

Research Paper

An Economic Analysis and Compound Growth Rate of Major Pulses in Northern part of Chhattisgarh

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Received: 19-09-2021

Revised: 12-12-2021

Accepted: 23-01-2022

ABSTRACT

The study to examine the An Economic Analysis and Compound Growth Rate of Major Pulses in Northern Tribal Belt of Chhattisgarh finite to Jaspur district of Chhattisgarh state. The study took 60 sample farms during the year 2016-17. A formal survey method was used to collect the required information from the sample area. The objectives were achieved using exponential function, regression, and perception analyses. The finding reveals that only area under pigeon pea in Northern hills part and Jashpur district simultaneously increased with a significant growth rate 1.59 and 1.85 percent/annum respectively. Still, the production in Jashpur district has a huge significant growth with 3.05 percent /annum and in case of production of chickpea Jashpur district has recorded a positively significant growth (4.54%). In pigeon pea, the per hectare Cost-A₁, Cost-A₂, Cost-B₁, Cost-B₂, Cost-C₁, Cost-C₂ and Cost-C₃ at the overall level were ₹ 8080.31, ₹ 8080.31, ₹ 8505.16, ₹ 14755.16, ₹ 10024.21, ₹ 16274.21 and ₹ 17901.63 per hectare, and in chickpea, these were ₹ 7853.03, ₹ 7853.03, ₹ 8274.38, ₹ 14524.38, ₹ 9827.56, ₹ 16077.56 and ₹ 17685.32 per hectare, respectively, on the sample farms. The overall family labor income, farm business income, farm investment income, and input-output ratio at farm size and at overall in the study area for pigeon pea were recorded ₹/ha. 4572.05, ₹/ha. 11246.91, ₹/ha. 9727.86 and 1:1.2 and in chickpea, these were ₹/ha. 8789.65, ₹/ha.15461.01, ₹/ha. 13831.54 and 1:1.45, respectively. In the cultivation of major pulses, high labor charges (86.57%) ranks first among all constraints, followed by the non- dedication of the farmers to the farming activities (76.67 %) and poor soil health (73.33 %) were the major constraints. It is suggested that there is a need to smoothen the process of farmer credit by financial agencies in the study area. Also, the availability of cheap transportation facilities will help to strengthen the marketing channel of the study area.

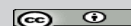
HIGHLIGHTS

- ① It focuses the trend and pattern of different costs of major pulses across major producing district of northern part of the states form formation of the state.
- ① The trends of growth in area, production and yield of major pulses in the northern part of state appears to be positive behaviour.
- ① More growth rate was observed in production of major pulses.
- ① Cost of cultivation was comparable among all the farm holdings.
- ① Net returns were lower in marginal farmers in comparison to other farm groups.
- ① Return over cost ratio was found to be proportional to operational holding.
- ① The constraints regarding the production of selected major pulses crops were also identified and tabulated

Keywords: Pulses, compound growth rate, cost of cultivation, constraints, Chhattisgarh

How to cite this article: Seth, M.K., Chandrakar, M.R. and H. (2022). An Economic Analysis and Compound Growth Rate of Major Pulses in Northern part of Chhattisgarh. *Economic Affairs*, 67(01 Spl.): 93-100.

Source of Support: None; **Conflict of Interest:** None



As we know that the, pulses are the second-best source of protein after livestock produce but the first most preference of vegetarian community. In the dietary plate of Indian food items, most of the population prefer vegetarian and relatively pulses contribute the central portion in Indian meal. In India, the share of pulses to the gross cropped area was 12 %, and in whole food, grains basket was 6-7 % (Tiwari and Shivhare 2016). Pigeon pea is the second most important pulse crop in India and occupies 62.20 lakh ha. or 7% area (FAO Statistics 2013). The country's total area coverage and pigeon pea production were 38.35 lakh hectares and 29.92 lakh tones, respectively. The state-wise trend shows that Maharashtra ranked first in area and production (29.19 % and 29.68 %) followed by Karnataka (19.23 % and 15.96 %). The third place is occupied by Madhya Pradesh (13.17% and 13.30 %). The highest yield was recorded by Bihar (1739 kg/ha) followed by Haryana (1111 kg/ha) and Gujrat (1105 kg/ha). The lowest yield was observed in the state of A.P. (521 kg/ha) followed by C.G. (623 kg/ha) and Karnataka (648 kg/ha). Chhattisgarh contributed only 1 % in area and production to the pulses producing states in India.

