Document of Compilation on Achieving Self-Sufficiency in Edible Oil Production: Present Status, Future Projections, and Roadmap

Road Map to Self Sufficiency in Edible oils

ICAR-DIRECTORATE OF GROUNDNUT RESEARCH

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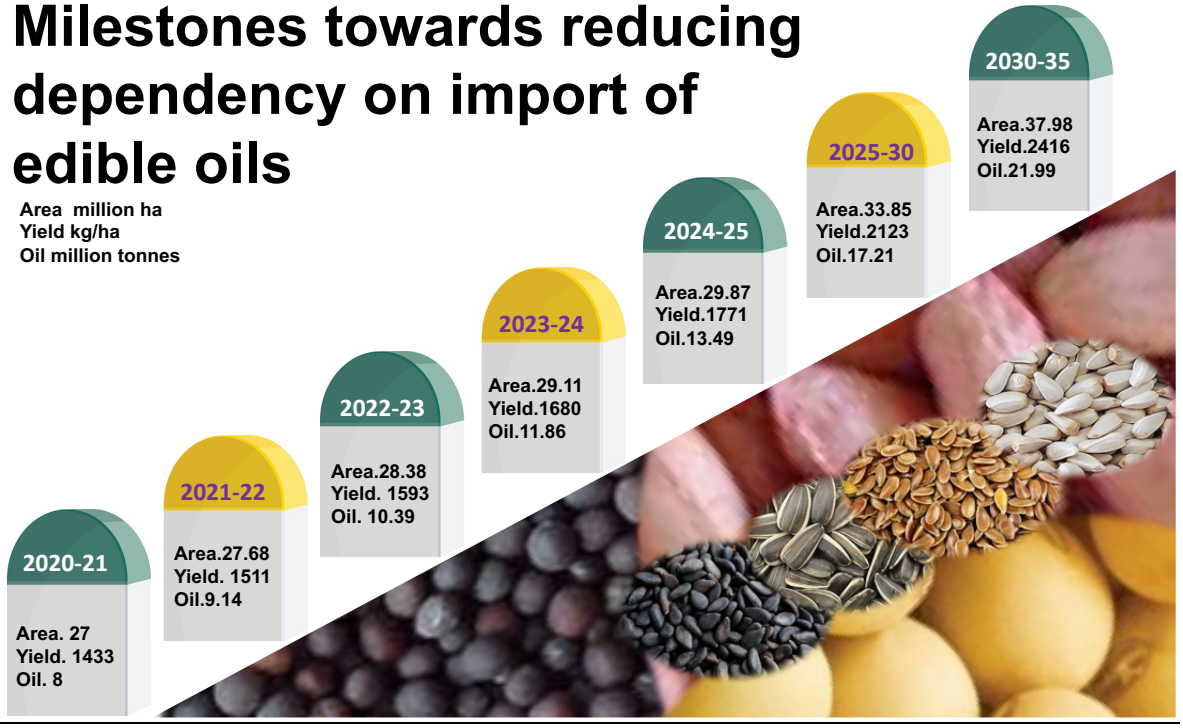
Milestones towards reducing dependency on import of edible oils

Area million ha
Yield kg/ha
Oil million tonnes



Achieving Self-Sufficiency in Edible Oil Production: Present Status, Future Projections, and Roadmap

Introduction

To meet the growing demand, India is importing edible oils nearly 15 MT worth nearly rupees seventy thousand crores at the cost of valuable foreign reserves. The per capita consumption of edible oils has grown @ 2.48% annually with a CAGR of 2.17% from 15.8 kg/capita/year in 2012-13 to 18.76 kg/capita/year in 2019-20. If the trend continues, the per capita consumption in 2034-35, with CAGR of 2.32%, will be 27.08 kg. The growth in consumption is attributed mainly to change in life-style, increase in population, urbanization, growing demand of fast food among younger generations, etc. The demand for edible oil was 25.63 MT in 2019-20 against domestic production of 10.53 MT (7.03 MT from primary sources and 3.50 MT from secondary sources) necessitating the import of 15.10 MT to fill the demand and supply gap.

To lessen the burden on foreign exchequer because of huge import of edible oils and to encourage the domestic production, Government of India has timely intervened and called for 'Atmanirbhar Bharat' in edible oil production.

Considering the low productivity of edible oilseeds (Groundnut, Soybean, Rapeseed and Mustard, Sesame, Sunflower, Safflower and Niger) and being predominantly rainfed cultivation in marginal land by marginal farmers in erratic and deficient rainfalls, the task set is abysmally difficult. The situation is compounded further because of the recent declining trend in area of major and minor edible oilseeds, increase in import of cheaper edible oil, non-availability of quality seeds, etc.

During 2019-20, area under edible oilseed crops was 25.81mha with production and productivity of 31.48 MT and 1220 kg/ha, respectively. However, to boost domestic production towards 'atmanirbhar', the anticipated edible oil production in the year 2024-25 has been set to around 18 MT (13.50 MT from primary sources from seven edible crops and 4.50 million tonnes from secondary sources viz. Coconut, Palm oil, Rice bran, cotton seed, and TBOs). Total demand for edible oil in 2024-25 would be around 28.00 million tonnes with expected import of 10.00 million tonnes assuming that present *per capita* consumption of 19.22 kg/year will remain unchanged. However, at the present rate of increase in consumption of edible oil, the demand would be around 30.4 MT and there will be need for import to the tune of 12.4 MT.

Considering the declining trend in population growth, the demand of edible oil during 2029-30 and 2034-35 is expected to be around 28.7 and 29.7 MT, respectively keeping the present rate of consumption (19.22 kg/capita/year) unchanged. However, at present rate of increase in consumption i.e. 2.48% annually, the demand during the same period would be around 35.76 and 41.83 MT against the anticipated domestic production of 23.04 and 29.48 MT, respectively from primary- and secondary-sources combined.

Therefore, if the *per capita* consumption can be kept unchanged at 2019-20 level through aggressive campaign, gradually the demand and supply gap can be bridged from domestic production substantially.

To fulfil the dream of 'atmanirbhar in edible oil', a new mission i.e. National Mission on Edible Oils (NMEO) has been proposed with the aim to enhance the edible oilseeds production and edible oils availability in the country. The mission aims in enhancing the production of seven edible oilseeds and in boosting edible oil from secondary sources to reduce the staggering burden of import of edible oils. However, meticulous planning and concerted efforts of all stakeholders are required to achieve the mission. The details of such planning is discussed here in the context of improving productivity of edible oilseeds and area under cultivation.

1. Present Status

In India, both annual and perennial edible oilseeds are in cultivation. Annual edible oilseeds include Groundnut, Rapeseed-Mustard, Soybean, Sunflower, Sesame, Niger, and Safflower and perennials include Oil palm and Coconut. Besides, there are minor oil producing species of forest and tree origin. Moreover, edible oils are also produced domestically from secondary sources like rice bran, cotton seed, corn, and other Tree Borne Oilseeds (TBOs).

Presently, India produces edible oils nearly 40% of its demand and 60% is imported. As per capita consumption of edible oils has grown @ 2.48% annually with a CAGR of 2.17% from 15.8 kg/capita/year in 2012-13 to 18.76 kg/capita/year in 2019-20, the demand and supply gap has widened over the years. The demand for edible oil was 25.63 MT in 2019-20 against domestic production of 10.53 MT necessitating the import of around 15.1 MT (palm oil: about 60%; Soybean oil: 25%; Sunflower: 12% and rest others) costing around 69000 crores to national exchequer.

In 2019-20, India produced 31.48 MT of edible oilseeds from 25.81 mha with productivity of 1220 kg/ha with edible oil production of 7.03 MT. Among the edible oilseed crops, Soybean (35.63%), Groundnut (32.09%), Rapeseed & Mustard (28.96%) contributed 96.68 per cent of the total edible oilseeds production. Sesame, Sunflower, Safflower and Niger contributed 3.32%.

Contrary to production, the major contribution to domestic edible oil kitty comes from Mustard (3.191 MT: 45.39%), Groundnut (1.769 MT: 25.17%) and Soybean (1.754 MT: 24.95%) amounting to 95.52%. The minor edible oilseeds (Sesame, Sunflower, Safflower and Niger) contributed 4.48% of domestic production of 7.03 MT. Around 3.50 MT of edible oils comes from secondary sources (cotton seed oil, palm oil, corn oil, rice bran oil, coconut oil and other TBO). The major oilseed producing states are: Madhya Pradesh, Maharashtra and Rajasthan (Soybean); Gujarat, Andhra Pradesh, Rajasthan and Karnataka (Groundnut); Rajasthan, Madhya Pradesh, Uttar Pradesh, West Bengal and Haryana (Rapeseed & Mustard); Madhya Pradesh, Uttar Pradesh, Rajasthan and Gujarat (Sesame); Karnataka (Sunflower); and Maharashtra and Karnataka (Safflower).

The overall yield gap in oilseed is 65%. The maximum yield gap is in Sunflower (160 per cent) among minor oilseeds and in major oilseeds (Groundnut, Soybean and Rapeseeds and Mustard), the yield gap ranged from 37 to 71 per cent. Therefore, production of edible oilseeds in India would enhance substantially by bridging the yield gap by technological interventions, even without the expansion of area under cultivation.

2. SWOT analysis of edible oilseeds

Strength:

- High genetic yield potential of the newly developed varieties of annual edible oilseeds like Groundnut (3500-4000 kg/ha), Mustard (3000-3500 kg/ha), Soybean (2200-2800) and Sunflower (2000-2500 kg/ha) can be realized by optimizing the agro-ecological conditions and adopting available production and protection technologies.
- Two major oilseed crops (Groundnut and Soybean) contributing more than 66% of total area under edible oilseeds and production are leguminous and thus require meagre amount of external application of nitrogenous fertilizers
- Both groundnut (25-30%) and soybean (40-45%) are rich source of proteins
- Genome sequence available majority of edible oilseeds are available for further exploitation for developing high yielding verities using molecular breeding, developing SNPs, genome editing, identifying genes responsible for susceptibility/tolerance of traits, etc.

