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EDIBLE OILSEED PRODUCTION, DEMAND – SUPPLY GAP IN INDIA- AN ANALYSIS

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Abstract: *The major edible oilseed crops grown in India are soybean, rapeseed & mustard and groundnut. They are widely grown in Rajasthan, Gujarat, Madhya Pradesh and Maharashtra. The yield of oilseeds in India is quite low when compared with that of the world. Though India is the fifth largest producer (around 13-15% of global production) of oilseeds, it imports around 60% of its edible oil requirement. A study was conducted to find the growth in area, production and productivity of oilseeds over the last 20 years and to analyze the demand- supply gap of edible oils in India. The demand for edible oils was found to increase substantially over the years and its domestic supply was insufficient. Furthermore, demand is also expected to increase with rise in income level and population. So, there is a need to increase the production of oilseeds in India.*

Keywords: *Demand, Edible oils, Import, Oilseeds, Supply.*

Introduction

India is the largest producer of oilseeds in the world in the year 2017-18 and oilseed sector occupies an important position in the agricultural economy of the country. In terms of area, production and economic value, oilseeds occupy second position next to food grains. Oilseeds account for 13% of the gross cropped area (GCA), 5% of the Gross National Product (GNP) and 10% value of all the agricultural commodities. India is the fifth largest oilseed producing country in the world contributing 6 % after USA (24%), followed by Brazil (18%), Argentina (11%) and China (9%) (USDA, 2018). India accounts for 13-15 per cent of oilseed area, 6-8 per cent of oilseeds production, 4-6 per cent edible oil production, 12-14 per cent of vegetable oil imports and 10-12 per cent of the edible oil consumption (Narayanan, 2017). India is blessed with varied agro- ecological environment ideally suited for growing a variety of oilseeds which includes groundnut, rapeseed-mustard, sunflower, soybean, sesame, safflower, castor, linseed and niger seed along with two perennial oilseeds *viz*., coconut and oil palm. Oil is also obtained from rice bran, cotton seed, corn, apart from tree-borne oilseeds (TBOs), *viz*., sal, mahua, simarouba, kokum, olive, karanja, jatropha, neem, jojoba, cheura, wild apricot, walnut, tung etc. which are cultivated under different agro-climatic conditions.Currently the total area under oilseeds in India is 26.11 million ha with a production of 31.37 MT and there is a massive yield gap found between India and other developed countries and also within India, between research station yield and farmers' yield. Oilseeds are mostly cultivated under marginal and sub marginal lands and more than three fourths of the area under oilseeds is still rainfed which resulted in poor crop productivity. India is the world's second-largest edible oil consumer after China, meeting nearly 60% of its annual requirement through imports, due to the inadequacy of domestic production to meet the demand [Solvent Extractor Association (SEA), 2018].

The demand for vegetable oils and fats has been rising rapidly due to increase in the per capita income, increase in the standard of living and with

more concern about health, food safety and hygiene (Sindelar and Aradhey, 2017). So, the gap between the demand and supply was met through import of edible oils into India.India is importing more than half of its annual edible oils demand which is driven by the ever increasing population and urbanization over the period of time. To become self-sufficient, either it is required to improve the national oilseeds productivity or shift to better alternative crops with higher oil content like palm (4 tons ha^{-1}) (Meena *et al.,* 2014).Narayanan (2016) analyzed the demand and supply gap of edible oils in India and found solution that the Government of India should focus on increase in oilseed production to achieve the self sufficiency of edible oils in future.A study was conducted to observe the growth performance of major oilseed crops in terms of area, production and productivity both spatially and temporally and also explored the dynamics of major oilseeds in different states in India. This study also focused on the stability in the growth of various oilseeds across the states (Reddy and Immanuelraj, 2017). Singh *et al.,* (2017) analyzedthe area, production and productivity of oilseed crops in India. There was a large gap in production and demand of edible oilseeds, leading to growing dependency on import day by day. Productivity of oilseeds was low that should increase to achieve the self- sufficiency in edible oils.

