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### Growth trends, trade and self-sufficiency in oilseed sector in India

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#### Abstract

This research paper provides a comprehensive analysis of India's oilseed sector spanning from 1949 to 2021, examining key aspects such as production, consumption, trade dynamics, and pricing trends. A gradual expansion in oilseed was indicated by compound annual growth rates in area (1.34%), production (2.86%) and productivity (1.53%), albeit with higher instability in production. Analysis of edible oil production, import, and consumption trends from 1995 to 2021 indicates a significant shift towards growing reliance on imports, with domestic production averaging 83.90 lakh tonnes and imports averaging 83.49 lakh tonnes, leading to a decline in self-sufficiency from 64.98 percent to 44.30 percent. While domestic production and availability of edible oils show steady growth to the tune of 2.29 percent and 2.51 percent respectively, however, imports recorded growth at substantially 9.36 percent, surpassing domestic production growth. Pricing trends analysis from 2001 to 2021 reveals a dynamic nature of export and import prices, with export prices growing at a CAGR of 7.18 percent and import prices at 7.39 percent. The research underscores need to minimize the reliance on imports to bridge the gap between domestic production and consumption and emphasizing the need for strategic interventions to ensure stability and sustainability.

**Keywords:** Exports, imports, trade deficit, strategic measures, self-sufficiency, trade imbalance, oilseeds, edible oil, dependency, challenges, compound annual growth rate

#### 1. Introduction

Oilseeds and edible oils constitute vital commodities with high sensitivity in India. The country, being one of the world's largest oilseed producers, holds a crucial position in the agricultural economy, yielding an estimated 40.99 million tons of nine cultivated oilseeds in the 2022-23 period. In the financial year 2021-22, exports of oil meals, oilseeds, and minor oils amounted to approximately 3.8 million tons, valued at Rs 17,656 crores (APEDA). Despite its significant production, India faces a productivity challenge, with oilseed crops such as soybean, rapeseed mustard, and others exhibiting lower yields compared to global averages.

In the Indian agricultural landscape, oilseeds rank second only to food grains in terms of area and production. During the 2022-23 period, domestic edible oil production reached 10.9 million tonnes, while domestic oil consumption surged to 24.8 million tonnes annually. However, a substantial gap of 13.9 million tonnes is filled through imports, incurring a cost of US\$ 16.60 billion (Rs. 1.38 lakh crore). Notably, edible oil is the sole major commodity within the agro-based product basket where India experiences a trade deficit, with imports constituting 60 percent of the domestic demand. The prevailing challenge lies in the inability of domestic production to keep pace with the escalating demand and

population growth, accentuating the urgency for strategic measures to bridge this gap and enhance self-sufficiency in edible oil production.

The deficit stemming from imports of edible oils has seen a significant and alarming increase. In the period from January to October 2021, the trade deficit in edible oils surged to USD 13 billion, marking a substantial rise from the USD 8 billion recorded during the same timeframe in the pre-pandemic year of 2019. The proportion of edible oil within the overall trade deficit of the nation nearly doubled, escalating from 5.9 percent in January-October 2019 to 10 percent in the corresponding period in 2021. (Dastagiri *et al.*, 2017) <sup>[1]</sup>.

India's reliance on imported palm oil, soya oil, and sunflower oil is pronounced, accounting for 56 percent, 27 percent, and 16 percent, respectively. The trade deficit specifically in palm oil expanded from USD 4.5 billion to USD 7.8 billion, while for soybean oil, these figures increased from USD 1.9 billion to USD 3.4 billion between January-October 2019 and the same period in 2021. This underscores a growing and concerning dependency on edible oil imports, posing economic challenges and emphasizing the need for strategic measures to address the widening trade imbalance. (Oilseed policy paper-ICAR-NAARM. 2022)

## 2. Data Source and Methodology

This is a study on the production, domestic consumption, imports of oilseed and edible oils and their self-sufficiency level in India. Selected crops which include soybean, groundnut, safflower, sunflower, rapeseed & mustard, sesame, linseed, niger seeds and oil palm were selected. Data on production, consumption, import quantities were assembled from Directorate General of Commercial Intelligence and Statistics (DGCIS), FAO-STAT, Agri-Exchange-APEDA, ICAR-Indian Institute of Oilseed Research, WORLD STATISTICS, EXIM, CMIE Commodities, and India-Stat etc.

