACT
Keeping in view the importance of the pulses a study an production and marketing of pulses was conducted in Thekma block of Azamgarh district. A sample of 100 farmers belonging to marginal, small and medium holding size were drawn through purposive cum proportionate random sampling technique, from five selected villages of Thekma block, personal interview method with the help of prestructured schedule was applied to collect the primary and secondary data were collected from block and district offices. Tabular and functional analysis was done to analyse the data and presentation of the result. Resource use efficiency and MVP of four factors i.e. human labour costs of seed, manure and fertilizer and machinery charges were analysed and found that seed cost was statistically significant on each size group of farms and for each crops. MVP of all these factors were more than one indicated further scope of investment to receive additional income.
Keyword: Pulse, Marginal value product, Regression analysis,

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INTRODUCTION

Pulses are good sources of proteins and commonly called the poor man's meat (Reddy 2010). The frequency of pulses consumption is much higher than any other source of protein; about 89.00 percent population consume pulses at least once a week, while only 35.40 percent of persons consume fish or chicken/meat at least once a week in India [1]. At the world level pulses are grown in an area of 78 million hectares with an annual production of 70 million tonnes (MT) and productivity of 9.08 q/hectare [2]. In India pulses are grown on 22.23 million hectares of area with an annual production of 13.15 million tonnes (MT). India accounts for 33% of the world's area under pulses and 22% of the world production of pulses. About 90.00% of the global pigeonpea, 65.00% of chickpea and 37.00% of lentil area falls in India, corresponding to 93.00, 68.00 and 32.00 percent; of the global production, respectively [3].

India is the world's largest producer and the largest consumer of pulses. Pakistan, Canada, Burma, Australia and the United States, in that order, are significant exporters and are India's most significant suppliers. In spite of this, the net per capita availability of pulses has come down over years from 61.00 g./ day per person in 1951 to 32 g./day per person in 2010. Thus the availability of pulse per capita per day has proportionately declined from 71.00 g (1955) to 36.90 g (1998) against the minimum requirement of 70.00 g per capita per day. There is not much possibility of the import of pulses in the country. The production of pulses has to be increased internally to meet the demand [6].

Area production and productivity of pulses in India were 23.47 million hectare, 18.34 million tonnes, and 7.81 q/ha respectively *(National Council of Applied Economic Research New Delhi 2012-13)*. While area, production, and productivity in Uttar Pradesh were 2.31 million hectare, 1.71 million tones and 7.42 q/hectare respectively. Area, production, and productivity of pulse crops in Azamgarh district were 18533.00 hectare, 22352 metric tonnes, and 12.6 q/ha respectively during the period 2011-2012. Area,

production and productivity of major pulse crop Gram, Pea and Pigionpea in Azamgarh district were 3213.00, 6546.00 and 8397.00 hectare, 4220.00, 8922.00 and 8914.00 metric tonnes and 13.13, 13.63, and 10.62 Q/ha respectively during the period 2011-12.

MATERIAL AND METHODS

The study involves a comprehensive data base of which most are primary in respect to their origin. Keeping in view the limitation of material resources and time factor, the study was conducted using sample survey method for collection of the relevant information. Sampling design, method of data collection and specification of analytical tools, all these together, constitute the methodological part of present study. The chapter is solely devoted for a detailed discussion on these aspects.

Sampling technique: The purposive com random sampling design was used for the selection of district, block, villages and respondents.

Selection of District: Azamgarh district of eastern U.P. was selected purposively to avoid the operational inconvenience of the investigator.

Selection of Block: Out of twenty two blocks of selected district, one block namely Thekma having highest area under gram, pea and Pigeonpea was selected purposively.

Selection of village: A list of all the villages falling under selected block was prepared and arranged in ascending order according to area covered by gram, pea and Pigeonpea crop and five villages were selected randomly are as follows 1- Chauki, 2- Khamholi, 3- Bardaha, 4- Beekapur and 5- Bheera.

