

Growth Rates and Relative Contributions of Different Components towards the Production of Oil-seed Crops in Gujarat

R L Shiyani and B K Jha

Division of Dairy Economics, Statistics and Management, NDRI, Karnal - 132 001 India

Abstract An attempt has been made in this paper to study the compound growth rates in area, production and productivity of major oil-seeds viz. groundnut, sesamum, castor and rapeseed mustard of the Gujarat. To measure the relative contribution of area, yield and prices in increase of oilseeds production, decomposition analysis has been carried out. The study is based on secondary data collected for the period from 1966-67 to 1989-90. The results revealed that the productivity of groundnut and sesamum remained almost stagnant in all the districts under study, while the area, production and productivity of castor and rapeseed mustard increased significantly. The Kutch district was an exception in both the cases. Decomposition analysis revealed that the price factor individually contributed the most to increases in the production of groundnut and sesamum, whereas the combination of yield, more area and better price gave positive growth impact for castor and rapeseed-mustard.

Key words Growth rates, Contribution, Components, Oil-seed crops

In spite of the fact that India is the largest grower of oil-seed crops, it is also one of the biggest importers of edible oils in the world. In fact import of edible oils has become very significant in terms of foreign exchange outflow and therefore, the oil-seeds crops have attracted the attention of the policy makers, technologists and also the economists of our country.

Despite the fact that Gujarat has earned the distinction of being a trend setter in oil-seeds, it had nearly 21.3% of the total cropped area under oil-seed crops in 1970-71 which increased to 31.22% in 1990-1991. Very little efforts have been made to measure the relative contribution of area, yield and farm harvest prices to the increase of oil-seeds production, particularly in Gujarat. The present study is, therefore, an attempt to analyse and discuss the growth rates and relative contributions of different components towards the production of oil-seed crops in Gujarat.

Materials and Methods

The secondary data on area, production, yield and farm harvest prices of four major oil-seeds viz., groundnut, sesamum, castor, and rapeseed mus-

tard were collected for the period 1966-67 to 1989-90 from the Directorate of Agriculture, Gujarat Ahmedabad. The Amreli, Bhavnagar, Jamnagar, Junagarh, Kutch, Rajkot and Surendranagar districts account for about 84 and 82 % of the total area under groundnut and sesamum cultivation, respectively. Ahmedabad, Banaskantha, Junagarh, Kutch, Mehsana and Sabarkantha districts with 79.72% of the total area under castor in the state and Ahmedabad, Banaskantha and Mehsana districts with an area of 77.96% of total area under rapeseed mustard have been selected for the study.

Districtwise compound growth rates were worked out by fitting exponential function $Y = ab^t$ for area, production and productivity of all the four oilseeds and their significance was tested based on the probability level.

To measure the relative contribution of area, yield and prices and their interactions in increase of oil-seeds, the model of Sharma (1977) was used

$$X = P_0 A_0 \Delta Y + P_0 Y_0 \Delta A + A_0 Y_0 \Delta P + P_0 \Delta A \Delta Y + A_0 \Delta P \Delta Y + Y_0 \Delta A \Delta P + \Delta A \Delta Y \Delta P$$

X was calculated by subtracting X_0 from X_n

Table 1 District wise compound growth rates of area, production, productivity and decomposition analysis of groundnut and sesamum in Gujarat.

Crops	Amreli	Bhavnagar	Jamnagar	Junagarh	Kutch	Rajkot	Surendranagar	Gujarat State
Groundnut								
Area	2.18*	2.83*	1.43	0.39	9.10**	-0.03	-6.51*	0.05
production	2.61	0.81	-7.70	0.12	20.32**	-8.49	-6.03	0.44
Productivity	0.56	-1.98	-8.82	-0.28	10.41**	-8.05	-0.91	0.25
Decomposition analysis								
Yc	5.97	-5.03	2.81	3.48	3.66	6.89	8.83	5.05
Ac	3.16	5.78	6.68	2.89	7.98	-0.18	-34.49	0.37
Pc	68.67	101.38	51.30	65.95	26.56	66.73	238.62	72.81
AcYc	1.17	-1.04	1.29	0.59	4.05	-0.08	-4.58	0.10
YcPc	2.55	-18.27	23.50	13.55	13.47	27.67	31.66	19.84
AcPc	13.48	20.96	9.89	11.25	29.38	-0.73	-123.64	1.45
AcYcPc	5.00	-3.78	4.53	2.31	14.90	-0.30	-16.40	0.38
Sesamum								
Area	4.65*	2.99	1.18*	-22.82	4.66	18.54**	2.40	0.67
production	2.20	-0.98	-2.05	0.77	5.05*	19.01	0.33	-1.75
Productivity	-2.80	-3.70	-1.98	-1.98	0.48	0.48	-2.18	-2.04
Decomposition analysis								
Yc	3.33	7.19	2.42	-0.59	0.94	1.96	2.19	2.71
Ac	4.94	5.50	12.78	-8.14	9.79	11.94	3.96	2.30
Pc	46.80	44.63	29.83	146.73	43.82	12.27	71.62	76.94
AcYc	1.55	2.37	2.97	0.15	0.81	6.34	0.40	0.27
YcPc	14.71	19.25	6.92	-2.61	3.64	6.52	7.28	9.12
AcPc	21.81	14.71	36.59	-36.18	37.85	39.82	13.21	7.74
AcYcPc	6.86	6.35	8.49	-0.64	3.15	21.15	1.34	0.92

*Significant at 5 per cent level

**Significant at 1 per cent level

Yc = Yield effect, Pc = Price effect, Ac = Area effect, AcPc = Area-Price effect, AcYc = Area-Yield effect, YcPc = Yield-Price effect, AcYcPc = Area-Yield-Price effect.

