Research & Reviews: Journal of Agriculture and Allied Sciences

e-ISSN:2347-226X
p-ISSN:2319-9857

Status, Challenges and Solutions of Oil-Seed Production in India

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Mini Review

Received date: 24/01/2019
Accepted date: 20/02/2019
Published date: 28/02/2019

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Keywords: Oilseed production, Consumption trend, Current scenario, Oilseeds sufficiency

ABSTRACT

With an annual average yield of about 29 million tons, India stands as forth leading oilseeds producing countries, next only to the USA, China, and Brazil. Though the country has made a significant paradigm in the total oilseeds production i.e. from meagre 5.26 million metric tons (MMT) in Marketing year (MY) 1949/50 to a whopping 32.10 MMT in year MY 2016/17, the country is not able to pace up with the skyrocketing demand of the oilseed brought about by the booming population growth.

The country is still importing around half of its domestic consumption requirements of edible oils from various global exporters. Soybean and Mustard oil being consumed as a vegetable oil by the large proportion of the Indian population occupies an important position in edible oils sector of India. This article analyses the current scenario of oilseed production, challenges associated and various solutions that might take country towards oilseeds sufficiency.

INTRODUCTION

Attributed by high oil content along with moderate level of fiber, several vitamins, minerals and fatty acids (both saturated and unsaturated), oilseeds are energy dense foods. Apart from being an essential component of human diet, these oils and fats carries industrial significance that is essential for the production of large number of products such as soaps, hair oils, pharmaceuticals, textiles, paints and varnishes, etc. Oilcakes and meals obtained after the extraction of oils from these crops are the important sources of animal feeds and manures. Accounting about 19% of global area with around 2.7% of global production, these field crops hold the second most important determinant of Indian agricultural economy only next to cereals [1]. With under 27 Mha area under oilseeds cultivation with an average yield of 1095 kg/ha yielding 29 Mt, India occupies an significant position in the world as forth leading oilseeds producing countries lacking behind only to USA, China and Brazil [1]. Oilseed crops has attained annual growth rate of 2.44%, 5.47% and 2.96% at area, production and yield respectively during last decade (1999-2009) [2].

Being country rich in diverse agro-ecological conditions, India has optimal conditions for the production of all nine annual oilseeds including seven edible oilseeds, *viz*. Groundnut, Rapeseed-Mustard, Sunflower, Sesame, Niger, Safflower, and Soybean, and Castor and linseed as non-edible oilseeds. Along with these nine annual oilseeds, other minor oil-bearing plants of horticultural and forest origin, including Coconut and Oil palm, and other non-conventional sources like rice bran, cotton seed, corn seed and tobacco seeds also provide substantial quantity of oils [3]. The country stands as the leading nation in Castor production contributing a massive 79.6% of global production and along contributes substantially to the Groundnut (25.1%) holding the pride of being second largest producer after China and Rapeseed- Mustard production contributing around 16% of the global production, ranking third in global stand only behind China and Canada [4]. Though the country is gifted with such rich diversity, the cultivation of oilseed crops on poor and marginal soils primarily under rainfed situations has resulted in poor realization of its genetic potential [5]. Because of which, though it covers 20.8% of global area of oilseed crops, the country produces only around 10% of the total production causing disparity between the demand and the supply of these oils that has to be met via imports annually [4]. Booming populations with higher income is likely to further increase the domestic consumption of edible oils. The country is not able to meet up with the annual demand that is increasing at the rate of 6% with production increasing with mere 2% per annum [6].

