Socio-Economic Evaluation of Cropping Systems for Small Holder Farmers in Begusarai Dist. of Bihar - Challenges and Options

Sachin Rathour[2]*, Birendra Kumar[1], Meera Kumari[3] &Jaykar Singh[4]

[1]Department of Agricultural Economics & Statistics, CSAUA&T Kanpur -208002

[3]Department of Agricultural Economics, BAU, Sabour, Bhagalpur-813210

[2]Research Scholar, Department of Agricultural Economics & Statistics, CSAUA&T Kanpur -208002

[4]Research Scholar, Department of Agronomy, CSAUA&T Kanpur -208002

**Corresponding address- sachinrt86@gmail.com*

ABSTRACT

The exact identification of smallholder farmers varies widely worldwide depending on location and intensification of farming systems. Generally, a smallholder farmer is viewed as a person involved in farming a small piece of land, most of them do subsistence farming. In many localities, smallholder farmers practice mixed crop-livestock farming, whereby the number of large ruminants kept is around. Keeping this in mind, the present study was based on the analysis-Economic Evaluation of Cropping Systems for Smallholder Farmers in Begusarai Dist. of Bihar– Challenges and Options. The primary data of Socio-Economic Evaluation of Cropping Systems for Smallholder Farmers were collected from 120 farmers of Begusarai district from a cluster of three villages each from two blocks for the agricultural year 2020-21 through SRSWOR Technique and secondary data were collected from DES (Department of Economics and Statistics), Govt. of Bihar. Primary data on various aspects related to socioeconomic and personal characteristics were collected through personal interviews with help of a pre-tested interview schedule. It consists of information on age, education, size of family, size of operational holdings, prevailed cropping system, source of income, cost incurred on the cultivation of crops, gross income, net income received and farmer level constraints, etc. The sample was dominated by semi-medium farmers followed by medium, marginal & small, and large farmers. In the study area, observed that maize and wheat were the two most important crops in the cropping system. The cropping intensity on sample farms was 190 percent. It was found in order of category of farms, i.e. a minimum of 185 percent on marginal & small farms followed by 190, 195 and 193 percent on semi-medium, medium and large farms, respectively. It may be due to the land situation of the marginal & small farmers which restricts them from intensive farming. For the sake of nation and enhancement of small & Marginal Farmers income, there is a need to step up investment in agricultural research, education, extension to reach among an unreached section of society emphasizing quality of production and value addition.

Keywords: Small Holder farmers, cropping pattern, Cropping system, Income etc.

1. INTRODUCTION

India holds a top-ranking in the world not only in terms of rich diversity of oilseed crops but also in terms of area as well. Oilseeds occupy an important position in the Indian economy as they account for 14 per cent of the gross cropped area and contributing more than 4 per cent to the Gross National Product (GNP) as per Directorate of oilseed Development (DOD). India is the third largest rapeseed-mustard producer in the world after China and Canada with 16 per cent of world's total production. The area under rapeseed-mustard in the country was 6.23 Million hectares, produced about 9.34 million tonnes with 1499 kg/ha productivity during the year 2018-19. Bihar ranked ninth among the states, in rapeseed-mustard production, with a growth rate of 7.34% during the eighties whereas Rajasthan state with top ranked. It is the most important crops among oilseeds in terms of both area (0.08 million ha) and production (0.11 million tonnes) in Bihar. (DES, Government of Bihar Patna, 2018-19). Production of oilseeds and oils has not fluorescing with increasing demand for edible oils and due to this widening demand-supply gap has necessitated imports of edible oils. With competing demands on agricultural land from various crops and enterprises, the production of oilseeds can be increased only if productivity is improved significantly and farmers get remunerative prices and assured market access. However, farmers face various constraints in oilseeds production. For the Socio-Economic Evaluation the primary data were collected by using personal interview method. The study found that the sample was dominated by semi-medium farmers followed by medium, marginal & small and large farmers. In the study area, observed that maize and wheat were the two most important crops grown during Rabi season. The area under maize ranged from 0.68 ha on marginal & small farms to 4.61 ha on large farms with overall average of 2.56 ha. Moreover, the cropping intensity on sample farms was 190 per cent. It was found in order of category of farms, i.e. minimum of 185 per cent on marginal & small farms followed by 190, 195 and 193 per cent on semi-medium, medium and large farms, respectively. It may be due to land situation of the marginal & small farmers which restrict them from intensive farming. In the problems/constraints sides, they were facing the Unavailability of good Variety seeds, Severe Agro-ecological, technological, institutional, and socio-economic constraints, small holding, getting very low income from their cropping system that was adopted by growers, also inhibit exploitation of the yield potential of crops and need to be addressed. Taking into account the changing policy regarding small & Marginal Farmers, small holders, environment, input cost incurred, availability of nutrition by household, Low Income, to bridge gap between demand & supply should be address. Therefore the study attempts to analyze the Socio-Economic Evaluation of Cropping Systems for Smallholder Farmers in Begusarai District of Bihar – Challenges and Options.

