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Sparking Yellow Revolution in India Again

Dr. Vinod Kumar [1] and Abhishek Tiwari [2]

India is the fourth largest producer of oilseeds accounting for about 20% of the global area and 10% of the global production. The oilseed crops have registered significant growth in area and production in last 30 years. However, compared to cereals like paddy and wheat, the growth rate of area and production of oilseeds is insignificant with wide variability in their yield in different states of the country. It has explored the growth performance and dynamics of major oilseed crops in the country. Reduction in yield gap and adoption of new technology can improve India's oilseeds production and make India Atmanirbhar (self-sufficient) in oilseeds.

1. The Context

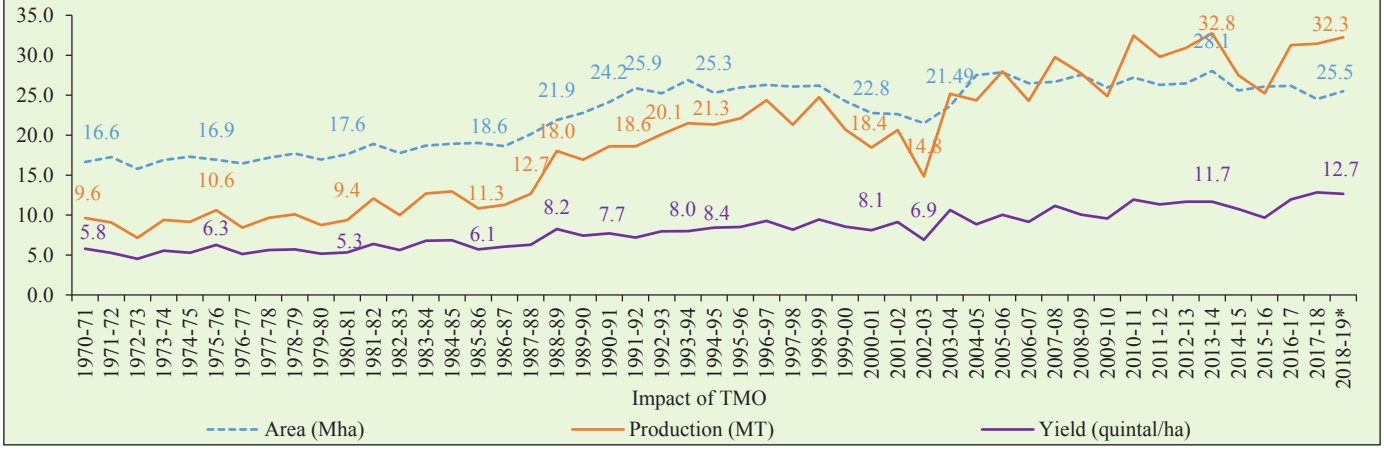
India has been forced to go in for large imports of edible oils since the domestic production of oilseeds falls short of demand. The self-sufficiency in oilseeds attained through "Yellow Revolution" during early 1990s, could not be sustained beyond a short period. There is a spurt in vegetable oils consumption in recent years in respect of both edible as well as industrial usages but domestic supply is unable to meet the demand. India is the fourth largest producer of oilseeds in the world, with oilseed sector occupying an important position in the country's economy. However, India is also one of the largest oil importing country in the world. There have been impressive changes in the oilseeds scenario of the country during the last 3 decades. India changed from net importer status in the 1980s to a net exporter status during 1989-90, which was again reversed later during 1997-98 when the country had to spend huge foreign exchange to meet the domestic needs of vegetable oils. Objective of this note is to understand the growth in oilseeds production, technology mission on oilseeds, yield gap analysis and future vision to make India Atmanirbhar in oilseeds sector.