- Network of KVKs and ATARIs are in place in all districts of the country for paid dissemination of improved technologies
- Oil meals are available in plenty after oil expulsion for animal feed and protein isolates and other commercial exploitation
- Wide adaptability of the edible oilseed crops in tropical, sub-tropical, temperate, and semi-arid tropics
- Most of the edible oilseed crops fit well in inter- and sequential cropping systems
- Most of the edible oilseeds are rich in oil (25-55%) except soybean (16-18%)

Weakness:

- Narrow genetic base of most of the edible oilseed crops
- Underutilisation of available germplasms and gene pools for developing pre-breeding materials, resistance breeding, etc.
- Most of edible oilseed crops (except rapeseed and mustard) are cultivated in rainfed condition without availability of life saving irrigation affecting productivity
- Lack of availability of suitable varieties for drought and salinity condition as most of them are susceptible to both the conditions
- Contrary to cereals, hybrids among major edible oilseeds (Groundnut, Soybean), are not available, through hybrids are restricted to sunflower and safflower and Rapeseed and Mustard with very limited area under cultivation
- Lack of availability of land races among the edible oilseeds as Groundnut, Soybean, Rapeseed and Mustard, Sunflower, and Niger are rather domesticated to India
- Lack of early maturing varieties in most of the edible oilseeds to fit in different agro-climatic and cropping sequences
- Inadequate supply of quality seeds of improved varieties in both traditional and non-traditional areas
- Lack of availability and application of low cost bioagents which can reduce the input cost and enhance production substantially
- Lack of market intelligence
- Cultivation of edible oilseeds with inadequate inputs and sub-optimal soil condition affecting productivity
- Lack of policy support like better incentives to farmers
- Lack of mechanization, marketing infrastructure in non-traditional areas
- Lack of R&D support with proper funding for high end research

Opportunity:

- Availability of genomic resources like SNP panels for high throughput multi trait breeding and allele mining
- Tremendous scope for area expansion and season expansion
- Average yield gap in edible oilseeds is nearly 60% and therefore, production can be enhanced substantially without much efforts on expansion of area under cultivation
- All edible oilseeds respond well to fertilizer application and thus through agronomic management, production can be enhanced further

Threats:

- Most of the edible oilseed crops are susceptible to soil-borne and foliar fungal diseases affecting productivity
- As most of the edible oilseed crops are susceptible to abiotic stresses, impeding climate change and predicted increase in frequency and intensity of abiotic stresses will affect

the productivity of a number of crops further rendering their cultivation rather non-remunerative

- Lack of infrastructure for marketing and promotion to non-traditional areas
- Competition from more remunerative crops and has the potential to replace edible oilseeds further
- Import of cheap crude edible oils
- Low SRR and VRR among the edible oilseeds. The situation is further compounded owing to very low seed multiplication ratio of two major oilseeds viz. Groundnut and Soybean

Future Projections

3. Projected Consumption

The per capita consumption is the most critical factor demining the demand of edible oil. Therefore, corrective measures and intervention in maintaining the present rate of consumption or slowing down the growth in consumption will be the determining factor for total demand of edible oil. Since 2012-13, the per capita consumption of edible oil is increasing @ 2.48% annually with a CAGR of 2.17%. The per capita consumption in 2012-13 was 15.8 kg which has increased to 18.76 kg/capita/year in 2019-20. If the trend continues, the projected per capita consumption in 2024-25, 2029-30 and 2034-35 will be 21.20 kg, 23.96 kg and 27.08 kg, respectively with a CGAR of 2.32% (Figure1). In the year 2020-21, the consumption is estimated at 19.22 kg/capita/year. To bridge the demand and supply gap, the represent consumption of 19.22 kg/capita/year needs to be maintained by aggressive campaign and creation of mass awareness among the consumers about the health benefits of less consumption of edible oils.

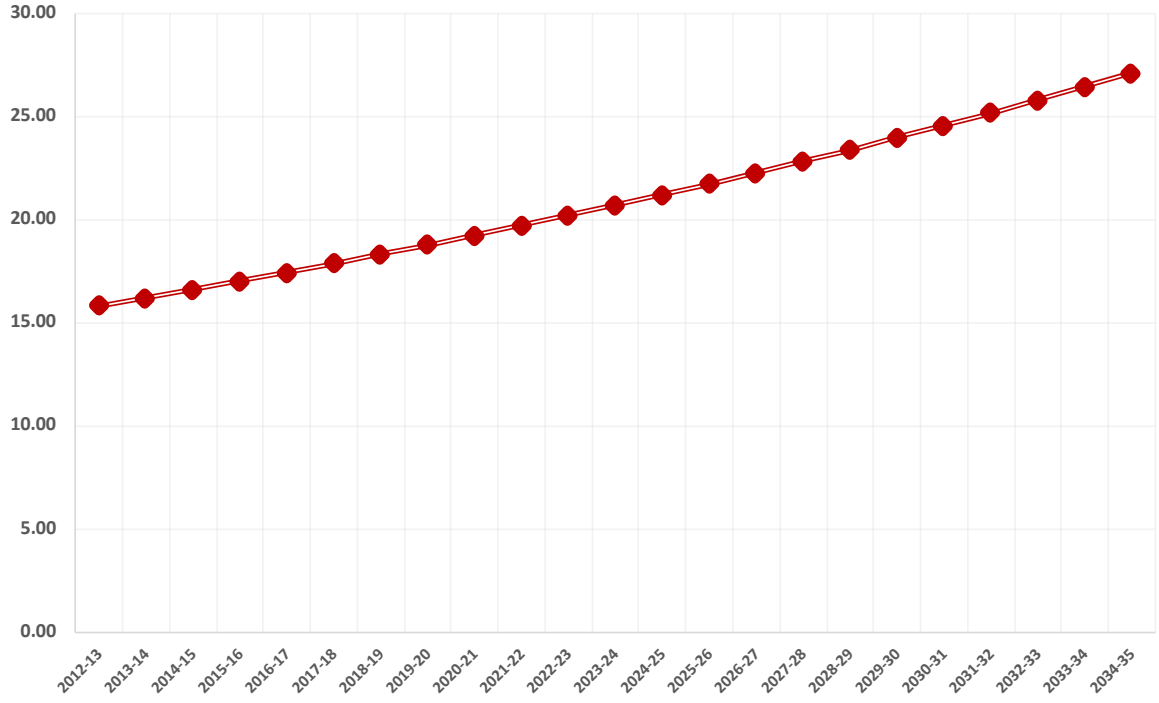


Figure 1 Projected consumption of edible oil

4. Population Growth

The demand of edible oil will increase with the increase in population. As per the long-term estimate of population, there is a declining trend in growth in the last decades. Whereas population of India in 2019 was 136.64 crores with a growth rate of 1.02% as compared to previous year, the projected population of India would be 138.00 crores with a growth rate of 0.99% as compared to the population in the year 2019-20. The growth rate will decline further in the next decades and projected to be 0.90%, 0.77% and 0.63% in the year 2024-25. 2029-30 and 2034-35, respectively with projected population of 143.24, 149.25 and 154.45 crores in the corresponding year, respectively

5. Demand at present rate of consumption (base year 2020-21) to be maintained as static

The two critical factors that decide the total demand of edible oil are population and per capita consumption. The per capita consumption of edible oil in the pear 2020-21 is estimated to be 19.22 kg and with projected population of 138.00 crores, the total demand of edible oil in India will be 26.52 MT. If the present level of consumption can be maintained by aggressive campaign to create awareness about the health benefit in using less oil, the projected demand of edible oil will be 27.53 MT, 28.69 MT and 29.69 MT in the year 2024-25, 2029-30 and 2034-35, respectively. As per the projection, the population in the corresponding year will be 143.24, 149.25 and 154.45 crores, respectively.

6. Demand at present rate of increase in consumption (base year 2012-13)

Since 2012-13, the per capita consumption has increased from 15.8 kg to 18.76 kg in the year 2019-20 with annual growth rate of 2.48% and with a CAGR of 2.17%. Owing the change in life style, increasing demand for fast foods, urbanization in rapid pace, and growth in population, the trend is likely to be same. Therefore, the demand of edible oils will also continue to grow with the growth in per capita consumption. At the present rate of growth in per capita consumption, the projected growth in demand of edible oil in 2024-25, 2029-30 and 2034-35 will be 30.37 MT, 35.76 MT and 41.83 MT with a CGAR of 2.32% considering 2019-20 as base year and also considering the population and per capita consumption during that period.

7. Future projection for area, productivity and production of edible oilseeds and oils

The total production of particular edible oilseeds in India will depend primarily on area under its cultivation and the productivity of the particular oilseed. In the year 2019-20, India has produced 31.48 MT of seven edible oilseeds (Soybean, Rapeseed-Mustard, Groundnut, Sunflower, Sesame, Niger, and Safflower) from about 25.81 mha with an average productivity of 1220 kg/ha. The major oilseeds (Rapeseeds and Mustard, Soybean and Groundnut) contributed 96.68% of the total production and the rest 3.32% was contributed by four minor oilseeds (Sesame, Sunflower, Safflower and Niger).

To meet the future target set for projected edible oil production in 2024-25, 2029-30 and 2034-34, the area, productivity and production of edible oilseeds need to grow at CAGR of 2.44%, 6.92% and 4.37%, respectively considering 2019-20 as base year (Figure 2).