The Compound Annual Growth rates of area, production & instability of oilseeds were studied for the years of 1949-2021. Domestic consumption and import of edible oils were studied for the years 1995-2022. This secondary data covered the period from 1949-1950 to 2021-2022, encompassing 70 years, and we further divided into sub-periods based on the study's objectives. Then the data were tabulated and analysed using suitable statistical and economic tools. Formulas, add-ons available on MS Excel, and statistical software such as R-studio employed for further data analysis. QGIS software also have used for mapping and the data visualization.

### 2.1 Estimation of Compound Annual Growth Rates:

The growth rate in area, production, productivity of oilseeds in India, domestic production, total consumption, imports of edible oils in India were studied by using compound annual growth rate.

The growth rate was estimated using following model

$$Y = a.b^t$$

Where,

Y = Dependant variable for which growth rate is to be estimated

a = Intercept

b = Regression Coefficient

t = Time Variable

This equation was estimated after transforming (1) as follows,

$$\text{Log } y = \log a + t \text{ Log } b$$

Then the percent compound annual growth rate (g) was computed using the relationship.

$$\text{CAGR (g)} = ((\text{antilog } b) - 1) \times 100$$

The significance of the regression coefficient was tested using the student 't' test.

### 2.2 Instability Index

The instability index encapsulates the magnitude of

fluctuations or deviations from an expected or normative state within a system. It helps in identifying periods of heightened instability, which could signify potential shifts, disruptions, or anomalies within the system under study.

Instability index in area, production, domestic consumption, total consumption, and import of oilseed in India were worked out by using coefficient of variation as follow

$$CV = \frac{\sigma}{\mu} \times 100$$

Where,

CV = Coefficient of Variation

$\sigma$  = Standard Deviation

$\mu$  = Mean

### 2.3 Price elasticity of Export-Import:

Price elasticity of export-import, denoted as  $\epsilon$ , is calculated using the formula:

$$\epsilon = \frac{\% \Delta Q}{\% \Delta P}$$

Where:

$\epsilon$  = Price elasticity of export-import

$\% \Delta Q$  = Percentage change in quantity of exports or imports

$\% \Delta P$  = Percentage change in price

Alternatively, it can be expressed as:

### 2.4 Terms of Trade (TOT)

It refers to the ratio between the prices of a country's exports and its imports. In the context of oilseeds, the TOT formula can be expressed as follows:

$$\text{TOT} = \frac{P_x}{P_m} \times 100$$

Where,

$P_x$  = Price index of oilseed exports from country.

$P_m$  = Price index of oilseed imports into the country.

A TOT greater than 100 indicates that the country is able to purchase more imports with the revenue earned from its exports, while a TOT less than 100 implies that the country can purchase fewer imports for the same value of exports.

## Results and Discussion

### Growth trends of Area, Production and Productivity of oilseed India

It was observed that in study period (1949-2021), area have shown increasing trend to the tune of 1.34 percent. However, in recent past (1997-2021) the area is increasing as much slower pace (0.49 percent annual. Which is the reason for increasing gap between requirement of oilseed in country and its production.

**Table 1:** Growth of Area Production and Productivity of Oilseed in India:(1949-2021)

	Period I (1949-1972)			Period II (1973-1996)			Period-III (1997-2021)			Overall		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y
CAGR	2.07***	1.78***	-0.11 NS	2.4***	4.73***	2.28***	0.49**	2.44***	1.93***	1.34***	2.86***	1.53***
R <sup>2</sup>	0.90 ***	0.54***	0.008 NS	0.904 ***	0.881***	0.784***	0.23**	0.646 ***	0.695 ***	0.90	0.94	0.87
CV %	14.69	16.85	8.66	18.22	35.89	18.21	58.04	61.99	26.71	27.83	59.07	35.69

A: Area, P: Production, Y: Productivity

Table 1 presents the Compound Annual Growth Rate (CAGR) of the area, production, and productivity of oilseed in India over different periods. From 1949 to 1972, the area under oilseed cultivation in India witnessed a growth rate of 2.07 percent, while the production of oilseed grew at a rate of 1.7 percent. However, during this period, the productivity of oilseed showed a negative growth rate of -0.11 percent per annum.

Between 1973 and 1996, there was an increase in the growth rates of area, production, and productivity of oilseed, with rates of 2.4 percent, 4.7 percent, and 2.28 percent respectively.

