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# RE-VISITING AGRICULTURAL POLICIES IN THE LIGHT OF GLOBALISATION EXPERIENCE: THE INDIAN CONTEXT

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# Development Programmes and Performance of Oilseeds Sector in India

## I

## INTRODUCTION

Oilseeds and edible oils are one of the most sensitive essential commodities and had gone through several phases of development policies since 1980 mainly driven by consumer interests. This sector occupies an important position in the agricultural economy of the country. Oilseed crops accounts for 13 per cent of gross cropped area, 3 per cent of gross national product, 10 per cent of total value of output from agricultural crops and 6.0 per cent of value of output from agriculture and allied sector. In terms of acreage, production and economic value, these crops are second only to foodgrains. Indian Vegetable oil economy is world's fourth largest after USA, China and Brazil. India accounts for about 14 per cent of global oilseeds area, 8 per cent of oil crops production, 6-7 per cent of vegetable oils production, 13.5 per cent of vegetable oils import, 6.5 per cent of oilcakes export and 10.7 per cent of the global edible oils consumption. The per capita availability of edible oils had increased from 3.5 kg/person/year in 1970-71 to 15.8 kg in 2012-13 (Government of India, 2014).

Low productivity of oilseed crops, fragmented and under-utilised processing facilities, and lack of technological inputs hampered the edible oil production in the country (EPW, 2003), resulting in heavy reliance on imports of edible oils. Country has now become largest edible oil importer, and import of edible oils emerged as the second largest items of country's imports after petroleum products. The cultivation of oilseeds in the country is mostly in high risk regions with minimum use of productive inputs. They are mostly grown under rain-fed conditions which are characterized with extreme variations in rainfall both in time and space, poor soil quality, etc. It has resulted in a high degree of variation in production of oilseeds annually. Though, the oilseeds area under irrigation has increased from 7.4 per cent in 1970-71 to 25.9 per cent in 2009-10, this has been mainly concentrated for *rabi* oilseed crops.

The efforts were continuously being diverted by government towards increasing the production and productivity of oilseeds in the country to enhance availability of edible oils. The efforts includes both developmental policies targeted towards increasing and sustaining yield levels of oilseeds through technological interventions, and through trade policies to meet the growing edible oil demand of the consumers.

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As the demand of edible oils is highly income elastic, the increase in per capita income pushes demand significantly (Chand *et al.*, 2004).

To increase the availability of edible oils for the ever increasing population, enduring policy efforts were initiated by government through TMO, OPP, ISOPOM, etc. with an overall view to increase oilseed productivity. Under this backdrop, this paper intends to review oilseed production and policy scenario, pricing, and international trade and their role in changing oilseeds scenario in India.

## II

## METHODOLOGY

The paper is mainly based on secondary data. The data on area, production and yield of oilseeds and other requisite information were collected from publications and website of Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. Growth and instability of oilseeds were analysed during different phases of development policies, the data were divided in different periods, like Pre-TMO (1970-71 to 1985-86), post-TMO (1986-87 to 1994-95), Post-WTO (1995-96 to 2003-04), and post-ISOPOM (2004-05 to 2012-13). Compound annual growth rates for different periods were calculated.

To measure the relative contribution of area and yield to the total output change for individual crop, the component analysis model was followed (Narula and Vidysagar, 1973; Singh and Sisodia, 1989; Bastine and Palanisami, 1994; and Singh and Ashokan, 2000).

$$\Delta P = A_0\,\Delta Y + Y_0\,\Delta A + \Delta A\,\Delta Y \qquad \text{....(1)}$$

Change in Production = Yield effect + Area effect + Interaction effect.

The total change in production can be decomposed into three effects such as; yield effect, area effect and interaction effect due to change in yield and area.

Coefficient of variation around the trend (Instability index) was worked out as suggested by Cuddy and Della Valle (1978) as:

A linear trend $y=a+bt+e$ was fitted to the indices of area, production and yield for different period and trend co-efficient “b” was tested for significance. Whenever the trend co-efficient was found significant, the index of instability was constructed as follows:

$$\text{Instability Index} = (CV) \times \text{sqrt}\,(1-R^2) \qquad \text{....(2)}$$

Yield gap for oilseed crops for the present study was calculated as follows:

$$YG = Y_t - Y_a$$

where, $Y_t$ is the average yield of crop realised at farmers' field in Frontline Demonstrations (FLDs), and $Y_a$ is the national level average yield in a particular year.

