



## Research Article

# TEMPORAL CHANGES IN ECONOMICS OF SESAMUM IN SAURASHTRA REGION

KATARA R.P.\* AND KHUNT K.A.

Department of Economics, College of Agriculture, Junagadh Agricultural University, Junagadh, 362 001, India

\*Corresponding Author: Email - rekha.katara96@gmail.com

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**Abstract:** The present study was undertaken with the main objectives viz; to assess the temporal changes in cost and return and problems faced by the farmers. The study was conducted in Junagadh and Rajkot districts of the Saurashtra region of Gujarat. Total 120 sesamum growers. i.e. 60 *kharif* and 60 summer sesamum growers were selected for the study. The secondary data were collected for the period 1995-96 to 2018-19 and 2010-11 to 2018-19 for analysis of growth rate of *kharif* and summer sesamum, respectively. The compound growth rate and Garrett's ranking technique were used to analyze the collected data. The trend in input use and return from *kharif* and summer sesamum revealed that use of family labour declined significantly over a period in quantity in *kharif* as well as summer sesamum, while in value term, significant increase was observed only in *kharif* sesamum. The average net profit observed more than double in case of summer sesamum when compared with *kharif* sesamum. In Junagadh district, the major problems faced by farmers in cultivation of *kharif* and summer sesamum were; the lack of irrigation facilities in summer, lack of new technology and extension support and lack of availability of quality seeds. In case of Rajkot district, the lack of new technology and extension support and lack of availability of quality seeds were common problems faced by farmers in cultivation of *kharif* and summer sesamum.

**Keywords:** Sesamum, Growth rate and economics

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## Introduction

Sesamum (*Sesamum indicum* L.) is an ancient oil yielding crop and popularly known as 'Queen of Oilseeds'. Sesamum belongs to Tubiflorae order and Pedaliaceae family. It is one of the ancient oil seed crops originated in Africa and also one of the earliest domesticated plants. Sesamum is also known as Gingelly and sesame in English, Tila and Snehpala in Ayurveda, Til and Kunjad in Unani. India produces a wide range of sesamum varieties with different grades each peculiar to the region. Sesamum is harvested twice a year and is available around the year. Sesamum has been classified in different colours viz; white seed, yellow seed, red seed, brown seed and black seed. Sesamum ranks third in production among the oilseed crops. The major oilseeds grown in the country on 246.05 lakh ha and producing 31.82 million tonnes of total oilseed [1]. Sesamum is cultivated over an area about 99.83 lakh ha in the world with an annual production of 55.31 lakh tonnes and yield of 5541 kg/ha. The largest producer of sesamum seeds in 2017 was Myanmar [2]. India account for the largest area under sesamum cultivation in the world, contributing nearly 25 per cent to international trade. Japan is the largest importer in world. India has the largest acreage but per hectare yield is comparatively lower than that obtaining in other countries. Hence, the emphasis has been on increasing the seed yield and stability of lines to different agro climatic conditions. India is one of the largest exporters of sesamum seeds exporting 3,25,908 tonnes of seeds annually [3]. Gujarat is the only state which has an Agri-Export Zone (AEZ) for sesamum seeds in the country. Amreli, Bhavnagar, Surendranagar, Rajkot and Jamnagar form part of the AEZ for sesamum seeds. In Gujarat, total area under oilseeds crops is about 28.00 lakh ha and producing 5.86 million tonnes with productivity of 2123 kg/ha [4]. The sesamum crop is cultivated under 1.76 lakh ha and produces about 8.36 lakh tonnes with productivity of 469.59 kg/ha [5]. In which major area of sesamum is confined to Surendranagar, Junagadh, Jamnagar, Amreli, Rajkot, Kutch, Devbhumi Dwarka and Mehsana districts of the state.

Keeping this in view, the present study was undertaken with following specific objectives:

## Objectives

To study temporal changes in economics of *kharif* and *summer* sesamum crop  
To identify the problems faced by farmers in cultivation of sesamum crop

## Materials and Methods

The study was conducted in Junagadh and Rajkot district of the Saurashtra region of Gujarat. It was selected based on three years average cultivated area of sesamum crop. This occupied highest area of sesamum in Junagadh followed by Rajkot district of the state. Therefore, Junagadh and Rajkot districts were selected purposively for the study. Purposive sampling technique was used to select the two districts of Saurashtra region. Two talukas were selected from each selected districts. This was followed by random selection of 15 *kharif* and 15 *summer* sesamum growers from each selected talukas. Thus, total 120 sesamum growers. i.e. 60 *kharif* and 60 *summer* sesamum growers were selected for the study.