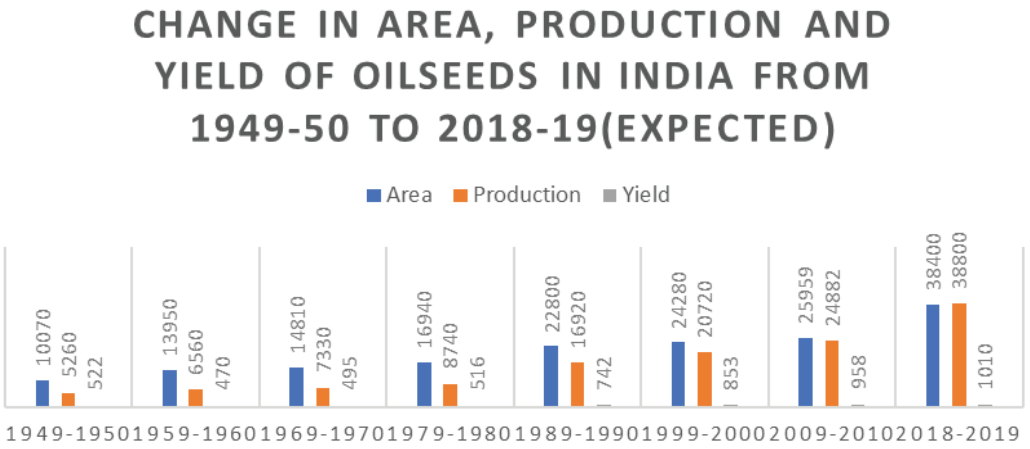
OBJECTIVES OF THE STUDY

1. To analyze the present status of Indian oil economy in global stand.

e-ISSN:2347-226X
p-ISSN:2319-9857

2. To study the scenario of different oilseed crops of India.
3. To find out various constraints in production of oilseeds in country
4. To find out the various ways around to overcome the constraints to lead country towards self-sufficiency.

Trend of Oil seeds production, area and yield in India

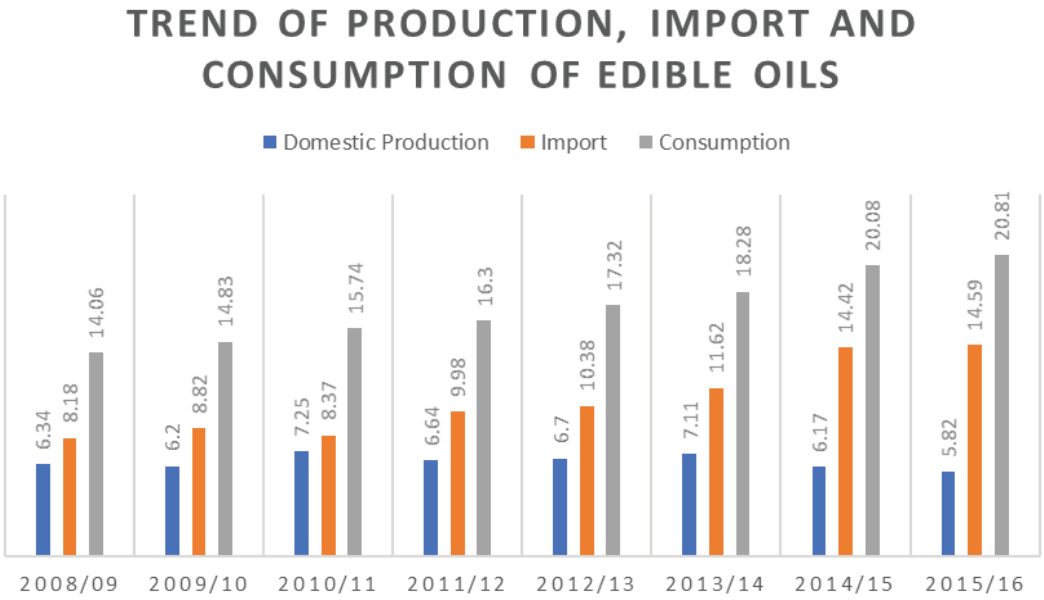


Source: Madhuri & Rao, 1949-2014 [7]

Figure 1. Trend of Oil Seeds Production, Area and Yield in India.

The country has made a significant jump in all three aspects viz. area, production and yield comparing the data from 1949-50 to 2018-19 (expected) as seen in **Figure 1**. The area under the oilseeds increases from 10.07 million ha to 38.4 million ha increasing the production from 5.26 million metric tonnes to 38.8 million metric tonnes brought about by increment in productivity from 522 kg/ha to 1010 kg/ha [7].

Domestic edible oils production, import and consumption



Source: Patel, 2016 [8]

Figure 2. Domestic Edible Oils Production, Import and Consumption.

