

Area, Production, Yield Trends and Pattern of Oilseeds Growth in India

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ABSTRACT

India is the fourth largest producer of oilseeds accounting for about 19% of the global area, 2.7% of global production in the world. The oilseeds crops have registered the significant growth in area and production in last 30 years. However, compare to cereals like paddy and wheat, the growth rate of area and production of oilseeds is insignificant and there exists wide variability in their yield in different states of the country. The study has explored the growth performance, and dynamics of major oilseeds in different states of the country. Oilseeds exhibited a dismal picture in their production performance both spatially and temporally.

Keywords: Oilseeds, trends, production, growth, yield, dynamics

India is the fourth leading oilseeds producing country in the world, next only to the USA, China, and Brazil, harvesting about 29 million tonnes of oilseeds per annum, grown in an area of nearly 27 Mha with an annual average yield of 1058 kg/ha. Oilseeds sector have an annual turnover of about ₹ 80000 crores which subjugate a vital position in the agrarian economy of the country. Oilseeds are significant following only to food grains in terms of area and production. India accounted for 19% of oilseeds area, and 2.7% of oilseeds production in the world, (FAOSTAT, 2013). India is blessed with varied agro-ecological environments ideally suited for growing a variety of oilseeds which include groundnut, rapeseed and mustard, sunflower, soybean, sesamum, safflower, castor, linseed and niger seed, two perennial oilseeds (coconut and palm oil). India occupies the place of pride as the world's largest producer of groundnuts, sesamum, linseed and castor seeds.

India is the world's second most populous country, the third largest economy in Asia, and one of the world's fastest growing developing economies since

1990. India is also a major producer and consumer of oilseeds and their products, emerging in the late 1990s as one of the world's largest importers of edible oils. Higher incomes, low productivity in domestic oilseeds production, and more liberal policies for edible oil imports have driven expanding trade. The domestic demand for vegetable oils and fats has also been rising rapidly at an increasing rate due to increase in per capita income and increase in standard of living. Thus, annual demand is increasing at the rate of 6% while our domestic output has been increasing at just about 2% (G.K. Jha *et al.*, 2012). Despite more open oil import policies, extensive policy intervention continues to affect oilseeds production, trade, and processing in India, and policy change is likely to play a major role in the future growth and composition of India's oilseeds and product trade.

At the national level, the domestic achievements in oilseeds production are unparalleled when we observe that six times increase in oilseeds production during the period of 1950–2011 was achieved under predominantly rain fed (72%)

agro-ecological conditions, which is even higher than the production increase in total food grains during the corresponding period (Hegde, 2012). The mid-1990s saw a significant turnaround in terms of cheaper edible oil availability in the international market and a faster economic growth, resulting in increased demand for edible oils. India's oilseed and edible oil sector are being increasingly exposed to international markets and the influence of policy options like the minimum support price and other market intervention policies have not been able to generate the desired changes commensuration with the demand and production target.

Objectives

The present study is attempted to examine the growth performance, decomposition of edible oilseeds in major producing states of India. The specific objectives of the study are to assess the spatiotemporal growth performance of main oilseeds in major producing states of India.

Data and Methodology

India has a diversified cropping pattern across regions based on rainfall pattern, soil type, and climatic conditions. The present paper attempts to study nine oilseeds viz., groundnut, rapeseed–mustard, soybean, sunflower, sesame, safflower and niger seed, and two non-edible oilseeds, viz. castor and linseed. The main four oilseeds viz. groundnut, rapeseed–mustard, soybean and sunflower, accounted for more than 80% of the total oilseed cropped area and more than 90% of total oilseeds production in the country during TE 2012. The study is based on secondary data mainly collected from various published sources viz. Agricultural Statistics at a Glance, Handbook of Statistics on Indian Economy and website of Directorate of Economics and Statistics (DES). The historical performance of oilseeds has been assessed for all major oilseeds and states. The study related to last three decades from 1980-81 to 2011-12.