2. Present Status of Oilseed Crops in India

India accounts for about 15-20 per cent of global oilseeds area, 6-7 per cent of vegetable oils production, and 9-10 per cent of the total edible oils consumption. In terms of acreage, production and economic value, oilseeds are second only to food grains. As per the fourth advance estimates for 2018-19, the area and production of nine oilseed crops is 25.5 million hectare (Mha) and 32.26 million tonnes (MT), respectively. It shows an increase of 1.04 per cent in production, compared to 2008-09. Figure 1 is indicating trends in area, production and productivity of oilseeds since 1970. In India, majority of the oilseeds are cultivated under rainfed ecosystem (70%). Only 28% of oilseeds area is covered under irrigation. The area under oilseeds has experienced a deceleration in general, due to their relative lower profitability against competing crops like maize, cotton, chickpea, etc., under the prevailing crop growing and marketing situations.

The area and production of oilseeds is concentrated in the Central and Southern parts of India, mainly in the states of Madhya Pradesh (27.89%), Rajasthan (21.49%), Maharashtra (14.84%), Gujarat, Andhra Pradesh and Karnataka. Among

Figure 1: Area, Yield and Production of Oilseeds Since 1970



[1] Deputy General Manager and [2] Assistant Manager, Department of Economic Analysis and Research, NABARD, HO, Mumbai.

different oilseeds, groundnut, rapeseed-mustard and soyabean account for about 80 per cent of area and 87 per cent of production of oilseeds in the country during 2018-19. Currently, share of oilseeds are 14% of the total area under major crops.

The diverse agro-ecological conditions in the country are favourable for growing nine annual oilseed crops, which include seven edible oilseeds (groundnut, rapeseed & mustard, soyabean, sunflower, sesame, safflower and niger) and two non-edible oilseeds (castor and linseed) and several perennial oil-bearing tree crops. In addition, oilseeds of tree and forest origin, which grow mostly in tribal inhabited areas contribute significantly as minor source of oil, including coconut and oil palm. Among the non-conventional oils, rice bran oil and cotton seed oil are also important, along with small quantities from tobacco seed and corn.

The domestic demand for vegetable oils and fats has been rising rapidly, at the rate of 6 per cent per annum, but our domestic output has been increasing at just about 2 per cent per annum. In India, the average yield of most oilseeds is extremely low as compared to other countries of the world. The cultivation of oilseeds in India is in high risk regions where there are uncertain returns on investments.

3. Growth Rate of Oilseed Crops: Sunflower and Safflower Losing the Plot

The production and productivity of rapeseed-mustard grew with a CAGR of 1.81 per cent and 1.84 per cent, respectively during 2008-09 to 2018-19. While area of rapeseed-mustard has decreased by 0.3 per cent. At the time of yellow revolution, area, production and yield of rapeseed-mustard seed experienced a significant growth from 1984-85 to 1996-97, primarily due to the increase in irrigated land and the availability of high-yielding seeds in the country. However, growth has become almost stagnant in last one decade due to intermittent drought conditions in some of the major oilseed producing states and changes in cropping pattern. Groundnut has shown highest increase in yield by 3.72 per cent during 2008-09 to 2018-19 (Table 1). The groundnut crop recorded a decline in area by 1.97 per cent mainly due to the gradual replacement of the crop by cotton, soyabean. Gujarat was the only state that exhibited impressive growth in the production of groundnut mainly on account of yield growth.

The area under all oilseeds declined during 2008-09 to 2018-19, except for soyabean, which saw a rise of 1.68 per cent. The growth in production of oilseeds has been moderate with a CAGR of just 1.04 per cent driven by production of groundnut, rapeseed-mustard and soyabean. Whereas, production has declined over time for sunflower, safflower and nigerseed.

Table 1: CAGR of Major Oilseed Crops: Production, Area and Yield (%) During 2008-09 to 2018-19

Particulars	Area	Production	Yield
Groundnut	-1.97	1.71	3.72
Soyabean	1.68	0.98	-0.71
Sunflower	-17.07	-15.03	2.09
Sesamum	-1.85	1.5	3.3
Nigerseed	-6.9	-5.02	1.72
Rapeseed & Mustard	-0.3	1.81	1.84
Safflower	-14.67	-16.31	-1.7
Total Oilseed (9)	**-0.73**	**1.04**	**1.92**

