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An economic analysis of production and marketing of soybean in Rajnandgaon district of Chhattisgarh

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Abstract
The present study was conducted in Chhuikhadan block in Rajnandgaon district of Chhattisgarh state. The findings of this study revealed that the per farm total cultivated area is observed to be 0.83 hectare, 1.87 hectare, 4.54 hectare at small, medium and large farms, respectively along with 2.05 hectare as an overall sample average. The average cropping intensity is calculated 147.12 percent. The average percent of illiteracy was observed in 87.83 percent respectively. The compound growth rate of this crop in case of area is estimated as 5.14 percent and 169.75 percent in the Chhattisgarh state and Rajnandgaon district respectively of total period of 10 years. The Rajnandgaon district highest productivity of this crop is estimated 1320 kg per hectares during year 2007-08. The sample average cost of cultivation is worked out as Rs. 26538.38 per hectare. The sample average yield of soybean is observed as 10.55 quintal in the study. The marketable surplus of soybean is observed as 6.97 quintal, 16.46 quintal and 45.32 quintal per farm which is 81.52 percent, 83.34 percent and 90.75 percent to their total production at small, medium and large farms respectively. The producer share in consumer rupee was higher in channel I 96.75 percent. The market efficiency was higher in channel I 30.78 percent. Major constraints pertaining to cultivation of soybean were Lack of sufficient soil testing facilities (72.50 percent) is generally faced by sample farmers. Lack of implementation of support price in the village sale is the major problem faced by soybean producers.

Keywords: Growth rate, cost of production and returns, cost concepts, marketing margin and price spread, income measures and constraints

Introduction
Soybean (*Glycine max-Linn.*) is a leguminous and self-pollinated crop belongs to family Leguminoceae sub- family Papilionoideae (fabaceae). Crop cultivars generally reach a height of around 1 m (3.3 ft), and take 80–120 days from sowing to harvesting. Soybeans, like most legumes, perform nitrogen fixation by establishing a symbiotic relationship with the bacterium *Bradyrhizobium japonicum*. It is categorised as an oilseeds rather than a pulse, despite being rich source of protein and used as food and feed by the human as well as live stocks across the Globe because soybean cannot be cooked as a normal pulse. Parts of plants like leaves, stalks, petioles and stems are also used as dry fodder for the animals.

Soybean is a rich source of edible oil containing no cholesterol and almost none of the saturated fats. Soybean oil surpasses all other oils because it is an ideal food for heart patients and those who wish to avoid heart disease. It also contains a large amount of lecithin and a fair amount of fat-soluble vitamins. Lecithin is an important constituent of all organs of the human body and especially of the nervous tissue, the heart and liver. Soybean is, therefore, a good food. Besides its nutritive quality, functional properties of soy protein have opened avenues for producing new products and improving the quality of existing standard food products.

Production of soybean in India is dominated by Maharashtra and Madhya Pradesh which contribute 89 percent of the total production. Rajasthan, Andhra Pradesh, Karnataka, Chhattisgarh and Gujarat contribute the remaining 11 percent production.

Soybean cultivation was in practice in Himalayan States including North-Eastern Region from ancient time. However, commercial cultivation of soybean as an oilseed crop was commenced in late 60s. It has been widely adopted as rainfed crop under Vertisols with an average rainfall of 750-900 mm in the country. Area under soybean is largely spread the states of Madhya Pradesh, Maharashtra, Rajasthan, Chhattisgarh, Andhra Pradesh and Karnataka.

Area from millets, upland paddy and cotton has been diverted to soybean. State wise area, production and productivity of soybean growing States during last three years is given in The major soybean growing states are Madhya Pradesh (63.8 lakh ha.), Maharashtra (39.17 lakh ha), Chhattisgarh (1.07 lakh ha), Rajasthan (11.77 lakh ha.), Andhra Pradhesh (2.45 lakh ha.) Karnataka (2.25 lakh ha.) and other states (1.49 lakh ha). The area and production of soybean in different states and the country show arising trend in the recent years (Anonymous 2014-15).