Selection of respondents: A lists of gram, pea and Pigeonpea growers of selected villages were prepared alongwith their size of holding. Thus, the farm holding categorised into three size groups (1) Marginal: (Below 1.0 ha;) (2) Small: (1.0-2.0 ha;) (3) Medium: (2.0-4.0 ha). From this list a sample of 100 respondents were selected following the proportionate random sampling technique.

Collection of Data: Primary data were collected through personal interview method on well pre-structured schedule specially designed for this study, while secondary data were collected from published/ unpublished record of district and blocks, headquarters, books, journals, periodicals, and news bulletins etc. among different pulses grown in Azamgarh district, three crops i.e. Gram, Pea, Pigeonpea (Arhar) had covered the highest are i.e. 3213.00, 6546.00, and 8397.00hectare respectively. Thus these three crops of pulse were considered for study.

Period of study: The data pertained for the agriculture year 2015-2016.

Analytical Tools: Analytical tools used for the analysis and interpretations of the data are given below.

Regression analysis: To study the effect of various independent variables on the dependent variables, various form of production function have been explored. However, Cobb-Douglas production function, has been found best fit for analysis of data.

The mathematical form of Cobb-Douglas function (power function) is as follows:

$$Y = aX_1^{b1}.X_2^{b2}.X_3^{b3}.X_4^{b4}.X_5^{b5}.e_u$$

Where,

Y = Dependent variable (output value in rupees/hectare)

X_1- X_4 = Independent variable (input value rupees/hectare)

a = Constant

b_1- b_4 = Production elasticity with respect to $X_{i's}$

The value of the constant (a) and coefficient (bi) in respect of independent variable in the function have been estimated by using the method of least square. The Cobb-Douglas production function in log form is as follows:

$\text{Log } Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + \ldots\ldots + u \log e$

Where,

Y = Value of gross returns of crops (Rs./ha)

X_1 = Expenditure on human labour (Rs./ha)

X_2 = Expenditure on seed (Rs./ha)

X_3 = Expenditure on manure and fertilizer (Rs./ha)

X_4 = Expenditure on irrigation (Rs./ha)

e = Random factor

a = Intercept

b_i : j = 1, 2……4) are the elasticity coefficient of the j^{th}

Marginal value product (MVP): The marginal value product of inputs were estimated by following formula:

$$(MVP)\,X_j = b_j \frac{\overline{Y}}{\overline{X}_j}$$

Where,

b_j = Production elasticity with respect to X_j

$\overline{Y}$ = Geometric mean of the dependent variable Y

$\overline{X}$ = Geometric mean value of X_j

MVP = Marginal value product of j^{th} input

Significance test: Having estimates of the elasticity coefficients, it is desirable to ascertain the reliability of these estimates. The most commonly used 't' test was applied to ascertain whether the sample production elasticity coefficient ; bj is significantly different from zero or not at some specified probability level.

't' cal = b_j/standard error or b_j: If cal. 't'is greater than table value of t-distribution at (n-k-1) degree of freedom and specified probability level of significance, b_j is said to be statistically significant from zero (K is number of independent variable and n is sample size).

RESULT AND DISCUSSION

First parts deals with the composition of family, education of family, farm assets structure, cropping-pattern, cropping-intensity, cost of cultivation, measure of costs and farm profits, marginal value productivities and resource use efficiency.

Resource use efficiency: The production function analysis was carried out to determine the efficiency of various resources viz X_1 =human labour, X_2 = seed, X_3= fertilizer, X_4 machinery charges used in production of pulses. Cobb-Douglas production function was fitted to the data and result were summarized.The values of elasticity of production, standard error, co-efficient of multiple determination and returns to scale of pulse under study are presented.

Marginal value productivity is the amount added to total value product when another unit of the variable input used, while other inputs are held constant at their geometric mean level. Marginal value productivity indicated an increase (if MVP is positive), a decrease (if MVP is negative) in the gross value of product in respect to a unit increase in the input factor.

Elasticity of production and MVP of gram in study area: The estimated value of production, standard error, co-efficient of multiple determination and returns to scale for gram produced at different size group of farms are given in table 1. The value of R^2 presented in table indicated that 81.00, 92.00 and 89.00 per cent variation in output on marginal, small and medium size group of farms are caused by the included factures in study viz., X_1 =human labour, X_2 = seed, X_3= fertilizer, X_4 machinery charges.