Growth in area, production and yield of oilseeds

The pace of agricultural development of a region can be ascertained through measuring growth in area, production and yield of crops grown in that particular region. The present study has assessed

the compound growth rates of the area; production and yield of major oilseeds on regular interval during 1982-2012. The compound annual growth rates (CAGR) of area, production, and yield of oilseeds were estimated as follows:

$$Y_t = AB^t e$$

$$\ln Y_t = \ln A + (\ln B)t + \ln e$$

Where, $B = (1+r)$

Y_t = Area/Production/ Yield of major oilseeds in the i^{th} period,

t = a time variable (1, 2, 3....., n), A and B are parameters to be estimated,

r = compound growth rate, and e =error term

Further to examine the stability in the growth of oilseeds across states, the coefficient of variation was estimated using following procedure. CAGR were also used in classifying the states in different categories based on their growth performance.

$$CV = \frac{SD}{\bar{X}} \times 100$$

RESULTS AND DISCUSSION

Present Status of Oilseeds in India

Presently, about 27Mha area is under oilseeds, producing nearly 29 Mt oilseeds; with the average yield of 1095kg/ha (Table 2). The estimated share of different states in total oilseeds area and production has shown that Madhya Pradesh, Maharashtra, Gujarat, and Rajasthan contributed about 70% of the total area and 75% of total oilseeds production during TE 2012 (Appendix-I). Thus, these four states were considered as the major oilseeds producing states though other states like Andhra Pradesh, Karnataka, Tamil Nadu and Uttar Pradesh, etc. are also important in the production of various oilseeds in the country.

Further diagnosis of shares in area and production of individual oilseeds revealed that Gujarat, Andhra Pradesh, and Karnataka contributed maximum area under groundnut cultivation with their respective share of 32%, 25%, and 14%. Madhya Pradesh, followed by Maharashtra and Rajasthan contributed

maximum area under soybean in India with respective share of 56%, 30%, and 8%. Rapeseed and mustard was mainly grown in Rajasthan, Madhya Pradesh and Uttar Pradesh with the share of 46%, 13% and 10%, respectively, while for sunflower Karnataka ranked first followed by Andhra Pradesh and Maharashtra with the share of 50%, 23%, and 17%, respectively. A similar pattern was noticed for the production of these crops (Appendix II). Thus the production of individual oilseeds was also concentrated in a few states with their respective dominant share.

Production Performance of Total Oilseeds

In India, area under oilseeds has increased from 18 Mha during TE 1982 to 27Mha during TE 2012 due to initiatives have taken on a technological mission on oilseeds and other oilseed development programmes. The area expansion in oilseeds during the last three decades was a major source of growth in oilseeds. The area increase came where the

oilseed crops were superior options to traditional crops like coarse cereals and millets. Farmers always searched for technological options and practices which brought them higher returns and readily responded to various economic incentives. Analysis of season-wise performance of oilseeds has shown that *Kharif* season is the major season for growing of oilseeds in the country. Productivity level of Rabi oilseeds is higher than *Kharif* season due to lower pest problem and assured irrigation availability (Table 2).

Analysis of growth performance in total oilseeds over past three decades (1982-2012) gives an idea of the pace of oilseeds development in the country. Results revealed that the production of total oilseeds has increased substantially during the above study period (Table 3). The growth rate in the area of total oilseeds was found to be always been positive during 1980 to 2012. It was about 2% during 1981-90 and 2000-12, while it was about 1.03 during 1991-00. During the same period, there was high growth rate

Table 1: Change in Production of Oilseeds in India ('000 tonnes)

Oilseeds	Average Production		Change in Production	Share in Changed production
	TE1982	TE2012		
Soybean	425	11942	11517	60.29
Rapeseed & Mustard	2289	7130	4841	25.34
Sunflower	149	693	544	2.85
Sesamum	529	786	257	1.34
Nigerseeds	134	395	261	1.37
Groundnut	7125	6886	-239	-1.25
Others	205	2116	1921	10.06
Total oilseeds	10856	29948	19092	100

Table 2: Area, production, and yield of oilseeds in India

	Area(Mha)			Production(Mt)			Yield(Kg/ha)		
	<i>Kharif</i>	<i>Rabi</i>	<i>Total</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Total</i>	<i>Kharif</i>	<i>Rabi</i>	<i>Total</i>
TE 1982	10.51 (58)	7.58 (42)	18.09 (100)	5.81 (55)	4.67 (45)	10.48 (100)	552	616	578
TE 1992	14.80 (59)	10.29 (41)	25.09 (100)	10.38 (54)	8.73 (46)	19.11 (100)	702	848	762
TE 2002	15.04 (67)	7.26 (33)	22.30 (100)	11.38 (63)	6.60 (37)	17.98 (100)	755	908	804
TE 2012	18.21 (69)	8.29 (31)	26.50 (100)	19.45 (67)	9.61 (33)	29.05 (100)	1067	1158	1095

Note: Figures in parentheses are percent of total

in production than the growth rate in the area due to increase in yield.