There has not been a significant rise in domestic production of the edible oils as seen in the **Figure 2** but the consumption of the oils triggered by mushrooming population and enhanced income has increased by about one and half folds reaching to 20.81 million metric tonnes in 2015/16 which was 14.06 in 2008/09. For narrowing this disparity country has to spend huge budget in the import of these oils, near about half of its domestic consumption requirements, from various exporting countries [8].

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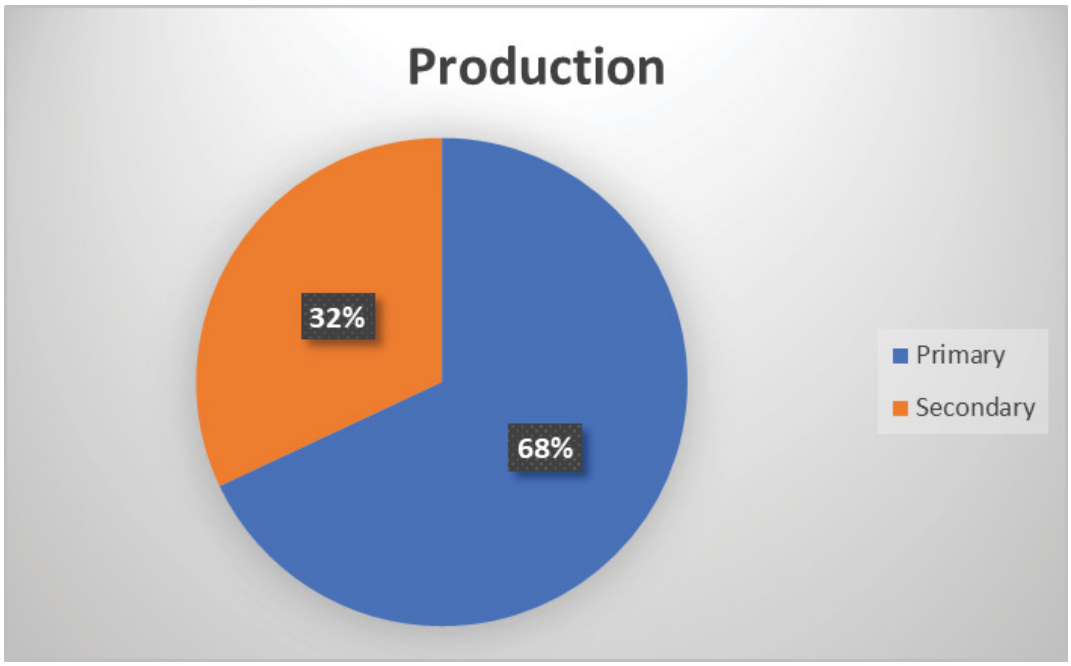
p-ISSN:2319-9857

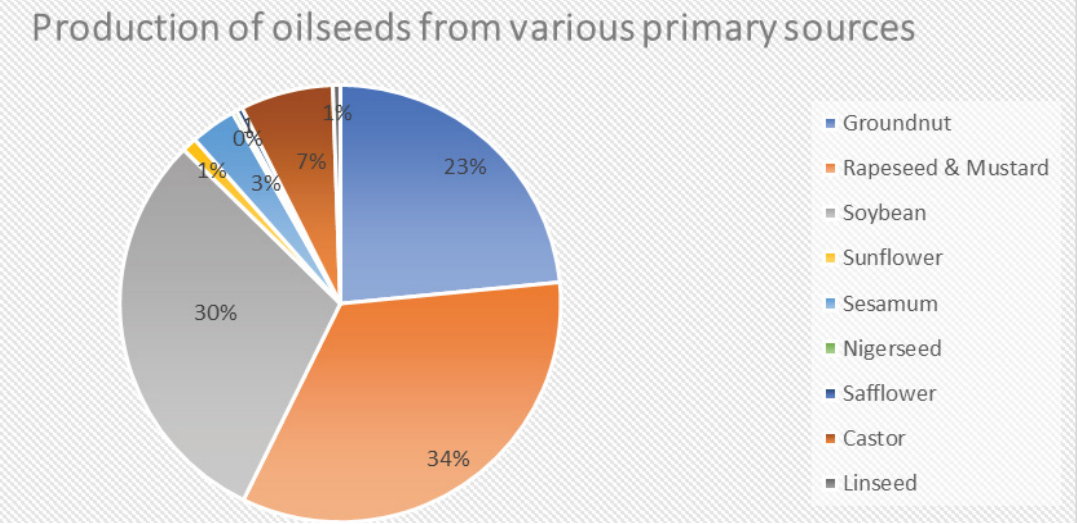
Production of oils from different sources in India (2016-17)



Source: Ministry of Agriculture and farmers welfare, GoI, 2017 [9]

Figure 3. Production of oils from different sources in India.