It is also revealed from the table that (X_2) seed was statistically significant at 1 per cent level of probability in all size group of farms, where as Human Labour (X_1) was found significant at the 1 per cent probability level in case of marginal size group of farms. Rest two input factor viz., fertilizer and machinery charges did not show significant association with the dependent variable in any category of farms. Returns to scale on marginal, small and medium size of farms were found to, 0.8358103, 0.87978 and 0.8097948 respectively. On the basis of these values it is concluded that cultivation of Gram is characterized by decreasing returns to scale on each farm situation.

Table 1: Production elasticity of Gram crop on different size group of farms.

Size groups	Elasticity of output				Sum of elasticities	R^2	Marginal value product			
	X_1	X_2	X_3	X_4			X_1	X_2	X_3	X_4
Marginal	**0.199*** (0.086)	**0.474**** (0.039)	0.158 (0.320)	0.003 (0.017)	0.835	0.815	1.208	8.860	1.714	0.096
Small	0.187 (0.181)	**0.436**** (0.116)	0.237 (0.116)	0.019 (0.030)	0.879	0.926	2.190	6.736	2.265	0.636
Medium	0.278 (0.343)	**0.375**** (0.096)	0.131 (0.252)	0.025 (0.032)	0.809	0.895	3.407	5.686	1.096	11.189

(Figures in parentheses indicates standard error of respective variable, **1%level of significance and *5% level of significance) Where: X_1= Human Labour, X_2= Seed, X_3= Fertilizer, X_4= Machinery charges

The MVP of different input factors are also presented in Table 4.16. It is depicted from the table that the MVP of all included factors on each size group of farms were positive indicating that there is further scope for increasing the investment on all these factors specially seed and human labour on each farm situation to realize more return than the existing use of inputs. Only MVP of machinery charges (x4) was less than unity on marginal and small size group of farms.

Elasticity of production and MVP of Pea in study area: The estimated value of production, standard error, co-efficient of multiple determination (R^2) and returns to scale for Pea produced at different size group of farms are given in table 4.17. The value of R^2 presented in table indicated that 82.00, 87.00 and

83.00 per cent variation in output on marginal, small and medium size group of farms are caused by the included factures in study viz., X_1 =human labour, X_2 = seed, X_3= fertilizer, X_4 machinery charges.

It is also revealed from the table that (X_2) seed was statistically significant at 1 per cent level of probability in marginal and small at 5% level of probability in medium size group of farms. Where as human labour (x1) in marginal farm size and fertilizers (x3) in medium size of farm were found significant at 5% probability level. Other factors did not have any significant value on any farm size group. Returns to scale on marginal, small and medium size of farms were found to 0.8458748, 0.84997 and 0.8120943 respectively. On the basis of these values it is concluded that cultivation of pea is characterized by decreasing returns to scale on each farm situation.

The MVP of different input factors are also presented in Table 2. It is depicted from the table that the MVP of all included factors on each size group of farms were positive indicating that there is further scope for increasing the investment on all these factors specially seed and human labour on each farm situation to realize more return than the existing level of inputs used.MVP value of machinery charges an marginal and medium size of farms.

Elasticity of production and MVP of Pigeonpea in study area: The estimated value of production, standard error, co-efficient of multiple determination (R^2) and returns to scale for Pigeonpea (Arhar) produced at different size group of farms are given in table 4.18. The value of R^2 presented in table indicated that 0.82, 0.95 and 0.89 per cent variation in output on marginal, small and medium size group of farms are caused by the included factures in study viz., X_1 =human labour, X_2 = seed, X_3= fertilizer, X_4 machinery charges.

It is also revealed from the table that (X_2) seed was statistically significant at 1 per cent level of probability in marginal and small size group of farms and at 5% level of significant where as Human Labour (X_1) was found statistically significant at 5% level of probability in marginal farm size. Fertilizer (X3) was also significant at 5% probability level in case of medium medium farm size. Machinery charges (X4) on each farm size group and fertilizer (X3) on marginal and size group of farms did not show any significant association.