Table 1: Area, Production and Productivity of Soybean in India (20114-15)

S. No.	States	Area (Lakh ha)			Production (Lakh tones)			Yield (kg/ha)		
		2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
1	Madhya Pradhes	56.69	60.32	63.80	62.81	78.00	53.69	1108	1293	842
2	Maharastra	30.10	32.18	39.17	39.69	46.69	47.85	1319	1451	1222
3	Rajsthan	8.97	10.40	11.77	13.85	14.69	9.75	1544	1413	828
4	Karnataka	1.91	1.72	2.25	1.72	1.18	2.54	901	1047	1129
5	Chattisgarh	1.00	1.06	1.07	0.76	1.28	0.94	753	1208	879
6	Andhra Pradhesh	1.30	1.59	2.45	2.10	2.89	3.94	1615	1818	1608
7	Others	1.12	1.16	1.49	1.20	1.44	1.18	1071	1241	792
All India		101.09	108.43	122	122.13	146.17	119.89	1208	1354	1034

Soybean is one of the important pulse crop of Chhattisgarh with an area of 107.77 thousand hectares, production 111.86 thousand tonnes and productivity 1038 kg/ha. Rajnandgaon is major soybean growing district of Chhattisgarh. Chhattisgarh state with an area of 36.87 thousand hectares, production 42.21 thousand tonnes and productivity 1145 kg/ha.

Material and Methods

Multi stage sampling procedures was adopted for the present study. In Chhattisgarh state, Rajnandgaon district stands first with the area 24210 ha. under Soybean crop cultivation. The Rajnandgaon district Consists of 9 blocks, Out of nine development blocks viz.-Rajnandgaon, Chhuikhadan, Khairagarh, Dongargarh, Chhuriya, Dongargaon, A.Chowki, Mohala and Manpoor, one block "Chhuikhadan" was selected purposively due to highest area under production of Soybean. The Chhuikhadan block has 255 villages, out of which the soybean crops are being grown in about 176 villages in the block. Out of these 10 villages were randomly selected. In selected villages, Thereafter a complete list of all soybean respondents were arrange in ascending order on the basis of their land holding and these respondents were categories into three size of farm groups.

i.e.- Small size form group - having cultivate area less than 1 ha.

Medium size form group - having cultivate area of 1-2 ha.

Large size form group - having cultivate area of more than 2 ha.

Then 10% sample farmers were selected by random sampling technique from each, selected villages, therefore all together 120 soybean growers / households (small 54, medium 37 and large 29) were selected for the present study.

Results and Discussion

Compound growth rate

The compound growth rate of soybean during period (2004-05 to 1013-14) is presented in table 4.12**,** It is clear from figures of growth rate that though, the growth rate of productivity (21.34 percent) in period (2004-05 to 2013-14) is significantly increase, the significant and positive growth rate of production **(**32.12 percent) is observed mainly due to positive and significant growth rate (5.14 percent) in area of this crop during period (2004-05 to 2013-14) in the state of Chhattisgarh in this 10 year.

The compound growth rate of area over the period of 10 years is estimated as 169.75 percent in the Rajnandgaon district which get success to increase the productivity of crop in the district in early due to positive and significant growth rate (141.91 percent) in productivity of this crop. The district experienced positive and significant growth rate (171.99 percent) in production of this crop. It is observed that the productivity of this crop was increasing during period (2004-05 to 2013-14). During this period, the compound growth rate of productivity is estimated positive most and significant in the district (141.91 percent) and state (21.34 percent) as well.