For analysing change in yield gap of oilseed crops over the years, yield gap for the period 1990-91 to 1994-95 was taken from Bansil, 1997. The yield gap for the period 2007-08 to 2011-12 was calculated from the data collected from publication on FLD results of Directorate of Oilseed Research, Hyderabad.

## III

## OILSEED DEVELOPMENT POLICIES IN INDIA

To augment the production of oilseed crops during early plan periods, persistent efforts were made by state governments through implementing a number of schemes under state sector. These included popularisation of basic oilseed production technology such as providing improved quality seeds, use of recommended fertilisers and plant protection measures. Thereafter, Government of India launched a centrally sponsored scheme called Intensive Oilseeds Development Programme during 1969-70 (Government of India, 1981). The growth performance of oilseeds in terms of production was lower during post-green revolution (1967-68 to 1986-87) as compared to pre-green revolution (Gulati *et al.*, 1996). The slow growth in production and rise in edible oil demand due to high expenditure elasticity for edible oils resulted in heavy dependence on imported edible oils to meet domestic requirements (Ninan, 1995; Bansil, 1997). Responding to the mounting edible oil import bills under chronic shortage of foreign exchange India decided to adopt an import substitution strategy in edible oils, and launched the National Oilseeds Development Project (NODP) in 1985-86 by integrating all the centrally sponsored schemes for oilseed development. Further towards making concerted effort in coordination of technology delivery for crops and oilseed processing, price support and support services under mission mode led to the launch of Technology Mission on Oilseeds (TMO) in 1986. The goal of TMO was to achieve complete self- sufficiency in edible oils by 1990. A special three years scheme called Oilseed Production Thrust Programme (OPTP) targeting four major oilseed crops was also launched in 1987-88 which ran concurrently with TMO. The assurance of fair and stable prices for oilseeds was the key to achieving desirable shift in cropping area in favour of oilseed crops and for inducing private investments in oilseed crops. Price support operations in oilseeds were undertaken as a part of this strategy. For undertaking price support operations in oilseeds, National Agricultural Cooperative Marketing Federation (NAFED) was designated as the nodal agency during 1985-86 (Bansil, 1997; Ninan, 1995; Thomas *et al*. 2012).

To avoid duplicity and bring in better coordination, Oilseed Production Programme (OPP) was launched in 1990-91 by merging ongoing OPTP and NODP into a single window programme. The National Dairy Development Board (NDDB) was also involved in stabilisation of supplies and prices of edible oils through its

Market Intervention Operations (MIO). The market intervention operations by NDDB between 1989 and 1994 were the first major attempt by the government to stabilise oilseed/edible oil prices with a pre-determined price-band. The NDDB did this through buffer stocks and imports of both oilseeds and oil (Srinivasan, 2004 a,b). During this period the imports of edible oils were kept under the negative list and only State Trading Corporations (STCs) and designated public sector agencies like NAFED were allowed to import edible oils. During 1994, liberalisation era started in edible oils sector by placing palmolein imports under Open General Licence, and the imports and tariff rates on other edible oils and oilseeds were liberalised in a phased manner. The import of all edible oils (except coconut oil, palm kernel oil, RBD palm oil, RBD palm stearin) was placed on OGL with 30 per cent import duty from March, 1995 (Thomas, *et al*. 2012). The edible oil import/export policy has been changed about 30 times in a span of 18 years.

To provide flexibility to the states in implementation of these programmes on the basis of regionally differentiated approach, in view of the suggestions of the Planning Commission, all schemes have been modified and merged into one Centrally Sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) during the 10th Five Year Plan, which is under implementation from 2004-05. The ISOPOM is under implementation in 427 districts of 14 potential States viz., Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal for oilseeds production programme.