Returns to scale on marginal, small and medium size group of farms were 0.8343412, 0.7922257, and 0.8420943 respectively. On the basis of these values it is concluded that cultivation of Arhar is characterized by decreasing returns to scale on each farm situation.

The MVP of different input factors are also presented in Table 3. It is depicted from the table that the MVP of X1 X2 and X3on each size group of farms were positive indicating that there is further scope for increasing the investment on all these factors specially seed and human labour on each farm situation to realize more return than the existing level of inputs use. The MVP of machinery charges (X4) was less than unity on each farm size group indicate the excessive use of this input factor.

Table 2: Production elasticity of Pea crop on different size group of farms.

Size groups	Elasticity of output				Sum of elasticity	R^2	Marginal value product			
	X_1	X_2	X_3	X_4			X_1	X_2	X_3	X_4
Marginal	**0.263*** (0.107)	**0.478**** (0.039)	0.097 (0.215)	0.007 (0.017)	0.845	0.823	1.072	4.366	1.325	0.126
Small	0.169 (0.076)	**0.454**** (0.056)	0.190 (0.503)	0.035 (0.016)	0.849	0.875	1.322	5.020	2.477	15.827
Medium	0.140 (0.112)	**0.258*** (0.077)	**0.397*** (0.098)	0.015 (0.025)	0.812	0.831	0.903	2.252	3.756	0.349

(Figures in parentheses indicates standard error of respective variable, **1%level of significance and *5% level of significance) Where: X_1= Human Labour, X_2= Seed, X_3= Fertilizer, X_4= Machinery charges

Table 4.18: Production elasticity of Pigeonpea crop on different size group of farms.

Size groups	Elasticity of output				Sum of elasticity	R^2	Marginal value product			
	X_1	X_2	X_3	X_4			X_1	X_2	X_3	X_4
Marginal	**0.191*** (0.078)	**0.481**** (0.040)	0.153 (0.421)	0.008 (0.017)	0.834	0.822	2.183	20.116	16.318	0.176
Small	0.180 (0.084)	**0.431**** (0.054)	0.147 (0.188)	0.033 (0.019)	0.792	0.954	2.860	14.765	17.219	0.910
Medium	0.170 (0.136)	**0.258*** (0.077)	**0.397*** (0.098)	0.015 (0.025)	0.842	0.897	2.382	9.128	34.485	0.362

(Figures in parentheses indicates standard error of respective variable, **1%level of significance and 5% level of significance) Where: X_1= Human Labour, X_2= Seed, X_3= Fertilizer, X_4= Machinery charges

CONCLUSION

Four independent factors that are costs of human labour, seed, fertilizer and machinery charges were considered for analysis of resource use efficiency and it was found that seed cost had significant association with changes in output of all three crops i.e. gram, pea and arhar but the MVP of all these factors were found more than one indicated further scope of investment to harvest the additional income.

REFERENCE

1. Atar Singh Lakhan Singh Singh, N. P.(2005). Performance analysis of pulses in frontline demonstrations.Indian Journal of Pulses Research; 2005. 18(2):202-205.
2. Badal, P. S. Pramod Kumar Geeta Bisaria (*2008). Banaras Hindu University - CAB Abstracts International Journal of Agricultural Sciences;. 4(1):321-324.*
3. Bera, B. K. Nandi, A. K (2010). Recent trend of pulses production in West Bengal. Bangladesh Journal of Agricultural Economics; 2010. 33(1/2):83-92.
4. Choudhary, A. K.(2013). Technological and extension yield gaps in pulse crops in Mandi district of Himachal Pradesh, India. Indian Journal of Soil Conservation; 2013. 41(1):88-97.
5. Choudhary, J. N. Singh, K. M. Singh, R. K. (1990). pulses production in Bihar an empirical analysis *Agricultural Situation India; 1990. 45*
6. Singh, K. P. Ved Prakash Srinivas, K. Srivastva, A. K 2008). Effect of tillage management on energy-use efficiency and economics of soybean (Glycine max) based cropping systems under the rainfed conditions in North-West Himalayan Region. Soil & Tillage Research; 2008. 100(1/2):78-82.

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