## Nature and source of data

The questionnaire comprised of factors considered by farmers for allocation of acreage under sesamum crop and their production constraints. The survey was conducted during 2017-18. The secondary data were collected for the period 1995-96 to 2018-19 and 2010-11 to 2018-19 for analysis of growth rate of *kharif* and *summer* sesamum, respectively.

## Tools and techniques used

The compound growth rates (CGRs) of area, production and productivity of sesamum were estimated by using the exponential function of the following specification:

Table-1 The changes in cost and return over the period in kharif and summer sesamum in Gujarat (CGR %/annum)

S	Particulars	Kharif 1995-96 to 2017-18		Summer 2009-10 to 2017-18	
		Physical unit	Value (Rs)	Physical unit	Value (Rs)
1	Human labour:				
	Family (man days)	-0.55 **	8.06 **	-1.67**	-7.53
	Hired (man days)	1.11**	10.03 **	-1.67**	7.62**
2	Bullock labour (pair days)	-5.61**	3.20**	-13.97	-4.52
3	Seeds (kgs)	3.95*	10.53**	1.87**	7.06**
4	Manures (kgs)	-6.23	6.01 *	-18.5	-9.02
5	Chemical fertilizers (kgs)				
	Nitrogen	3.27 **		4.25**	
	Phosphorus	0.33**		-0.21**	
	Potash	11.25		2.56	
			5.91**		9.31**
6	Irrigation		-19.48		7.4**
7	Insecticide/pesticide		10.6**		2.91**
8	Miscellaneous cost		21.07**		15.41**
9	Interest on owned fixed capital		5.19*		3.74**
10	Cost A		8.22**		7.51**
11	Cost C <sub>2</sub>		8.13**		7.57**
12	Yield of main product (qn/ha)	0.72**		0.73**	
13	F.H.P. of main product (Rs/qn)		7.99**		3.98**
14	Gross income (Rs/ha)		8.69**		3.9**
15	Return per hectare over:				
	Cost A (Rs/ha)		9.11*		3.34*
	Cost C <sub>2</sub> (Rs/ha)		10.40		0.00
16	Cost of production				
	Cost A (Rs/qn)		7.68**		6.73**
	Cost C <sub>2</sub> (Rs/qn)		7.46**		1.67**
17	Input- output ratio				
	Cost A		0.42 **	-2.58**	

Note: \*\* and \* indicate statistically significant at 1 %, and 5 %, respectively, CGR: Compound growth rate

Table-2 The economic behaviour of kharif and summer sesamum crop in Gujarat

Kharif (1995-96 to 2017-18)			Summer (2009-10 to 2017-18)		
Net income Range (Rs./ha)	Year (23)	Average Income (Rs./ha)	Net income range (Rs./ha)	Year (9)	Average Income (Rs./ha)
Year of loss	3 (0.13)	-750.33	Year of loss	0 (0.00)	-
01-4000	12 (0.52)	2119.50	01-9000	1 (0.11)	6911.00
4001-8000	3 (0.13)	4742.67	9001-18000	2 (0.18)	11818.00
8001-12000	2 (0.08)	9427.00	18001-27000	2 (0.18)	20321.00
12001-16000	1 (0.04)	14324.00	27001-36000	3 (0.33)	30154.00
16001-20000	1 (0.04)	18240.00	36001-45000	1 (0.11)	45004.00
20001-24000	1 (0.04)	23698.00	-	-	-

$$Y_t = ab^t \quad (1)$$

Where,

$Y_t$  = Dependent variable (area / production / yield)

$t$  = Time variable in years taking the value of 1, 2, 3, ..., n

$a$  = Intercept

$b$  = Regression coefficient (1+r)

$r$  = Compound growth rate.