2. RESEARCH METHODOLOGY

For the study of socio-economic status and cropping pattern under rapeseed-mustard growers were conducted in two blocks in Begusarai district of Bihar. Three villages from each block consisting of 20 rapeseed-mustard growers from each village were selected randomly. Thus, the data were collected from 120 farmers through a semi-structured interview schedule by using personal interview technique.

Table 1: Sampling framework

STAGE	STUDY (SAMPLE) UNIT	
I	Selection of District	Begusarai, District was Selected purposively, being major rapeseed-mustard growing district of the state.
II	Selection of Block	From the selected district, two blocks were selected randomly under rapeseed-mustard cultivation.
III	Selection of cluster/village	One cluster consisting of three villages were selected randomly from each selected block.
IV	Selection of Rapeseed-Mustard growers	Samples of rapeseed-mustard 20 growers were selected randomly from each cluster. Thus the total sample size was 120 for the study.

Source: ***www.dse.bih.nic.in***

The primary data were collected from selected rapeseed-mustard growers in study area. Primary data on various aspects related to socioeconomic status and personal characteristics were collected, It consists of information on age, education, size of family, size of operational holdings, size of land holding, cropping system, cropping Pattern, source of income, cost incurred on cultivation of crops, gross income, net income received, farmer level constraints or problems and challenges they were facing in production of rapeseed-mustard. The data consisting of the physical quantities viz., seed, manures, fertilizers, pesticides, weedicides, land preparation, human labour (family and hired), machine labour etc., and their costs, yield and price received were also collected from sample rapeseed-mustard growers for the crop grown during *Rabi Season* 2020. Thereafter data were compiled, tabulated, analysed and interpreted as per theme of the study.

2.2 Garrett Ranking Method : were used for analyzing the constraint according to the severity of the problem facing by household. In this method to the farmers the given rank 1 means most important problem and vice versa. In the next stage rank assigned to each reason by each individual were converted into per cent position by using the formula:

$$\text{Percentage Position} = 100\ (Rij - 0.5) / Nj$$

Where,

Rij = rank given for ith item by jth individual

Nj = number of items ranked by jth individual

The percentage position was then converted to Garrett Score using Garrett Ranking conversion table. The individual score then obtained were added and mean value were calculated and ranked in descending order.

3. RESULTS

The socio-economic characteristics of sample farmers of Begusarai districts have been presented the following sections:

3.1 Classification of sample farmers based on operational holding of rapeseed-mustard growers

The classification given by CACP in their manual used to categories the sample farmers based on operational holdings and presented below (Table 2). The respondents were further categories into marginal & small farmers having operational holding size less than equal to 2.0 ha, semi-medium farmers with holding size ranging from 2.0 ha to 4.0 ha and medium (4-10 ha) and large farmers (more than equal to 10 ha) and presented in the table 4.1. Table indicated that the out of total 120 sample farmers, 25 farmers were of marginal& small farmers (20.83 percent) followed by 49 farmers of semi-medium (40.83 percent) and 33 farmers were belonged to medium (27.5 percent) whereas only 13 farmers were large (10.84 percent) farmer's categories.

Table 2: Classification of sample farmers based on operational holding of rapeseed-mustard growers (ha)

Category of Rapeseed-Mustard farmers	Operational holding (ha)	Number of Farmers	
		Number	Percentage
Marginal & Small	Less than 2 .00 ha	25	20.83
Semi-Medium	2.00 - 4.00 ha	49	40.83
Medium	4.00 - 10.00ha	33	27.5
Large	More than 10.00ha	13	10.84
Total		120	(100.00)

3.2 Average size of land holding and area under rapeseed-mustard : The table 3 indicated that average total cultivated area of the four categories of sample rapeseed-mustard farmers were 0.57 ha, 1.07 ha, 1.08 ha and 2.73 ha, respectively with overall mean of 1.15 ha.