## IV

## GROWTH AND INSTABILITY IN OILSEEDS DURING DIFFERENT PHASES OF DEVELOPMENT POLICY

The area, production and yield of oilseeds in India have grown at a compound annual rate of 1.4 per cent, 3.4 per cent and 2 per cent, respectively, during the period 1970-71 to 2012-13 (Table 1). Growth in area and production of soybean and sunflower, the oilseed crops introduced in India during 70’s, was found to be higher as compared to other oilseed crops. The area and production growth of crops like linseed, nigerseed and safflower was negative during the overall period. Growth analysis was worked out for different periods representing different phases of oilseed development policies in the country to elucidate the impact of those policies and programmes. The area, production and yield of total oilseed crops with an exception of linseed and safflower, witnessed accelerated growth during post-TMO period. With the concerted efforts for realising self-sufficiency through increasing oilseeds production in the country resulted in higher growth in oilseeds production.

Consequent upon the setting up of Technology Mission on Oilseeds, a major breakthrough in increasing Oilseeds production was achieved through an integrated approach like introduction of new crop production technologies, better supply of inputs, extension services, support for marketing, post-harvest technologies and

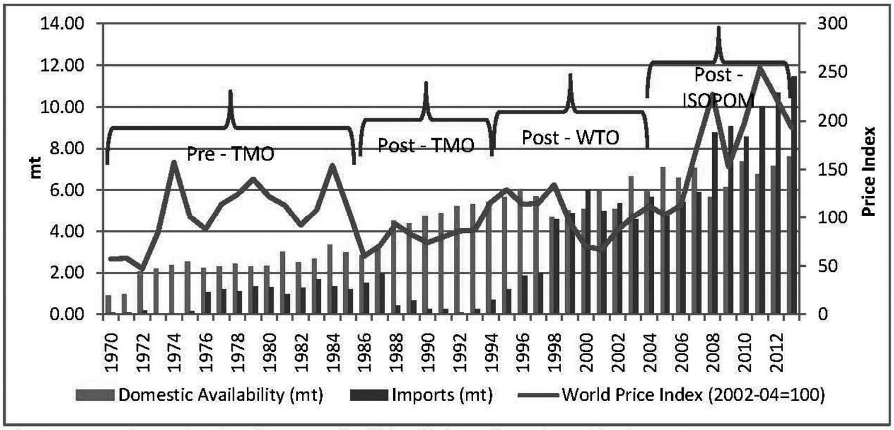
TABLE 1. ANNUAL COMPOUND GROWTH RATES OF OILSEEDS IN INDIA

| Crop (1) | APY (2) | Pre-TMO (3) | Post-TMO (4) | Post-WTO (5) | Post-ISOPOM (6) | Overall (7) |
|---|---|---|---|---|---|---|
| | Area | 0.9 | 4.3 | -2.3 | -0.5 | 1.4 |
| Oilseeds | Prod | 2.2 | 7.7 | -2.0 | 2.6 | 3.4 |
| | Yield | 1.2 | 3.3 | 0.4 | 3.1 | 2.0 |
| | Area | 0.03 | 1.6 | -3.3 | -3.5 | -0.6 |
| Groundnut | Prod | 0.6 | 3.0 | -3.3 | -2.2 | 0.5 |
| | Yield | 0.6 | 1.3 | 0.1 | 1.4 | 1.1 |
| | Area | 1.4 | 6.3 | -4.7 | -2.0 | 1.8 |
| R&M | Prod | 3.3 | 8.7 | -2.6 | -0.1 | 4.2 |
| | Yield | 1.9 | 2.3 | 2.2 | 1.9 | 2.3 |
| | Area | 33.0 | 16.6 | 2.5 | 4.5 | 14.8 |
| Soybean | Prod | 36.0 | 23.8 | 1.4 | 8.4 | 16.6 |
| | Yield | 1.4 | 6.2 | -1.1 | 3.7 | 1.5 |
| | Area | 10.4 | 10.5 | -3.3 | -14.3 | 6.5 |
| Sunflower | Prod | 6.8 | 17.1 | -5.2 | -12.5 | 6.7 |
| | Yield | -3.1 | 6.0 | -1.9 | 2.1 | 0.2 |
| | Area | 2.4 | 4.0 | -0.7 | 7.3 | 1.9 |
| Castor | Prod | 7.2 | 17.5 | -4.2 | 12.8 | 5.7 |
| | Yield | 4.6 | 12.9 | -3.5 | 5.2 | 3.7 |
| | Area | -2.5 | -3.6 | -8.2 | -5.3 | -4.7 |
| Linseed | Prod | -2.0 | -1.8 | -6.2 | -2.0 | -3.2 |
| | Yield | 0.5 | 1.8 | 2.2 | 3.5 | 1.6 |
| | Area | 1.2 | -0.3 | -4.2 | -3.7 | -1.0 |
| Nigerseed | Prod | 2.4 | 2.6 | -7.0 | -1.7 | -0.5 |
| | Yield | 1.2 | 2.9 | -2.9 | 2.0 | 0.5 |
| | Area | -0.3 | -0.8 | -1.9 | 0.8 | -0.9 |
| Sesame | Prod | 1.1 | 1.9 | 1.4 | 2.1 | 1.1 |
| | Yield | 1.4 | 2.7 | 3.4 | 1.3 | 2.1 |
| | Area | 3.5 | -3.4 | -8.5 | -7.8 | -2.4 |
| Safflower | Prod | 9.9 | -0.5 | -9.4 | -7.1 | -0.6 |
| | Yield | 6.2 | 3.0 | -0.9 | 0.8 | 1.8 |