The total area of pulses was 8.14 lakh ha, and production was 4.84 lakh metric tonnes, which was raised by 43 percent in 2017-18. Due to emphasis was given to grown to food security under Rashtriya Krishi Vikash Yojana (RKVY).

The present study is an attempt to examine the Compound growth rate of area production and yield and cost incurred in the cultivation of significant pulses in northern hills in Chhattisgarh and to identify the constraints faced by pulses growers during cultivation of major pulses in the study area, thereby increasing production and profitability of farmers in the present scenario.

METHODOLOGY

The study was carried out in the Jaspur district of Chhattisgarh state. Out of 6 blocks, Patthalgaon and Pharsabahal blocks of Jaspur district were selected on the basis of inducing maximum area among all pulses crops of chickpea in *rabi* season and pigeon pea in *Kharif* season. The list of major selected pulses grower villages was obtained from the office of Deputy Director of Agriculture, Jaspur, for 2016-17. From the list of major selected pulses grower

villages, 2 villages from each block and 25 percent (i.e., at least 15 chickpea growers from each village) were considered for the study. There were 60 chickpea and pigeon pea growers, comprised 17, 20, 17, and 6 (Table 1) pulses growers of marginal, small, medium, and large size categories, respectively. The primary data were collected from sample farmers on all the relevant aspects by using well-structured schedule to fulfill the objectives of the study. The simple averages and percentages were applied to analyze the data and report the results as per the objectives framed for the study.

ANALYTICAL TOOLS

Compound Growth rate

Annual Compound growth rates in the area, production, and productivity of major selected pulses *i.e.*, chickpea and pigeon pea were, done in the study area by fitting an exponential function of the following form.

$$Y = a B^t$$

$$\text{Log } Y = \log a + t \log b$$

Where,

Y = area/ production/ productivity

a = constant

B = regression coefficient

t = time in year

Compound growth rate (%) = (Antilog of b-1) 100

Cost of cultivation

The costs and returns of major pulses cultivation were estimate through standard cost concepts given by the CACP. That includes:

- ♦ **Cost A₁**= Consist of all actual expenses
- ♦ **Cost A₂**= Cost A₁+Rent paid for Leased in Land.
- ♦ **Cost B₁** = Cost A₁+Interest on value of Owned Capital assets (excluding land)
- ♦ **Cost B₂**= Cost B₁ + rental value of owned land
- ♦ **Cost C₁**= Cost B₁+ Imputed value of Family labour.
- ♦ **Cost C₂** = Cost B₂+ Imputed value of Family labour.

- ♦ **Cost C_3** = Cost C_2 + 10 percent of cost C_2 as managerial cost

Source: Commission for Agricultural Costs and Prices Department of Agriculture and Cooperation Ministry of Agriculture Govt. of India New Delhi 2011.

Evaluation of Output

Farm produce is evaluated at the actual price received by the farmers. Unsold produce is evaluated at a price fixed by the government of Chhattisgarh state.

Measures of comparison

The following measures of comparison have been adopted:

- Cost of cultivation per hectare.
- Net income per hectare.
- Cost of production per quintal.
- Input-output ratio.
- Income analysis

Constraints in production and marketing of major pulses

Constraints in the production of major selected pulses in the sampled farms were analyzed and examined using the perception and experience of the pulses growing farmer.

General characteristics of sample households

Table 1 contains general information regarding Jaspur district of Chhattisgarh. The table shows

that the total number of sample households was 60, 17, 20, 17, and 6 for marginal, small, medium, and large farmers, respectively. The overall average size of holding in hectare was 1.91, the overall irrigated area in Northern hills was 1.11ha, and the primary source of irrigation was irrigation through tube wells covers 80.18 percent (0.89 ha.) in this area. The overall cultivated area of pigeon pea was 26.86 percent (0.51 ha.) in *Kharif* season and 77.19 percent (0.93) of chickpea in *rabi* season to the total cultivated area in the study area. The reason behind the major area of pulses was because the selected farmers were only pulses growers. The northern part's overall gross cropped and net cultivated areas were 3.72 ha. and 1.91 ha. Respectively, overall cropping intensity was 195.48 percent registered. It was maximum at marginal farmer (265.08 %) and minimum at large farmer (182.83 %).