Out of total edible oils produced (107.49 lakhs tonnes) in the country 68% i.e. 73.09 lakhs tonnes are contributed from primary sources and remaining 32% i.e. 34.4 lakhs tonnes from secondary sources as seen in **Figure 3** [9].

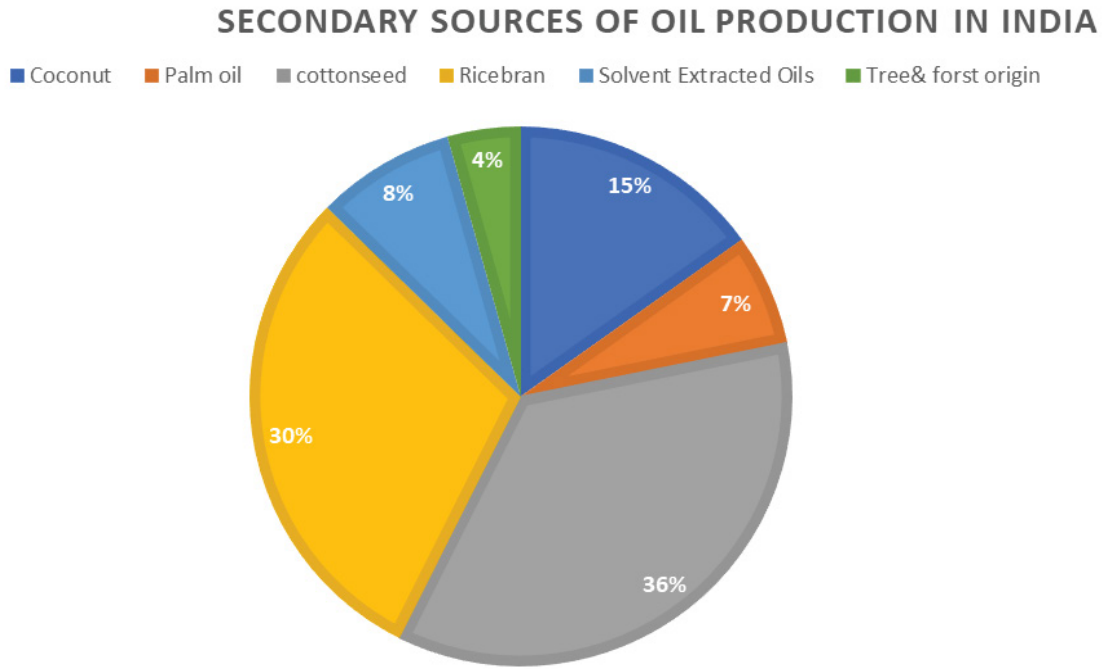


Source: Ministry of Agriculture and Farmers Welfare, GoI, 2018 [10].

Figure 4. Production of oilseeds from various primary sources.

Out of all various primary sources rapeseed mustard contributes the most i.e. 34% of total yield of 73.09 lakh tonnes while the least contribution is from linseed i.e. 1%. Soybean contributing 30% and groundnut contributing 23% are other important players in the edible oil of India **(Figure 4)** [10].

