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Chickpea: Economic study on measuring efficiency of used resource in Auraiya dist. of U.P.

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Abstract
Chickpea is one of the important crop in U.P. as well as, in India. World-wide India ranks 1st in production of chickpea. In India, the total food production in 2013-14 was about 257.4 million tones out of these only 19.3 million tones was contributed by pulses. The production of cereals increase by 460 per cent since 1950-51 to give the year but the production of pulses in the country has increased only 178 per cent. There is acute shortage of pulses in the country. The prices have increased considerably and the consumer is hard hit to buy his pulse requirements. Thus the availability of pulse per capita per day has proportionately decline from 71g (1955) to 36.9g (1998) against the minimum requirement of 70g per capita per day. District Auraiya was purposively selected and the block Auraiya having highest acreage under gram was selected purposively for the study. List of the villages from selected block were prepared along with acreage under Chickpea cultivation and 5 villages were selected randomly for study. In all 100 number of farmers were selected proportionally from each category of farmers and classified into three categories i.e. marginal (below 1 ha), small (1-2 ha) and medium (2-4 ha & above). The data were collected by personal interview technique with the help of pre-tested structured schedule. The period of enquiry pertain to the agricultural year 2017-18.Cobb-Douglas production function was applied for estimating resource use efficiency of chickpea cultivation The study revealed diminishing return to scale as sum of elasticities were deserved less than unity in case of all categories. The included factors in functional analysis viz. X1, X2, X3 and X4 representing per ha. Value of seed, manures and fertilizers, human labour and tractor/ machinery charges (Rs.) respectively. High value of R^2 (coefficient of multiple determination) ranging from 0.81 to 0.84 was observed, which explaining that 81 to 84 percent variation in yield of chickpea crop is explained by included factors in the study area. MVP(Marginal Value Productivity) of all included factors were found more than unity, explaining that these are further scope of these factors to realizing optimum production. It is inferred that chickpea cultivation is suitable for upgrading food security mission of India.

Keywords: MVP, Resource use efficiency, returns to scale, coefficient of multiple determination

Introduction
India is the largest producer of pulses in the world with 25 per cent share in the global production. Chickpea, pigeonpea, mungbean, urdbean, lentil and field pea are important pulse crop contributing 39 per cent, 21 per cent, 11 per cent, 10 per cent, 7 per cent and 5 per cent of total pulse production in the country. (Hindu, 2009). The major chickpea producing counties which contributed to about 90% of global chickpea production during 2013 India (67.4%), Australiya (6.21%), Pakistan (2.13%), Turkey(3.86%), Myanmar (3.74%), Iran (2.25%).
In India, the total food production in 2013-14 was about 257.4 million tones, out of which only 19.3 million tones was contributed by pulses. The production of cereals increase by 460 per cent since 1950-51 but the production of pulses in the country has increased only 178 per cent. There is acute shortage of pulses in the country. The prices have increased considerably and the consumer is hard hit to buy his pulse requirements. Thus the availability of pulse per capita per day has proportionately decline from 71g [1955] to 36.9g [1998] against the minimum recommended requirement of 70g 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. India is the largest producer of chickpea in the world sharing 65.25 and 65.49 per cent (FAO STAT, 2013) of the total area (11.97 m ha) and production (9.53mt), respectively. In India, Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Gujarat, Andhra Pradesh and Karnataka are the major chickpea producing states sharing over 95 per cent area. During last five decades, chickpea has registered significant increase in production (3.53 average annual growth rate for 1950-2012), which is primarily due to introduction of high yielding and diseases resistant varieties and adoption of improved production technologies.

During last ten years, the productivity of chickpea has increased @ 1.74 per cent but the gross Chickpea production has gone up by 6.32 per cent, besides the growth in area @ 4.43 per cent. With accelerated growth rate and steps taken by the government under National Food Security Mission, the target of 10.22 mt chickpea production by 2030 can be achieved, successfully. Pulses are grown across the country with highest share coming from Madhya Pradesh (24 per cent), Uttar Pradesh (16 per cent), Maharashtra (14 per cent), Andhra Pradesh (10 per cent), Karnataka (7 per cent) followed by Rajasthan (6 per cent), which together accounted about 77 per cent of the total pulse production, while the remaining 23 per cent contributed by Gujarat, Chhattisgarh, Bihar, Orissa and Jharkhand. Among Pulses, chickpea (45.1 per cent) occupies the major share, followed by pigeonpea (15.7 per cent), moong (9.9 per cent), urad (9.6 per cent) and lentil (7.3 per cent), altogether which together accounts for 87 per cent of the total pulses production. Much of the pulses production has been slowly shifted from kharif to *Rabi* and now the *Rabi* share is increased to about 61.10 per cent of the total pulse production. Therefore, more emphasis is required to be given on *Rabi* pulse crops as there production share is much higher and increasing in recent years.

Gram, commonly known as "Chickpea" or 'Bengal gram' is the most important pulse crop of India. India alone covers nearly 52.5 per cent of the world acreage and production of gram. Chickpea occupies about 38 per cent of area under pulses and contributes about 50 per cent of total pulse production of India. It is used for human consumption, as well as, for feeding to animals. It is eaten both whole fried or boiled and salted, or more generally in the form of the split pulse which is cooked and eaten.