Compound growth in Area, production and productivity of Pigeon pea and chick pea

Table 2 evident that the area under pigeon pea in the Northern hills part and Jashpur district simultaneously increased with a significant growth rate of 1.59 and 1.85 percent per annum respectively, but the production Jashpur district has a vast significant growth rate with 3.05 percent per annum. In Northern hills, it was registered a negatively significant growth rate with -6.87 percent per annum that's a deplorable situation for the sub-agro-climate zone. It was also observed that the yield of pigeon pea for Northern hills and the Jashpur district has a positive but non-significant growth rate of 1.02 and 1.19 percent per annum, respectively.

Table 1: General information of sample households of Northern Hills

Sl. No.	Particulars	Farm Size				
		Marginal	Small	Medium	Large	Overall
1	Total number of sample households	17	20	17	6	60
2	Average family Size	5.88	5.65	5.41	6.17	5.70
3	Average holding size (ha.)	0.63	1.47	2.37	5.65	1.91
4	Irrigated area (ha.)	0.24	0.91	1.65	2.75	1.11
5	Un-irrigated area (ha.)	0.39	0.56	0.72	2.9	0.8
6	Area irrigated through tube well (ha.)	0.18 (75.00)	0.63 (69.23)	1.39 (84.24)	2.39 (86.91)	0.89 (80.18)
7	Area of Pigeonpea in <i>kharif</i> season (ha.)	0.3 (47.62)	0.4 (21.21)	0.4 (16.88)	1.8 (31.86)	0.51 (26.86)
8	Area of Chickpea in <i>rabi</i> season (ha.)	0.45 (77.59)	0.6 (72.29)	0.93 (70.99)	3.37 (86.41)	0.93 (77.19)
9	Total Cropped Area	1.67	2.93	4.38	10.33	3.72
10	Net Cropped Area	0.63	1.47	2.37	5.65	1.91
11	Cropping Intensity (%)	265.08	199.32	184.81	182.83	195.48

Note: Figure in the parenthesis indicates the percentage to total irrigated area.

Table 2: The calculated growth rate for area, production and yield of Pigeon pea

Sl. No.	Region	Crop	Compound growth rate (Percentage)					
			Area		Production		Yield	
			CGR	P-value	CGR	P-value	CGR	P-value
1	Northern hills	Pigeonpea	1.59**	4.32E-07	-6.87*	0.0275	1.02	0.2022
		Chickpea	-3.08	0.1287	-3.15**	0.0025	0.36	0.9530
2	Jaspur district	Pigeonpea	1.85**	0.00077	3.05**	0.0073	1.19	0.1589
		Chickpea	6.62**	0.0028	4.54**	0.0036	-1.95	0.3428

* Significant at 5% level; ** Significant at 1% level.

Table 3: Cost of cultivation of pigeon pea of Northern Hills (₹/Ha)