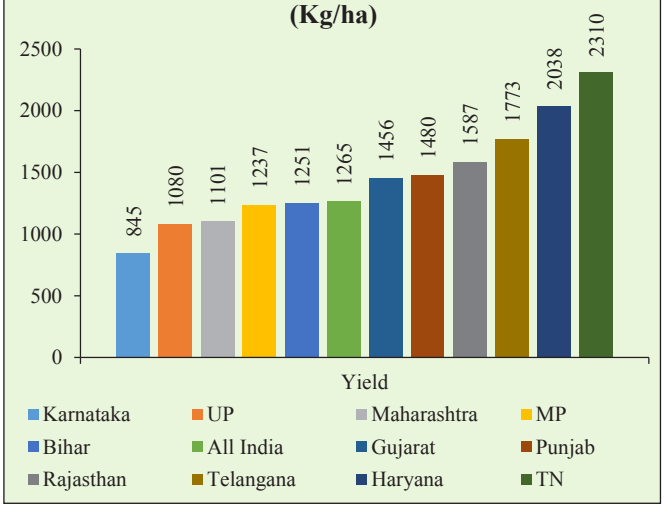
Source: Department of Agriculture, Cooperation and Farmers' Welfare, GoI.

In India yield of oilseeds varies a lot. Maximum yield in 2018-19 was recorded in Tamil Nadu at 2,310 (kg/ha) while all India average yield was just 1,265 (kg/ha) (Figure 2). In India, edible oil consumption has been growing steadily over the years, from aggregate consumption of 14 MT in 2009-10 to around 20 MT by 2018-19. Of this, India imports around 60 per cent of its edible oil demand. The per capita demand also increased at a faster pace of about 6 per cent on account of enhanced per capita consumption (19 kg/annum) driven by increase in population and growth in per capita income.

Assuming the business as usual, scenario with no significant technological breakthroughs and taking the yield level of 1265 kg/ha (triennium ending 2018-19) and a CAGR of -0.73 per cent in area and 1.92 per cent in yield, which was observed during the previous decade, domestic edible oils production is projected at 45.65 MT in 2021-22 and yield at 1465 kg/ha. Given the increase in demand and population, India's import for edible oil will rise. However, any further improvement in the yield growth due to technological breakthrough shall reduce the dependence on the imports.

The oilseed sector has tremendous potential for further growth. The role of irrigation, seeds, efficient crop management and technological interventions act as the

Figure 2: Comparison of Yield of Oilseeds (Kg/ha)



key sources of growth of oilseed production and yield. The percentage of area under irrigation in oilseeds stand at less than 30 per cent, which is very less as compared to area under cereal crops. Among the three major oilseed crops, the area under irrigation is high for rapeseed-mustard (72%), whereas it is quite low in groundnut (20%) and soyabean (2%). Another source of growth in oilseed crops is the technological component embedded in the low cost and no cost technologies developed for efficient field management of the crop.

4. Impact of Oilseed Technology Mission of Production and Yield

Directorate of Oilseed Research (DOR) was established in Hyderabad on 1st August, 1977 to guide the research & development in nine mandate crops. The oilseed scenario in India had undergone dramatic change with the initiation of Technology Mission on Oilseeds (TMO) in 1986. The period 1970-71 to 2018-19 has been divided into two parts viz., (1) before launching of TMO (1970-71 to 1985-86) and (2) after launching of TMO (1986-87 to 2018-19). The highest oilseed production achieved was 24.75 MT during 1994-95 against 11.0 MT during 1986-87. Since then, the growth is sluggish. Yield of oilseeds increased significantly after launch of technology mission but it has become stagnant in last one decade. This dramatic change of Indian oilseed production from a net importer to a self-sufficiency and net exporter during early nineties has been popularly known as Yellow Revolution.

Although there is a positive growth in area, production and yield after inception of Technology Mission on Oilseeds but the growth was meagre. Important reason for sluggish growth was change in cropping pattern as there are better incentive for farmers to grow wheat, paddy and sugarcane. Change in cropping pattern caused significant decrease in the area under cultivation for various oilseeds crops.