e-ISSN:2347-226X
p-ISSN:2319-9857

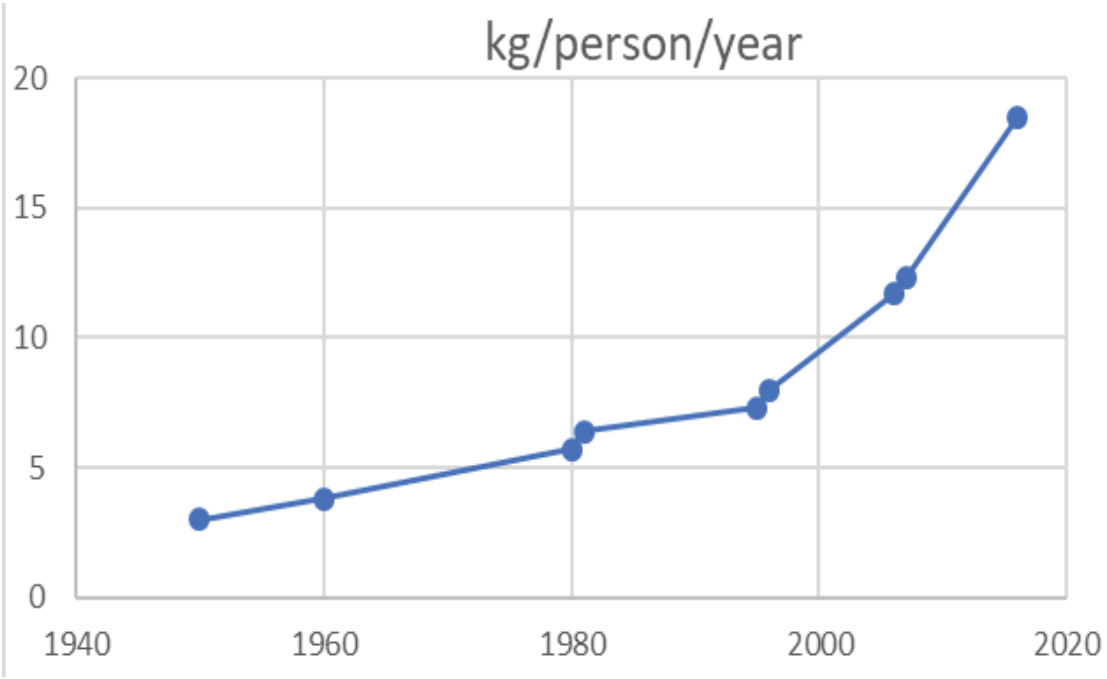


Source: Ministry of Agriculture and Farmers Welfare, GoI, 2018 [10].

Figure 5. Secondary sources of oil production in India.

Among the secondary sources, cottonseed holds a significant place contributing about 36% of total oil produced from secondary sources. Ricebran with 10.31 lakhs tonnes and coconut with 5.2 lakhs tonnes are other important sources. Tree and forest origin with 1.5 lakhs tonnes being the minimum among all **(Figure 5)** [10].

Trend in Per capita consumption of vegetable oils in India



Source: Presentation on oilseeds 2018, 2018 [11].

Figure 6. Trend in Per Capita Consumption of Vegetable oils in India.

With an annual increase of 6% in oilseed demand elicited by higher income, the per capita consumption of oil increases from 3 kg/person/year in 1950 to 18.5 kg/person/year in 2016 with WHO recommendation being 11 kg/person/year. Though

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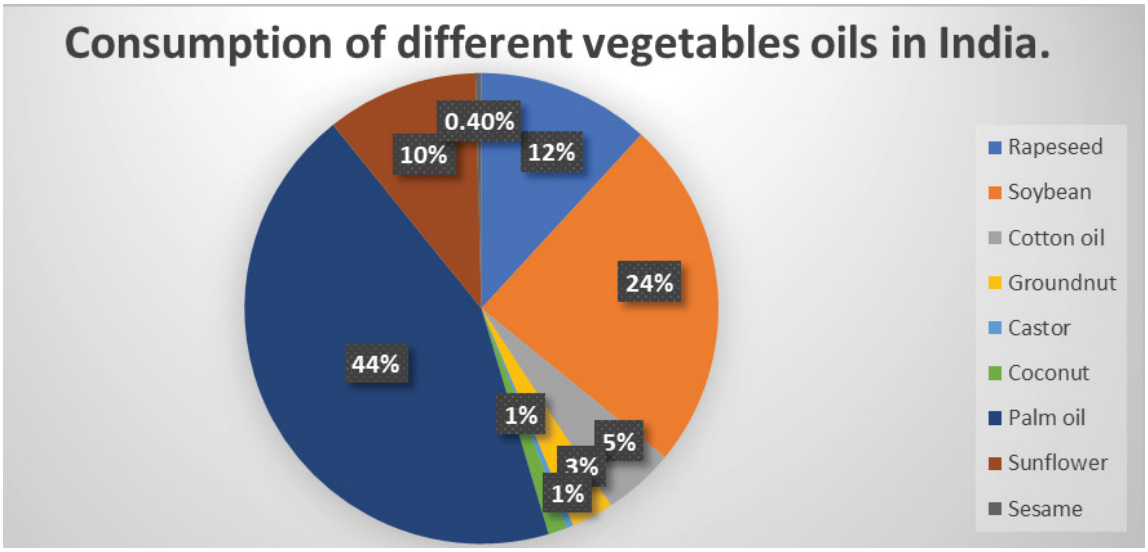
p-ISSN:2319-9857

