

Economic Analysis of Chickpea Production in Ahmednagar District of Maharashtra

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ABSTRACT

Chickpea (*Cicer arietinum L*) is one of the major pulse crops grown in India. Chickpea has the richest, cheapest and easiest source of best quality proteins and fats. Chickpea is also a good source of vitamins (especially B vitamins) and minerals like potassium and phosphorus. The present investigation revealed that, average age of high chickpea growers was 30 to 45 years. The average family education high school was more 68.33 per cent. The occupation is more in primary level was 53.34 per cent. The land holding was more in 2 to 4 ha was 50.00 per cent. The livestock position number of more in bullock was 43.60 per cent and the investment on commonly used assets (Rs.) 14241.60. The area under chickpea was observed was 0.79 ha. Per hectare use of physical inputs in production was observed that, highest 37.73 man days of hired human labour were utilized. Per hectare return were Rs. 77817.22 while total cost of cultivation was Rs. 39596.37. The share of cost-A and cost-B in cost-C was Rs. 52455.48 and 55539.52. Farm business income was Rs. 38220.85. The net profit was arrived at Rs. 22277.71, with output - input ratio of 1.70 and Per farm total production of chickpea was found 15.38 q.

Keywords *Economics of production, Cost of cultivation, output - input ratio.*

Chickpea (*Cicer arietinum L*) is one of the major pulse crops grown in India. Domesticated chickpea has been found in Turkey since 3500 BC. By the Bronze age chickpea was known in Italy and Greece. Chickpea has the richest, cheapest and easiest source of best quality proteins and fats. It has a vast multiplicity of uses as food and industrial products. There is a need to cultivate the crop in the irrigated area as against only in the marginal land. The domestic demand and consumption, however, are much higher than production, mainly because, chickpea is a major source of protein for a large section of the vegetarian population in the country. Chickpea account for around 19.00 per cent of the gross cropped area and less than 8.00 per cent of the total food grain production of the country. Important chickpea markets in India are Mumbai, Delhi, Chennai, Indore, Kanpur, Bikaner, Hapur and Hyderabad. Indian pulse market is a price sensitive market. Chickpea is cultivated in Australia, Africa, Afghanistan, Pakistan, Iran, America, Ethiopia, Argentina, Italy, Greece, Turkey and India. The

Food and Agriculture Organization (FAO) believes 13,730,998 million tones of chickpea were produced around the world in 2015. And 13,307,760 million tonnes of chickpea were produced around the world in 2014.

Maharashtra accounts for 13.15 lakh hectare of area, 7.54 lakh tonnes of chickpea production and 574 kg/ha yield of chickpea crop in 2015. In Maharashtra Ahmednagar, Akola, Amravati, Buldhana, Latur, Sangli, Dhule, Jalgaon and Solapur are major chickpea growing districts in Maharashtra. In Ahmednagar district, area under chickpea was 135100 hectares with production of 64300 tonnes and productivity of 402 kg/ha during year 2015-16.

MATERIALS AND METHODS

Methodology is of vital importance in the economic study. Ahmednagar is the largest district of Maharashtra State in respect of area. It is situated in the central part of the State and lies between north latitudes 18°19' and 19°59' and east longitudes 73°37' and 75°32'. The district has a geographical area of 17114 sq. km., which is 5.54 per cent of the total State area. It is divided into 14 talukas namely Ahmednagar, Rahuri, Shirampur, Newasa, Shevgaon, Pathardi, Jamkhed, Karjat, Srigonda, Parner, Akole, Sangamner, Kopargaon and Rahata. The soil types of the district are broadly divided into four categories namely coarse shallow soil; medium black soil; deep black soil and reddish soil occupying about 38, 41, 13 and 8 per cent of the cultivated area respectively. The climate of the district is hot and dry, on whole extremely genial and is characterized by a hot summer and general dryness during major part of the year except during south-west monsoon season.