Table 3: Average size of Land holding for different categories of sample farmers (ha)

Particulars	Category of farmers				
	Marginal & Small	Semi-Medium	Medium	Large	Overall
	n_1=25	n_2=49	n_3=33	n_4=13	N=120
Owned Land	1.08	3.04	4.84	10.92	4.97
Leased-in Land	1.16	0.9	2.23	6.02	2.57
Leased-out Land	0.00	1.33	2.33	4.00	1.91
Operational holding	2.24 (100)	2.61 (100)	4.74 (100)	12.94 (100)	5.63 (100)
Area under Rapeseed-Mustard	0.57 (25.45)	1.07 (40.99)	1.08 (22.78)	2.73 (21.10)	1.15 (20.43)
Area under another crop	1.67 (74.55)	1.54 (59.01)	3.66 (77.22)	10.21 (78.90)	4.48 (79.57)

Note- Figure in Parentheses shows percent to total.

The table also revealed that marginal & small and semi-medium farmers were taken land on lease-in with an average of 1.16 and 0.9 ha, respectively while medium and large farmers leased out their land, with mean of 2.33 and 4.00 ha, respectively. The table also indicated that the large farmers devoted maximum area under rapeseed-mustard cultivation, followed by semi-medium, medium and small & marginal category of farmers. Area under another crop was in reverse order on four categories of farmers. On overall basis 20.43 per cent area were under rapeseed-mustard crop while 79.57 per cent under another crop such as wheat, maize, gram and other *Rabi season* crops.

3.3 CROPPING PATTERN ON SAMPLE FARMERS

Table-4 Cropping pattern on sample farmers (ha)

Particulars	Category of farmers				
	Marginal & Small	Semi-Medium	Medium	Large	Overall
	n_1=25	n_2=49	n_3=33	n_4=13	N=120
Net Area Sown	1.79	5.23	6.24	15.97	6.55
(A) Kharif					
Soybean	0.95	1.98	3.54	8.5	4.67
Rice	1.06	1.47	2.27	4	2.2
Maize	0.82	1.75	1.42	2.48	1.04
Total (A)	2.83	5.2	7.23	14.98	7.91
(B) Rabi					
Rapeseed-Mustard	0.33	1.18	1.38	2.73	1.32
Wheat	0.78	1.83	2.53	8.63	2.67
Maize	0.68	2.22	2.33	4.61	2.56
Total (B)	1.79	5.23	6.24	15.97	6.55
(C) Zaid					
Green gram	0.5	1.63	1.31	2.5	1.36
Total (C)	0.5	1.63	1.31	2.5	1.36
Gross Cropped Area (A+B+C)	4.62	10.93	13.97	31.95	14.96
Cropping Intensity (%)	185	190	195	193	190

The table 4 showed that maize and wheat were the two most important crops grown during *Rabi* season in the study area. The area under maize ranged from 0.68 ha on marginal & small farms to 4.61 ha on large farms with overall average of 2.56 ha. Moreover, the cropping intensity on sample farms was 190 per cent. It was found in order of category of farms, i.e. minimum of 185 per cent on marginal & small farms followed by 190, 195 and 193 per cent on semi-medium, medium and large farms, respectively. It may be due to land situation of the marginal & small farmers which restrict them from intensive farming.

3.4 Area under rapeseed-mustard varieties grown on sample farmers : The table 5 represented area (ha) under different rapeseed-mustard and varieties cultivated by sample farmers. It was observed that overall share of local variety was 66.03 per cent while Varuna, Pusa Jai Kisaan, Pusa bold, & others varieties was cultivated on 46.32 per cent area. It may also be inferred from the table that marginal & small and semi-medium category of farmers preferred local Varieties (85.31 % & 73.52 %) while medium farmers preferred both varieties (69.48 %) and the large farmer preferred to grow improved varieties (54.08 %).

Table 5: Area under rapeseed-mustard varieties on sample farmers (ha)

Name of the Variety	Category of farmers				
	Marginal & Small	Semi-Medium	Medium	Large	Overall
	n_1=25	n_2=49	n_3=33	n_4=13	N=120
Local	12.20 (85.31)	38.75 (73.52)	24.68 (69.03)	16.03 (45.92)	91.66 (66.03)
Varuna, Pusa bold & others	2.10 (14.68)	13.95 (26.47)	11.07 (30.97)	19.20 (54.08)	46.32 (33.97)
Total area of Rapeseed-Mustard cultivated	14.30 (100.00)	52.70 (100.00)	35.75 (100.00)	35.50 (100.00)	138.25 (100.00)

Note- Figure in Parentheses shows percent to total.