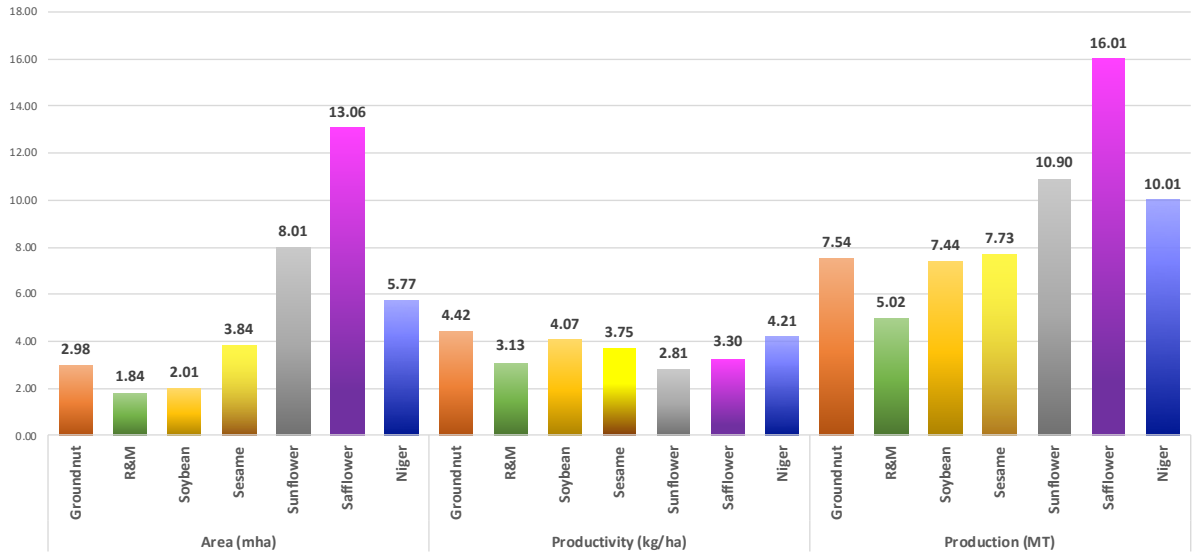


Figure 2 Projected Compound annual growth rate of edible oil seed over next 15 years

The projected area to be covered under edible oilseeds in 2024-25, 2029-30 and 2034-35 will be 29.87, 33.85 and 37.98 mha, respectively (Figure 3).

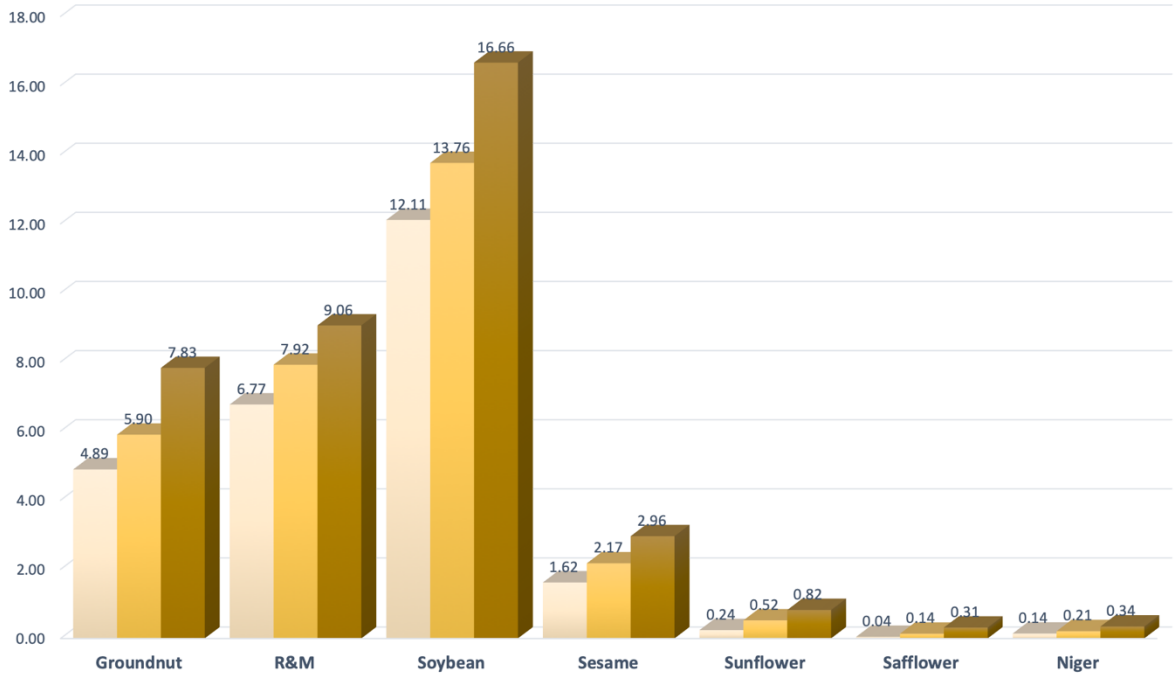


Figure 3.Projected area of edible oilseed crops

The projected productivity during the corresponding years will be 1771 kg/ha, 2123 kg/ha, and 2416 kg/ha. Consequently, because of increase in both area and productivity with technological interventions, the production of edible oilseeds will be 52.91 MT, 71.86 MT, and 91.78 MT during 2024-25, 2029-30 and 2034-35 to meet the target set for domestic production of edible oils from primary sources (Figure 4).

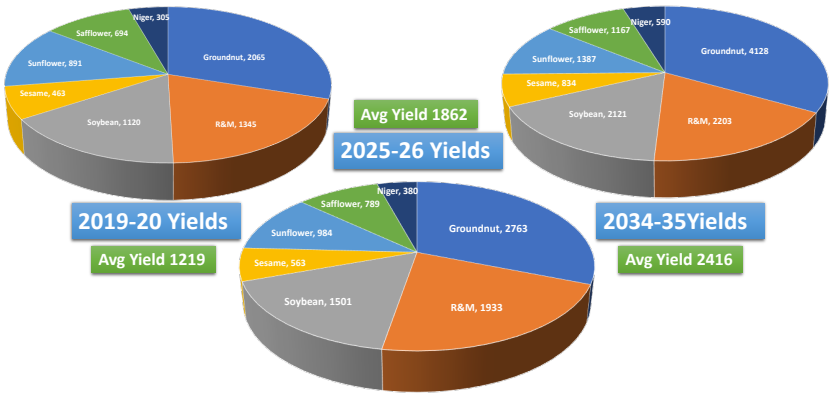


Figure 4. Current and projected yields of major oils seeds

Whereas area under edible oilseeds cultivation need to grow at 15.71%, 13.33% and 12.21%, respectively in 2024-25, 2029-30 and 2034-35 over 2019-20, 2024-25 and 2029-30 as base year, respectively, productivity has also to grow simultaneously @ 45.26%, 19.84%, and 13.83% correspondingly. Because of double impact of increase in area and productivity, the production of edible oilseeds will be increased by 68.08%, 35,82%, and 27.72%, respectively in 2024-25, 2029-30, and 2034-35 over the base year 2019-20, 2024-25 and 2029-30. As a result, the domestic contribution to edible oil will grow significantly from 7.03 MT in 2019-20 to 13.49 MT in 2024-25, 17.21 MT in 2029-30 and 21.99 MT in 2034-35 with a CAGR of 7.39% over the base year of 2019-20 (Figure 5).

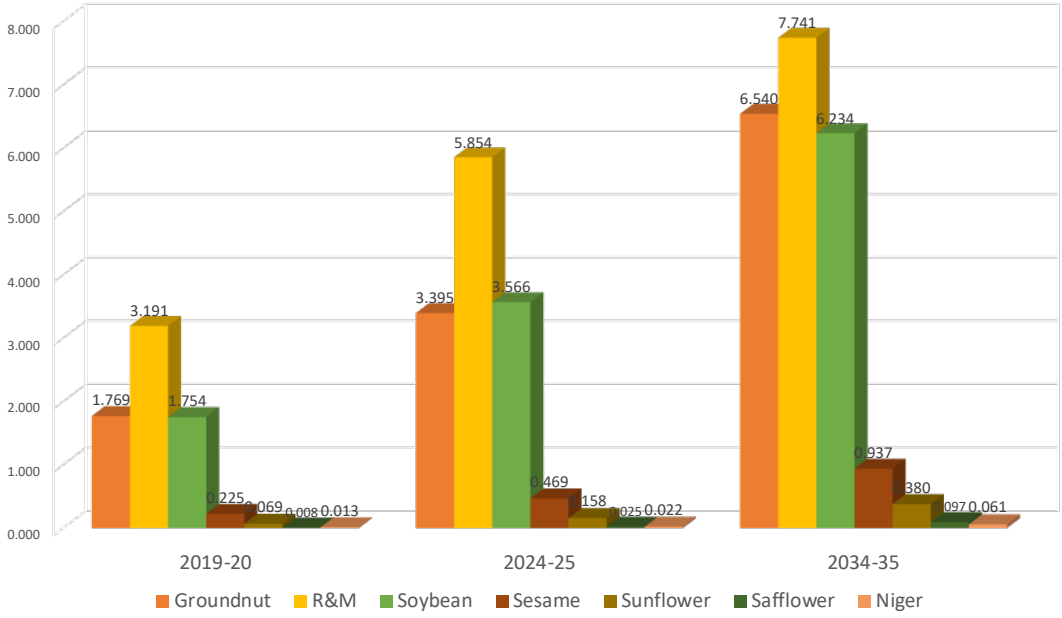


Figure 5. Estimated production of edible oil from major oil seeds

In this endeavour, major contribution (on an average 90% in area, 96% in edible oilseed production and 95% in edible oil production) will come from three major edible oilseeds viz. Rapeseed and Mustard, Groundnut and Soybean (Figure 6. Relative contribution of rest of the minor oilseeds will remain below 5%. Thus, major thrusts need to be given on expansion of area and improving the productivity of major oilseeds to bridge the future demand and supply gap to lessen the burden on import of edible oil.