Subsequently, the compound growth rate (%) was computed as under:

$$\text{Compound growth rate (r)} = [(Antilog of \log b) - 1] \times 100 \quad (2)$$

The Garrett's ranking technique is adopted to analyze the problems faced in the production of sesamum and its marketing using the following formula separately for both the production and the marketing problems.

$$\text{Percent position} = 100 * (R_{ij} - 0.5) / N_j$$

Where,

$R_{ij}$  = Rank given for  $i^{\text{th}}$  factor (constraint) by  $j^{\text{th}}$  individual

$N_j$  = Number of factors (constraints) ranked by  $j^{\text{th}}$  individual

The relative position of each rank obtained from above formula was converted into scores by referring to the table given by Garrett and Woodworth in 1969 (transmutation of orders of merit into units of amount of scores) for each factor scores of all individuals was added and then divided by the total number of respondents for the specific factor (constraint) attributes.

## Results

The changes in expenditure on labour and inputs, incomes and input-output ratio over the period in *kharif* and *summer* in Gujarat, are presented in [Table-1]. The results revealed that use of family labour declined significantly over a period in quantity in *kharif* as well as *summer* sesamum, while in value term, significant increase was observed only in *kharif* sesamum. This might be due to the increase in wage rate in *kharif* season, because of high demand for labour especially in *kharif* season. In case of quantity of hired human labour utilization, the significant increase was observed in *kharif* sesamum but significant decrease was noticed in *summer* sesamum. But the expenditure on hired human labour showed significant increase in both *kharif* and *summer* sesamum. This indicated the shifting of family labour from the agriculture and rising of agricultural wage rate. In the *kharif* and *summer* sesamum, the use of bullock labour was declined but it declined significantly over a period in term of quantity in *kharif* sesamum. While in value term, significantly increase was observed only in *kharif* sesamum. This indicated the rise in rate of bullock labour. The utilization of seed has increased significantly in terms of quantity and value in both *kharif* and *summer* sesamum. But the highest increase was observed in *kharif* season compared to *summer* season which might be due to the failure of germination because of water logging condition, insect, pest and disease in *kharif* sesamum. The cost of manure was increased significantly in *kharif* sesamum because of rise in price of FYM which might have decreased the use of FYM. The use of nitrogen in quantity increased significantly in both *kharif* and *summer* sesamum. The positive increase in quantity of phosphorus was observed in *kharif* sesamum but it decreased significantly in *summer* sesamum.

The consumption in NPK in value term increased significantly in both *kharif* and *summer* sesamum. The cost of irrigation increased significantly in *summer* crop only which is quite obvious. The cost of insecticide or pesticide increased significantly in both *kharif* and *summer* sesamum but, it was found higher in *kharif* sesamum because the problems of insect, pest and disease is generally severe in the *kharif* sesamum. In case of the cost of miscellaneous, a significant increase was observed in both *kharif* and *summer* sesamum. The cost on interest on owned fixed capital increased significantly in *summer* sesamum. The cost A which is paid out cost, increased significantly in both *kharif* and *summer* sesamum indicated increase in use of purchased inputs rather than inputs produced on own farm. The positive growth in cost  $C_2$  was observed which was higher than the growth of FHP at the same time increase in yield observed less than one per cent in both the *kharif* and *summer* crops. This shows the pessimistic economics of sesamum crop in Gujarat. The details of years of profit and loss and average profit of *kharif* and *summer* sesamum crop in Gujarat are given in [Table-2]. The results showed that in *kharif* sesamum, income varied from loss of Rs. -750.33/ha to Rs. 23698 indicated the high variation. It meant cultivation of sesamum is risky. Whereas, in *summer* sesamum, variation in net income observed relatively in narrow range i.e. from Rs. 6911 to Rs. 45004 and average income also found higher as compared to *kharif* sesamum. This might be due to assured irrigation facility and better crop management in *summer* sesamum. The figures in parenthesis indicate the probability of profitability of *kharif* and *summer* sesamum. The highest probability of profit in *kharif* sesamum is in range of Rs. 1-4000/ha. The probability of loss in *kharif* sesamum is 0.13. The probability of obtaining the highest profit in range of Rs. 20001 to 24000 is only 0.4. In *summer* sesamum the probability of loss is zero. The probability of getting profit in *summer* sesamum in the range of Rs. 27001 to 36000 is the highest (0.33). The probability of obtaining the highest net profit i.e. from Rs. 36001 to 45000 is only 0.11. On the whole, as far as the net income is concerned, much variation is observed in case of *kharif* as compared to *summer* sesamum indicated the high risk in *kharif* sesamum cultivation. The average net profit observed more than double in case of *summer* sesamum when compared with *kharif* sesamum.