The growth rates of production and yield were significant mainly in *Kharif* season during 1980-90 due to initiatives were taken by technological mission on oilseeds and other oilseed development programmes and growth momentum was maintained in next two decades. Instability in the yield of oilseeds over the years was also examined by estimating CV in different periods. It was found that CV declined from 9.32% during 1980-90 to 5.82% during 1990-00 due to technological and other government interventions, the CV value has increased to 9.15% in the recent period (2000-12) shows increased instability in the yield of oilseeds (Table 3). This raises the concern over the long-term sustainability of oilseeds production in India.

Categorization of states as per performance in oilseeds production

To examine the state wise performance of oilseeds, the states were categorised according to positive and negative growth rates in the area, production, and yield (Table 4). Table 4 throws a light on the structural shift in production of oilseeds in some states. During 1980-90, Andhra Pradesh showed positive growth rate in the area, production, and yield, but during 2000-12, the growth rate in area and production shifted from positive to negative though growth rate in yield was positive. This might be due to the large-scale substitution of oilseeds area to other high-value crops which give comparatively high returns. In the case of Gujarat, the growth rate in the area, production and yield were negative during 1980-90, but during 1990-00 and 2000-12, the growth rate in the area, production and yield

shifted from negative to positive. Thus in the light of positive growth rate in the area, production, and yield, Gujarat shifted from negative to positive growth rate category in the recent period. Further, Karnataka had shown a positive growth rate in the area, production and yield of oilseeds during 1980-90, but the negative growth rate in the area, production, and yield during the recent period.

As the growth rate shows a partial picture, the major oilseeds producing states were further classified according to CGR of yield together with CV reflecting instability in yield (Table 5). Results have shown the structural shift in the yield performance of oilseeds in major states over the years. Andhra Pradesh which had shown a negative growth and low variability during the 1999-00s, shifted to positive CGR and medium CV category during 2000-12, similarly, Karnataka shown a positive growth and low variability during the 1980-90 and 1990-00, shifted to negative CGR and low variability during 2000-12. Gujarat shown a negative CGR and medium variability during the 1980s shifted to positive CGR and medium variability during and 1990-00 and 2000-12. Madhya Pradesh, Maharashtra, and Rajasthan had shown positive CGR though there was a change in the level of variability during last three different decades.

Comparison of State Level Yield with National Averages for Major Oilseeds during TE 2012

Analysing disaggregated data of oilseeds and comparing the yield of individual oilseeds with national average yield during TE 2012, it was found that Andhra Pradesh and Karnataka, which ranked second after Gujarat in area and production of groundnut (Appendix II), had a yield less than

Table 3: Season-wise compound growth rate (CGR) in area, production, yield of oilseeds in India

Period	Area (Mha)			Production(Mt)			Yield(kg/ha)		
	<i>Kharif</i>	<i>Rabi</i>	Total	<i>Kharif</i>	<i>Rabi</i>	Total	<i>Kharif</i>	<i>Rabi</i>	Total
1980-90	2.15	1.72	1.98	3.80	5.91	4.69	1.56 (6.59)	4.15 (16.19)	2.64 (9.32)
1990-00	1.27	0.66	1.03	4.88	0.32	2.97	3.53 (10.58)	-0.27 (2.93)	1.91 (5.82)
2000-12	2.03	0.95	1.67	4.67	3.34	4.20	2.58 (9.84)	2.37 (8.38)	2.51 (9.15)

Note: Figures in parentheses are coefficients of variation

Table 4: Classification of Indian states based on compound growth rate of oilseeds

Area

CAGR	>4	4 to 2	2 to 0	<0
1980-90	AP, KR, MP, RJ	MH	TN	GJ, UP
1990-00	MP, RJ	—	GJ, MH	AP, KR, TN, UP
2000-12	MH, RJ	MP	GJ	AP, KR, TN, UP