India is the largest producer of pulses in the world with 25 per cent share in the global production. Chickpea, pigeonpea, mungbean, urdbean, lentil and field pea are important pulse crop contributing 39 per cent, 21 per cent, 11 per cent, 10 per cent, 7 per cent and 5 per cent of total pulse production in the country. (Hindu, 2009). The major chickpea producing counties which contributed to about 90% of global chickpea production during 2013 India (67.4%), Australiya (6.21%), Pakistan (2.13%), Turkey(3.86%), Myanmar (3.74%), Iran (2.25%). Objective of this study is, to workout resource use efficiency of chickpea in the study area. Seeing the importance of chickpea it appears that this crop is suitable for doubling the income of respondents in the study area.

Materials and Methods

Auraiya district of Uttar Pradesh was selected purposively to avoid the operational inconvenience of the investigator. A list of all 7 blocks of Auraiya district was prepared and one block, namely, Auraiya having highest area under chickpea crop was selected. A list of villages growing chickpea was prepared from selected block and five villages were selected randomly for study.

A list of all chickpea growers of each selected village was prepared along with their size of holding. The respondents were stratified into 3 categories, viz; marginal (below1 ha), small (1-2 ha) and medium (more than 2 ha). Ultimately, 100 respondents were selected randomly according to their proportion under various categories. The primary data were collected by survey method through personal interview technique with the use of pre structured and pre tested schedule while secondary data were collected from journals, reports and records of districts and block head quarter. The study pertains the agriculture year 2017-18. Cobb–Douglas production function was applied for estimating resource use efficiency of various resources used in production of chickpea in the study area.

Result and Discussion

The Cobb- Douglas production function was applied to find out the efficiency of various resources used in the production of chickpea. Resource use efficiency estimates are presented in Table-1. It is evident from this table that magnitude of the sum of the elasticity or return to scale was found less than unity on various size groups of farms. This indicates that production of chickpea is characterized by diminishing return to scale in the study area. This functional analysis also revealed that, included factors explain more than 81 percent variation in yield on different size group of farms in the study area. High value of estimated R^2 (Coefficient of multiple determination)ranges from 0.81 to 0.84 explain that 81 to 84 percent variation in yield of chickpea cultivation explained by four included factors viz. X1, X2, X3 and X4 representing per ha value of seed, manure and fertilizers, human labour and tractor and machinery labour, respectively in the study area. This justified that selection of included factors for functional analysis is well framed by the investigators.

Table-2 reflects the MVP (marginal value productivity) of included factors in the functional analysis of chickpea cultivation. It is clear from the table that value of MVP of X1,X2,X3 and X4 factors were more than the unity in case of marginal, small and medium farms, indicating that there is further scope of investment on these factors to optimize their application for realizing optimum return,X4 factors gives mixed trend of MVP. Less than unity value of MVP explain that excessive application of those factors was practiced.

Table 1: Resource use efficiency estimator of chickpea on different size of sample farms in the Study area.

Size of sample farms (ha)	Production of elasticity				Sum of elasticity	R^2
	X_1	X_2	X_3	X_4		
Marginal	0.224682* (0.095473)	0.431696** (0.047837)	0.094172 (0.998501)	0.109050 (0.227787)	0.859600	0.81195
Small	0.26983** (0.094495)	0.375081** (0.053086)	0.04269 (0.717774)	0.205167 (0.170292)	0.892769	0.836804
Medium	0.250032 (0.119615)	0.310477** (0.052707)	0.123529 (0.309823)	0.198658 (0.288327)	0.882696	0.815698

* Significant at 5% level of probability

** Significant at 1% level of probability x1, x2, x3 and x4 stand for seed, manure and fertilizers, human labour and tractor/machinery charge (Rs.) respectively.

Table 2: Marginal value productivity (MVP) of included factors in Production of chickpea crop.

Size group of farms	Marginal Value Productivity of input / factors			
	X1	X2	X3	X4
Marginal	2.093097	5.028636	0.564022	1.304706
Small	2.080002	3.522176	0.280875	2.440331
Medium	1.812802	2.603894	0.820567	2.22565

x1, x2, x3 and x4 stand for seed, manure and fertilizers, human labour and tractor/machinery charge (Rs.) respectively.

Summary and Conclusion

The study is based on 100 respondents of different categories belonging to Auraiya Dist. Of U.P. The study revealed diminishing return to scale as sum of elasticities were observed less than unity in case of all categories. The included factors in functional analysis viz. X1, X2, X3 and X4 representing per ha. Value of seed, manures and fertilizers, human labour and tractor/ machinery charges (Rs.) respectively. High value of R^2 (coefficient of multiple determination) ranging from 0.81 to 0.84 was observed, which explaining that 81 to 84 percent variation in yield of chickpea crop is explained by included factors in the study area. MVP(Marginal Value Productivity) of all included factors were found more than unity, explaining that these are further scope of these factors to realizing optimum production. It is inferred that chickpea cultivation is suitable for upgrading food security mission of India. It seems that chickpea cultivation is suitable for doubling the income of growers in the study area.

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