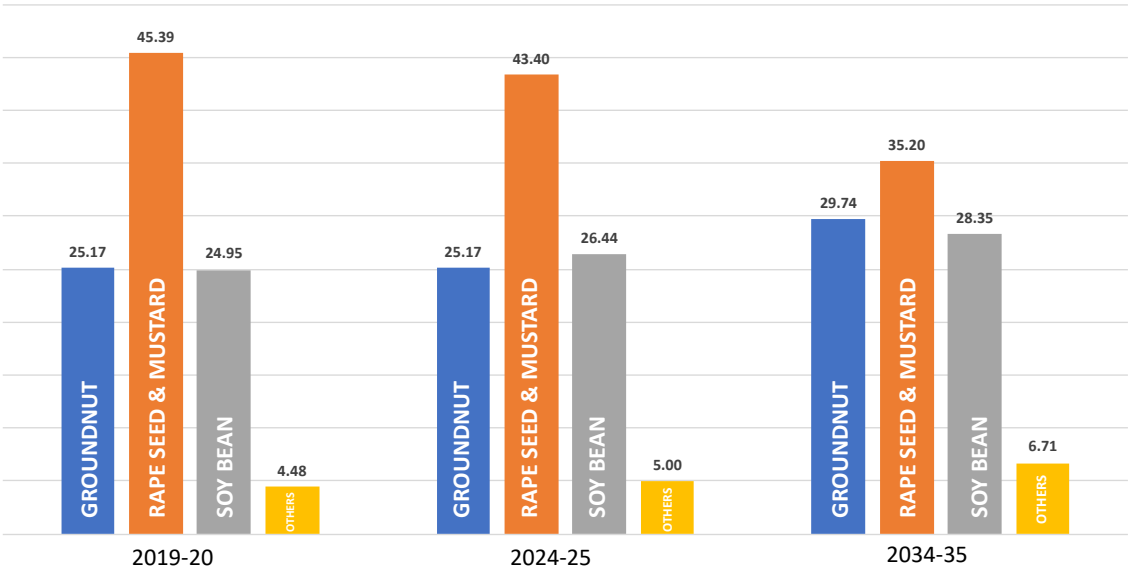


Figure 6 Relative contribution of oilseed crops to edible oils (%)

8. Demand and supply gap vis-à-vis import and dependency depending on projections

Enhancement in area and productivity of seven edible oilseeds alone will not be sufficient to meet the projected edible oils production target. Edible oils from secondary sources will play a significant role in this endeavour. At present, India produces around 3.5 MT of edible oil from secondary sources (Palm Oil, Cotton seed oil, corn oil, coconut oil, rice bran oil and oil from TBOs). To bridge the demand and supply gap further, production of edible oil from secondary sources need to grow at CAGR of 4.87%. As a result, contribution of edible oils from secondary sources will be 4.51 MT in 2024-25, 5.81 MT in 2029-30 and 7.49 MT in 2034-35. Consequently, total supply of edible oils from primary and secondary sources domestically will be 18.0 MT, 23.03 MT and 29.48 MT in the year 2024-25. 2029-30 and 2034-35 (Figure 7).

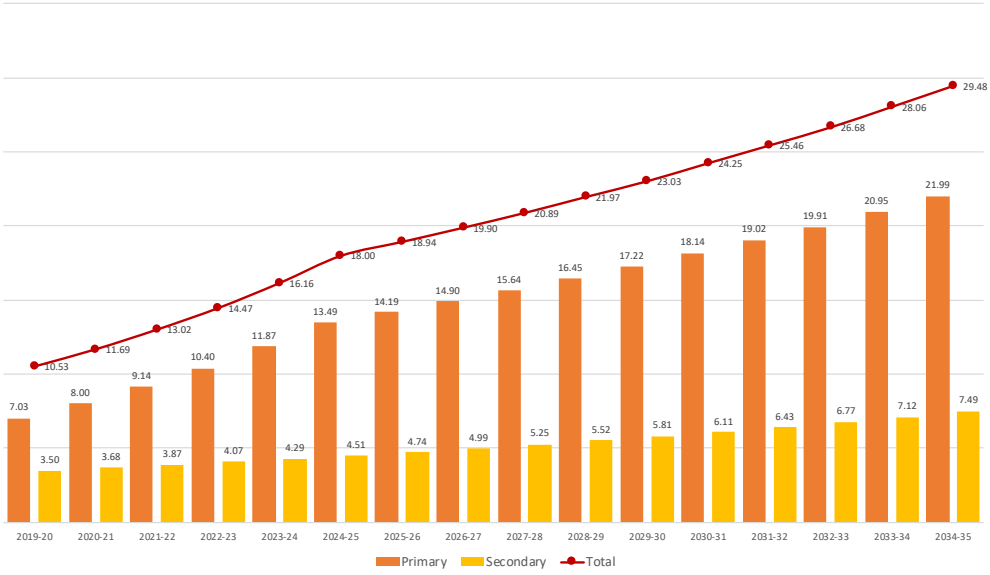


Figure 7 Total edible oil production- projections

Therefore, the projected demand (calculated at present rate of growth in consumption) will be 30.37 MT, 35.76 MT and 41.83 MT in the year 2024-25, 2029-30 and 2034-35, creating gap of 12.37 MT, 12.72 MT and 12.35 MT, respectively. The dependency on import of edible oils be reduced drastically from around 60% in 2019-20 to 40% in 2024-25, 37% in 2029-30 and 30% in 2034-35 (Figure 8) calculated considering the growth in consumption at 2.48% annually. The decrease in dependency will be at CAGR of -4.22%. However, if per capita consumption of 19.22 kg in the year 2020-21 is maintained in subsequent years, the demand and supply gap be negligible in the year 2034-35 and India need not to import edible oils as against the demand of 29.69 MT, the domestic production will be 29.48 MT. The dependency on import will be drastically reduced from 60% in 2019-20 to 35% in 2024-25, 20% in 2029-30 and 0.7% in 2034-35 with CAGR of -24.19%.

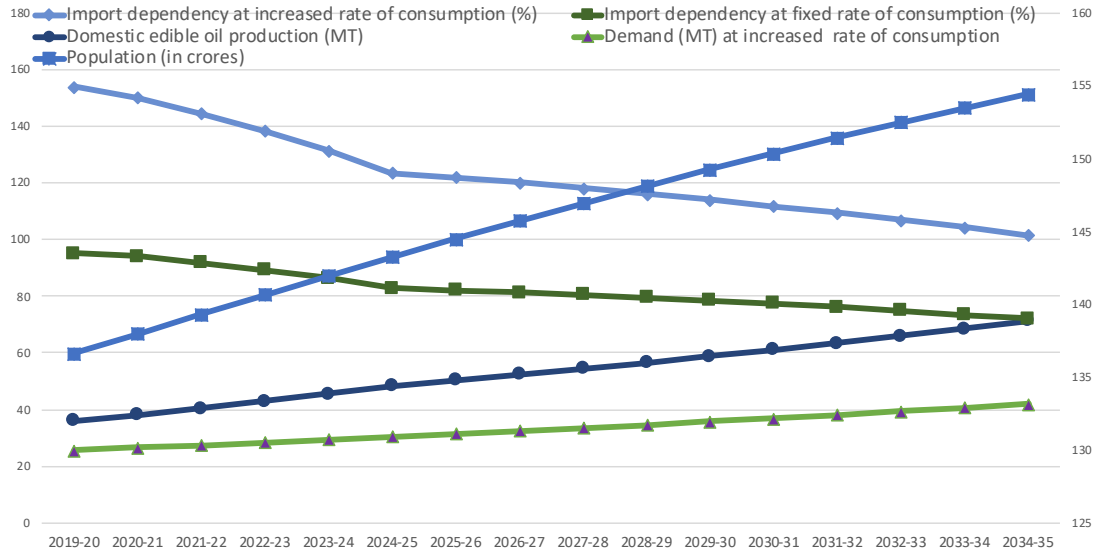


Figure 8. Estimates on the dependency on import of edible oil

9. Yield gaps

The existing yield gap for oilseeds is 65 per cent. Highest scope exists in case of Sunflower (160 per cent), while for other crops the yield gaps range from 22 per cent (Sesame) to 81 per cent (Safflower). The yield gaps in major oilseeds, namely, Groundnut, Soybean and Rapeseed range from 37 to 71 per cent. However, with the availability of high yielding varieties and matching agronomic and plant protection technologies local specifically, the yield gap can be bridged substantially. If the gap is reduced from 60% at present to 20% in next 10 years, yield can be improved substantially and additional production of 15-20 MT can be achieved without much difficulties.