Sl. No.	Farm size					
A	Variable cost	Marginal	Small	Medium	Large	Overall
1	Family Human labour	1963.57 (12.62)	1534.08 (09.52)	1272.92 (07.57)	906.81 (05.22)	1519.05 (09.33)
2	Hired Human labour	849.30 (05.46)	1453.98 (09.03)	1849.63 (11.01)	2329.82 (13.42)	1482.34 (09.11)
	Total Human labour	2812.87 (18.08)	2988.06 (18.55)	3122.55 (18.58)	3236.63 (18.65)	3001.39 (18.44)
3	Bullock power	607.47 (03.90)	417.22 (02.59)	268.59 (01.60)	199.74 (01.15)	407.26 (02.50)
4	Machine power	934.00 (06.00)	1025.96 (06.37)	1246.34 (07.42)	1345.93 (07.75)	1094.34 (06.72)
	Total labour cost	4354.34 (27.99)	4431.24 (27.51)	4637.48 (27.60)	4782.30 (27.55)	4502.99 (27.67)
5	Seed	3000 (19.28)	3170 (19.68)	3250.34 (19.34)	3370.41 (19.42)	3164.64 (19.45)
6	Manure/ fertilizers	850.71 (05.47)	970.13 (06.02)	1140.34 (06.79)	1270.44 (07.32)	1014.55 (06.23)
7	Irrigation charges	45 (0.29)	48 (0.30)	120 (0.71)	120 (0.69)	74.75 (0.46)
8	Plant protection chemicals	200 (01.29)	230.27 (01.43)	310.35 (01.85)	350.31 (02.02)	256.39 (01.58)
9	Interest on working capital@4%	259.46 (01.67)	292.62 (01.82)	327.42 (0.95)	359.47 (02.07)	299.77 (01.84)
	Sub-total	8709.51 (55.98)	9142.26 (56.76)	9785.93 (58.23)	10252.93 (59.07)	9313.09 (57.23)
B	Fixed Cost					
1	Land Revenue	10 (0.06)	10 (0.06)	10 (0.06)	10 (0.06)	10 (0.06)
2	Depreciation on implements	170.28 (01.09)	280.36 (01.74)	330.06 (01.96)	410.47 (02.36)	276.26 (01.70)
3	Rental value of owned land	6250 (40.17)	6250 (38.80)	6250 (37.19)	6250 (36.01)	6250 (38.40)
4	Interest on fixed capital@6.5%	417.97 (02.69)	425.12 (02.64)	428.35 (02.55)	433.58 (02.50)	426.26 (02.61)
	Sub- total	6848.25 (44.02)	6965.48 (43.24)	7018.41 (41.77)	7104.05 (40.93)	6984.05 (42.77)
C	Total cost (A+B)	15557.76 (100)	16107.75 (100)	16804.35 (100)	17356.98 (100)	16456.71 (100)

The acreage under chickpea in northern hills has recorded as a non-significantly negative growth that was -3.08 percent per annum and the In case of production Jashpur district has recorded a positively significant growth (4.54%), and northern hills have a significantly negative growth (-3.15%) at 1 % level of significance. Jashpur district has a negatively non-significantly growth rate -1.95 percent per annum for a yield of chickpea respectively.

Cost of cultivation of pigeon pea crop

Table 3 reveals that the overall variable cost and fixed cost for the total cost of cultivation of pigeon

pea in Northern hills has contributed per hectare 57.23 percent and 42.77 percent, respectively. In variable cost, the major share of cost among different cost items was found in labor which was 27.67 percent to the total cost of cultivation out of which 18.44 % contribution of human labor, bullock labor, and machine labor together contribute 9.22% followed by seed cost (19.45 %), manure and fertilizer together contribute (6.23%). In the case of fixed cost, the major cost incurred in the rental value of land is 38.40 %, followed by interest on fixed capital (02.61 %) and depreciation on implements (1.70 %). It also seems that the labor utilization

and investment for the purchasing of seeds were the salient tasks for cultivating pigeon pea in the northern hills of Chhattisgarh.

Cost and returns based on cost concept

The cost and returns based on cost concept in the production of pigeon pea have been presented in table 4 and 5. It is evident from the table that the per hectare Cost-A₁, Cost-A₂, Cost-B₁, Cost-B₂, Cost-C₁, Cost-C₂ and Cost-C₃ at the overall level were ₹8080.31, ₹ 8080.31, ₹ 8505.16, ₹ 14755.16, ₹ 10024.21, ₹ 16274.21 and ₹ 17901.63 per hectare, respectively, on the sample farms. The overall

income per hectare over Cost-A₁, Cost-B₁, Cost-B₂, Cost-C₁, Cost-C₂ and Cost-C₃ were worked out in table 5, which were ₹ 11338.26, ₹ 11338.26, ₹ 10913.93, ₹ 4663.93, ₹ 9358.27, ₹ 3108.27 and ₹ 1486.38 respectively.