*Source*: Authors calculation.

excellent co-ordination/co-operation between various concerned organizations/ departments and Ministries (Acharya, 1993; World Bank 1997; Bansil, 1997; Ramasamy and Selvraj, 2002; Reddy, 2009; Government of India, 2014). This increased the oilseed production and India became self-sufficient by early 1990s. Import of edible oils was almost negligible (2 per cent of total consumption) during 1992 (Figure 1).

The improved technologies emanated through research by ICAR and SAUs helped in enhancing productivity of oilseeds, in addition to market support and high edible oil import tariffs, incentivised farmers for expanding area under oilseeds and improve in input use. Although, the tempo of growth in oilseeds production could not be sustained during post-WTO period, mainly on account of liberalisation of edible oil trade by reducing import tariffs under WTO commitments. During the post-WTO period, most of the oilseed crops witnessed negative growth in area and production. During this period there was a surge in imports of edible oils and domestic production of these started to decline due to fall in real prices (Chand, *et al.* 2004). During the post-ISOPOM, the production of soybean, castor and sesame increased positively, while growth in production of groundnut, R&M, sunflower, linseed, nigerseed and safflower continued to decline.




*Data Source*: FAS, USDA, World Price Index from FAO Data.

Figure 1. Domestic Production, Imports of Edible Oils in India and World Prices.

The Cuddy-Della Valle index of instability was worked out for area, production and yield of oilseeds for different phases of developmental policies and programmes and the results are presented in Table 2. The results clearly indicated that the instability in area, production and yield was higher for soybean, sunflower and safflower for the overall period. Overall instability in area under oilseed crops was found to be 8 per cent, while fluctuation in production was 14 per cent and yield instability was 9.5 per cent during the period 1970-71 to 2012-13. The production and yield instability declined during post-TMO and post-ISOPOM periods for most of the oilseed crops. The instability in area under oilseed crops had increased during post-WTO phase, while during post-ISOPOM phase the area has almost stabilised.

TABLE 2. INSTABILITY IN AREA, PRODUCTION AND YIELD OF OILSEEDS IN INDIA

| Crop (1) | APY (2) | Pre-TMO (3) | Post-TMO (4) | Post-WTO (5) | Post-ISOPOM (6) | Overall (7) |
|---|---|---|---|---|---|---|
| | Area | 2.8 | 4.5 | 4.1 | 2.0 | 8.0 |
| Oilseeds | Prod | 11.1 | 8.8 | 14.2 | 8.1 | 14.1 |
| | Yield | 9.2 | 7.3 | 11.8 | 6.9 | 9.5 |
| | Area | 2.9 | 7.5 | 2.7 | 5.9 | 10.4 |
| Groundnut | Prod | 14.0 | 14.0 | 19.8 | 22.1 | 19.9 |
| | Yield | 12.2 | 10.5 | 20.1 | 17.5 | 15.5 |
| | Area | 6.6 | 7.9 | 10.3 | 8.1 | 14.2 |
| R&M | Prod | 17.2 | 11.9 | 16.5 | 11.1 | 19.0 |
| | Yield | 15.1 | 7.9 | 13.3 | 4.8 | 12.0 |
| | Area | 17.0 | 7.0 | 5.3 | 2.7 | 31.3 |
| Soybean | Prod | 23.1 | 13.9 | 17.4 | 7.8 | 33.7 |
| | Yield | 22.5 | 13.5 | 13.9 | 8.6 | 17.6 |
| | Area | 58.4 | 18.3 | 21.4 | 14.3 | 43.8 |
| Sunflower | Prod | 55.5 | 19.4 | 20.0 | 16.9 | 42.9 |
| | Yield | 8.9 | 11.9 | 8.6 | 9.7 | 16.6 |