Roadmap to achieve self-sufficiency in edible oils production

10. Enhancing production of edible oilseeds

Through expansion in area

Projected increase om area under cultivation in next five years (2024-25)

As off now, the edible oilseeds is cultivated in around 25.81 mha during 2019-20 comprising 25.44 mha in traditional and only 0.37 mha in non-traditional areas. However, to enhance the production through expansion of area under cultivation, acreage has to grow both in traditional and non-traditional areas with a CAGR of 1.93%

in traditional and 14.99% in non-traditional areas (Table1, Figure 9). The area in projected to grow from 0.37 mha in 2019-20 to 1.57 mha, a jump of nearly 5 times but net area gain will be 1.20 mha in non-traditional areas. At the same time, area in traditional areas will improve from 25.44 mha in 2019-20 to 28.30 mha in 2024-25, an increase of about 11.25%, net gain of 2.85 mha. Contribution in net gain in area in non-traditional areas will come from Groundnut (0.28 mha: rice- and potato- fallows in West Bengal; Potato-fallows in Deesa-Gujarat and Western UP; rice fallows in Odisha and Jharkhand; NEH region; intercrops with sugarcane in UP, etc.), Rapeseed and Mustard (0.11 mha: NEH region, part of Telangana, Andhra Pradesh, and Karnataka under assured irrigated conditions), Soybean (0.64 mha: Andhra Pradesh, Arunachal Pradesh, HP, Jharkhand, UP, Uttarakhand, WB, Punjab, Haryana and Odisha), Sunflower (0.1 mha: parts of Punjab, Haryana, Bihar, WB, NEH region, Telangana, UP, and MP), Sesame (0.065 ha: parts of Bihar, Haryana, Punjab, Assam, and NEH region) and rest by safflower (0.012 mha: parts of Gujarat, MP and Chhattisgarh) either as sole or as intercrops.

In the traditional areas, the edible oilseed crops are likely to regain some of the lost ground or expanded to new areas and there will be project net gain of 2.85 mha (Groundnut: 54 mha in the states of Gujarat, Rajasthan, Maharashtra, Karnataka, Tamil Nadu, MP, Odisha and WB; Rapeseed and Mustard: 0.93 mha in the states of Rajasthan, UP, Punjab, West Bengal, Haryana, Gujarat, and Assam; Soybean: 0.72 mha in the states of MP, Maharashtra, Karnataka, Rajasthan and Gujarat; Sesame: 0.40 mha in the states of Karnataka, UP, WB, MP, Gujarat, Rajasthan, and TN; Sunflower: 0.14 mha in the states of AP, Karnataka, Maharashtra, TN and Odisha; Safflower: 0.06 mha in the states of Maharashtra, Karnataka, Telangana and AP; and Niger: 0.06 mha in the states of Odisha, Chhattisgarh, Assam, Gujarat and MP).

Projected area under cultivation in next10 years (2029-30)

During the five-year period of 2025-26 to 2029-30, the area in projected to grow from 1.57 mha in 2024-25 to 2.62 mha, a net area gain of 1.05 mha in non-traditional areas. At the same time, area in traditional areas will improve from 28.30 mha 2024-25 to 31.23 mha in 2029-30, an increase of about 10.36%, net gain of 2.93 mha. Total grain in area from both traditional and non-traditional areas will be 3.99 mha. Contribution in net gain in area in non-traditional areas will come from Groundnut (0.30 mha: rice- and potato- fallows in West Bengal; Potato-fallows in Deesa-Gujarat and Western UP; rice fallows in Odisha and Jharkhand; NEH region; intercrops with sugarcane in UP, etc.), Rapeseed and Mustard (0.08 mha: NEH region, part of Telangana, Andhra Pradesh, and Karnataka under assured irrigated conditions), Soybean (0.56 mha: Andhra Pradesh, Arunachal Pradesh, HP, Jharkhand, UP, Uttarakhand, WB, Punjab, Haryana and Odisha), Sunflower (0.1 mha: parts of Punjab, Haryana, Bihar, WB, NEH region, Telangana, UP, and MP), Sesame (0.02 ha: parts of Bihar, Haryana, Punjab, Assam, and NEH region) and rest by safflower (0.012 mha: parts of Gujarat, MP and Chhattisgarh) either as sole or as intercrops.

In the traditional areas, the edible oilseed crops are likely to expand to new areas and there will be project net gain of 2.93 mha (Groundnut: 0.69 mha in the states of Gujarat, Rajasthan, Maharashtra, Karnataka, Tamil Nadu, MP, Odisha and WB; Rapeseed and Mustard: 0.52 mha in the states of Rajasthan, UP, Punjab, West Bengal, Haryana, Gujarat, and Assam; Soybean: 0.96 mha in the states of MP, Maharashtra, Karnataka,

Rajasthan and Gujarat; Sesame: 0.45 mha in the states of Karnataka, UP, WB, MP, Gujarat, Rajasthan, and TN; Sunflower: 0.13 mha in the states of AP, Karnataka, Maharashtra, TN and Odisha; Safflower: 0.12 mha in the states of Maharashtra, Karnataka, Telangana and AP; and Niger: 0.07 mha in the states of Odisha, Chhattisgarh, Assam, Gujarat and MP).

Cumulatively, over the base year of 2019-20, there will be increase in area under edible oilseeds cultivation by 8.05 mha (5.79 mha in traditional and 2.26 mha in non-traditional areas).

Projected area under cultivation in next 15 years (2034-35)

During the five-year period of 2030-31 to 2034-35, the area in projected to grow from 2.62 mha in 2029-30 to 3.43 mha, a net area gain of 0.79 mha in non-traditional areas. At the same time, area in traditional areas will improve from 31.23 mha in 2029-30 to 34.56 mha, an increase of about 10.63%, net gain of 3.32 mha. Total grain in area from both traditional and non-traditional areas will be 4.13 mha. Contribution in net gain in area in non-traditional areas will come from Groundnut (0.10 mha: rice- and potato-fallows in West Bengal; Potato-fallows in Deesa-Gujarat and Western UP; rice fallows in Odisha and Jharkhand; NEH region; intercrops with sugarcane in UP, etc.), Rapeseed and Mustard (0.10 mha: NEH region, part of Telangana, Andhra Pradesh, and Karnataka under assured irrigated conditions), Soybean (0.53 mha: Andhra Pradesh, Arunachal Pradesh, HP, Jharkhand, UP, Uttarakhand, WB, Punjab, Haryana and Odisha), Sunflower (0.20 mha: parts of Punjab, Haryana, Bihar, WB, NEH region, Telangana, UP, and MP), Sesame (0.01 ha: parts of Bihar, Haryana, Punjab, Assam, and NEH region) and rest by safflower (0.02 mha: parts of Gujarat, MP and Chhattisgarh) either as sole or as intercrops.

In the traditional areas, the edible oilseed crops are likely to expand to new areas and there will be project net gain of 3.32 mha (Groundnut: 1.03 mha in the states of Gujarat, Rajasthan, Maharashtra, Karnataka, Tamil Nadu, MP, Odisha and WB; Rapeseed and Mustard: 0.55 mha in the states of Rajasthan, UP, Punjab, West Bengal, Haryana, Gujarat, and Assam; Soybean: 1.15 mha in the states of MP, Maharashtra, Karnataka, Rajasthan and Gujarat; Sesame: 0.39 mha in the states of Karnataka, UP, WB, MP, Gujarat, Rajasthan, and TN; Sunflower: 0.27 mha in the states of AP, Karnataka, Maharashtra, TN and Odisha; Safflower: 0.18 mha in the states of Maharashtra, Karnataka, Telangana and AP; and Niger: 0.13 mha in the states of Odisha, Chhattisgarh, Assam, Gujarat and MP).