The district leads in cultivation of jowar, maize, blackgram, greengram, chilli, sunflower, sesamum, brinjal, lady's finger, coriander, bitterguard, bottleguard, ridgeguard, tomato, tur and soybean in kharif season. In rabi season crops like chickpea, wheat, onion, methi, chilli, safflower crops are taken. In the summer season under irrigated condition, groundnut, fodder maize, cucumber, chilli, watermelon, muskmelon and sugarcane crops are taken. This district also leads in mango, mandarin orange, sweet orange and banana as fruit crops.

Sampling Design

Multistage sampling design was adopted for selection of district, tehsil, villages and chickpea growers. At the first stage, Ahmednagar district was purposely selected

Table 1. Socio-economic characteristics of chickpea growers.

Sr. No.	Particulars	Number (No=60)	Per cent
1.	Age (year)		
	a) Up to 30 yrs	13	21.66
	b) 30 to 45 yrs	27	45.00
	c) Above 45 yrs	20	33.34
2.	Education (In 3 quantum number)		
	a) Non-literate	9	15.00
	b) High school	41	68.33
	c) College	10	16.67
3.	Family size (No.)		
	a) Male	2.36	41.62
	b) Female	2.30	40.56
	c) Children	1.01	17.82
4.	Occupation level (In 3 quantum number)		
	a) Primary	32	53.34
	b) Secondary	13	21.66
	c) Tertiary	15	25.00
5.	Land holding (ha.)		
	a) Up to 2 ha	6	10.00
	b) 2 to 4 ha	30	50.00
	c) 4 and above	24	40.00
6.	Livestock position (No.)		
	a) Bullock	0.96	43.60
	b) Buffalo	0.28	12.78
	c) Cow	0.81	36.82
	e) Goat	0.15	06.80
7.	Investment on commonly used assets (Rs.)	14241.60	—

for present study because of favorable climate and availability of high area under all types of pulse crops in the district. In the second stage, Newasa and Shevgoan tehsil of Ahmednagar district was selected on the basis of higher area under cultivation of chickpea. In the third stage, From each selected thesil, three villages were selected on the basis of highest area under chickpea cultivation in the winter season. The selected villages in Newasa and Shevgoan tehsil were namely Kukana, Taravdi, Vadule, Sukali, Bhaygaon and Hatgaon. In fourth stage, growers were obtained from each village and from that each of lists, ten growers were selected randomly. In such a way 60 farmers were selected for present study in the year 2015-16.

ANALYTICAL TECHNIQUES

In analytical techniques, the first objective, i.e. to study socio-economic characteristics of chickpea growers was achieved by tabular analysis. Simple analytical tools like average, percentage, ratios, frequency distribution etc. were used to analyse socio-economic characteristics of respondents. Second objective, i.e. to estimate per hectare costs and returns of chickpea production was achieved by tabular analysis in which simple statistical tools and different

cost concept viz. cost-A, cost-B and cost-C, and output input ratio were used.

TERMS AND CONCEPTS USED

A. Cost concepts

Terms and concepts which were used in the study are clarified there for convenience to reader.

1. COST-A:

“Actual expenses incurred by producer farmer from his pocket for the production of particular crop.” Cost –A includes cost of the items viz. hired human labour, bullock labour, machine labour, manures, fertilizers, plant protection, irrigation, land revenue, incidental charges. Depreciation on implements and machine used and interest on working capital.

2. COST-B:

It includes the Cost-A plus, rental value of land and interest on fixed capital.

3. COST-C:

It includes the Cost- B plus, imputed value of family labour.

Table 2.1. Cropping pattern of chickpea grower

Particulars		Area (ha.)	Per cent
A)	<i>Kharif</i>		
	Soybean	0.61	12.29
	Red gram	0.51	10.28
	Red gram +soyabean	0.52	10.48
	Green gram	0.16	3.22
	Black gram	0.06	1.20
	Cotton	1.59	32.05
	Sub total	3.45	69.40
B)	<i>Rabi</i>		
	Chickpea	0.79	15.92
	Wheat	0.37	7.45
	<i>Rabi</i> jowar	0.10	2.01
	Sub total	1.26	25.56
C)	Summer		
	Sugarcane	0.25	5.04
	Sub total	0.25	5.04
i)	Gross cropped area	4.96	100.00
ii)	Double cropped area	1.52	30.65
iii)	Net cultivated area	3.44	69.35
iv)	Cropping intensity %	--	144.65