*Contd.*

TABLE 2. CONCLD.

| Crop (1) | APY (2) | Pre-TMO (3) | Post-TMO (4) | Post-WTO (5) | Post-ISOPOM (6) | Overall (7) |
|---|---|---|---|---|---|---|
| | Area | 14.3 | 11.0 | 18.7 | 20.3 | 18.2 |
| Castor | Prod | 19.4 | 19.8 | 16.4 | 20.0 | 27.3 |
| | Yield | 14.0 | 12.2 | 16.3 | 2.7 | 17.4 |
| | Area | 9.5 | 6.6 | 5.8 | 6.5 | 10.5 |
| Linseed | Prod | 16.1 | 9.1 | 8.0 | 2.9 | 13.0 |
| | Yield | 11.3 | 6.4 | 7.5 | 6.9 | 10.0 |
| | Area | 7.9 | 3.3 | 4.1 | 5.6 | 12.6 |
| Nigerseed | Prod | 15.3 | 9.1 | 11.1 | 5.4 | 21.8 |
| | Yield | 12.3 | 7.5 | 8.0 | 5.7 | 11.6 |
| | Area | 5.2 | 9.1 | 7.5 | 6.5 | 10.2 |
| Sesame | Prod | 13.8 | 17.6 | 18.6 | 12.9 | 17.1 |
| | Yield | 13.7 | 13.8 | 13.8 | 10.3 | 13.1 |
| | Area | 8.6 | 15.9 | 9.8 | 7.3 | 25.9 |
| Safflower | Prod | 21.9 | 25.0 | 35.4 | 14.9 | 45.1 |
| | Yield | 19.0 | 17.2 | 27.5 | 10.0 | 22.0 |

*Source*: Authors calculation.

In case of groundnut, yield instability has doubled during post-WTO period compared to the post-TMO period. Although, groundnut yield instability declined marginally during post-ISOPOM period, but still was at an elevated level. This may be one of the reasons for negative growth in area under groundnut during post-WTO and post-ISOPOM period. Area under soybean had stabilised in the country, as indicated by the low (2.7 per cent) instability index during post-ISOPOM period. Similarly, yield levels of mustard and castor had shown stability during post-ISOPOM period. Production and yield of minor oilseed crops like sesame and safflower continued to be highly instable, though during post-ISOPOM period instability index had declined. Overall, increasing trend in yield of total oilseeds and declining instability signifies the sustainable development of oilseeds in the country.

## V

## DETERMINANTS OF CHANGE IN OUTPUT OF OILSEEDS

Production of total oilseeds in the country was 8210.9 thousand tons during triennium average ending (TE) 1970-71, and has increased to 31079.2 thousand tons during TE 2012-13, resulting in enhancement of 278.4 per cent. Of the total change in production of oilseeds in the country, about 59 per cent is contributed by expansion in yield level, 31 per cent due to area affect and 10 per cent by area and yield interaction (Table 3). The effect of yield in production increase of oilseeds was found to be lower during post-TMO period and even negative during post-WTO period. However, the situation improved during post-ISOPOM period. This can be ascertained to the concerted research in technological developments by ICAR and SAUs along with the use of modern and productive inputs by farmers thereby helping in realising higher yield and resulted in increased production of oilseeds in the country. However, yield gap analysis indicated large exploitable yield reservoir is yet to be realised (Kiresur *et al.* 2001, Chand *et al.* 2004, Jha, *et al.* 2011). The effect of change in yield to change in production of linseed was found to be negative during all the periods.