Objectives of Study

The major objectives of this study were:

1. To analyze the growth rate of area, production and productivity of edible oilseeds in India
2. To analyze the demand - supply gap of edible oils in recent years.

Methodology

The study is based on secondary data. Data on area, production and productivity of edible oilseeds in India was collected from the website of India Agristat. Data on Domestic Production and import of edible oils were collected from the Department of Food and Public distribution and Solvent Extractor Association. The present study has assessed the growth performance of edible oilseed crops on regular intervals related to two decades from 1998 to 2017. Compound Annual Growth Rate (CAGR) was used to measure the growth of economic variables (Lazarus *et al.,* 2016). CAGR was calculated using the following formula:

$$Y = ab^{t}e_{t}$$

where, Y= dependent variable for which growth rate was estimated,

a = Intercept,

b = Regression co-efficient,

t = Time variable and

e = Error term

Simple percentage analysis was used to identify the major states growing edible oilseed crops in terms of area, production and productivity in India. This was analyzed by taking the average of last five years. Percentage analysis was also used to find the import to demand ratio of edible oils over the last 15 years.

Results and Discussion

Growth rate in area, production and productivity of edible oilseed crops

India is one of the largest oilseed producer in the world. Among the edible oilseed crops, India ranks first in the production of minor edible oilseed crops such as sesame, safflower and niger seed. In the case of major edible oilseeds, India ranks first in the production of groundnut, second in rapeseed and mustard, fourth in sunflower and fifth in soybean (Venkattakumar and Padmaiah, 2010). The compound growth rates of area, production and productivity of individual edible oilseeds in India during 1998-2017 were presented in table 1.

Table 1: CAGR of area, production and productivity of edible oilseed crops (1998-2017)

Crops	Compound Annual Growth Rate (CAGR)

	Area	Production	Productivity
Soybean	1.04	1.04	1.00
Groundnut	0.98	1.00	1.02
Rapeseed & Mustard	1.00	1.03	1.02
Sunflower	0.94	0.95	1.03
Sesame	1.01	1.02	1.02
Safflower	0.93	0.95	1.02
Niger	0.96	0.98	1.01

All the oilseed crops have shown an increase in Compound Annual Growth Rate (CAGR) over the last 20 years (1998-2017). The growth rates of area was found to be high in case of soybean (1.04%), sesame (1.01%) and rapeseed- mustard (1%), and it was low in case of groundnut (0.98%), niger seed (0.96%), sunflower (0.94%) and safflower (0.93%). The CAGR of production was found to be high in the case of soybean (1.04%), rapeseed-mustard (1.03%), sesame (1.02%) and groundnut (1.00%) whereas it was low in case of niger seed (0.98%), sunflower (0.95%) and safflower (0.95%). The growth rate of productivity was almost same for various oilseeds and it was found to be between 1.01 and 1.03 per cent per annum. In general, growth rates of area, production and productivity of edible oilseeds were found to be less in India. Thus, the domestic production of edible oils remains less in order to meet the total domestic demand in India.

State wise share of area, production and productivity of oilseeds

In India, area occupied by oilseeds was 23.30 million hectares which contributed to a production of 26.09 MT on an average during last five years (2013-17). Rajasthan was recorded first rank (21%) in the area of oilseeds and contributes 23% to the total production of oilseeds followed by Madhya Pradesh and Maharashtra (each contributing 18% of total area) and Gujarat ranks second in production (contributes 18% to production). Gujarat ranks third in total area whereas Madhya Pradesh and Maharashtra contribute a third each to total production. Therefore these four major oilseed producing states i.e., Rajasthan, Madhya Pradesh, Gujarat and Maharashtra occupied 68% of total area under oilseeds and contributed 73% to production of oilseeds, on an average during the last five years (2013-17). Tamil Nadu has shown a higher productivity level of 2199 kg/ha. The other important oilseed producing states i.e., Karnataka, Andhra Pradesh, Uttar Pradesh, West Bengal, Tamil Nadu, Haryana and Telangana occupied 25% of total area and produced 22% of oilseeds in India. The other minor oilseed producing states occupied 7% of total area.

