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An Economic Analysis of Growth Performance of Oilseed Crops in India

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Abstract : The study is an attempt to know the growth performance and instability in oilseeds sector using secondary data. The results of the study indicated that positive and significant growth rates were observed in the case of area and production of all the oilseeds except safflowr and linseed, where growth rate was negative and nonsignificant in safflower but significant in the case of linseed. Growth rates of productivity were positive and significant in case of castor, sesamum, linseed and rapeseed-mustard. Area and production of sunflower and soybean were highly unstable when compared to other oilseed crops. Area was found to be the major contributor to the production of sunflower and soybean, whereas productivity was found to be the major contributor to the production of castor and sesamum. Both area and productivity together influenced the production of castor, sesamum, rapeseed - mustard and soybean.

Introduction

India is a paradise for oilseed crops No other country has its range of perennial and annual oil seeds. Although India has about 20 per cent of world's area under oilseeds, it accounts for less than 10 per cent of world's production. In terms of value of output as well as employment potential, the oilseeds sector is far more important than any other industry. Oilseeds form the second largest agricultural commodity after cereals sharing 13 per cent of the gross cropped area, accounting for nearly 5 per cent of GNP and 10 per cent of the value of all agricultural products in the country. During the year 1996-97 India produced about 24 millions tonnes of oil seeds on an area of about 26 million hectares. But, the demand, at the present consumption level by 2020 A.D. is placed at 34 million tonnes. a continuous appraisal of the productivity growth alongwith the analysis of instability are paramount importance for future planning. This aids in locating the weaknesses in the existing policy formulations and programmes and reformulating appropriate investment strategies for the future so as to create necessary infrastructure on the farm front to sustain growth with stability. In this context, an attempt was made here to study the growth rate and instability in area, production and productivity of major oil seeds crops and to know the contributions of area and productivity towards production.

Material and Methods

Time series data on area, production and productivity of important oilseed crops grown in India for the period from 1980-81 to 1992-93 were collected from the annual reports of Area, Production and Productivity under Principal crops in India published by The Directorate of Economics and Statistics (DES), Government of India.

The exponential function of the following form was fitted to the data to compute the annual compound growth rates

$Y_t = AB^t Ut$ .....(1)

Where,

Y_t = Area/Production/Productivity of the crop in the year

A = Intercept indicating Y in the base period (when t = 0)

t = Time period in years

Ut = Error term

Taking logarithms on both sides equation (1) becomes

$\log Y_t = \log A + t \log B + \log Ut$

which can be written as

$Qt = a + bt + vt$ .....(2)

Where,

Qt = log Y_t, a = log A, b = log B and Vt = log Ut.

The values of **a** and **b** were estimated by using the techniques of Ordinary Least Square (OLS) estimation. Latter original **A** and **B** parameters in equation (1) were obtained by taking antilogarithms of **a** and **b** values as

A = Anti log **a**

B = Anti log **b**

The average annual compound growth rate (g) will be

$g = (B-1)$ .....(3)

The growth rates worked out with the above equation were converted into percentages for better understanding and effective comparison. Growth rates were tested for their significance using the students `t' test.

The co-efficient of Variation (CV) was used as the measure of instability

$$CV = \frac{\text{Standard deviation}}{\text{Mean}} \times 100 \quad \text{.....(4)}$$

To measure the contribution of area and productivity towards increased production of the crops concerned, the following methodology was used.

$P = A_o(Y_n-Y_o) + Y_o(A_n-A_o) + A.Y$.....(5)

Where,

P = (P_n-P_o) = change in production

A_o = Area in the base period

Y_o = Yield in the base period

A_n = Area in the current period

Y_n = Yield in the current period

A = $(A_n - A_o)$ = Change in area

Y = $(Y_n - Y_o)$ = Change in yield

Then,

$P = A_o.Y+Y_o.A+ A.Y.$

Where the first term on right hand side indicates productivity contribution, the second term indicates area contribution and the last term shows the interaction effect.