Table 2: Compound growth rate of area, production and productivity of Soybean crop in Chhattisgarh state and Rajnandgaon district

S. No	Particular	Chhattisgarh	Rajnandgaon
1	Area (%)	5.14	169.75
2	Production (%)	32.12	171.99
3	Productivity (%)	21.34	141.91

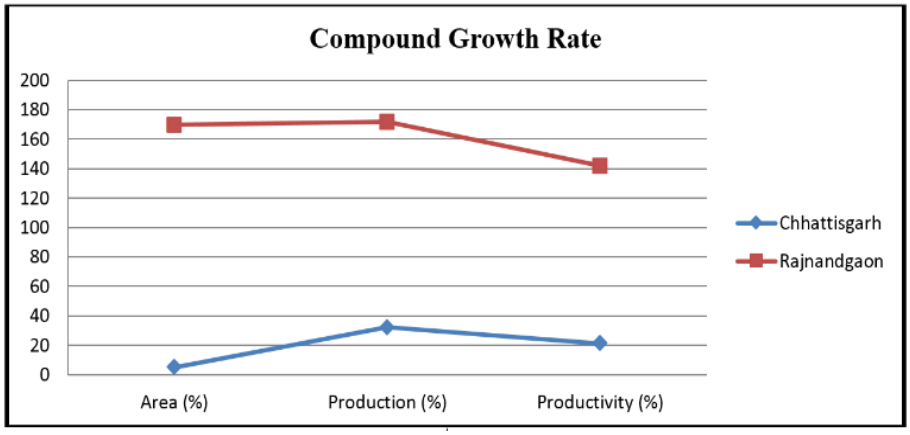

Fig 1: Compound growth rate of area, production and productivity of Soybean crop in Chhattisgarh state and Rajnandgaon district.

Cost of cultivation of soybean at different farms

The average cost of cultivation in soybean production is about Rs. 26538.38 the average cost of purchase of seed is about 3420.92 for a hectare which is about 12.91 percentage of total cost of cultivation. Manure and fertilizer applications are also costly operation in the soybean production. The expenditure incurred on this operation is about Rs. 2725.58 per hectare (10.29). The expenditure on soybean cultivation is about Rs. 272900.50 cost incurred in small farms. Similarly medium farms and large farms the cost of cultivations incurred about Rs. 26379.22 and 25340.96 respective.

Table 3: Cost of cultivation of soybean crop at different farms: (Value in Rupees)

S. No.	Particular	Size of Farms Group			Sample Average
		Small	Medium	Large	
(A)	**Variable Cost**				
1.	Hired Labour Charge	1225.00 (4.49)	1915.00 (7.26)	3030.00 (11.96)	1873.69 (7.15)
2.	Bullock Labour Charge	1215.00 (4.45)	512.00 (1.94)	- -	704.62 (2.60)
3.	Cost of Machinery Charge	2887.00 (10.58)	3270.00 (12.40)	3300.00 (13.02)	3104.90 (11.73)
4.	Cost of Seed	3380.00 (12.39)	3450.00 (13.08)	3460.00 (13.65)	3420.92 (12.91)
6.	Cost of Manure & fertilizer	2620.00 (9.60)	2790.00 (10.58)	2840.00 (11.21)	2725.58 (10.29)
7.	Cost of Plant protection	975.00 (3.57)	1056.00 (4.00)	1014.00 (4.00)	1009.40 (3.81)
8.	Irrigation Charge	968.00 (3.55)	842.00 (3.12)	782.00 (3.09)	884.20 (3.31)
9.	Interest on W.C.	1050.3 (3.85)	953.82 (3.73)	887.76 (3.62)	981.27 (3.76)
(B)	**Fixed Cost**				
1	Depreciation on fixed cost	400 (1.47)	635 (2.41)	750 (2.96)	557.04 (2.12)
2.	Interest on F.C	775.20 (2.84)	803.40 (3.05)	817.20 (3.22)	794.05 (3.00)
3.	Land revenue paid to Govt.	60.00 (0.22)	60.00 (00.23)	60.00 (0.24)	60.00 (0.23)
4.	Rental value of Own Land	7500.00 (27.48)	7500.00 (28.43)	7500.00 (29.60)	7500.00 (28.29)
(C)	**C Cost**				
1	Family labour Charge	4235.00 (15.52)	2580.00 (9.78)	870.00 (3.43)	2911.50 (10.83)
Total (A+B+C)		27290.50 (100)	26379.22 (100)	25340.96 (100)	26538.38 (100)