3.5 Problems and Challenges faced by different categories of rapeseed-mustard sample farmers: The constraints faced by different categories of sample farmers are presented in table 4.13 the marginal & small farmers faced lack of improved varieties of seed as the most important constraint (GS: 89.96) followed by high transportation cost (GS: 77.20), agro-ecological constraints (GS:71.68), high fluctuation in market prices (GS: 63.96) and lack of subsidy on inputs (GS:58.76). On overall basis the first two most important constraints were lack of improved varieties of seed and high transportation cost with Garrett score of 89.3 and 76.58, respectively and sample farmers also reported about cost and non-availability of quality seeds on time, because of this most of the farmers use their local seeds. Agro-ecological constraints, high fluctuation in market prices were next two important constraints on overall basis. Lack of subsidy on inputs for rapeseed-mustard cultivation ranked 5th constraint (GS: 53.27). With respect to problems of marketing, the lack of market information ranked 6th with Garrett Score 49.92 and high fluctuation in market prices ranked 4th with Garrett Score 63.2 of the sample farmers.

Problems of weed management and High pest & disease Incidence were ranked as 10th and 11th constraint with Garrett Score of 38.75 and 35.13, respectively in cultivation of rapeseed-mustard by the sample farmers. Lack of marketing facilities in rural area, Fertilizers and nutrients management, Lack of co-operative and Lack of storage facilities in rural areawere the least concerned constraint as these facilities and inputs were available in plenty along the study area, therefore the sample farmers ranked them as 12th, 13th, 14th and 15th with Garrett Score of 35.13, 32.59, 30.72 and 30.31, respective.

Table-6 : Major Problems faced by sample farmers in rapeseed-mustard cultivation

Source: Compiled by Author (Year 2020-21)

Sl. No	Farmers level constraints of rapeseed-mustard Growers	Overall (N= 120)	
		Garrett Score	**Rank**
1.	Lack of Improved varieties of seed	89.3	1
2.	High transportation cost due to small quantity	76.58	2
3.	Agro-ecological constraints	72.06	3
4.	High fluctuation in market prices	63.2	4
5.	Lack of Subsidy on inputs	53.27	5
6.	Lack of market information	49.92	6
7.	LabourAvalibility	49.62	7
8.	Long distance of regulated market	48.8	8
9.	Low market price	44.32	9
10.	Problems of Weed Management	38.75	10

4. DISCUSSION

The total cultivated area of the four categories of sample farmers was 2.24, 2.61, 4.74, and 12.94, respectively with overall mean of 5.63 ha (Table 4.5). The marginal & small and semi-medium farmers had taken land on lease with an average area of 1.16 and 0.9 ha, respectively while semi-medium and medium farmers leased out their land, with an overall mean of 1.33 and 2.33 ha, respectively, which is obvious because the medium and large farmers normally lease out their land due to larger fragmented area. The average area under rapeseed-mustard ranged from 0.57 ha on marginal & small farms to 2.73 ha on large farms with overall average as 1.15 ha. The semi-medium farmers devoted maximum (40.49 per cent) area under rapeseed-mustard cultivation, while marginal & small, medium and large category of farmers allocated 25.45, 22.78 and 21.10 percent area under rapeseed-mustard cultivation, respectively. This clearly indicating that agro-ecology was not appropriate for cultivation of rapeseed-mustard at large scale as only 21.10 percent of total area were devoted by large farmers on cultivation of rapeseed-mustard crop.

The cropping intensity on sample farms was 185 per cent. It was found in order of category of farms, i.e. minimum of 190 per cent on marginal farms and semi medium farmers followed by 195 and 193 per cent on medium and large farms, respectively. It may be due to inability of marginal & small farmers as well as semi-medium farmers to adopt intensive farming due to land situation. The cropping intensity was usually high i.e. 185 percent indicating that farmers of study area were using double cropped in which farmers were cultivating rapeseed –mustard based or other crops based farming system.

It was observed that Local varieties were important rapeseed-mustard varieties cultivated on 66.03 per cent area by the sample farmers it may be due to unavailability of improved seed varieties. It was also revealed that marginal & small (85.31 per cent) and semi-medium farmers (73.52 per cent) preferred Local traditional varieties while medium and the large farmer preferred to grow both varieties equally.