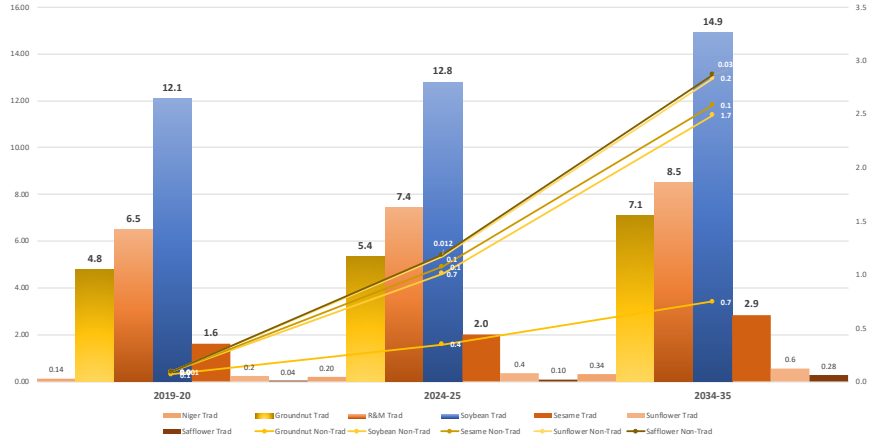


Figure 9 Projection of the expansion of area in oilseed crops

Table 1 Estimated expansion of area in million ha in oilseed crops

Year	Groundnut			R&M			Soybean			Sesame			Sunflower			Safflower			Niger	Total		
	Trad	Non-Trad	Total	Trad	Non-Trad	Total	Trad	Non-Trad	Total	Trad	Non-Trad	Total	Trad	Non-Trad	Total	Trad	Non-Trad	Total	Total	Trad	Non-Trad	Grand total
2019-20	4.8	0.1	4.9	6.5	0.3	6.8	12.1	0.0	12.1	1.6	0.0	1.6	0.2	0.0	0.24	0.04	0.001	0.04	0.14	25.447	0.367	25.81
2020-21	4.9	0.1	5.0	7.1	0.3	7.4	12.3	0.0	12.4	1.7	0.0	1.7	0.3	0.0	0.33	0.055	0.002	0.06	0.15	26.562	0.439	27.00
2021-22	5.1	0.1	5.2	7.2	0.3	7.5	12.5	0.1	12.6	1.8	0.0	1.8	0.4	0.0	0.36	0.065	0.003	0.07	0.16	27.133	0.547	27.68
2022-23	5.2	0.2	5.4	7.2	0.3	7.6	12.7	0.2	12.9	1.9	0.0	1.9	0.4	0.0	0.40	0.077	0.004	0.08	0.17	27.662	0.723	28.38
2023-24	5.3	0.3	5.5	7.3	0.4	7.7	12.8	0.3	13.2	2.0	0.0	2.0	0.4	0.0	0.44	0.09	0.007	0.10	0.18	28.099	1.023	29.12
2024-25	5.4	0.4	5.7	7.4	0.4	7.8	12.8	0.7	13.5	2.0	0.1	2.1	0.4	0.1	0.48	0.10	0.012	0.12	0.20	28.301	1.565	29.87
2025-26	5.5	0.4	5.9	7.5	0.4	7.9	13.0	0.7	13.8	2.1	0.1	2.2	0.4	0.1	0.52	0.12	0.014	0.14	0.21	28.883	1.732	30.61
2026-27	5.6	0.4	6.1	7.6	0.4	8.0	13.2	0.8	14.1	2.2	0.1	2.3	0.4	0.1	0.56	0.14	0.016	0.16	0.22	29.466	1.919	31.38
2027-28	5.8	0.5	6.3	7.7	0.4	8.2	13.4	1.0	14.4	2.3	0.1	2.4	0.5	0.2	0.61	0.16	0.019	0.18	0.24	30.055	2.129	32.18
2028-29	5.9	0.6	6.5	7.8	0.4	8.3	13.6	1.1	14.7	2.4	0.1	2.5	0.5	0.2	0.66	0.19	0.021	0.21	0.25	30.638	2.364	33.00
2029-30	6.1	0.6	6.7	7.9	0.5	8.4	13.8	1.2	15.0	2.5	0.1	2.6	0.5	0.2	0.71	0.22	0.025	0.25	0.27	31.235	2.625	33.86
2034-35	7.1	0.7	7.8	8.5	0.6	9.1	14.9	1.7	16.7	2.9	0.1	3.0	0.6	0.2	0.82	0.28	0.035	0.31	0.34	34.556	3.428	37.98
CAGR (%)	**2.43**	**15.96**	**2.98**	**1.69**	**4.63**	**1.84**	**1.32**	**30.72**	**2.01**	**3.63**	**32.84**	**3.84**	**5.62**	**41.20**	**8.01**	**12.40**	**24.77**	**13.06**	**5.77**	**1.93**	**14.99**	**2.44**

Cumulatively, over the base year of 2019-20, there will be increase in area under edible oilseeds cultivation by 12.07 mha (9.11 mha in traditional and 3.06 mha in non-traditional areas).

Interventions required for expansion of area:

- Making suitable high yielding short duration varieties (90-100 days duration with yield target of >4000 kg/ha for groundnut with fresh seed dormancy, >2500 kg/ha for Rapeseed and Mustard, >2500 kg/ha for soybean, >1500 kg/ha for sunflower; >1000 kg/ha for sesame; >1000 kg/ha for other oilseeds) equipped with tolerant to biotic and abiotic stresses of all edible oilseeds available for non-traditional areas (potato fallows, rice fallows, NEH region, inter- and sequential cropping systems, hilly terrains, river beds, etc.). **Responsibility**: Crop Institutes, SAUs, ICAR
- Making medium duration and high yielding varieties (yield target of >3500 kg/ha for groundnut for rainfed, >2000 kg/ha for soybean, >1000 kg/ha for sesame and other oilseeds for rainfed) tolerant to abiotic stresses like drought and salinity and biotic stresses like soil-born and foliar fungal diseases for traditional areas: **Responsibility**: Crop Institutes, SAUs, ICAR
- Development of required processing and marketing infrastructure in non-traditional areas. **Responsibility**: State Government, DAC, GOI, NGOs
- Popularization of edible oilseeds in non-traditional areas: **Responsibility**: State Government, DAC, GOI, NGOs, KVK, SAUs
- Production and making quality seeds available to farmers in traditional and non-traditional areas in PPP mode: **Responsibility**: State Seed Corporations, DAC, NSC, SFCI, NGOs, KVK, FPOs, SAUs, State Department of Agriculture
- Mechanization of farm operation and contract farming involving KVKs, NGOs, FPOs, SAUs
- Policy support: Higher MSP, incentives for adopting micro-irrigations and assured buyback policy: **Responsibility**: DAC, GOI
- R&D support: Liberal funding for development of high yielding varieties of all edible oilseed crops suitable for existing and newer niches: **Responsibility**: DAC, GOI, ICAR

Through enhancing productivity

To meet the growing demand of edible oils, production needs to be enhanced to match up the demand and supply gap. That can be achieved through expansion of area and enhancing productivity. To meet the projected target of overall production of edible oilseeds of 52.91 MT, 71.86 MT and 91.78 MT in 2024-25, 2029-30 and 2034-35, respectively, the overall productivity has to be increased by 45.26%, 19.84% and 13.83% during the corresponding period with an overall CAGR of 7.39% during the entire period of next 15 years. All the edible oilseeds need to contribute in improving the productivity. Thus, productivity of Groundnut, Rapeseed and Mustard, Soybean, Sesame, Sunflower, Safflower and Niger has to be enhanced by 33.82%, 43.74%, 34.01%, 21.67%, 10.41%, and 13.66% individually by the year 2024-25, respectively. Similarly, in the year 2029-30, the productivity will be improved further in Groundnut, Rapeseed and Mustard, Soybean, Sesame, Sunflower, Safflower and Niger by 28.84%, 10.26%, 20.73%, 21.67%, 21.67%. 27.63% and 33.82%, respectively (Table 2).

Table 2 Expected enhancement in the productivity

Year	Groundnut	R&M	Soybean	Sesame	Sunflower	Safflower	Niger	Mean
2019-20	2065	1345	1120	463	891	694	305	1219
2020-21	2189	1520	1235	482	909	708	319	1433
2021-22	2320	1614	1297	501	927	722	333	1511
2022-23	2459	1714	1361	521	946	736	348	1593
2023-24	2607	1820	1429	542	964	751	364	1680
2024-25	2763	1933	1501	563	984	789	380	1771
2025-26	2929	2053	1561	586	1023	828	403	1862
2026-27	3076	2063	1623	609	1064	870	427	1922
2027-28	3229	2110	1688	634	1107	913	453	1994
2028-29	3391	2121	1756	659	1151	959	480	2060
2029-30	3561	2132	1812	685	1197	1007	509	2123
2030-31	3667	2142	1870	713	1233	1037	524	2177
2031-32	3777	2157	1930	741	1270	1068	540	2234
2032-33	3891	2172	1992	771	1308	1100	556	2292
2033-34	4007	2188	2055	802	1347	1133	572	2353
2034-35	4128	2203	2121	834	1387	1167	590	2416
CAGR (%)	**4.42**	**3.13**	**4.07**	**3.75**	**2.81**	**3.30**	**4.21**	**4.37**

Further improvement is predicted for Groundnut, Rapeseed and Mustard, Soybean, Sesame, Sunflower, Safflower and Niger by the year 2034-35 to the tune of 15.93%, 3.34%, 17.06%, 21.67%, 15.93%. 15.93% and 15.93%, respectively.

The herculean task of enhancing productivity in a sustained manner over a span of 15 years with a CAGR of 4.37% can only be achieved with the following interventions:

Development of high yielding varieties: Responsibility: Crop Institutes, SAUs, ICAR

Development of high yielding varieties is of immediate priority adoption of which can improve the productivity by 25-30%. The average target yield of different edible oilseeds will be as under for overall productivity enhancement from 1220 kg/ha in 2019-20 to 1771 kg/ha in 2024-25, 2123 kg/ha in2029-30 and 2416 kg/ha in 2034-35. The varieties should also be tolerant to drought and or salinity stress and tolerant to major soil-borne and foliar diseases and pests.

Year 2024-25 (at least two high yielding varieties as per target set for each crop developed):

Groundnut: 2763 kg/ha (rainfed: 2600 kg/ha; irrigated: 3600 kg/ha)
Rapeseed and Mustard: 1933 kg/ha
Soybean: 1501 kg/ha
Sesame: 563 kg/ha
Sunflower: 984 kg/ha
Safflower: 789 kg/ha
Niger: 380 kg/ha

Year 2029-30 (at least two high yielding varieties at par target set for each crop developed):

Groundnut: 3561 kg/ha (rainfed: 3500 kg/ha; irrigated: 4000 kg/ha)
Rapeseed and Mustard: 2132 kg/ha

Soybean: 1812 kg/ha
Sesame: 685 kg/ha
Sunflower: 1197 kg/ha
Safflower: 1007 kg/ha
Niger: 509 kg/ha

Year 2034-35 (at least two high yielding varieties at par target set for each crop developed):
Groundnut: 4128 kg/ha (rainfed: 4000 kg/ha; irrigated: 4500 kg/ha)
Rapeseed and Mustard: 2203 kg/ha
Soybean: 2121 kg/ha
Sesame: 834 kg/ha
Sunflower: 1387 kg/ha
Safflower: 1167 kg/ha
Niger: 590 kg/ha

Improvement in SRR

The seed replacement rate of most of the edible oilseeds is very low. The seed replacement rate will require to be improved substantially in most of the crops by the year 2034-35 to achieve the targeted productivity. Whereas, in groundnut it has to be improved from 20% to 30%, it will be 38% to 68% in soybean, 40-68% in rapeseed and Mustard, 18-29% in Sesame, 18% to 36% in Sunflower, 22-27% in Safflower and 8% to 36% in case of Niger. With aggressive policy intervention, production of quality seeds of recently released improved varieties in the entire seed chain of nucleus-breeder-foundation-certified seed-supply to farmers is to be ensured to improve SRR. **Responsibility: DAC, State Department of Agriculture, SAUs, KVKs, GOI**

Improvement in VRR

Concomitant with the improvement of SRR, VRR also need to be improved from present level of 5% to 50% in next 5 years and 100% in the next 10 years. Cultivation of old varieties should be discouraged both at policy and procurement level with giving inceptive to farmers for cultivation of new varieties with assured buy back policies. **Responsibility: DAC, State Department of Agriculture, SAUs, KVKs, GOI**