Table 2.2. Per farm land use pattern of chickpea grower

Sr. No.	Particulars	Area (ha.)	Per cent
1.	Irrigated area	2.66	66.32
2.	Rain fed area	1.35	33.68
3.	Net sown area	3.44	85.78
4.	Total area	4.01	100
5.	Gross cropped area	4.96	—
6.	Cropping intensity	—	144.65

B. Measurement and evolution of cost items

- Hired human labour.** Hired human labour was measured in Man days. One man day consists with 8 hours. Labour cost was evaluated at the rate of Rs. 200.00 per day for male and Rs.150.00 per day for female. The female labour was converted into man day by multiplying to the number of female with 0.67.
- Bullock labour.** Hired bullock labour charge was considered for 8 hours as a day, actually paid in the locality. Family bullock labour charge accounted equal to the charges paid to the hired bullock pair. For the

study, hired bullock charge was Rs.400.00 per day for a bullock pair.

- Machine labour.** Machine labour in case of owned machine was evaluated as per the hired charge prevailed in the village and in case of hired machine that was Rs.600.00 per hour.
- Seed of chickpea.** The actual price with expenditure incurred on procurement was taken into account for purchase of seed chickpea was Rs.100.00 / kg .
- Fertilizers.** Fertilizers in the form of Diammonium Phosphate were used and quantity of nitrogen and

Table 3. Per hectare physical input and output of chickpea farm (Unit/ha.)

Sr. No.	Particulars	Unit	Usase
INPUT			
1.	Hired human labour	man days	37.73
2.	Family human labour	man days	15.42
3.	Bullock labour	pair days	1.13
4.	Machine labour	Hours	18.34
5.	Seed	kg	84.17
6.	Manure	q	22.89
7.	Fertilizer		
a.	Nitrogen	kg	25.48
b.	Phosphorus	kg	50.95
c.	Potash	kg	0.00
8.	Plant protection	L	1.66
OUTPUT			
1.	Main produce	q	15.38
2.	By produce	q	3.08

Table 4. Per hectare cost of cultivation of chickpea crop (Rs/ha.)

Sr. No.	Particulars	Amount (Rs.)	Percent
1.	Hired human labour	7546.22	13.59
2.	Bullock labour	453.78	0.82
3.	Machine labour	11004.20	19.82
4.	Seed	8476.89	15.26
5.	Manure	4579.83	8.25
6.	Fertilizer		
a.	Nitrogen	332.30	0.59
b.	Phosphorus	1957.83	3.53
c.	Potash	0.00	0.00
7.	Plant protection	1792.43	3.23
8.	Land revenue	120.00	0.21
9.	Incidental charges	367.44	0.66
10.	Interest on working capital@13 %	1587.34	2.85
11.	Depreciation on capital assets @10%	338.19	0.60
12.	Irrigation	1039.92	1.87
13.	Cost-A(Σ 1to12)	39596.37	71.29
14.	Rental value of land	12482.10	22.47
15.	Interest on fixed capital @11%	377.01	0.68
16.	Cost-B (Σ 3to15)	52455.48	94.44
17.	Family human labour	3084.08	5.56
18.	Cost-C (Σ 16to17)	55539.52	100.00

Table 5. Per hectare profitability in chickpea production (Rs/ha.)