5. CONCLUSION

Overall the study observed that the socio-economic status of rapeseed-mustard growers in study area along with Bihar state is below average but rapeseed-mustard crop production having the potential to bridge the gap between demand and supply of edible oils. However, Inclusion of rapeseed-mustard cultivation in cropping system may improve the living standard of household. It's thrust area to conduct study in the field of oilseeds crops. Instead of having the great opportunities in the cultivation of oilseeds crops, farmers in the study area are more likely to prefer to grow bold cereals crops- mostly 'Rabi Maize', farmers are not giving priority to oilseeds crops (Rapeseed-Mustard) it may be due to the shortage or unavailability of improved varieties of seeds (As per table 6). Thus, these findings will be useful for rapeseed-mustard growers to prefer IVS (Improved Varieties of Seeds) instead of Local Seeds from research stations or KVKs. The finding may also be useful for efficient utilization of resources to reduce the cost of cultivation of rapeseed-mustard. As well as, the technology should be targeted in these areas as cost effective or/ less costly than the competitive crop so that the farmers could get the net returns equivalent to that they get from the competitive crops especially from wheat and maize so that they can rise their social status.

REFERENCES

Naresh Prasad, N., Kumar, M., Pande, Y.K., Soni, S., Saha N., Chand, S. and Arya (2019) *Socio-Economic Status and Problems Faced by Dairy Farmers of Sardhana Block of Meerut District.* International Journal of Livestock Research. 9(4), 120-128

Gound, R.S., Anuradha, T., Kamraju, M. and Vani, M. (2017) *Socio-Economic Conditions of Farmers: A case study of Warangal District.* International Journal of Engineering Research. 5 (4)

Ali, M. and Kumar, V. (2014) A Study on socio economic status of farmers practicing organic farming in estern dry zone of Karnataka Ananthnag. Journal of Bioscience and Informatics. 2320-2930

Khoza, T.M., Senyolo, G.M., Mmbengwa, V.M. &Soundy, P. (2019) *Socioeconomic factors influencing smallholder farmers' decision to participate in agro-processing industry in Gauteng province, South Africa.* Cogent Social Sciences, 5:1, 1664193

Badekhan, A. and Devi, K.U. (2018) *The Socio-economic Status of Cotton Farmers and their Attitude Towards Pesticide Use.* Economic Affairs. 63, 4, 883-889

Ashutosh Kolte , B., Deshmukh ,S., and Gidwani, M. (2019) *Socio- Economic state of Farmers in the state of Maharashtra*. ADALYA JOURNAL Volome 8, Issue 8, : 1301-2746

Gayathri H., Chakrabarty Y.S. and PG Scholar Agril.Eco. (2021) *Economics of Rapeseed-Mustard in Imphal West District of Manipur.* Indian Res. J. Ext. Edu. 21(1).

Sarkar M.A., Rahman H., Haque M.R., Islam S.and Sultana R. (2020) *An Economic Study of the Oilseed Mustard Variety Binasarisha-4 Production in Some Selected Areas of Bangladesh.* Saudi Journal of Economics and Finance, DOI: 10.36348/sjef.2020.v04i11.001

Sharma S., Raghuwanshi J.S. and Srivastava S.C. (2018) *An Economic Analysis of Costs and Returns of Rapeseed and Mustard Production in Morena District of Madhya Pradesh.* Journal of Community Mobilization and Sustainable Development, Vol. 13(3), 475-482.

Sahu, Kumar P., Kant K., Pratap H. and Singh C. (2018) *Cost of Cultivation of Mustard Crop in Fatehpur District of Uttar Pradesh.* International Journal of Current Microbiology and Applied Sciences (IJCMAS) 7(08): 3356–61.

Sonvanee O.P. and Pathak H. (2016) *An Economic Analysis of Production and Marketing in Rapeseed-Mustard Crops in bastar plateau of chhattisgarh India.* Plant Archives 16(1): 37–44.

Sharma V .P., et al. (2014). Study *the cost of cultivation and Net income of Mustard in different farm size groups on the fields.* Plant Archives Vol. 15 No. 2, 2015 pp. 841-842

Web references

Agricultural Statistics at a Glance (2019) Ministry of Agriculture and farmers welfare, Government of India. : 72-73 available at https://eands.dacnet.nic.in/PDF/At%20a%20Glance%202019%20Eng.pdf (accessed on 2 feb. 2021)

Directorate of Economics and Statistics, Government of Bihar. (2019) Area , Production & Yield of Oil Seeds during year 2018-19. (1)Farmers Welfare, Government of India. Available at https://state.bihar.gov.in/krishi/SectionInformation.html?editForm&rowId=982 (accessed on 4 Feb. 2021)

■■■