the consumption has heightened significantly the country and India is the largest importer and third largest consumer of edible oils after China and EU, the country is still below the world average of 25kg/person/year **(Figure 6)** [11].

Consumption of different vegetable oils in India

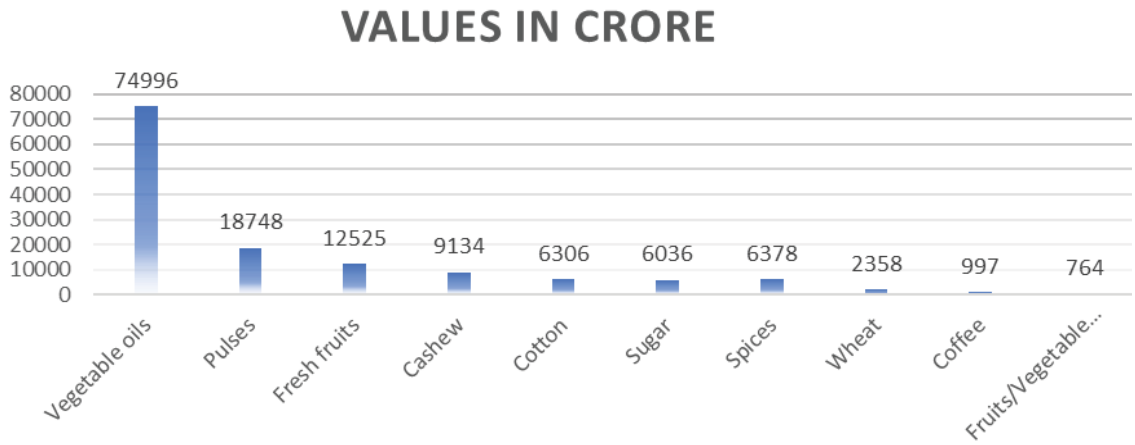


Source: Presentation on oilseeds 2018, 2018 [11].

Figure 7. Consumption of different vegetable oils in India.

Out of all edible oils in India the palm oil holds the position of being the most consumed oil followed by soybean contributing 24% of total oil consumed. Rapeseed mustard being third important source contribute 12% and sesame contributes the least **(Figure 7)**.

Import share of different agricultural produce



Source: DoC

Figure 8. Import share of different agricultural produce.

India largely rely on imports to fulfill its domestic consumption requirements and is the largest importer of vegetable oils in the world followed by China and USA. Of the total value of India's Agricultural imports i.e. 152061 crores, vegetable oils alone occupies about half i.e. 47% of total import share with its important import sources being Indonesia (39%) followed by Argentina (21%) and Malaysia (18%) **(Figure 8 and Table 1)**.

Trend of production of different oil sources in different years

Table 1. Trend of production of different oil sources in different years.

Oilseeds	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16
Groundnut	15.58	18.38	11.19	21.12	16.48	12.49	19.01	16.02	10.8	22.34	17.02	15.36
Rapeseed	23.54	25.21	23.05	18.08	22.32	20.48	25.35	20.47	24.89	24.42	19.47	21.16
Soybean	11	13.24	14.16	17.55	15.85	15.94	20.38	19.54	23.47	18.97	16.6	13.76
Sunflower	3.92	4.75	4.05	4.83	3.82	2.81	2.15	1.7	1.8	1.66	1.43	1.1