Subsequently, from 1997 to 2021, the growth rates slowed down, with the area, production, and productivity of oilseed growing at rates of 0.49 percent, 2.44 percent, and 1.93 percent respectively.

Overall, spanning from 1949 to 2021, the area under oilseed cultivation, production, and productivity in India grew at

rates of 1.34 percent, 2.86 percent, and 1.53 percent respectively. Notably, the production of oilseed exhibited higher instability over the entire period, with a variability of 59.07 percent.

**Period wise assessment of oilseeds in India**

Table 2 presents an insightful analysis of the average domestic production, import and total consumption of edible oil, over three distinct periods: Period-I (1995-2008), Period-II (2008-2021), and the overall span from 1995 to 2021.

Examining domestic production of edible oils, the figures reveal an ascent from 6.90 million tonnes in Period-I to 9.90 million tonnes in Period-II, contributing to an overall average of 8.40 million tonnes. This surge in availability underscores efforts to meet domestic demand and ensure a stable supply of edible oils.

**Table 2:** Average Domestic Production, Import, Total Consumption and self-sufficiency in edible oils (in million tonnes)

Particulars	Period-I (1995-2008)	Period-II (2008-2021)	Overall (1995-2022)
Domestic production of edible oils (mt)	6.90	9.90	8.40
Imports (mt)	4.00	12.70	8.34
Total Consumption (mt)	10.90	22.60	16.73
Self Sufficiency %	64.98	44.30	54.64
Import %	35.02	55.70	45.36

Imports witnessed a remarkable rise, escalating from 4.00 million tonnes in P-I to 12.70 million tonnes in P-II, resulting in an overall average of 8.34 million tonnes. This surge in imports suggests a growing reliance on external sources to fulfil the demand for edible oils, potentially influenced by factors such as global market dynamics and domestic production constraints.

The total consumption of edible oils exhibited a similar upward trend, climbing from 10.90 million tonnes in P-I to 22.60 million tonnes in P-II. The overall consumption over the entire period averaged at 16.73 million tonnes, indicating a consistent growth in the demand for edible oils. The percentage of self-sufficiency in edible oil production declined from 64.98 percent in P-I to 44.30 percent in P-II, settling at an overall average of 54.64 percent. This signifies an increased dependence on imports and underlines the need to bridge the gap between domestic production and

consumption.

Conversely, the percentage of imports in the total availability or consumption of edible oils rose from 35.02 percent in P-I to 55.70 percent in P-II, with an overall average of 45.36 percent. This reflects a notable shift in the balance between domestically produced and imported edible oils, highlighting the evolving dynamics in the country's edible oil sector over the analysed periods.

**Growth trends in oilseed production, import and consumption:**

The growth in consumption in oilseed reflected due to growth in population of country. The consumption is increasing at 2.34 percent per year which is not satisfied by the production growth trend (2.51 percent per annum) which resulted in relatively higher import growth rate (9.36 percent annum)

**Table 3:** Growth trends of oilseed production, edible oil production, import and Consumption (1995-2022)

	Production of oilseed	Domestic production of edible oils	Import	Consumption
CAGR	2.29 ***	2.51 ***	9.36 ***	2.34***
R <sup>2</sup>	0.662 ***	0.773 ***	0.879 ***	0.697
CV %	22.03	21.93	59.9	21.83

Table 3 provides a detailed analysis of the growth patterns in the oilseed sector, specifically focusing on production of

oilseeds, domestic production, imports, and total consumption of edible oils. Production of oilseeds has seen

a positive growth, with a CAGR of 2.29%, signifying a steady increase in the overall production of oilseeds in India. Similarly, domestic availability of edible oils has grown at a rate of 2.51% annually, indicating an upward trajectory in the availability of edible oils within the domestic market. In contrast, imports have shown a more substantial growth with a CAGR of 9.36%, emphasizing a significant reliance on imported edible oils to meet the consumption demand. Total consumption of edible oils has experienced a growth rate of 2.34%, indicating a consistent rise in the overall consumption levels. The Coefficient of Variation (CV%) provides insights into the variability or stability of the data. The relatively low CV% values for production (22.03%), domestic availability (21.93%), and total consumption (21.83%) indicate a moderate level of stability in these parameters over the specified period. In contrast, the higher CV% for imports (59.9%) suggest a greater degree of variability in the annual import quantities.