Results and Discussion

The present study encompassing the period from 1980-81 to 1992-93 showed positive growth in case of all the crops area, production (except safflower and linseed) and productivity (except sunflower and safflowers).

The crop wise area growth rates are presented in table 1. It is evident from the table that, the area under sunflower registered the highest growth rate of 9.31 per cent per annum followed by soybean (6.91%) which were highly significant at one per cent level, while growth

Table 1. Compound growth rates of area, production and productivity of oilseed crops in India

Sl.No.	Crop	Per cent Growth rates of		
		Area	Production	Productivity
1.	Groundnut	0.83* (0.0024)	1.31* (0.0064)	0.47* (0.0048)
2.	Sunflower	9.31* (0.0131)	8.96* (0.0120)	-0.29 (0.69)
3.	Safflower	-0.39 (0.70)	-1.16 (0.0094)	-0.79 (0.61)
4.	Castor seed	2.33* (0.0088)	7.02** (0.0250)	4.79** (0.0177)
5.	Sesamum	0.48 (0.055)	4.35* (0.0104)	2.69* (0.0106)
6.	Nigerseed	0.40*** (0.0022)	0.94*** (0.0050)	0.54 (0.053)
7.	Rapeseed-mustard	1.65* (0.0042)	3.80* (0.0046)	2.13* (0.0026)
8.	Linseed	-5.16* (0.0051)	-3.84 (0.079)	1.64 (0.47)
9.	Soybean	6.91* (0.0048)	7.79* (0.0069)	0.83 (0.55)

Note : Figures in parentheses indicate respective standard error.

* = Significant at one per cent. ** = Significant at five per cent. *** = Signficant at ten per cent.

rate of area under caster (2.33%) was significant at one per cent. Eventhough groundnut is a leading oilseed crop it registered a lower growth of 0.83 per cent per annum but it was highly significant at one per cent and so also similar results were found in the case of repeseed-mustard area (1.65%). The area under sesamum increased by 0.48 per cent, where as the area under safflower decreased by 0.39 per cent but both were nonsignificant. There was significant annual decrease of 5.16 per cent in area under linseed. But smaller area has been allocated to these crops because they are of the least importance in human consumption.

The spurt in the expansion of area under sunflower can be attributed to its theremo and photo insensitive nature which render it ideally suited for year around planting in diverse crops growing situations and systems, availability of HYV and hybrids with different durations, high seed multiplication rate and drought tolerance alongwith rapid revivability after prolonged period of drought. The increased area under other important oilseed crops could be attributed to the introduction of technology mission on oilseeds, institutional support given by the government and increasing prices.

Sunflower, soybean, caster, sesamum and repeseed mustard stoodout with high growth in production. The sunflower registered the highest growth of 8.96 per cent in production followed by once again soyabean (7.79%), castor (7.22%), sesamum (4.35%) and rapeseed-mustared (3.80%) and all were statistically significant. Groudnut and nigerseed showed reasonably good and significant growth. Significant negative growth was noticed in case of linseed. Whereas non significant declining trend was noticed in case of safflower production. The growth in oilseeds production can be attributed to both area expansion and improvement in productivity. This additional area might have come from millets and other unremunerative crops and partly from increased cropping intensity. Apart from these the co-operatisation of oilseeds production and the market intervention operations of the National Dairy Development Board (NDDB) have created a conducive macro policy environment to oilseeds production.

It is also clear from the table 1 that, there had been an increase in productivity of all the crops except sunflower and safflower. Castor registered the highest significant growth rate of 4.79 per cent followed by sesamum (2.69%) rapeseed-mustard (2.13%) and linseed (1.64%). On the other side, over the period groudnut, nigerseed and soyabean performed well in terms of productivity growth. The decrease in the productivity of sunflower was mainly on account of large scale cultivation of low yielding open pollinated varieties under rainfed situations on marginal lands. However, three was an improvement in the productivity of oilseeds which can be attributed to increase in the irrigated area under these crops, adoption of improved varieties and other components of production technology such as quaiity seeds, fertilizers and nutrient management.