#### Problems faced by farmers in cultivation of *kharif* and *summer* sesamum

Problems faced by farmers in cultivation of *kharif* sesamum in Junagadh district are ranked using Garret ranking analysis. The problems associated with cultivation of *kharif* sesamum are presented in [Table-3].

Table-3 Problems faced by farmers in cultivation of *kharif* sesamum of Junagadh district

S	Attributes	Total score	Garrett's score	Rank
1	Lack of availability of quality seeds	1956	65.2	3
2	Lack of new technology and extension support	1966	65.53	2
3	Lack of adequate irrigation facilities in summer	2001	66.7	1
4	Problems of insect, pest and disease	1671	55.7	4
5	Weather abnormalities	1088	36.26	8
6	Lack of labour availability and storage facilities	1359	45.3	5
7	Lack of price information	1256	41.86	6
8	High fluctuation in market price of sesamum	1248	41.6	7
9	Delaying payment by traders	985	32.83	9

The results revealed that among the nine different cultivation problems faced by the sesamum respondents, the lack of adequate irrigation facilities in *summer* was major problems expressed with a Garrett's score of 66.7 (Rank-I) followed by lack of new technology and extension support (65.53), lack of availability of quality seeds (65.2), problems of insect, pest and disease (55.7), lack of labour availability and storage facilities (45.3), lack of price information (41.86), high fluctuation in market price of sesamum (41.6), weather abnormalities (36.26) and delaying payment by traders (32.83). Problems faced by farmers in cultivation of *kharif* sesamum of Rajkot district are ranked using Garret ranking analysis. The problems associated with cultivation of *kharif* sesamum are presented in [Table-4]. The results revealed that among the nine different cultivation problems faced by the sesamum respondents, the lack of new technology and extension support was main problems expressed with Garrett's score of 65.1 (Rank-I) followed by lack of availability of quality seeds (60.2), problems of insect, pest and disease (52.1), lack of price information (49.2), weather abnormalities (47.83), lack of adequate irrigation facilities in *summer* (47.46), lack of labour availability and storage

facilities (46.4), delaying payment by traders (41.9) and high fluctuation in market price of sesamum (40.26). Problems faced by farmers in cultivation of *summer* sesamum of Junagadh district are ranked using Garret ranking analysis. The problems associated with cultivation of *summer* sesamum are presented in [Table-5].

Table-4 Problems faced by farmers in cultivation of *kharif* sesamum of Rajkot district

S	Attributes	Total score	Garrett's score	Rank
1	Lack of availability of quality seeds	1806	60.2	2
2	Lack of new technology and extension support	1953	65.1	1
3	Lack of adequate irrigation facilities in summer	1463	47.0	6
4	Problems of insect, pest and disease	1563	52.1	3
5	Weather abnormalities	1435	47.83	5
6	Lack of labour availability and storage facilities	1392	46.4	7
7	Lack of price information	1476	49.2	4
8	High fluctuation in market price of sesamum	1208	40.26	9
9	Delaying payment by traders	1257	41.9	8

Table-5 Problems faced by farmers in cultivation of *summer* sesamum of Junagadh

S	Attributes	Total score	Garrett's score	Rank
1	Lack of availability of quality seeds	1819	60.63	3
2	Lack of new technology and extension support	1803	60.1	2
3	Lack of adequate irrigation facilities in summer	1899	63.3	1
4	Problems of insect, pest and disease	1606	53.53	4
5	Weather abnormalities	1180	39.33	8
6	Lack of labour availability and storage facilities	1361	45.36	6
7	Lack of price information	1303	43.43	7
8	High fluctuation in market price of sesamum	1425	47.5	5
9	Delaying payment by traders	1104	36.8	9

The results revealed that among the nine different cultivation problems faced by the sesamum respondents, the lack of adequate irrigation facilities in *summer* was major problems expressed with a Garrett's score of 63.3 (Rank-I) followed by lack of new technology and extension support (60.1), lack of availability of quality seeds (60.63), problems of insect, pest and disease (53.53), high fluctuation in market price of sesamum (47.5), lack of labour availability and storage facilities (45.36), lack of price information (43.43), weather abnormalities (39.33) and delaying payment by traders (36.8). Problems faced by farmers in cultivation of *summer* sesamum of Rajkot district are ranked using Garret ranking analysis. The problems associated with cultivation of *summer* sesamum are presented in [Table-6].