Sr. No.	Particulars	Physical unit	Physical quantity	Amount (Rs.)
1	Return from a main produce	q	15.38	76890.75
2	Return from by produce	q	3.08	926.47
3	Gross return (? 1 to 2)	–	18.46	77817.22
4	Cost- A	–	–	39596.37
5	Cost- B	–	–	52455.48
6	Cost –C	–	–	55539.52
7	Farm business income (Gross return minus cost- A)	–	–	38220.85
8	Family labour income (Gross return minus cost- B)	–	–	25361.74
9	Net profit (Gross return minus cost- C)	–	–	22277.71
10	Output in put ratio (Gross return divided by cost- C)	–	–	1.70
11	Per quintal cost of production (Cost-C minus by produce value divided by main produce quantity)	–	–	3551.34

Note : (output = Rs.5000/q)

phosphorus was calculated in order to determine the actual, expenditure on nitrogen and phosphorus. The rate prevailing in the market for nitrogen, phosphorus was Rs. 13.04 / kg and Rs.38.43 / kg respectively.

6. **Plant protection.** This includes the actual cost incurred on purchased of inse-cticides, pesticides, fungicides and their procurement.
7. **Land revenue.** The land revenue was considered actually paid by cultivators for crop area.
8. **Incidental expenditure.** It includes minor repairs, refreshing charges and other ex-penditure for cultivation of the crop.
9. **Interest on working capital.** It was calculated by charging interest at the rate of 11.00 per cent on items of expenditure as human labour, bullock labour, machine labour, seed chickpea, fertilizer, manure, plant protection, irrigation, land revenue and incidental chares for crop duration.
10. **Depreciation of asset.** Depreciation means the decrease in the value of asset through wear and tear. Straight-line method was used for calculating depreciation. The uniform rate of 10.00 per cent on the present value from the beginning of the year of farm implements and machinery was taken and only the proportionate charges were taken for the crop on

hectare basis.

11. **Rental value of land.** Rental value of owned land was estimated at 1/6 of the value of gross produce i.e. value of main produce minus land revenue.
12. **Interest on fixed capital.** It was calculated by charging interest at the rate of 10.00 per cent on investment on commonly used assets like plough, harrow, seed drill, hoe, bullock cart, hand sprayer, machine sprayer and power sprayer.
13. **Irrigation structure.** It includes capital investment on well, electric motor, pipe line, electric motor shed and dripper. Annual expenditure on irrigation structure inclu-de electric charge, depreciation on well @ 2.00 per cent, interest on well @ 10.00 per cent, depreciation on electric motor @ 10.00 per cent, interest on electric motor @ 10.00 per cent, depreciation on pipeline @ 10.00 per cent, interest on pipeline @ 10.00 per cent.

RESULTS AND DISCUSSION

The data collected from the sample farmers were analyzed as per the materials and methods.

Socio-economic characteristics of chickpea growers

Socio-economic characteristics viz. age, education, family size, occupation and land holding, livestock position,

etc. were studied and their mean values are presented in Table 1. Age wise distribution of selected samples revealed that majority of chickpea growers were in 30 to 45 years age group i.e. 45.00 per cent, up to 30 years age group 21.66 per cent and above 45 years age group was 33.34 per cent. It means that, up to 30 years farmers are less involved in this profession. Distribution of selected farmers according to educational status revealed that, more than half sample were attended high school 68.33 per cent. Further, it was noticed that 15.00 per cent sample were non-literate whereas 16.67 per cent sample was attended college. Thus it is clear that, majority of sample was attended high school and few were non-literate. On an average, family size of selected sample composed of 5.67 members of whom 2.36 were male, 2.30 were female and 1.01 were children.

The share of male, female and children were 41.62 per cent, 40.56 per cent and 17.82 per cent, respectively. The occupational distribution of selected sample was revealed that the majority of farm families i.e. 53.34 per cent had primary occupation agriculture as a main source of occupation while 21.66 per cent families were engaged in secondary occupation business and remaining 25.00 per cent were engaged in tertiary occupation service. The land holding wise distribution of selected sample revealed that respondents possessing the land up to 2 ha were 10.00 per cent. It was also noticed that 50.00 per cent of respondents were possessing the land holding between 2 to 4 ha, while 40.00 per cent respondents possessing land holding 4 ha and above. Per household total livestock position with the selected farmers was 2.2 per house hold, distribution of livestock revealed that, proportion of bullock to the total livestock was highest i.e. 43.60 per cent, buffalo i.e. 12.78 per cent. The per cent share of cow was 36.82 per cent. The proportion of buffalo and goat was 12.78 per cent and 06.80 per cent, respectively. Investment on commonly used asset was Rs. 14241.60

Land use pattern

Details regarding size of holding, net cultivated area in which irrigated and rain fed areas, gross cropped area and cropping intensity in relation to selected chickpea grower farms were calculated and presented in table 4.2. Average size of holding was 4.01 hectares. The proportionate irrigated area was 66.32 per cent while the rainfed area was 33.68 per cent. Net sown area was 85.78 per cent. While Gross cropped area was 4.96 and cropping intensity was 144.65.