Table 2: Average State- wise area, production and productivity of oilseeds during 2013-17

S. No.	State	Area ('000 ha)	% share in area	Production ('000 tons)	% share in production	Productivity (kg/ ha)
1	Rajasthan	4815.41	21	5929.08	23	1233
2	Madhya Pradesh	4161.76	18	4156.10	16	1040
3	Gujarat	2684.20	11	4686.14	18	1721
4	Maharashtra	4161.76	18	4156.10	16	1004
5	Karnataka	1356.80	6	919.22	4	675
6	Uttar Pradesh	1174.04	5	925.64	4	790
7	Andhra Pradesh	1242.58	5	895.40	3	719
8	West Bengal	772.90	3	899.53	3	1163
9	Tamil Nadu	388.36	2	860.54	3	2199
10	Haryana	537.74	2	885.94	3	1645
11	Telangana	472.28	2	608.64	2	1280

12	Others	1532.75	7	1172.97	5	966

Source: India Agristat, 2018

Crop wise share of area, production and productivity of edible oilseeds

In India, soybean, rapeseed & mustard and groundnut were the major edible oilseeds crops which occupied 89% of total area and 95% of total production on an average during last five years (2013-17). Soybean ranks first in both area and production. It contributes 45% of total area and 42% of total production, followed by rapeseed & mustard (24% of area and 27% of production) and groundnut (20% of area and 26% of production). The minor edible oilseeds such as sesame, sunflower, safflower and niger seed contribute very less amount both in terms of area and production. The productivity was found to be high in case of groundnut.

Table 3: Crop wise share of area, production and productivity of edible oilseeds (Average 2013-17)

S. No.	Crop	Area ('000 ha)	% share in area	Production ('000 tons)	% share in production	Productivity (kg/ ha)
1	Soybean	11251.2	45	11725.9	42	1049
2	Rapeseed & Mustard	6125.34	24	7380.39	27	1203
3	Groundnut	4985.79	20	7200.87	26	1435
4	Sesame	1749.73	7	764.91	3	437
5	Sunflower	592.02	2	405.98	2	682
6	Safflower	161.57	1	91.78	<1	562
7	Niger seed	269.86	1	86.85	<1	321
	Total	25135.51	100	27656.68	100	812.71

Source: India Agristat, 2018

Analysis of demand- supply gap for edible oils in India

The total domestic demand for edible oils has increased substantially over the years and has touched 254.16 lakh tons against the domestic supply of 100.99 lakh tons during 2016-17 and it is likely to increase further with rise in income and population. The growth in the supply of domestic edible oils has not been able to keep pace with the growth in demand and the gap between supply and demand is being met through huge imports. During 2003-17, it was found that the import to demand ratio was maximum in 2015-16 (63 per cent) and minimum in 2005-06 (33 per cent).Duringthe last five years, the average import to demand ratio was 57 per cent, which is quite high. Rising income level and cheaper imports have helped in increasing the per capita consumption of edible oils. The per capita consumption of edible oil and fat in India (17 kg/ person/ year in 2016-17) was found to be lower than the global average (25 kg/ person/ year) (Zakaria *et al.,* 2017). Furthermore, the domestic consumption of edible oils in India is expected to exceed 340 lakh tons by 2030.