Table-6 Problems faced by farmers in cultivation of *summer* sesamum crop of Rajkot

S	Attributes	Total score	Garrett's score	Rank
1	Lack of availability of quality seeds	1647	54.09	2
2	Lack of new technology and extension support	1897	63.23	1
3	Lack of adequate irrigation facilities in summer	1412	47.06	7
4	Problems of insect, pest and disease	1454	48.46	5
5	Weather abnormalities	1326	44.02	8
6	Lack of labour availability and storage facilities	1460	48.66	4
7	Lack of price information	1551	51.07	3
8	High fluctuation in market price of sesamum	1271	42.36	9
9	Delaying payment by traders	1447	48.23	6

The results revealed that among the nine different cultivation problems faced by the sesamum respondents, the lack of new technology and extension support was major problem expressed with a Garrett's score of 63.23 (Rank-I) followed by lack of availability of quality seeds (54.9), lack of price information (51.7), lack of labour availability and storage facilities (48.66), problems of insect, pest and disease (48.46), delaying payment by traders (48.23), lack of adequate irrigation facilities in *summer* (47.06), weather abnormalities (44.02) and high fluctuations in market price of sesamum (42.36). On the whole, in Junagadh district, the major problems faced by farmers in cultivation of *kharif* and *summer* sesamum were; the lack of irrigation facilities in *summer*, lack of new technology and extension support and lack of availability of quality seeds. In case of Rajkot district, the major problems faced by farmers in cultivation of *kharif* sesamum were; the lack of new technology and extension support, lack of availability of quality seeds and problems of insect, pest and disease.

In *summer* sesamum of Rajkot district, the major problems faced by farmers in cultivation of *summer* sesamum were; the lack of new technology and extension support, lack of availability of quality seeds and lack of price information. In case of Rajkot district, the lack of new technology and extension support and lack of availability of quality seeds were common problems faced by farmers in cultivation of *kharif* and *summer* sesamum.

### Conclusion

In nut shell, The family labour utilization has decreased in sesamum cultivation. The profitability has grown positively over a period of time, but *summer* sesamum cultivation found more profitable than *kharif* sesamum. The major constraints in *kharif* and *summer* sesamum are the lack of irrigation facilities in *summer*, lack of new technology and extension support and lack of availability of quality seeds.

**Application of research:** Provision should be made for adequate availability of quality seeds to increase farm profitability. To overcome the problem related to lack of technical guidance, there is a need for integrated efforts on the part of extension agency and university in research and development as well as transfer of technology for better reach out to farming community. To overcome the problems related to delayed payments, there is a need on the part of APMC to have strict regulation of practices to ensure prompt receipts of sale proceeds by the farmers.

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**Study area / Sample Collection:** Junagadh and Rajkot, Gujarat, India

**Cultivar / Variety / Breed name:** Sesamum (*Sesamum indicum* L.)

**Conflict of Interest:** None declared

**Ethical approval:** This article does not contain any studies with human participants or animals performed by any of the authors.

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### References

- [1] Agriculture Statistics at a Glance (2018) Available at <http://ends.decnnet.in>. Last accessed on 23<sup>th</sup> August, 2019.
- [2] Food and Agriculture Organization of the United Nations (FAO) (2017) <http://faostat.fao.org/site/339/default.aspx>. Last accessed on 22<sup>th</sup> April, 2019.
- [3] Food and Agriculture Organization of the United Nations (FAO) (2016) <http://faostat.fao.org/site/339/default.aspx>. Last accessed on 5<sup>th</sup> October, 2018.
- [4] Agriculture Statistics at a Glance (2018) Available at <http://ends.decnnet.in>. Last accessed on 23<sup>th</sup> August, 2019.
- [5] Directorate of Agriculture, Government of Gujarat, Gandhinagar (2016) Available at <https://dag.gujarat.gov.in>. Last accessed on 20<sup>th</sup> August, 2018.