Income measures of pigeon pea

Table 6 shows that the overall production of the main yield of pigeon pea was 4.52 q/ha. And by-product was 8.37 q/ha. Income over the main yield was 18077.33 rupee at the rate of 4000 per quintal, and overall income over by-product was 1250.55 at the rate of 150 per quintal. The gross income and net

Table 4: Different cost concepts of pigeon pea Northern hills (₹/Ha)

Sl. No.	Different cost	Farm size				
		Marginal	Small	Medium	Large	Overall
1	Cost A ₁	6926.22	7898.54	8853.07	9766.59	8080.31
2	Cost A ₂	6926.22	7898.54	8853.07	9766.59	8080.31
3	Cost B ₁	7344.19	8323.67	9281.43	10200.17	8505.16
4	Cost B ₂	13594.19	14573.67	15531.43	16450.17	14755.16
5	Cost C ₁	9307.76	9857.75	10554.35	11106.98	10024.21
6	Cost C ₂	15557.76	16107.75	16804.35	17356.98	16274.21
7	Cost C ₃	17113.53	17718.52	18484.78	19092.67	17901.63

Table 5: Income obtained over different cost of pigeon pea cultivation of Northern hill of Chhattisgarh (₹/Ha)

Sl. No.	Categories	Farm size				
		Marginal	Small	Medium	Large	Overall
1	Income over Cost A ₁	11425.28	10784.46	11294.43	13061.93	11338.26
2	Income over Cost A ₂	11425.28	10784.46	11294.43	13061.93	11338.26
3	Income over Cost B ₁	11007.31	10359.33	10866.07	12633.57	10913.93
4	Income over Cost B ₂	4757.31	4109.33	4616.07	6383.57	4663.93
5	Income over Cost C ₁	9043.74	8825.25	9593.15	11360.65	9358.27
6	Income over Cost C ₂	2793.74	2575.25	3343.15	5110.65	3108.27
7	Income over Cost C ₃	1237.97	964.48	1662.72	3430.22	1486.38

Table 6: Income measures of Pigeon pea of Northern hills of Chhattisgarh

Sl. No.	Particulars	Marginal	Small	Medium	Large	Over-all
		Farmers	Farmers	Farmers	Farmers	
1	Main yield	4.28	4.36	4.72	5.16	4.52
	Income 1	17120	17440	18880	20640	18077.33
2	Byproduct yield	8.21	8.39	8.45	8.5	8.37
	Income-2	1231.5	1243.5	1267.5	1275	1250.05
3	Gross income	18351.50	18683.00	20147.50	21915.00	19327.22
4	Cost of cultivation	15557.76	16107.75	16804.35	17356.98	16274.21
5	Net income	2793.74	2575.25	3343.15	4558.02	3053.01
6	Family labor income	4757.31	4109.33	4616.07	5464.83	4572.05
7	Farm business income	11425.28	10784.46	11294.43	12148.41	11246.91
8	Farm investment income	9461.71	9250.38	10021.51	11241.60	9727.86
9	Input output ratio	1:1.18	1:1.16	1:1.2	1:1.26	1:1.2

Main product price @4000/ quintal; By- product price @150/ quintal.

income of pigeon pea in northern hills were 19327.22 ₹/ha. and 3053.01 ₹/ha. respectively. The overall family labor income at rupee/ hectare farm business income at a rupee per hectare, farm investment income, and -output ratio at farm size and overall in the study area recorded were 4572.05 ₹/ha., 11246.91 ₹/ha., 9727.86, ₹/ha. and 1:1.2 respectively.

Cost of cultivation of chick pea crop

Table 7 contains that in Northern hills, overall variable cost and fixed cost for a total cost of cultivation of chickpea per hectare contributes 57.06 percent and 42.94 percent, respectively. In variable cost, the significant share of cost among different cost items was found in labor which is 29.89 percent to the total cost of cultivation, followed by seed cost (19.71%), manure, and fertilizer together contribute

(02.66%). In the case of fixed cost, the major cost incurred in rental value of land 38.87 %, followed by interest on fixed capital (02.62%) and depreciation on implements (1.38 %). It reveals that the major expenses incurred during the chickpea cultivation were labor charges and quality seed purchasing as working costs.

Cost and returns on the basis of cost concept chickpea

The cost and returns on the basis of cost concept in the production of chickpea have been presented in table 8 and 9. It is evident from the table that the per hectare Cost-A₁, Cost-A₂, Cost-B₁, Cost-B₂, Cost-C₁, Cost-C₂ and Cost-C₃ at the overall level were ₹ 7853.03, ₹ 7853.03, ₹ 8274.38, ₹ 14524.38, ₹ 9827.56, ₹ 16077.56 and ₹ 17685.32 per hectare,

Table 7: Cost of cultivation of Chick pea of Northern Hills (₹/Ha)