Production

CAGR	>4	4 to 2	2 to 0	<0
1980-90	AP, KR, MP, RJ	MH, TN	—	GJ, UP
1990-00	GJ, MP, RJ	MH	—	AP, KR, TN, UP
2000-12	GJ, MH, MP,, RJ	—	AP	KR, TN ,UP

Yield

CAGR	>4	4 to 2	2 to 0	<0
1980-90	MP, RJ, UP	—	AP, KR, MH, TN	GJ
1990-00	GJ	MH, MP	KR, RJ, TN, UP	AP
2000-12	GJ	MP, RJ, TN	AP, MH ,UP	KR

Note: CAGR= compound annual growth rate

Table 5: Classification of Indian states based on CGR and instability of oilseeds yield

Instability	1980-90				1990-00				2000-12			
	>4	4 - 2	2 to 0	<0	>4	4 - 2	2 - 0	<0	>4	4 - 2	2 - 0	<0
CV (<10)	—	—	AP, KR, MH, TN	—	—	MP	KR, RJ, UP	AP	—	—	MH, UP	KR
CV (10-20)	MP, UP	—	—	GJ	GJ	MH	TN	—	GJ	MP, RJ, TN	AP	—
CV (>20)	RJ	—	—	—	—	—	—	—	—	—	—	—

Note: AP= Andhra Pradesh, KR= Karnataka, MH= Maharashtra, TN= Tamil Nadu, GJ= Gujarat, RJ=Rajasthan, MP=Madhya Pradesh, UP=Uttar Pradesh

the national average (1242 kg/ha). In the case of soybean, Madhya Pradesh which had a maximum share in area and production showed lower yield than the national average (1186 kg/ha) whereas Maharashtra and Rajasthan have shown yield higher than the national average. In the case of rapeseed and mustard, Madhya Pradesh which ranked second after Rajasthan in area and production showed lower yield than the national average (1163 kg/ha). In the case of sunflower, Andhra Pradesh which ranked second after Karnataka in area and production showed lower yield than the (661 kg/ha) national average (Table 6). Thus the results have revealed stagnant conditions of oilseeds production in most of the major producing states and have revealed the potential of minor oilseed-producing

states in oilseeds development as yields of oilseeds in minor producing states was higher than the national average.

Historical Changes in Oilseeds Production

Total oilseeds production in India was about 29 million tonnes in 2011-12 which came from about 27 million hectares. On production pattern, there has been a remarkable diversification in oilseeds as the production of oilseeds increased. The share of soybean and rapeseed and mustard in changed production is 60.29%, and 25.34%, respectively, during the period TE1982 to TE 2012. The share of other oilseeds in changed production is very insignificant during the same period and groundnut was first in terms of production during TE 1982

Table 6: Comparison of state yield with national average for major oilseeds during TE 2012

Yield status	Groundnut	Rapeseed/Mustard	Soybean	Sunflower
Yield national average (kg/ha)	1242	1163	1186	661
Yield more than national average	TN, GJ, MP	HR, RJ	RJ, MH	MH, KR
Yield less than national average	MH, AP, KR	MP, MH	MP	AP, TN