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p-ISSN:2319-9857

Sesamun	2.09	1.99	1.92	2.35	1.98	1.82	2.77	2.51	2.12	2.21	2.57	2.7
Nigerseed	0.34	0.32	0.36	0.33	0.35	0.3	0.32	0.29	0.31	0.29	0.23	0.22
Safflower	0.52	0.69	0.72	0.68	0.57	0.54	0.45	0.44	0.33	0.31	0.27	0.18
Castor	3.17	3.96	3.05	4.21	4.68	4.04	5.4	9.18	7.86	6.91	7.48	5.8
Linseed	0.51	0.52	0.5	0.49	0.51	0.46	0.44	0.46	0.45	0.41	0.47	0.34
Coconut	5.5	4.2	4.5	4.5	4.5	4.5	4	4	3.9	5.3	4.8	4.32
Cottonseed	4.3	5.7	6.3	8	7.6	8	10.89	11.62	11.57	12.4	12.15	10.05
Ricebran	6.2	6.8	7	7.2	7.7	7.2	7.2	7.5	7.8	8.1	9.2	9.9
SEO	3.5	4.3	3.5	4	4	4.2	4.2	4.1	4.1	3.1	3	3.5
TFO	0.8	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.6	1.5

Source: Directorate of Vanaspati, Vegetable Oils and Fats.

TECHNOLOGY MISSION ON OILSEEDS

Despite having largest cultivated area under oilseeds cultivation in the world, the country still had to rely largely on imports to fulfill the domestic consumption requirements. The country did see the improvement in the oilseed production but it had not been able to make a satisfactory leap in this sector. The oilseed sector had always been neglected and major thrusts were on enhancing the food grains productivity. The per capita consumption of oils increased from 3 kg in 1950 to 6.4 kg in 1996-97 but the pace of oil production was not increasing with the same pace. For narrowing this disparity the Government of India launched a Technology Mission on oilseeds (TMO) in May 1985 by the late Prime Minister Shri Rajiv Gandhi with very ambitious objectives of- self-reliance on edible oils by 1990, reduction in imports to almost zero by 1990 and raise oilseed production to 18 million tonnes by 1989-90 and 26 million tonnes of oilseeds and 8 million tonnes of vegetable oils by 2000 [12]. This mission adopted a four-pronged strategy under four mini missions.- to improve oilseeds crop technology, improve processing and post-harvest technology, strengthen input support system bring awareness to the farmers about farm worthy technology and ensure remunerative prices to the farmers by effective procurement, handling and disposal [13]. With the execution of this mission the oilseeds scenario undergoes a drastic change in the following years. With the enhanced productivity from 570 to 882 kg/ha the level of self-sufficiency increased from 67% to 87%.

CONSTRAINTS IN OILSEED PRODUCTION IN INDIA

1. Though these oilseeds are energy rich crops requiring higher inputs with better management practices, more than 85% of the area under oilseed cultivation falls under rainfed and grown in energy starved conditions with low inputs and poor management practices due to which the total genetic potential of the crop remains unexploited explaining the sharp fluctuations and giving rise to high risk [14].
2. Due to the higher emphasis on the field grains, the progress has not really been substantial and these crops are generally grown in marginal and sub marginal areas where the fertility status of the land is low for the raising of field grains so the farmers use these crops just not to keep the land fallow.
3. As these crops are mostly grown under rainfed, farmers have to gamble with the monsoon to get the expected yield. These crops are thus subjected to the vagaries of monsoon and most of the crop suffer due to moisture stress during flowering, peg initiation, and pod filling stages.
4. Most of the cultivars and hybrids developed are drought susceptible and the high yielding varieties are also not suitable. They are generally long duration and also do not have higher level of oil content. There is scarcity of short, high yielding input responsive biotic and abiotic stress resistant varieties. As compared to cereals there has been failure of hybridization and seed multiplication programs. Similarly farmers are not able to get sufficient amount of these best quality seeds during sowing period due to very low seed multiplication ratio.
5. Similarly these crops are generally grown by small and marginal farmers under un-irrigated areas with poor management practices. Similarly the rate of inputs application is very low and farmers are also not adapted to new technologies and due to less land holdings mechanization has also not been so much popular.
6. These crops are generally grown as intercrop or in mixture with different crops and those places where these crops are grown as mono cropping, no crop rotations are practiced resulting in development of pests and diseases. Similarly since no legumes are taken in rotation the soil become quite drained out of fertility [15].
7. These crops are highly affected by pests and diseases. Pests like aphids, and diseases like powdery mildew, rust causes severe loss in production which can reach as much as 50%. The level of application of plant protection chemicals is also not sufficient.
8. There has not been a proper transfer of technology from lab to farm. The supply of technology and desired inputs from farm institutions to farmers is very poor.