**Table 4:** Period-wise export import prices, Term of Trade and export import elasticities of oilseeds (Rs. /kg)

Period	Ave. Export Price	Ave. Import Price	Ave. Term of Trade	Ave. Elasticity of Export	Ave. Elasticity of Import
2001-2010	40.92	24.51	1.67	0.84	0.71
2011-2021	84.53	55.56	1.52	2.61	1.36
2001-2021	63.76	40.77	1.56	1.56	1.07

In contrast, the subsequent period from 2011 to 2021 saw a significant surge in both average export and import prices of oilseed, with figures reaching Rs. 84.53 and Rs. 55.56 per kilogram respectively. Despite this increase, the TOT declined to 1.52, signalling a less advantageous position for exports of relative to imports compared to the previous decade. Notably, the average elasticity of exports notably increased to 2.61, reflecting a heightened sensitivity of export prices to market dynamics, potentially indicative of increased demand or changes in market structures. Similarly, the average elasticity of imports rose to 1.36, suggesting a greater responsiveness of import prices to external factors.

When considering the overall period from 2001 to 2021, the average export price settled at Rs. 63.76 per kilogram, while the average import price stood at Rs. 40.77 per kilogram.

**Export, import prices and Term of Trade of oilseeds:**

Table 4 provides a comprehensive overview of period-wise trends in export prices, import prices, the term of trade (TOT), and price elasticities of export-imports of oilseed for the period from 2001 to 2021. Across the two defined periods, namely 2001-2010 and 2011-2021, notable shifts in average export and import prices are evident.

During 2001-2010, the average export price of oilseed stood at Rs. 40.92 per kilogram, while the average import price of oilseed was Rs. 24.51 per kilogram. This period witnessed a TOT of 1.67, indicating a relatively favourable exchange ratio for exports compared to imports. Interestingly, the average elasticity of exports was recorded at 0.84, suggesting a moderate responsiveness of export prices to changes in demand or supply conditions, while the average elasticity of imports was slightly higher at 0.71.

The average TOT over this period was 1.56, maintaining a relatively stable exchange ratio between exports and imports. Furthermore, the average elasticities of both exports and imports were moderately balanced, with export elasticity and import elasticity averaging at 1.56 and 1.07 respectively.

**Growth trends of export prices and import prices of oilseeds in India:**

Table 5 presents the period-wise growth rates of export and import prices of oilseeds in India, categorized into two distinct periods: Period I (2001-10) and Period II (2011-21), as well as an overall analysis spanning from 2001 to 2021. Noteworthy trends emerge from the data, shedding light on the dynamic nature of oilseed trade pricing over time

**Table 5:** Period wise growth trends of export prices and import prices of oilseeds in India

Particulars	Period I (2001-10)		Period II (2011-21)		Overall (2001-21)	
	Export Price	Import Price	Export Price	Import Price	Export Price	Import Price
CAGR	9.64***	8.25***	4.13***	2.31 NS	7.18***	7.39***
R <sup>2</sup>	0.91***	0.71***	0.69***	0.122 NS	0.92***	0.80***
CV %	29.73	31.88	16.81	26.5	40.46	48.34

Table 5 presents the period-wise growth rates of export and import prices of oilseeds in India, categorized into two distinct periods: Period I (2001-10) and Period II (2011-21), as well as an overall analysis spanning from 2001 to 2021. Noteworthy trends emerge from the data, shedding light on the dynamic nature of oilseed trade pricing over time.

During P-I (2001-10), the Compound Annual Growth Rate (CAGR) of export prices exhibited a robust growth of 9.64 percent, while import prices also experienced a notable increase at 8.25 percent CAGR. This period was characterized by a high coefficient of determination (R<sup>2</sup>) of 0.91 for export prices and 0.71 for import prices, indicating strong explanatory power of the respective growth models.

However, it's worth noting that the coefficient of variation (CV %) for both export and import prices stood relatively high, at 29.73 percent and 31.88 percent respectively, suggesting considerable variability in pricing dynamics during this period.

In contrast, during Period II (2011-21), the growth rates of export and import prices moderated, with export prices growing at a CAGR of 4.13 percent and import prices at 2.31 percent CAGR. Despite this deceleration, the R<sup>2</sup> values remained relatively high, indicating a reasonable fit of the growth models to the data. However, the CV % values for both export and import prices remained elevated, highlighting continued volatility in pricing trends.