Sl. No.	Input cost	Farm size				
		Marginal	Small	Medium	Large	Average
A	Variable cost					
1	Family Human labour	2093.15 (13.55)	1440.81 (09.12)	1322.33 (07.97)	1051.89 (06.07)	1553.18 (09.66)
2	Hired Human labour	868.53 (05.62)	1526.78 (09.66)	1847.43 (11.14)	2350.84 (13.56)	1513.53 (09.41)
	Total Human labour	2961.68 (19.17)	2967.59 (18.78)	3169.76 (19.12)	3402.73 (19.63)	3066.71 (19.07)
3	Bullock power	1070.58 (06.93)	840.24 (05.32)	726.39 (04.38)	471.21 (02.72)	836.34 (05.20)
4	Machine power	567.02 (03.67)	855.93 (05.42)	1130.54 (06.82)	1360.37 (07.85)	902.32 (05.61)
	Total labour and power cost	4599.28 (29.77)	4663.76 (29.51)	5026.69 (30.31)	5234.31 (30.20)	4805.38 (29.89)
5	Seed	3033.56 (19.64)	3132.46 (19.82)	3250.36 (19.60)	3450.24 (19.90)	3169.62 (19.71)
6	Manure/ fertilizer	350 (02.27)	350 (02.21)	500 (03.02)	700 (04.04)	427.50 (02.66)
7	Irrigation charges	125 (0.81)	125 (0.79)	125 (0.75)	125 (0.72)	125 (0.78)
8	Plant protection chemicals	232.34 (01.50)	355.72 (02.25)	426.28 (02.57)	480.22 (02.77)	353.20 (02.20)
9	Interest on working capital@4%	249.88 (01.62)	287.45 (01.82)	320.24 (01.93)	357.52 (02.06)	293.10 (01.82)
	Sub-total	8590.06 (55.60)	8914.39 (56.40)	9648.57 (58.19)	10347.29 (59.69)	9173.80 (57.06)
B	Fixed Cost					
1	Land Revenue	10 (0.06)	10 (0.06)	10 (0.06)	10 (0.06)	10 (0.06)
2	Depreciation on implements	180.78 (01.17)	210.54 (01.33)	250.32 (01.51)	300.76 (01.74)	222.40 (01.38)
3	Rental value of owned land	6250 (40.45)	6250 (39.54)	6250 (37.69)	6250 (36.06)	6250 (38.87)
4	Interest on fixed capital@6.5%	418.65 (02.71)	420.59 (02.66)	423.17 (02.55)	426.45 (02.46)	421.36 (02.62)
	Sub-total	6859.43 (44.40)	6891.13 (43.60)	6933.49 (41.81)	6987.21 (40.31)	6903.76 (42.94)
C	Total cost (A+B)	15449.49 (100)	15805.51 (100)	16582.06 (100)	17334.49 (100)	16077.56 (100)

Table 8: Different cost concepts of chick pea of Northern hills (₹/Ha)

Sl. No.	Different cost	Farm size				
		Marginal	Small	Medium	Large	Overall
1	Cost A ₁	6687.69	7694.12	8586.56	9606.16	7853.03
2	Cost A ₂	6687.69	7694.12	8586.56	9606.16	7853.03
3	Cost B ₁	7106.34	8114.70	9009.73	10032.60	8274.38
4	Cost B ₂	13356.34	14364.70	15259.73	16282.60	14524.38
5	Cost C ₁	9199.49	9555.51	10332.06	11084.49	9827.56
6	Cost C ₂	15449.49	15805.51	16582.06	17334.49	16077.56
7	Cost C ₃	16994.44	17386.06	18240.27	19067.94	17685.32

Table 9: Income obtained over different cost of chick pea cultivation of Northern hills Chhattisgarh state (₹/Ha)

Sl. No.	Categories	Farm size				
		Marginal	Small	Medium	Large	Overall
1	Income over Cost A ₁	15334.31	15354.88	15445.44	16217.84	15461.01
2	Income over Cost A ₂	15334.31	15354.88	15445.44	16217.84	15461.01
3	Income over Cost B ₁	14915.66	14934.30	15022.27	15791.40	15039.65
4	Income over Cost B ₂	8665.66	8684.30	8772.27	9541.40	8789.65
5	Income over Cost C ₁	12822.51	13493.49	13699.94	14739.51	13486.47
6	Income over Cost C ₂	6572.51	7243.49	7449.94	8489.51	7236.47
7	Income over CostC ₃	5027.56	5662.94	5791.73	6756.06	5628.72