The Mission therefore has to focus on the increase in production through HYV's and creating awareness in farmers' on improved technologies. Appropriate steps need to be undertaken to convince the farmers about the need to increase output of these crops through demonstration or other incentive means to adopt new technology.

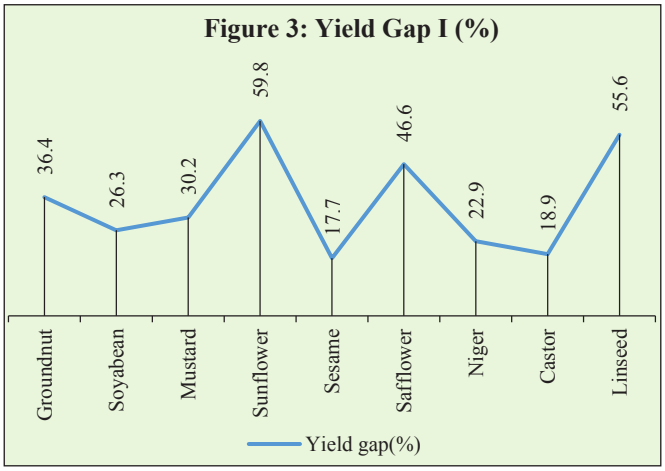
5. Yield Gap Analysis

Yield gap is the difference between the yield of improved variety at the research station and at farmers' field[3].

The major objective of Front Line Demonstrations (FLDs) is to demonstrate the productivity potentials and profitability of the latest and improved oilseed production technologies

[1] Yield Gap I (%) = (IT – NAY/ IT) x 100

where, NAY=National Average Yield, IT= Improved Technologies. Front line demonstration data is taken from "National Mission on Oilseeds and Oil Palm (NMOOP)" for the periods of 5 years i.e. 2010-2015.

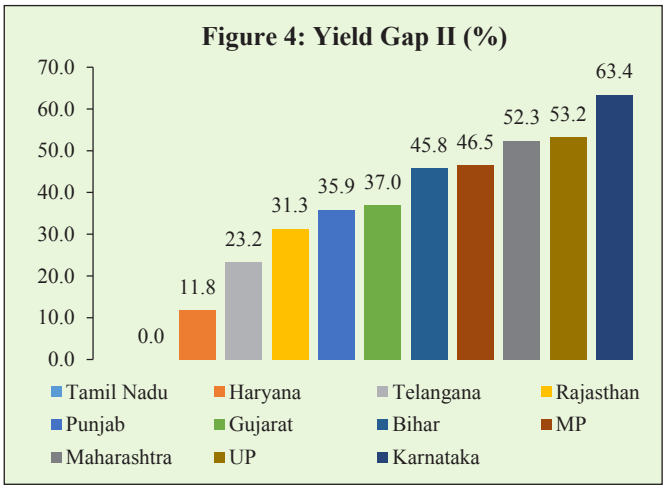


Source: FLD conducted by National Mission on Oilseeds and Oil Palm (NMOOP), https://nmoop.gov.in

under real farm conditions. There exists a tremendous potential for enhancing the yield of nine oilseed crops by adopting the technologies already available. This contention is based on the results of 23,118 FLDs during 2010-2015 conducted on nine oilseeds crops under real farm situations in different agro-ecological conditions of India over a period of five years [FLDs conducted by National Mission on Oilseeds and Oil Palm (NMOOP)]. Figure 3 indicates yield gap for 9 major oilseeds crops. From the finding it can be observed that improved technology can help in increase in production significantly.

There is another way of measuring yield gap by taking the difference between maximum yield state and other oilseeds producing states[4].

Figure 4 shows the gap of yield among states. Maximum yield gap is in Karnataka at 63 per cent, which individually makes a significant contribution in oilseeds production. If India's average yield can increase to the level of yield of Tamil Nadu, then total oilseed production will increase by 82 per cent (If area remains the same at 2018-19 level) (Table 2). As per trends, vegetable oil production is around



[4] Yield Gap II (%) = (HYS– SY/ HYS) x 100, where HYS- Highest Yield State, SY- State's Yield.