Table 4: Demand and supply gap for edible oils in India during 2003-17 (Quantity in lakh tons)

Year	Domestic supply	Import	Total demand/ consumption	% of import to total demand
2002-03	46.64	43.70	90.34	48
2003-04	71.40	43.97	115.37	38
2004-05	72.47	50.42	122.89	41
2005-06	83.16	40.91	124.07	33
2006-07	73.70	46.06	119.75	38
2007-08	86.54	54.34	140.88	39
2008-09	84.56	74.34	159.88	46
2009-10	79.46	74.64	154.10	48

2010-11	97.82	72.42	170.24	43
2011-12	89.57	99.43	189.10	53
2012-13	92.19	106.05	198.24	53
2013-14	100.80	109.76	210.56	52
2014-15	89.78	127.31	217.09	59
2015-16	86.30	148.50	234.80	63
2016-17	100.99	153.17	254.16	60

Source: GOI [Department of Food and Public Distribution], 2018

Import of edible oils by India

As the domestic availability of edible oils continues to remain inadequate to meet the domestic demand, India has been a major buyer of edible oils in the world market since mid-1990s. India continues to import the edible oils such as soybean oil, palm oil and sunflower oil. India imports almost half of its edible oil requirement, which makes it the world's third-largest importer of edible oils. Edible oil contributed nearly 47% of the value of the total agricultural imports in 2016-17 (India Agristat, 2018). Import of edible oil in terms of both quantity and value has grown substantially over the last 15 years. It was found to be 43.7 lakh tons amounting to Rs. 8,779 crore during 2003 which increased to 151.44 lakh tons amounting to Rs. 73,048 crore during 2017. The maximum amount of import was found in 2015-16. Share of edible oil in total agricultural imports has been continuously rising (India Agristat, 2018). In terms of volume, crude palm oil (42%), soybean oil (22%), and RBD (Refined, Bleached and Deodourized) palmolein (19%) formed a major amount of imported palm oil in 2016-17. Totally, palm oil contributes nearly 62% of all vegetable oil imports. India imports palm oil mainly form Indonesia and Malaysia, soybean oil from Argentina and Brazil and sunflower oil from Ukraine and Mexico [Solvent Extractor Association (SEA), 2018].

Table 5: Import of edible oils by India during 2003-17

Year	Import (in lakh tons)	Value (Rs. crore)
2002-03	43.7	8,779
2003-04	52.9	11,683
2004-05	45.0	11,076
2005-06	42.9	8,960
2006-07	42.7	9,539
2007-08	49.0	10,301
2008-09	67.1	15,819
2009-10	80.3	26,483
2010-11	66.7	29,860
2011-12	84.5	46,255
2012-13	110.1	61,107
2013-14	104.5	56,572
2014-15	127.32	64,890
2015-16	156.44	68,677
2016-17	151.17	73,048

Source: SEA [Solvent Extractor Association], 2018

Taken as a whole, the indication is that India needs to increase the productivity and production of oilseed crops to check the imports. On the other hand, there is a need to increase the area under oilseeds and oil palm.

The Central and State Governments have been making efforts to accelerate the production of oilseed crops. India has witnessed an impressive growth in the production of oilseeds during 1986-87 (11 million tons) and reached up-to 32 million tons during 2010-11 just in a span of two decades and achieved the self- sufficiency in edible oils during that period. This was due to the launch of Technology Mission on Oilseeds (TMO) during 1986, but it was short lived. Various schemes such as Integrated Scheme of Oilseeds, Oil Palm and Maize (2004-2014) and National Mission on Oilseeds and Oil palm (NMOOP) (2014-18) were launched by the government to promote and accelerate oilseeds production. NMOOP was converted into National Food Security Mission on Oilseeds and Oil palm in the year 2017-18. The aim of the scheme is to augment the availability of vegetable oils and to reduce the import of edible oils byincreasing the production and productivity of oilseeds upto 36.10 million tonsand 1290 kg/ha, respectively by end of 2019-20. Efforts will be made to achieve additional area of 1.05 lakh hectare with the total area of 4.20 lakh ha under oil palm cultivationduring 2017-18 to 2019-20.