Table 10: Income measures of chick pea of Northern hills of Chhattisgarh

Sl. No.	Particulars	Marginal Farmers	Small Farmers	Medium Farmers	Large Farmers	Over-all
1	Main yield	5.93	6.21	6.48	6.96	6.28
	Income 1	21386.00	22134.00	24514.00	26112.00	22994.20
2	By- product yield	9.30	9.68	9.99	10.80	9.77
	Income-2	1860.00	1935.00	1998.00	2160.00	1954.10
3	Gross income	22022.00	23049.00	24032.00	25824.00	23314.03
4	Cost of cultivation	15449.49	15805.51	16582.06	17334.49	16077.56
5	Net income	6438.78	7185.86	7397.05	8447.43	7160.18
6	Family labour income	8665.66	8684.30	8772.27	9541.40	8789.65
7	Farm business income	15334.31	15354.88	15445.44	16217.84	15461.01
8	Farm investment income	13107.43	13856.45	14070.22	15123.88	13831.54
9	Input output ratio	1:1.43	1:1.46	1:1.45	1:1.49	1:1.45

Main product price @ 3400/ quintal; By- product price @150/ quintal.

respectively, and overall income per hectare over Cost-A₁, Cost-B₁, Cost-B₂, Cost-C₁, Cost-C₂ and Cost-C₃ was found to be ₹ 15461.01, ₹ 15461.01, ₹ 15039.65, ₹ 8789.65, ₹ 13486.47, ₹ 7236.47 and ₹ 5628.72 per hectare, respectively.

Income measures of chickpea

Table 10 shows that the overall production of the main yield and by-product was 6.28 q/ha. and 9.77 q/ha. respectively. Income over the main yield was 22994.20 rupee at the rate of 3500 per quintal, and the by-product was 1954.10 at the rate of 150 per quintal. The overall gross income and net income of chickpea were 23314.03 ₹/ha. and 7160.18 ₹/ha. respectively. The overall family labor income at rupee/ hectare farm business income at a rupee per hectare, farm investment income and input-output ratio at farm size and at overall in the study area recorded was 8789.65 ₹/ha., 15461.01 ₹/ha., 13831.54 ₹/ha. and 1:1.45, respectively.

Constraint in production of major pulses

The constraints regarding the production of

selected major pulses crops were also identified and tabulated in table 11.

Table 11: Constraints in production of major pulses in Northern hills of Chhattisgarh

Sl. No.	Particular	Total Households
1	High labour charges	52 (86.57)
2	Non- dedication of the farmers to the farming activities	46 (76.67)
3	Lack of adoption of technology such as SRI, line sowing and transplanting	33 (55.00)
4	Small land holdings	36 (60.00)
5	Non- dedication of the farmers to the farming activities	32 (53.33)
6	Poor soil health	44 (73.33)

Note: Figures in parenthesis indicate the percentage of farmers responding the problems.

The table reveals that the pulses growers were faced the major problem during the cultivation of pulses was high labor charges (86.57%) ranks first among all constraints followed by a non- dedication of the farmers to the farming activities (76.67 %) and poor

soil health (73.33 %) was the major constraint. It is suggested that there is a need to smoothen the process of farmer credit by financial agencies in the study area. Also, availability of cheap transportation facilities will help to strengthen the marketing channel of the study area.