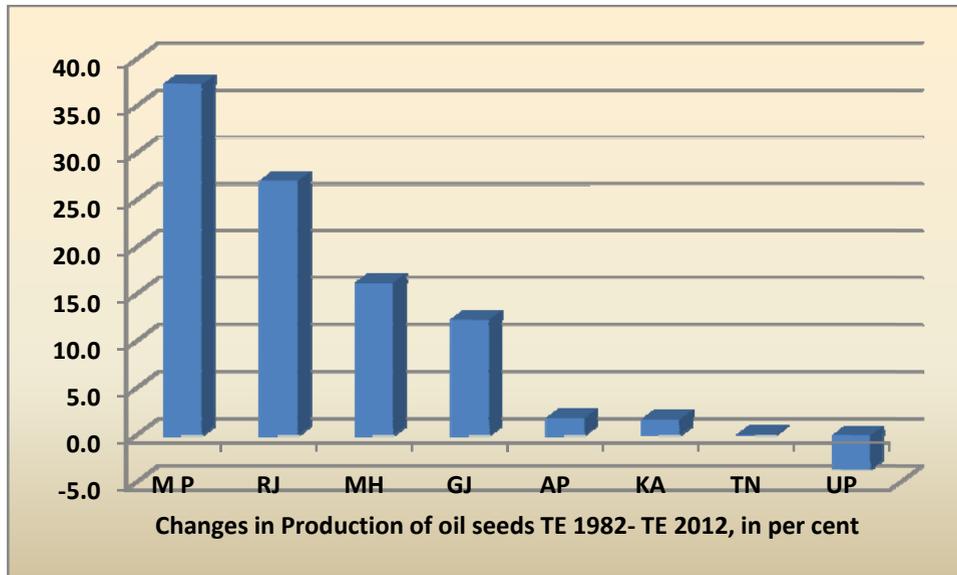


Fig. 1: Changes in production of total oilseeds in India

has lost its significance during TE 2012. On the regional pattern, a clear shift in oilseeds production has been noticed from southern states to western states. A change in production of oilseeds during TE 1982 to TE 2012 has mainly come from states of Madhya Pradesh (37.4%), Maharashtra (27.1%), Rajasthan (16.2%), and Gujarat (12.3%) and these four states accounts for more than 90% of additional production of oilseeds. There were 18.5 million tonnes of additional oilseeds production in India during 1980-81 and 2011-12. On the other hand the share of southern states namely Karnataka, Andhra Pradesh and Tamil Nadu has become highly insignificant during the same period.

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CONCLUSION AND POLICY IMPLICATIONS

Oilseeds are significant following only to food grains in terms of area; production and value and play a vital role in food and nutritional security of the country. The growth rate in the area of total oilseeds was found to be always been positive from 1980-81s to 2011-12. During the same period, there was high growth rate in production than the growth rate in the area due to increase in yield. On the regional pattern, a clear shift in oilseeds production has been noted from southern states to western states. Production of different oilseeds was also concentrated in a few states with their distinct dominated share. More than 90% of additional production (18.5Mt) of oilseeds is mainly coming from Madhya Pradesh, Maharashtra, Rajasthan and Gujarat during the period 1980-81 to 2011-12. Since the yield of oilseeds is stagnant vis-à-vis other crops, the income of oilseeds growing farmers can be considerably increased by yield improvement through technological breakthrough. Thus, yield improvement can fetch higher revenue to the farmers and may negate the advantage of

other crops over oilseeds. Further, a shift in the production performance of oilseeds producing states validates not only lack of spatial and temporal stability in their performance but also throws a light on the hidden potential of minor states in oilseeds production for long-term production sustainability. Hence, for different oilseeds, minor oilseeds producing states should be encouraged to identify the region specific constraints and efforts should be made for the creation of necessary infrastructure and efficient execution of oilseeds development programmes to provide favourable conditions for oilseeds production.

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APPENDIX I

Share of states in area and production of total oilseeds during TE 2012

(Percent)

States	<i>Kharif</i>		<i>Rabi</i>		Total	
	Area	Production	Area	Production	Area	Production
MP	34	35	11	9	26	27
Mah	18	20	5	3	14	14
Guj	14	19	5	6	11	15
Raj	11	11	34	36	18	19
AP	9	4	6	7	8	5
Kar	6	4	6	4	6	4
UP	2	1	8	5	4	3
TN	2	3	2	8	2	3
Others	4	3	24	22	10	9
India	100	100	100	100	100	100

APPENDIX II

Share of states in area and production of individual oilseeds during TE 2012

(Percent)

States	Groundnut		Soybean		Rapeseed/Mustard		Sunflower	
	Area	Production	Area	Production	Area	Production	Area	Production
AP	25.49	16.01	1.41	1.60	0.10	0.05	23.36	27.25
Guj	32.02	37.95	0.72	0.49	3.52	4.75	0.00	0.00
Kar	14.12	8.42	1.84	1.15	0.07	0.02	50.49	37.31
MP	3.63	4.18	56.30	55.44	12.62	12.03	0.02	0.01
Mah	5.91	5.66	29.74	30.02	0.15	0.04	16.67	14.62
Raj	2.52	3.90	8.29	9.79	46.19	48.12	0.00	0.00
TN	7.13	13.78	0.00	0.00	0.01	0.00	1.17	2.66
UP	1.61	1.15	0.12	0.13	10.10	9.93	0.48	1.54
Others	7.57	8.94	1.57	1.39	27.25	25.04	7.81	16.62
India	100	100	100	100	100	100	100	100