Cost Concepts

The cost concepts on different size of farm grower per hectare. Cost A was highest in large size farm (Rs. 15343.76/ha) followed by medium size farm (Rs. 14800.82/ha) and lowest in small size farm (Rs. 14320.30/ha) respectively. Cost B was highest in large size farm (Rs. 24470.96/ha) as compared to medium size farm (Rs. 23799.22/ha) and lowest in small size of farm (Rs. 23055.50/ha) respectively. Cost C was lowest in large size farm (Rs. 25340.96/ha) and highest in small size farm (Rs. 27290.50/ha). Sample average for Cost A, Cost B and Cost C was Rs. 14715.80/ha, Rs. 23626.88/ha and Rs. 26538.38/ha in different size of farm grower.

Table 4: Cost Concepts in Soybean crop per hectare in different Size of Farms Group: (Value in Rupees)

S. No.	Cost Concepts	Size of Farms Group			Sample Average
		Small	Medium	Large	
1	Cost A	14320.30	14800.82	15343.76	14715.80
2	Cost A1	14320.30	14800.82	15343.76	14715.80
3	Cost B	23055.50	23799.22	24470.96	23626.88
4	Cost C	27290.50	26379.22	25340.96	26538.38

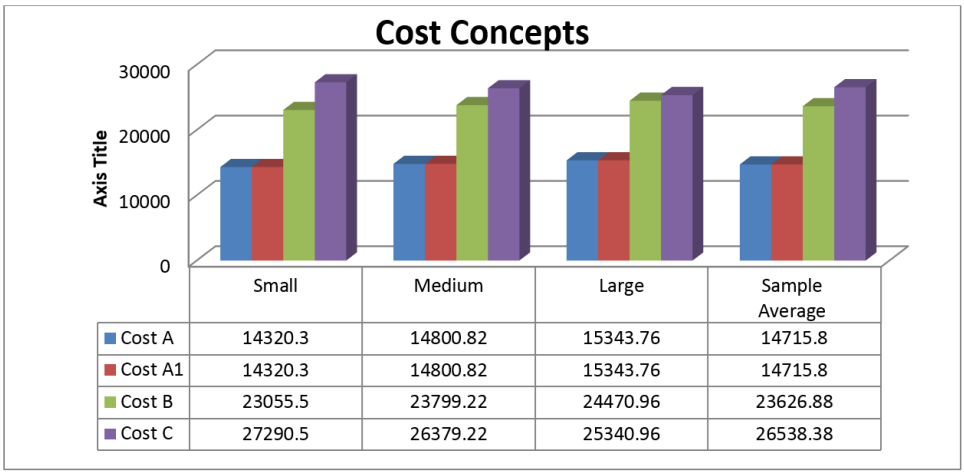

Fig 2: Cost Concepts in Soybean crop per hectare in different Size of Farms Group.

Income Measures

The sample average yield of soybean is observed as 10.55 quintals in the study area while the price of main product is Rs. 3600.00 per quintal. The per hectare net return depends on the per hectare yield of this crop as the price realized by farmers is not much varying across different categories. The net returns varied from Rs. 11952.50 per hectare at small farms, Rs. 13933.28 per hectare at medium farms to Rs.

16734.04 per hectare at large farms along with an sample average of Rs. 13718.78 per hectare. Farm business income in small, medium and large size of farms group was Rs. 24922.70/ha, Rs.25511.68 /ha and Rs.26731.24/ha respectively. Sample average for farm business income was Rs.25541.37 ha in different size of farms group. Sample average of Family labour income was Rs.16630.28/ha in different size of farms group. The input-output ratio is observed as 1:1.44 at small farms to 1:1.66 at large farms.