Agricultural sector, as it depends on climatic factors subjected to a large degree of uncertainty. Though it is said that growth with stability is ideal but growth with instability is more often the reality. Growth rates generally fail to explain fluctuations or instability in the time series data, So the co-efficient of Variation (CV) was used as a measure of instability in area, production and productivity and the results are presented in table 2.

Table 2. Instability of area, production and productivity of oilseed crops

Sl.No.	Crop	Instability of		
		Area	Production	Productivity
1.	Groundnut	9.55	21.11	14.01
2.	Sunflower	59.98	70.02	17.29
3.	Safflower	16.50	22.76	16.35
4.	Castor seed	14.40	40.27	27.34
5.	Sesamum	7.42	21.85	19.18
6.	Nigerseed	6.05	14.04	10.65
7.	Rapeseed-mustard	20.06	35.09	17.65
8.	Linseed	21.63	14.90	8.99
9.	Soybean	57.45	68.04	15.85

Instability was noticed in all the oilseed crops. The production instabilities were higher compared to yield and area instabilities for all the crops except linseed whose area instability was high. The area instability was found to be more in sunfloswer (59.98%) followed by soyabean (57.45%), linseed (21.63%) and rapeseed-mustard (20.06%). While, the groundnut, safflower, castor, sesamum and nigerseed area showed lesser instability. The instability in area could be attributed to the climatic conditions, allocation of land and other production resources among various crops depending on the price structure of the crop and its competing crops grown in the region.

With respect to production, all the crops showed instability. The magnitude of production instability was found to be the highest in the case of sunflower (70.02%) followed by soybean (68.04%), casterseed (40.27%), rapeseed-mustard (35.09%) and safflower (22.76%). This production instability was due to variability in both area and productivity of different oilseed crops

It was also found that the productivity of all the crops was instable. The highest yield instability of 27.34 per cent was noticed for caster followed by sesamum (19.18%), repeseed-mustard (17.65%), sunflower (17.29%) and soyabean (15.85%). In other crops it was comparatively less. These instabilities may be attributed to climatic variations, modern cultivation practices, irrigation facility, quantity and quality of inputs such as seeds, fertilizers and chemicals, incidence of insect pet and diseases. So production inputs and improved seeds if used under the condition of assured irrigation may promote growth with stabilitgy.

Contribution of area and productivity towards production were worked out and results are presented in table 3. It was found that, the

Table 3. Contribution of area and productivity towards production

Sl.No.	Crop	Area	Productivity	Interaction effect
1.	Groundnut	29.66	57.29	13.05
2.	Sunflower	97.94	0.12	1.94
3.	Safflower	-81.82	185.16	-3.34
4.	Castor seed	16.05	63.44	20.51
5.	Sesamum	-7.36	112.26	-4.90
6.	Nigerseed	-6.17	107.79	-1.62
7.	Rapeseed-mustard	47.75	34.09	18.16
8.	Linseed	129.45	-56.05	-2.66
9.	Soybean	82.56	2.92	14.50

area was the major contributor in case of linseed, (129.45%), sunflower (97.94%), soyabean (82.56%). While in the rest of the crops conribution of area was negative. The contribution of productivity was remarkable for safflower (185.16%), sesamum (112.26%), nigerseed (107.79%), caster seed (63.44%), groundnut (57.29%) and repeseed - mustard (34.09%). Both the area and productivity together influenced the production in the case of caster seed, soybean groundnut and rapeseed-mustard to the extent of 20.51 per cent, 14.50 per cent, 13.05 per cent and 18.16 per cent, respectively.

The study highlights that, the area and productivity of almost all the oilseed crops showed positive growth rate except linseed and safflower, whereas the productivity growth rates were fairly good. In some of the crops such as sunflower, linseed, rapeseed-mustard and soyabean productivity was not a major contributor towards production. The results of the study were in confirmity with findings of Mundinmani *et al.* (1995) in a study on growth performance of oil seeds in Karnataka. Supply of various inputs and provision of good marketing facilities are important to provide remunerative prices to farmers.

Reference

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