Cropping pattern on chickpea farm

The table 2 revealed that, the gross cropped area was 4.96 hectare on chickpea farm. The area under soybean and cotton was 0.61 and 1.59 hectares, which was 12.29 and 32.05 per cent of gross cropped area in *kharif* season. Among *kharif* crops soybean, cotton and red gram were found as major crops. In general, the proportionate area under cotton was highest in *kharif* season i.e. 32.05 per

cent followed by soybean 12.29 per cent, red gram+soybean 10.48 per cent, green gram 3.22 per cent and black gram 1.20 per cent, respectively. Among *rabi* crops chickpea, *rabi* jowar and wheat were found as major crops. The proportionate area under chickpea was highest in *Rabi* season as 15.92 per cent, followed by wheat 7.45 per cent, *rabi* jowar 2.01 per cent, respectively. Among summer crops, sugarcane was found as major crop. The proportionate area under sugarcane was 5.04. The cropping intensity was 144.65 per cent

Cost and returns from chickpea production

1. Physical inputs and outputs in chickpea production

Per hectare physical inputs and outputs of chickpea production were worked out and are presented in table 3. Average use of hired human labour was 37.73 and family labour was 15.42 on chickpea farms. Use of machine labour and Bullock labour in chickpea which was 18.34 hours and 1.13 hours, respectively. The use of seed was 84.17 kg for chickpea. In regard to manure farmer have used 22.89 quintals of manures. Use of nitrogen and phosphorus was 25.48 kg, and 50.95 kg, respectively. The use of plant protection for chickpea found to be 1.66 liters. It was also observed that main produce yield of chickpea was 15.38 quintals and by produce yield was 3.08 quintals.

Cost of cultivation of chickpea production

Per hectare total cost with regards to chickpea was Rs. 55539.52 while cost-A was Rs. 39596.37 and cost-B was Rs. 52455.48 Per cent share of cost-A was 71.29 per cent while cost-B was 94.44 per cent. Among the various items of expenditure, the per cent share of rental value of land was predominant as 22.47 per cent followed by hired human labour 13.59 per cent; family human labour 5.56 per cent and machine labour 19.82 per cent for chickpea crop. Cost-A, Cost-B and Cost-C was represented in table.4.

Profitability in chickpea production

Per hectare Profitability of chickpea was estimated and presented in table 5. It was observed that, gross return was high on chickpea farm Rs.77817.22 It was clear that, farm business income, family labour income and net profit were Rs 38220.85, Rs. 25361.74 and Rs.22277.71 for chickpea, respectively. It was clear that, output- input ratio was higher as 1.70 for chickpea farm. Per quintal cost of production was Rs.3551.34

The per hectare profit from production was 25361.74 which seems to be profitable, hence the chickpea crop is a profitable.

CONCLUSIONS

From the present investigation the following broad conclusions are majority of respondents was in 30 to 45 years age group 45.00 per cent and 68.33 per cent respondents were attended high school. The family

occupation level was 53.34 per cent respondents reported that they had (Primary) agriculture as a main occupation. The average area under chickpea was 0.79 ha. The gross cropped area was 4.96 ha and cropping intensity was 144.65 per cent. Per hectare total cost of chickpea i.e. cost-C was Rs. 35262.14 in which contribution of cost-A was Rs. 23036.28 and cost-B was Rs. 55539.52 The output –input ratio of chickpea was 1.70 which indicates that chickpea crop is highly profitable enterprise.

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