Analysing the overall period from 2001 to 2021, export prices of oilseeds in India recorded a CAGR of 7.18 percent, while import prices demonstrated a slightly higher growth rate at 7.39 percent CAGR. The  $R^2$  values for export and import prices over this entire period were notably high at 0.92 and 0.80 respectively, indicating strong explanatory power of the growth models. However, the CV % values for both export and import prices were considerably high, underscoring the persistent volatility and variability in pricing dynamics throughout the two decades.

### Conclusion

The performance of oilseed in area, production, productivity, import and self-sufficiency have indicated an alarming result. The government of India have given moderately serious thought by launching the '*Atmanirbhar Bharat*' in general and oilseed production in particular. However, the result of the study reveals that the oilseed area in study period (1949-2021), have shown increasing trend to the tune of 1.34 percent. However, in recent past (1997-2021) the area is increasing as much slower pace (0.49 percent annual.) Which is the reason for increasing gap between requirement of oilseed in country and its production.

The growth in consumption in oilseed reflected due to growth in population of country. The consumption is increasing at 2.34 percent per year which is not satisfied by the production growth trend (2.51 percent per annum) which resulted in relatively higher import growth rate (9.36 percent annum)

The net change in period II over period I indicated that the consumption is increasing at higher pace than production. The net change in period II over period I in case of consumption was 207 percent while in case of production it was just 143 percent. The gap between consumption and production is reflected in higher net change in period II over period I in case of imports was 317 percent and therefore the self-sufficiency is found to be reduced to 44.30 percent in period II from 64.98 percent in period I.

Though, the self-sufficiency of India in oilseed is 54.64 percent and dependency on import is increasing day by day, the term of trade in export of oilseed is positive and more than one in throughout the periods. Which provides a strategic thought to focus on export of few selected oilseeds. Analysing pricing trends in oilseed trade from 2001 to 2021 sheds light on the dynamic nature of export and import prices. During the period, export prices grew at a CAGR of 7.18%, slightly lower than import prices at 7.39% CAGR.

### References

1. Dastagiri M, Jainuddin S. International trading prices of India's oilseed crops: growth rates, elasticities and foreign trade policy. *European Scientific Journal*. 2017;13(31):185. <https://doi.org/10.19044/esj.2017.v13n31p185>
2. Joseph JV, Karunakaran N. Growth and instability in area, production and productivity of oilseed crops in India. *Agricultural Situation in India*. 2022;79(4):11–21.
3. Khan A, Ansari S, Ansari S, Rehmat A, Fateh M, Khan M. Growth and trend in area, production, and yield of wheat crops in Uttar Pradesh: A Johansen co-integration approach. *Asian Journal of Agricultural Extension Economics & Sociology*. 2023;41:74–82. <https://doi.org/10.9734/AJAEES/2023/v41i21850>
4. Dastagiri MB, Kareemulla K, Venkateshwarlu G, Sujatha M, Yashavanth BS, Thakur S, *et al*. Self-sufficiency in edible oilseeds in India: Strategies and policies. ICAR-National Academy of Agricultural Research Management, Hyderabad, India; 2022. p. 26.
5. National Academy of Agricultural Sciences. Self-sufficiency in edible oil production. Policy Paper No. 121. New Delhi: National Academy of Agricultural Sciences; 2022. p. 16.
6. OECD/FAO. OECD-FAO Agricultural Outlook OECD Agriculture statistics (database). 2021. Available from: <http://dx.doi.org/10.1787/agr-outl-data-en>
7. United States Department of Agriculture-Foreign Agricultural Service. Oilseed and product annual. 2021.
8. Reddy K, Viswanatha. Area, production, yield trends and pattern of oilseeds growth in India. *Economic Affairs*. 2017;62:327–334. <https://doi.org/10.5958/0976-4666.2017.00016.X>
9. APEDA-AgriExchange. [Internet]. Available from: <https://agriexchange.apeda.gov.in/importtoindia/18headgenReportmonth.aspx#content>
10. IndiaStatAgri. [Internet]. Available from: <https://www.indiastatagri.com/table/foreign-trade/imports-edible-oils-india-2010-2011-2021-2022/1421690>
11. National Mission on Edible Oils (NMEO): Ministry of Agriculture and Farmers Welfare, Government of India. [Internet]. Available from: <https://nmeo.dac.gov.in/Default.aspx>