Productivity performance of improved varieties

Total Factor Productivity

Total factor productivity (TFP) is an important measure to evaluate the performance of any production system and sustainability of a growth process. Total Factor Productivity measures the extent of increase in the total output, which is not accounted for by increase in the total inputs but by increase in new technology.

Chand *et al.,* (2012) conducted a study to estimate the TFP of different crops in India during 1975-2005. The annual rate of TFP growth was 1.9 per cent for wheat and it enjoyed higher benefit of technological breakthrough during the study period. Among oilseeds, rapeseed & mustard experienced a strong technological growth during 1975-85, which halved during 1986-95 and reached almost zero during 1996-2005. The TFP growth in groundnut has improved in each decade after 1985. The TFP growth for soybean has remained below 1% during last two decades. This means that edible oils research and technological growth was very poor in India.

Table 6: Total Factor Productivity (TFP) of major crops in India (1975-2005)

S. No.	Crop	1975-85	1986-95	1996-05	1975-2005
1.	Rice	0.90	0.74	0.40	0.97
2.	Wheat	1.60	2.51	1.61	1.92
3.	Maize	2.00	0.67	1.64	1.39
4.	Jower	1.15	0.74	-0.42	0.63
5.	Bajra	1.22	0.39	1.50	1.04
6.	Barley	0.06	0.44	0.61	1.38
7.	Gram	NA	0.09	0.34	0.16
8.	Moong	NA	-0.59	1.70	0.53
9.	Arhar	NA	0.21	-0.54	-0.69
10.	Urad	NA	-0.22	-0.73	-0.47
11.	Soybean	NA	0.83	0.63	0.71
12.	Groundnut	0.49	0.55	1.30	0.77
13.	Rapeseed- mustard	1.88	0.74	0.08	0.79
14.	Sugarcane	1.38	-1.32	-0.65	-0.41
15.	Cotton	2.84	0.92	0.80	1.41
16.	Jute	1.88	1.59	0.25	1.28
17.	Onion	NA	2.37	-1.62	-0.49
18.	Potato	NA	1.20	-1.28	-0.76

Source: Chand *et al.,* 2012

Yield gap analysis

Yield gap analysis is the difference between the potential yield of any crop at research station and the actual yield obtained by the farmers. Less than 20 to 30 % of yield gap is desirable.

The results of 23,118 frontline demonstrations (FLDs) conducted on oilseeds crops under real farm situations in different agro-ecological conditions of India over a period of five years during 2010-15 revealed that the yield gap between improved technology and farmers' practices ranged from 21 % in sesame to 149 % in sunflower. There exists a tremendous potential for enhancing the yield of oilseed crops by adopting the technologies already available (NFSM, 2018).

Table 7: Productivity potential (kg/ ha) of improved technology of oilseeds (2010-15)

S. No.	Oilseed	Improved technology yield (kg/ ha)	National average yield (kg/ha)	Increase in improved technology over National average yield (%)
1.	Groundnut	2264	1439	57
2.	Soybean	1603	1182	36
3.	Rapeseed & Mustard	1692	1181	43
4.	Sunflower	1742	700	149
5.	Sesame	536	441	21.5
6.	Safflower	1061	567	87.1
7.	Niger	406	313	29.7

Source: NFSM [National Food Security Mission], 2018

Conclusions

India has been a major importer of edible oils over a long period of time due to the deficit in production to meet the demand. To meet the edible oil demand of the country, the Government should take appropriate measures to increase edible oil production and to reduce the import of edible oils by India. In order to stimulate the TFP and minimize the yield gap among the oilseeds, the Government should increase research funding for development of high yielding, short duration, pest, disease and drought resistant/ tolerant varieties of oilseeds and also strengthen the extension services. This can contributes to the increase in oilseeds production significantly that would reduce the dependence on imports of vegetable oil besides realizing higher profitability to oilseed farmers. All this will require proactive strategy from researchers, planners, policy makers, market forces and farmers for boosting the production and productivity of oilseeds in India.

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