Table 2: Impact of Closing the Yield Gap on Production					
Crops	**Average Yield (Kg/ha)**	**HYS (Kg/ha)**	**Production (MT)**	**Estimated Production (MT)**	**(%) Increase**
Groundnut	1368	2430	6.69	11.5	72.5
Soyabean	1218	1893	13.8	21.4	54.7
Sunflower	866	1169	0.22	0.3	27.5
Sesamum	469	887	0.76	1.4	85.6
Mustard	1414	1921	9.3	11.9	28.3
Total Oilseed (9)	1265	2310	32.26	58.9	82.6

7.0 MT from about 32.0 MT of oilseeds necessitating import to the tune of 10-15 MT, accounting for about 60 per cent of the total demand. If production of oilseeds goes up to around 60 MT due to improvement in yield, then total edible oil production will go up to 14 MT which will reduce import of edible oil by 50 per cent.

Bridging yield gap across oilseeds can increase oilseeds production significantly that would concomitantly reduce the dependence on imports of vegetable oils besides realising higher profitability to oilseed farmers.

6 Conclusion and Way Forward

Yellow Revolution improved productivity but could not help in increasing oilseeds production significantly owing to lack of awareness and change in cropping pattern leading to significant decrease in area under oilseeds production. Technology mission on oilseeds II and Yellow Revolution 2.0 with better planning can help India to achieve self-sufficiency in oilseeds and also increase India's agri-export. Yield gap analysis shows that India's oilseeds production can improve by reducing yield gap among states itself. There is a great scope for increasing the yields of oilseed crops. Better extension systems, with downward accountability with the last mile extension gaps plugged will increase productivity.

The strategies for enhancing the productivity (and profitability) of oilseeds as under:

i. Increasing seed production and distribution of newly released varieties.

ii. Low cost technologies with high impact on productivity will result in higher income which will encourage farmers to go for oilseeds farming.

iii. Strategies with emphasis on quality improvement and value addition leveraging technologies with a bearing on the employment through skill/ entrepreneurship development.

The GOI launched Integrated Scheme for Oilseeds, Oil palm, Pulses and Maize Development Programme (ISOPOM) to provide flexibility to the states in implementation based on regionally differentiated approach to promote crop diversification. Recently, government has started Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA) scheme to promote robust procurement mechanism and ensure remunerative prices to farmers. This scheme will incentivise farmers to produce oilseed crops. Under Make in India, large processing plants should be mandated as well as incentivised to establish backward linkages to produce more oilseeds in the country. These processing plants can work in partnership with farmer producers organisations (FPOs) to boost oilseeds (raw material) output. FPOs can play a critical role in efforts to boost domestic oilseed production.

References

Agricultural Statistics at a Glance (2018), GoI.

Chandel, B. S. and Ramarao, D. (2003), "Investment in Oilseeds Research in India", Economic and Political Weekly, Vol. 38, (43).

Jat, R.S., Singh V.V., Sharma Pankaj and Rai, P.K., (2019) "Oilseed Brassica in India: Demand, Supply, Policy Perspective and Future Potential", ICAR-Directorate of Rapeseed-Mustard Research.

Jha, Girish Kumar, Pal Suresh and Mathur, V.C., (2012), "Edible Oilseeds Supply and Demand Scenario in India: Implications for Policy", Division of Agricultural Economics Indian Agricultural Research Institute, New Delhi.

Jha, Girish Kumar, (2011), "Yield Gap Analysis of Major Oilseeds in India", Journal of Community Mobilization and Sustainable Development, Vol. 6(2), pp. 209-216.

"Present Status of Oilseed crops and vegetable oils in India" (2018), Status Paper, National Food Security Mission, GoI.

Reddy, K. Viswanatha and Immanuelraj, T. Kingsly, (2017) "Area, Production, Yield Trends and Pattern of Oilseeds Growth in India", Economic Affairs, Vol. 62, (2), pp. 327-334.

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