Table 3 Projected Seed Replacement Rate (SRR) in oilseed crops

Year	Soybean	R&M	Gnut	Sesame	Sunflower	Safflower	Niger	Mean
2020-21	38	40	20	18	18	22	8	23.43
2021-22	41	44	21	20	18	22	9	25.00
2022-23	43	48	22	21	26	22	25	29.57
2023-24	45	53	24	22	27	22	25	31.14
2024-25	48	56	24	22	29	24	25	32.57
2025-26	52	59	25	24	30	27	29	35.14
2026-27	54	60	25	25	31	27	30	36.00
2027-28	56	61	25	25	32	27	30	36.57
2028-29	58	62	26	26	33	27	31	37.57
2029-30	59	63	27	26	34	27	31	38.14
2030-31	60	64	28	27	34	27	32	38.86
2031-32	61	65	28	27	34	27	33	39.29
2032-33	62	66	29	28	35	27	34	40.14
2033-34	63	67	29	28	35	27	35	40.57
2034-35	64	68	30	29	36	27	36	41.43

Ensured sufficient quantity of improved varieties

Unless required quantity of quality seeds in each stage of seed production is ensured, improved varieties will not reach to the farmers. To meet the target production, breeder, foundation and certified seeds of each edible oilseed crops need to be produced to ensure the adequate supply in time. The combined requirement of breeder seeds of seven edible oilseeds in 2021-22, 2024-25, 2029-30 and 2034-35 will be to the tune of 46766 q, 58645 q, 75938 q and 101898q, respectively to cover the projected area of 27.68 mha, 29.87 mha, 33.85 mha, and 37.98 mha, respectively in the corresponding years (Table 3). The requirement of foundation and certified seed of each crops has also be projected till 2034-35 (Table ---). Among the edible oilseeds more than 98% indent of breeder seed is for Groundnut and Soybean owing to high seed rate and low seed multiplication rates. As most of the time, there is insufficient production of breeder seed (particularly soybean) because erratic rainfall, the policy decision is required to grant permission for production of breeder seed in farmers field with the help of breeder concerned involving FPOs, KVKs, NGOs, and private parties in PPP mode. Quality seed should be emphasized to be produced location specifically in seed village, community level seed hubs, etc. involving FPOs, NGOs, KVKs, etc. Seed storage facilities to be created in each village involving private parties. More seed hubs (50 each) should be allotted for quality seed production of especially groundnut and soybean. **Responsibility: DAC, State Department of Agriculture, SAUs, KVKs, GOI, NGOs, ICAR, NSC, SFCI, State Seed Corporations, FPOs**

Table 4 Estimates of breeder seed production (q) of edible oilseeds

Year	Groundnut	R&M	Soybean	Sesame	Sunflower	Safflower	Niger	Total
2020-21	31476	2.35	11476	1.53	4.75	0.41	0.094	42962
2021-22	34107	2.63	12649	1.79	5.23	0.50	0.113	46766
2022-23	36875	2.91	13551	1.98	5.75	0.60	0.335	50437
2023-24	41515	3.26	14486	2.18	9.14	0.71	0.358	56016
2024-25	42843	3.50	15784	2.30	10.44	0.94	0.384	58645
2025-26	46056	3.74	17467	2.61	12.11	1.22	0.474	63543
2026-27	47530	3.86	18529	2.83	13.53	1.42	0.522	66081
2027-28	49051	3.98	19628	2.94	15.09	1.64	0.556	68703
2028-29	50621	4.11	20766	3.19	16.83	1.91	0.612	71413
2029-30	54330	4.24	21578	3.32	18.74	2.21	0.652	75938
2030-31	58225	4.37	22416	3.55	19.89	2.32	0.706	80672
2031-32	62314	4.50	23280	3.65	20.49	2.44	0.765	85625
2032-33	66605	4.64	24170	3.90	21.72	2.56	0.827	90808
2033-34	71106	4.78	25088	4.02	22.37	2.69	0.894	96229
2034-35	75828	4.93	26034	4.29	23.70	2.82	0.966	101898

Development of matching production and protection technologies

Genetic yield potential of a particular variety can only be realized with adequate supply of nutrients, suitable soil and environmental conditions and adequate disease and pest control measures are adopted simultaneously. Thus, to enhance productivity matching agronomic practices are required to be developed. At present such location specific

agronomic and plant protection measure for each crop are in place and the location specific technologies will be further refined as per emerging disease and pest situation and in line with the projected climate change. **Responsibility: Crop Institutes, DAC, State Department of Agriculture, SAUs, KVKs, NGOs, ICAR, FPOs, Line Departments**

11. Sustainability

Marketing and Infrastructure

To boost cultivation of edible oilseeds and making it remunerative particularly in non-traditional areas, required infrastructure will required to be created for post-harvest processing, value addition and marketing, easy availability of farm machineries, etc. The following support will be required: **(Responsibility: DAC, Ministry of Commerce, State Department of Agriculture, Ministry of Industries, etc.)**

- Establishment of oil mills, solvent extraction units, *ghanies* etc. in non-traditional areas in PPP mode. Government should provide all support for declare tax holidays for 10 years to all processing units, minimum freight for transportation of components of processing units, oil mills and farm implements. Soft loan to entrepreneurs for establishment of factories for manufacture of farm implements.
- Catch up grants for establishment of community seed bank, seed hubs, etc.
- Capacity building to farm women and shelf-help groups and FPOs to encourage production of value added products from oilseed crops and marketing them
- Establishment of seed hubs for production of quality seeds

Policy support

To make cultivation of each crop remunerative, positive policy support from GOI will be required to encourage the farmers to take up cultivation of edible oilseeds. The following policy supports will be required from GOI from time to time:

- Ensuring availability of quality seeds of each crops to the farmers and efforts to be made for establishment of more number of seed hubs, seed village, and seed bank (**Responsibility: DAC, NSC, ICAR, State Department of Agriculture**)
- All required machineries would be developed in PPP mode to ensure availability at affordable price. Tax holiday for small implements, tractors of more than 30 HP, other implements (**Responsibility: DAC, State Government)**
- Encourage 'Make in India' by discouraging import if cheap oil by imposing maximum possible bound duty (**Responsibility: DAC, Ministry of Commerce)**
- Ensure high MSP and remunerative price to farmers to take up more oilseed crops (**Responsibility: DAC)**
- Policy decision on releasing indigenously developed GM oilseeds may be hastened (**Responsibility: DAC; Ministry of Environment and Forest)**
- Shifting acreage from grain crops to oilseed crops (**Responsibility: DAC)**
- Ensure subsidies to transportation of edible oilseeds and oils to reduce cost of marketing of edible oil (**Responsibility: DAC)**
- Favourable internal transport and freight charges on edible oil and machinery (**Responsibility: DAC; Ministry of Railways and Surface Transport)**
- Incentives for adoption of new varieties with assured buyback (**Responsibility: DAC)**

- Extend subsidy to all machineries for adoption of micro-irrigation (**Responsibility: DAC)**
- Extend MSP buyback from 25% to 100% to assure return to the farmers (**Responsibility: DAC)**

Extension

Unless improved package of practices are reaching to the farmers, adoption will not take place. Benefits of all the crop production, crop protection and improved varieties of all edible oilseed crops need to be demonstrated in large scale to the farmer's field either as individual package or whole package as FLDs or CFLDs location specifically. It is proposed to have in place at least 1500 FLDs and 250 CFLDs for each crop in each season. Monitoring of the FLDs is to be ensured. Farmers are also required to be trained about the improved technologies through trainings, organizing goshthis, kisan mela, and dissemination of information using print, electronic and social media platforms. **(Responsibility: DAC, State Department of Agriculture, Line Departments, KVKs, SAUs, NGOs, etc.)**

12. Special emphasis on development of drought tolerant varieties

As majority of edible oilseeds (except rapeseed and mustard) cultivated under rainfed conditions, yield is affected significantly and worst scenario, the entire crop may fail. In the changed climatic scenario and with predicted increase in frequency and intensity of climate extremes, the incidence of drought will be more pronounced. Moreover, because of climate change, there will be ingression of saline water in coastal belt rendering vast area unfit for cultivation. Therefore, urgent attention will be required for developing suitable varieties and or management practices to impart either drought and salinity tolerance or developing mitigation strategies. The following actions are envisaged:

- Introgression of abiotic stress tolerant traits from germplasm or wild accessions into cultivated background using molecular tools
- Engineering drought and salinity tolerant genes into cultivated background from other known sources
- Alleviation of drought and or salinity stress by water management practices and application of endophytic microorganisms

(Responsibilities: All Crop Institutes, SAUs)

Self-Sufficiency in Edible Oil Production

With all the above technical and policy interventions in place, the projected production of edible oil will be to the tune of 13.49 MT, 17.21 MT and 21.99 MT in the year 2024-25, 2029-30 and 2034-35, respectively from present level of 7.03 MT. During this period of 2019-20 to 2034-35, the growth in production of edible oil will be at CAGR of 7.39%. Major contribution in edible oil kitty will come from Rapeseed and Mustard, Soybean and Groundnut with overall contribution of 43.40%(5.85 MT), 26.44% (3.57 MT) and 25.17% (3.39 MT) in the year 2024-25, respectively. In 2029-30, the relative contribution of these edible oils will be 40.55% (6.85 MT), 26.74% (4.51 MT) and 26.90% (4.80 MT), respectively for Rapeseed and Mustard, Soybean and Groundnut. By the year 2034-35, relative contribution of edible oil from Rapeseed and Mustard will go down to 35.20%, however, it will remain be top producer with 7.74 MT. On the contrary, the contribution from groundnut will be 29.74% with production of 6.54 MT

and that from soybean, it will be 6.23 MT (28.35%). The overall contribution from all other minor oilseeds will be of 4-6% (Figure 10).