Table 5: Measures of Farm profit of sample farms: (Value in Rupees)

S. No.	Particulars	Size of Farms Group			Sample Average
		Small	Medium	Large	
1.	Gross return (Rs./ha)	39243.00	40312.50	42075.00	40257.16
2.	Net return (Rs./ha)	11952.50	13933.28	16734.04	13718.78
3.	Net return (Rs./qtl)	950.44	1101.97	1296.28	1080.74
4.	Farm investment income (Rs./ha)	20227.70	22236.68	25051.24	22012.82
5.	Family labour income (Rs./ha)	16187.50	16513.28	17604.04	16630.28
6..	Farm business income (Rs./ha)	24922.70	25511.68	26731.24	25541.37
	Input-output ratio	1:1.44	1:1.53	1:1.66	1:1.52

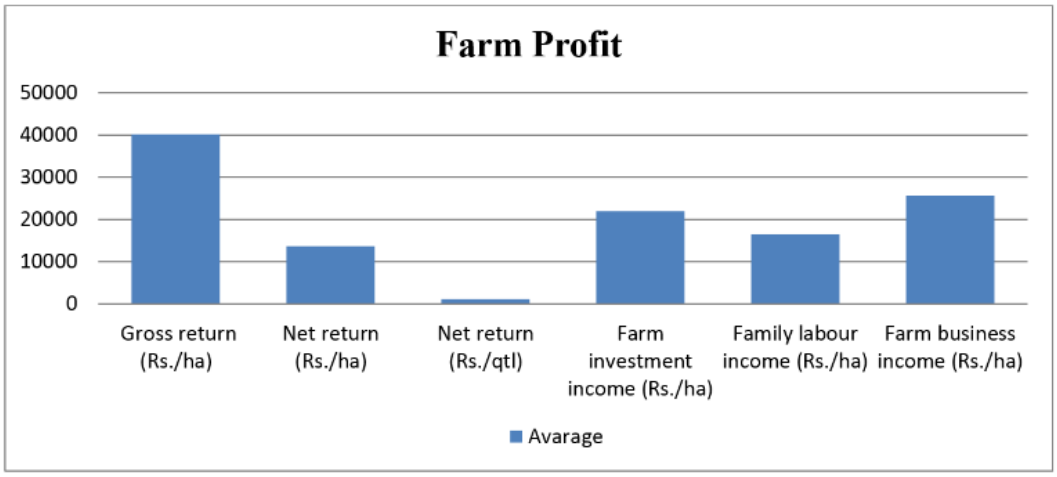

Fig 3: Measures of Farm profit in Soybean crop per hectare in of sample farms.

Marketing of soybeans

The area under Soybean cultivation per hectare for small size farms was 0.83 ha, 1.87 ha for medium size farms and 4.54 ha large size of farms group, which constituted on sample average of 2.05 ha respectively. Total production of Soybean in quintals was highest in large size farms (49.94 qu.) as compared medium (19.75 qu.) and was lowest in small size farms (8.55 qu.). The disposal pattern of actual Marketable surplus of Soybean in three different marketing channels i.e. channel I, channel II, channel III. Channel III was most prevalent adopted by the growers in the study area, as the highest percentage of the produce was transacted trough channel II i.e. 44.84 percent of growers followed by 34.25 percent through channel I and 20.51 percent through channel III respectively.

Marketing channels of soybean

There were three marketing channels for the soybean marketing in Chhuikhadan market given below:

Channel – I: Producer → Consumer

Channel – II: Producer → Village Merchants/ Retailers → Consumer

Channel – III: Producer → Commission Agents/ Wholesaler → Retailer → Consumer

Price spread, producer share in Consumers rupee and Marketing efficiency under different marketing channels of soybean.