e-ISSN:2347-226X
p-ISSN:2319-9857

9. Lack of mechanization and sophisticated machinery for sowing and harvesting of crop as these crops has high scattering property at the time of maturity. Similarly due to low efficiency of oil extraction units or expellers the total amount of oils cannot be extracted.
10. Similarly there is lack of suitable post-harvest technology to prevent post-harvest losses and lack of proper storage, grading and marketing facilities to avoid deterioration of quality.

Increasing population along with increasing per capita consumption of oils has created situation that requires immediate attention. Some of the measures that has to be taken care of to take country towards self -sufficiency are discussed below:

Enhancing oilseed production and productivity

1. Most of the areas in the eastern India after the harvest of paddy are left uncultivated also known as rice-fallow due to the irrigation unavailability. By adopting proper management practices such as raising early duration rice varieties, selection of proper varieties with suitable agronomic practices with integrated pest management these areas can be brought into cultivation of oilseed crops. This practice can offer ample opportunity to promote oilseed cultivation since there is vast availability of natural resources and fertile land [16].
2. There is a vast scope for extending the crop area under oilseeds through intercropping and sequential cropping as per system suitability with the aim of maximizing profit and enhancing area of oilseeds.
3. Proper extension practices for transfer of technologies from research lab to farmers field via front line demonstrations, trials, and different trainings to convince the farmers as there has been a slow adoption of improved varieties and production technologies and in some cases, this is simply because they are unaware about those technologies.
4. One of the major hinderance in spread of oilseeds is the unavailability of adequate quality seeds. Efforts are needed on production of hybrid seed and promotion of hybrids having short stature, high oil content properties and varieties with short durations.
5. One of the major constraints is the cultivation of oilseeds under energy deficit condition under rainfed areas. This can be overcome by promoting several conservation irrigation practices and promoting micro irrigations such as sprinkler and drip irrigation should be promoted.
6. There has been application of primary nutrients i.e. N, P, K to some extent but the secondary and micro nutrients such as Zinc, Sulphur, Boron has always been neglected. Several experiments has already shown that application of such inputs are capable of enhancing the productivity of these oilseed crops. So, different programs like soil health cards, soil fertility maps indicating the nutrients contents and recommendations to be given for raising the production.
7. Several research and development programs for the development of modern machineries to improve labour efficiency and productivity is necessary which ensures timeliness of operations and reduces human drudgery.
8. Good agronomic practices such as land levelling, seed treatments, good drainage facilities with proper weed and pest management practices should be chosen and practiced. Since these crops are highly sensitive to water logging and crop weed competition(CPCWC 20-30 DAS) care must be given.
9. These crops have high capsule scattering properties and oil reduction if harvesting not done at the proper maturity stages. So harvesting have to be done at the right stage.
10. Strengthen the post-harvest storage and processing facilities such as crushing, solvent extraction, oil refining and hydrogenation.
11. Favorable government policies such as imposing heavy import duty for raw materials and vegetable oils and increasing consumer awareness for the benefits of indigenously produced vegetable oils to discourage importer nexus and promote the indigenous oil seed sector.
12. Government schemes such as crop insurance with reasonable minimum support prices with added bonus to attract the new growers or avoiding the shifting of farmers towards other crops or professions.

CONCLUSION

Though the country has made a significant progress in oilseed production after the yellow revolution but the production has become stagnant. The country still has to import more than half of its domestic requirement and this amount is surely going to increase in the days to come due to mushrooming population and increased per capita consumption. An immediate action towards this sector is utmost required or the dependency on import will certainly increase. Country is already spending about 75000 crores for the imports of vegetable oils and with the present rate it will be around 80000 crores in next 5 years. So it is the high time to support the oilseed growers through the research and development, long term planning, government policies coupled with remunerative pricing of the produce to take country towards self-sufficiency.

e-ISSN:2347-226X
p-ISSN:2319-9857

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