Where,

$$X_n = A_n Y_n P_n, \text{ and}$$

$$X_o = A_o Y_o P_o,$$

A_o , P_o and Y_o are the area, price and yield in the base year (average of 1966-67 to 1970-71) and A_n , P_n and Y_n denote the corresponding values in the current year (average of 1985-86 to 1989-90; excluding the severe drought years-1987-1988); ΔA , ΔY , ΔP indicate change in area, yield and prices in current year over the base year.

Results and Discussion

As evident from table 1 and 2 the compound growth rates of area, production, and productivity of groundnut in Kutch district were found to be positive and highly significant. This might be due to the fact that the land allocated for the purpose was marginal in the initial period. No significant increase in the productivity of groundnut was found in any of the districts. The area under sesamum increased significantly in Rajkot. Amreli and Jamnagar districts but no significant change in area and productivity of these crops could be observed for

Table 2 District wise compound growth rates of area, production, productivity and decomposition analysis of castor and Rapeseed-mustard in Gujarat.

Crops	Ahmedabad	Banaskantha	Jamnagar	Kutch	Mehsana	Sabarkantha	Gujarat State
Castor							
Area	32.90**	20.89**	7.20	-3.47	13.86**	19.98**	18.56**
Production	43.87**	52.03**	19.74*	-5.66	27.14**	30.37**	32.48**
Productivity	8.28*	25.96**	10.91**	-2.95	11.60**	8.15*	11.64**
Decomposition analysis							
Yc	1.51	4.48	9.83	0.11	6.12	2.16	3.43
Ac	10.14	5.78	4.33	20.35	6.27	8.52	8.27
Pc	4.90	3.36	20.33	11.09	10.57	7.08	8.74
AcYc	10.37	18.31	6.12	0.65	10.53	9.41	10.25
YcPc	5.02	10.65	28.78	0.35	17.75	7.84	10.82
AcPc	33.64	13.78	12.68	65.36	18.20	30.87	26.12
AcYcPc	34.42	43.65	17.93	2.09	30.56	34.12	32.37
Rapeseed-mustard							
Area	45.18**	32.26**			16.18**		25.56**
Production	58.76**	44.99**			31.83**		44.89**
Productivity	38.36	18.45**			13.43**		15.38**
Decomposition analysis							
Yc	2.14	2.05			7.29		3.37
Ac	7.03	6.83			7.20		8.26
Pc	2.32	2.28			12.22		4.26
AcYc	17.34	17.05			10.68		16.05
YcPc	5.74	5.67			18.12		8.28
AcPc	18.85	18.94			17.92		20.30
AcYcPc	46.58	47.18			26.57		39.48

the state as a whole due to relatively higher decline and/or nonsignificant change in rest of the districts.

It is interesting to note that the compound growth rates of area, production and productivity of castor as well as rapeseed and mustard were positive and significant in all the districts, except in Kutch district where a declining trend was noticed for castor crop. The reason for increasing trend might be explained by the fact that both these crops are important oilseeds of the districts under study due to soil and water condition. Moreover, the kinds of area allocated to the crops were marginal during the initial years of study. The significant increase in productivity of castor and rapeseed-mustard was attributed mainly to the intensive efforts made by

the plant breeders to evolve new varieties of these crops and extension efforts.

The results of Decomposition analysis (Table 1 & 2) indicated that the price factor individually contributed much more than other components for the increased production of groundnut and sesamum in all the districts under study. A similar situation could also be noticed in Mehsana district for castor as well as rapeseed-mustard. This suggests that the lucrative price declared in advance may support increased land allocation and ultimately to the production of oil-seed crops in Gujarat State.

Area and other factors individually and collectively affected the trend of production of castor and

rapeseed-mustard in most of the districts under study. The interactions of area, yield and price components turned out to be negatively influenced only for groundnut crop in case of Bhavnagar, Rajkot and Surendranagar districts. The relative prices increased in all the districts but the area conspicuously reduced in Surendranagar and Rajkot districts; similarly, declining trend in yield of groundnut could be observed for Bhavnagar district. The area and yield factors of sesamum individually and jointly with price contributed negatively in Junagarh district.

In case of castor and rapeseed-mustard, the interactions of area, yield and prices was found to

be more powerful in all the districts under study, except Jamnagar and Kutch district where the interactions of yield and price, and of area and price, respectively, were more pronounced. The analysis of Gujarat state as a whole indicated that the price factor alone contributed the most for increases in the production of groundnut and sesamum while the interactions played vital role in case of castor and rapeseed-mustard production.

Reference

Sharma KL 1977 Measurement of area, yield and prices in the increase of value of crop output in India. *Agricultural situation in India* 32 (6) 349-351

(Received August 1992 Accepted December 1992)