The total marketing cost was higher in channel III (Rs. 384.00) Compared to channel I (Rs. 117.00) and channel II (Rs. 235.00). And the total marketing margin and price spread was also seen higher in channel III Rs. 635.00 and Rs. 1019.00 because in the channel III there are two intermediates, where as in the channel I and channel II there in only zero, and one intermediate. The producer share in consumer rupee was higher in channel I 96.75 percent and the market efficiency was higher in channel I 30.78 percent. compared to channel II (85.79 % and 8.84 %) and channel III (75.40 % and 4.53 %).

Table 6: Price spread, producer share in Consumers rupee and Marketing Efficiency under different marketing channels of soybean. (Value in Rupees/ha)

S. No.	Particular	Channel-I	Channel-II	Channel-III
1.	Total Marketing Cost	117.00 (3.25)	235.00 (6.16)	384.00 (8.31)
2.	Total Marketing Margin	-	225.00 (5.54)	635.00 (13.75)
3.	Price Spread	117.00 (3.25)	460.00 (11.33)	1019.00 (22.66)
4.	Producer share in Consumers Rupee (%)	96.75	85.79	75.40
5.	Marketing Efficiency	30.78	8.83	4.53

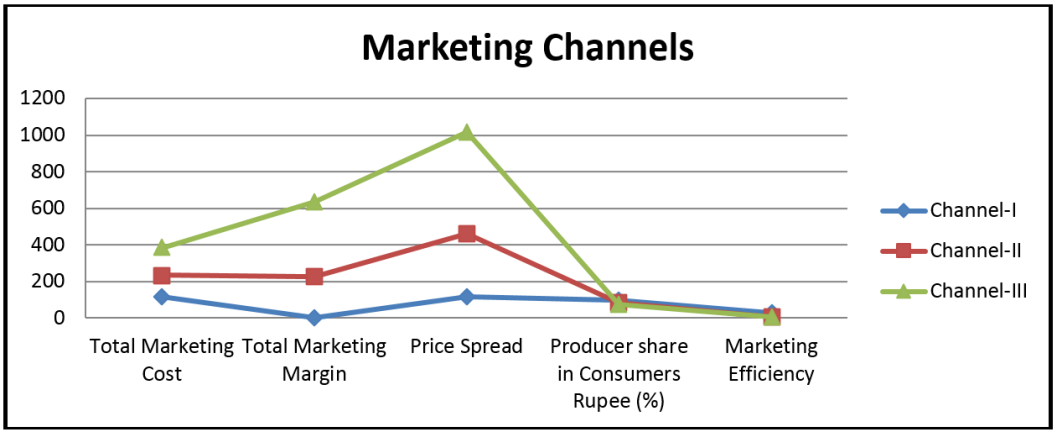

Fig 4: Different marketing channels of soybean

Constraints

Major constraints pertaining to cultivation of soybean were the further perceived that soil-testing facilities should be created by the Department of Agriculture at least block level in order to test the soil fertility of land. About 72.50 percent, Scarcity of labour during peak season 70 percent farmers faced this problem. And problems in marketing lack of implementation of support price in the villages are the major problem faced by soybean producers.

Conclusions

The study shows that the production and marketing of soybean in Rajnandgaon district. The main objective of the study is to analyze, socio economic characteristic of sample respondents, economics of soybean production, price spread and constraints in production and marketing of soybean. The results revealing that the socio economic status of the respondents found to be moderate with primary education, well economic back ground and greater access to all the assets. Economics of soybean production is more profitable in large size farms as compared to small size farms and medium size farms.

The study indicated that there is scope to increase the producer's share in consumer's rupee by making the market more effective so that the number of intermediaries is to be restricted and marketing costs and marketing margins to be reduced. This will be the way for making soybean cultivation more lucrative. Major constraints in production was Lack of sufficient soil testing facilities and Scarcity of labour during peak season and No implementation of support price in village sale among different farms size group followed by a huge price fluctuation was the major marketing constraint in soybean.

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