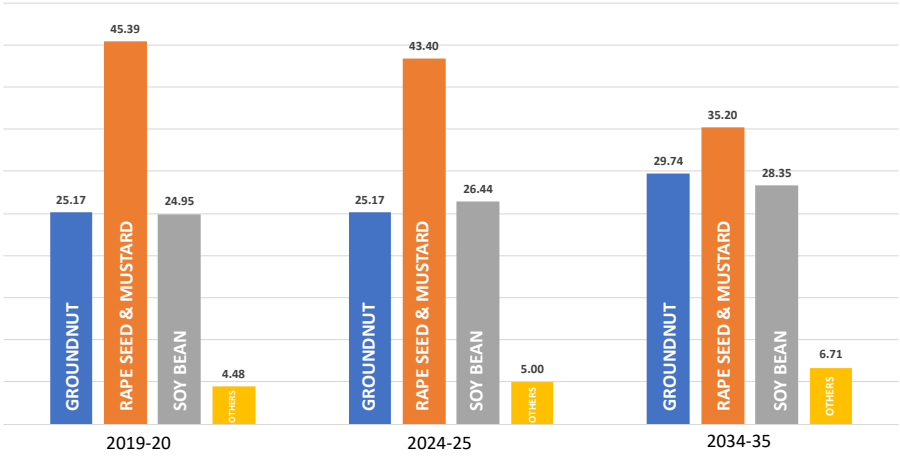


Figure 10 Relative contribution on edible oil production by major oil seed crops

13. Campaign for reducing edible oil consumption

In achieving self-sufficiency in production of edible oils in India, per capita consumption has to me maintained at present level i.e. 19.22 kg/capita/year as on 2019-20. However, it will be difficult owing to pressure from population growth, rapid urbanization, change in life style, and increase demand of fast food from younger generation. Therefore, aggressive campaign is to be launched involving prominent personalities and citizen appealing for reducing the consumption by creating awareness about the health benefits of using less oil in print, electronic and soil media platforms.

14. R&D support and establishment of centre of excellence

For development of required improved technologies for enhancing productivity of the edible oilseeds, R&D support will be required for take up the following issues:

- Development of high yielding varieties tolerant to abiotic and biotic stresses using molecular tools
- Development of matching agronomic and crop protection measures for enchanting production of edible oilseeds further
- Diversification and value addition of oilseed products and byproducts
- High throughput genotyping and phenotyping facilities Investment in developing high-end infrastructure facilities for developing required high yielding varieties by broadening the genetic base and introgressing stress tolerant genes into agronomic background from germplasm and germplasm accessions and for using MAS as much as possible for selection of superior desired genotypes
- Use in gene editing and genetic engineering tools for improvement of targeted traits w.r.t yield improvement
- Investment for making low cost bioagents to farmers in time on no-profit-no-loss basis in ‘Bioagent-hub’ concept as envisaged for certified seed production of improved varieties

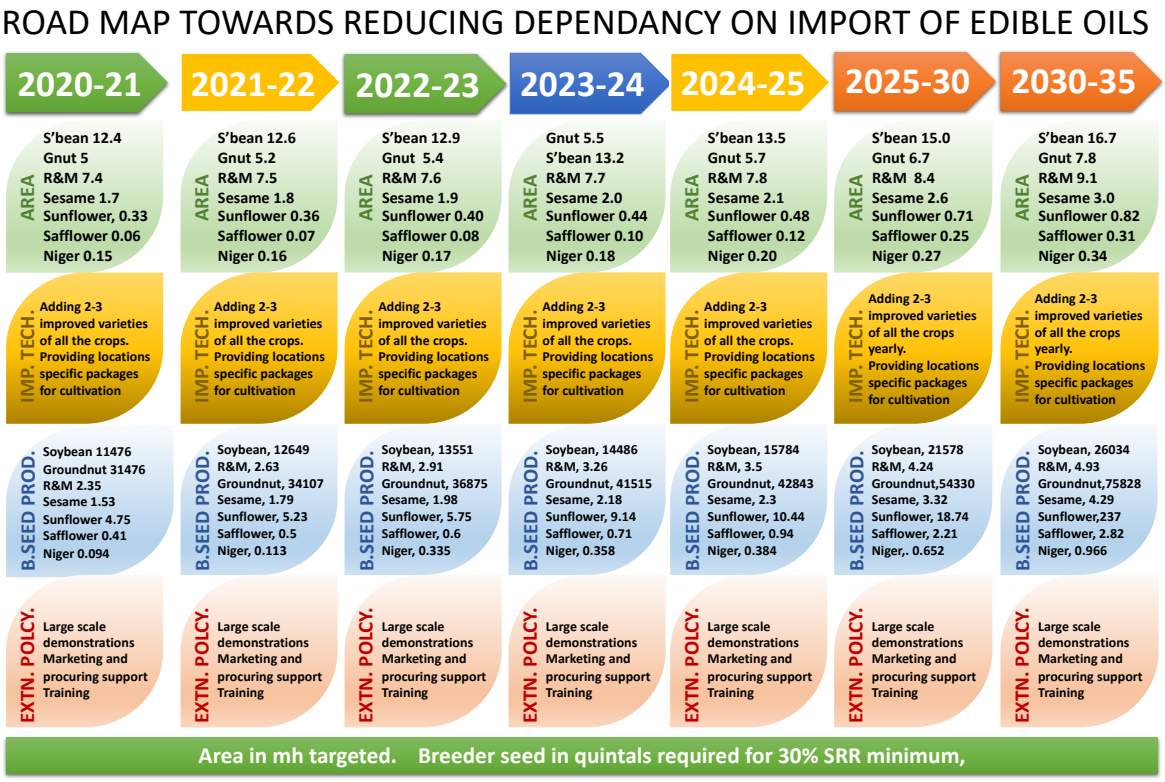
Establishment of centre of excellence by proving one-time grants for establishment of modern infrastructure facilities for R&D

The proposed Centre of Excellence (CoEs) will be set up through ICAR for each oilseeds (Groundnut, Rapeseed and Mustard, Soybean and other oilseeds) with the following objectives:

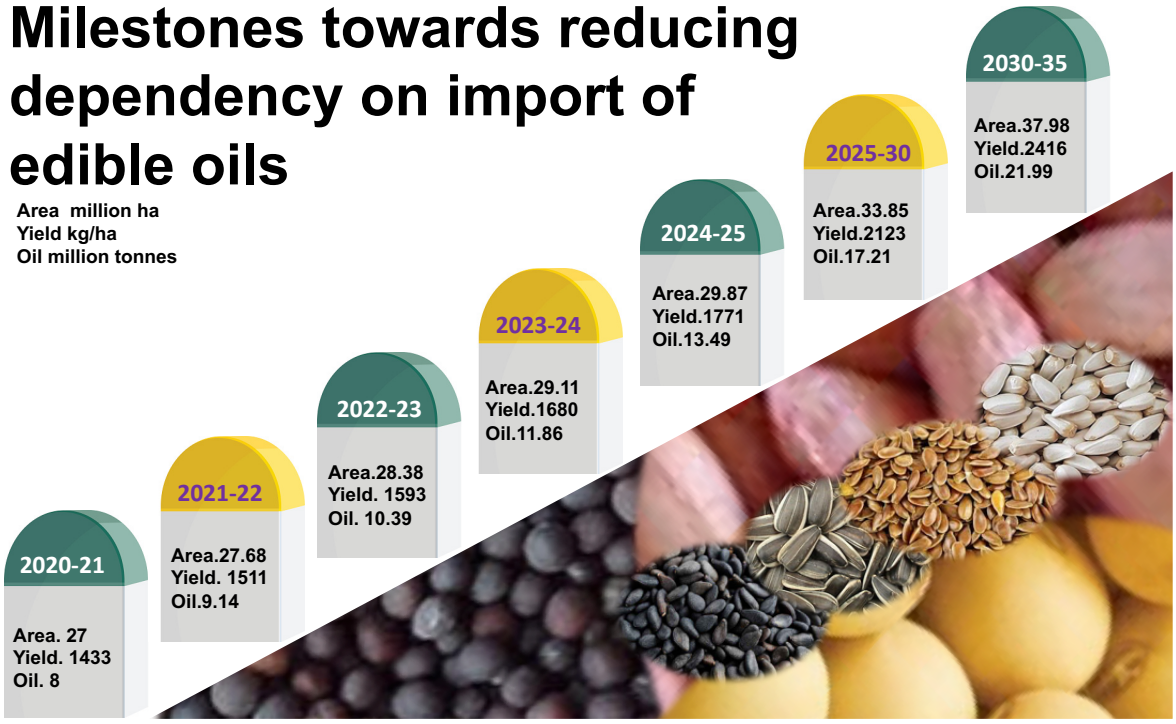
- Development of high yielding varieties tolerant to abiotic and biotic stresses using molecular tools
- Development of matching agronomic and crop protection measures for enchanting production of edible oilseeds further
- Diversification and value addition of oilseed products and byproducts
- Enhancing shelf-life of each oilseed crops
- Value added products and technologies and recipe development.
- Refinement of technology, retrofitting machineries and their demonstration
- Providing entrepreneurship development and training by incubating them
- Facilitate market linkages between processors and producers
- Up scaling of developed technologies
- Creating awareness on nutritional wellness of edible oils

(Responsibilities: ICAR, DAC)

Road map



Milestones



Conclusion

India needs to be 'Atmanirbhar' in edible oil production in future to save valuable foreign exchange to the tune of nearly seventy-thousand crores and so that the amount saved can be utilized for other developmental work. The action plan proposed here is to be followed in letter and spirit to achieve the goal. Though the target looks highly ambitious, it will be achievable with the coordinated effort and support of all stakeholders.