CONCLUSION

The above study to examine An Economic Analysis and Compound Growth Rate of Major Pulses in Northern Tribal Belt of Chhattisgarh State study has been done in the Jaspur district of Chhattisgarh state. The study took 60 sample farms during the year 2016-17. A formal survey method was used to collect the required information from sample area. The objectives were achieved by using an exponential function, regression, and perception analyses. It is revealed from the study that only area under pigeon pea in Northern hills part and Jashpur district simultaneously increased with a significant growth rate 1.59 and 1.85 percent per annum respectively, but in the production Jashpur district has a huge significant growth rate with 3.05 percent per annum. In case of production of chickpea, only Jashpur district has recorded a positively significant growth rate (4.54%) in pigeon pea, the per hectare Cost-A₁, Cost-A₂, Cost-B₁, Cost-B₂, Cost-C₁, Cost-C₂ and Cost-C₃ at the overall level were ₹ 8080.31, ₹ 8080.31, ₹ 8505.16, ₹ 14755.16, ₹ 10024.21, ₹ 16274.21 and ₹ 17901.63 per hectare, and in chickpea, these were ₹ 7853.03, ₹ 7853.03, ₹ 8274.38, ₹ 14524.38, ₹ 9827.56, ₹ 16077.56 and ₹ 17685.32 per hectare, respectively, on the sample farms. The overall family labor income at rupee/ hectare farm business income at a rupee per hectare, farm investment income, and input-output ratio at farm size and at overall in the study area for pigeon pea were recorded ₹/ha. 4572.05, ₹/ha. 11246.91, ₹/ha. 9727.86 and 1:1.2, and in chickpea, these were ₹/ha. 8789.65, ₹/ha. 15461.01, ₹/ha. 13831.54 and 1:1.45, respectively. In the cultivation of major pulses, high labor charges (86.57%) ranks first among all constraints, followed by the non-dedication of the farmers to the farming activities (76.67 %) and poor soil health (73.33 %) was the major constraint. It is suggested that there is a need to smoothen the process of farmer credit by financial agencies in the study area. Also, the availability of cheap transportation facility facilities will help strengthen the study area's marketing channel.

REFERENCES

- Agarwal, P.K., Singh, O.P., Verma, D.K. and Sen, C. 2012. Growth and instability of pulses production in India. *The Allahabad Farmer*, **LXVII**(2) 40-53.
- Anonymous 2018. Directorate of Economics, Ministry of Agriculture and Farmer (Department of Agriculture Cooperation & Farmer Welfare), Government of India.
- Ahmad, N., Sinha, D.K. and Singh, K.M. 2018. Growth and instability in pulses : A spatiotemporal analysis in eastern India. *J Agrisearch*, **5**(1): 1-9.
- Banafar, K.N.S. and Singh, G.N. 1998. An Economic Analysis of Production and Marketing of Soybean in District Sehore of M.P. *Ph.d., C.S.A.U.A.T. Kanpur*, U.P.
- Banerjee, Gangadhar and Palke, L.M. 2010. Economics of Pulses Production and Processing of India. National Bank for Agriculture and Rural Development. Occasional Paper - 51.
- Bhatia, M.S., 1991. Economic constraints in Increasing pulses production. *Agric. Situation in India*, **46**(4): 279-284.
- Chand, R., Saxena, R. and Rana, S. 2015. Estimates and Analysis of Farm Income in India, 1983-84 to 2011- 12. *Econ. Polit. Wkly.*, **50**(12): 139-145.
- Mohanty, S. and Satyasai, K.J. 2015. Feeling the pulse: Indian pulses sector, NABARD rural pulse, department of economic analysis and research (DEAR), NABARD, Mumbai; vol. 10.
- More, S.S., Singh, N. and Kuthe, S.B. 2015. Performance of pulses crops in Gujarat state - A decomposition analysis. *Int. J. Agri. Sci.*, **7**(5): 510-515.
- Nirmal, V. K., 2008. "Production and Marketing of major pulses in Rajnandgaon District of Chhattisgarh", M.Sc. (Agril. Eco.) IGAU-T-2146_2008, I.G.A.U. Raipur, (C.G.)
- Sharma, M.K., Sisodiya, B.V.S. and Lal, K. 2013. Growth and trends of pulse production in India. *J. Food Legum*, **26**: 86 -92.
- Singh, R.P. and Renu, R. 2009. Growth of production and productivity of different pulses in Jharkhand. *J. Eco. Soc. Dev.*, **5**(1&2).
- Singh, P., Shahi, B. and Singh, K.M. 2016. Pulses production in Bihar: An overview of constraints and opportunities. *J. of Agrisearch*, **3**(3): 176-184.
- Tiwari A.K. and Shivhare A.K. 2016. Pulses in India: Retrospect and Prospects Publication No.: Dpd/Pub.1/ Vol. 2/2016.
- Veena, V.M. 1996. Growth dimensions of horticulture in Karnataka- An econometric analysis, Unpublished Ph.D. thesis submitted to university of agriculture science, Dharwad (India).