TABLE 3. DECOMPOSITION OF CHANGE IN PRODUCTION IN OILSEEDS (per cent)

| Crop (1) | Due to (2) | Pre-TMO (3) | Post-TMO (4) | Post-WTO (5) | Post-ISOPOM (6) | Overall (7) |
|---|---|---|---|---|---|---|
| Oilseeds | Prod Change | 44.7 | 76.6 | -3.6 | 53.6 | 278.4 |
| | Area Effect | 34.3 | 52.0 | 348.0 | 33.7 | 30.7 |
| | Yield Effect | 56.9 | 34.3 | -283.3 | 56.2 | 58.8 |
| | AY Interaction | 8.7 | 13.7 | 35.3 | 10.1 | 10.5 |
| Groundnut | Prod Change | 18.5 | 30.1 | -21.2 | 3.4 | 25.5 |
| | Area Effect | 9.6 | 36.7 | 119.8 | -379.5 | -155.9 |
| | Yield Effect | 88.8 | 57.0 | -26.6 | 549.7 | 265.8 |
| | AY Interaction | 1.6 | 6.3 | 6.7 | -70.2 | -9.9 |
| R&M | Prod Change | 61.5 | 101.4 | -4.0 | 49.5 | 366.9 |
| | Area Effect | 40.3 | 57.8 | 471.4 | 55.2 | 39.1 |
| | Yield Effect | 47.8 | 26.6 | -457.7 | 35.2 | 51.0 |
| | AY Interaction | 11.9 | 15.6 | 86.3 | 9.6 | 9.9 |
| Soybean | Prod Change | 4020.2 | 485.6 | 52.8 | 114.9 | 79132.6 |
| | Area Effect | 45.3 | 69.6 | 99.0 | 52.9 | 64.1 |
| | Yield Effect | 1.7 | 6.9 | 0.6 | 29.3 | 17.6 |
| | AY Interaction | 53.0 | 23.5 | 0.3 | 17.8 | 18.2 |
| Sunflower | Prod Change | 303.4 | 287.3 | -33.8 | -31.0 | 86.0 |
| | Area Effect | 149.5 | 83.1 | 84.6 | 155.7 | 613.2 |
| | Yield Effect | -8.9 | 5.0 | 21.6 | -107.8 | 42.8 |
| | AY Interaction | -40.5 | 11.9 | -6.2 | 52.1 | -19.6 |
| Castor | Prod Change | 225.2 | 72.6 | -10.8 | 198.8 | 1396.5 |
| | Area Effect | 23.0 | 18.3 | 46.5 | 39.1 | 32.7 |
| | Yield Effect | 50.7 | 72.1 | 56.3 | 34.3 | 42.4 |
| | AY Interaction | 26.3 | 9.6 | -2.8 | 26.6 | 25.0 |
| Linseed | Prod Change | -5.0 | -23.0 | -37.4 | -23.1 | -64.8 |
| | Area Effect | 411.5 | 151.1 | 127.4 | 143.1 | 159.9 |
| | Yield Effect | -392.1 | -78.4 | -52.5 | -64.5 | -89.4 |
| | AY Interaction | 80.7 | 27.2 | 25.0 | 21.4 | 29.5 |
| Nigerseed | Prod Change | 40.2 | 23.9 | -40.6 | -5.7 | -2.7 |
| | Area Effect | 48.5 | 21.8 | 62.5 | 371.0 | 1427.9 |
| | Yield Effect | 43.1 | 74.3 | 50.2 | -343.2 | -981.1 |
| | AY Interaction | 8.4 | 3.9 | -12.8 | 72.1 | -346.8 |
| Sesame | Prod Change | 13.8 | 17.0 | 0.7 | 24.3 | 66.7 |
| | Area Effect | -63.2 | -19.8 | -3630.9 | 74.8 | -29.8 |
| | Yield Effect | 178.9 | 124.0 | 4894.8 | 21.4 | 147.6 |
| | AY Interaction | -15.7 | -4.2 | -1163.9 | 3.9 | -17.8 |
| Safflower | Prod Change | 262.1 | -8.4 | -58.7 | -24.3 | 3.7 |
| | Area Effect | 17.2 | 99.8 | 86.8 | 166.4 | -5732.9 |
| | Yield Effect | 57.1 | 0.2 | 27.0 | -111.5 | 3669.8 |
| | AY Interaction | 25.7 | 0.0 | -13.7 | 45.1 | 2163.1 |

*Source*: Authors calculation.

Exploitable yield reservoir of oilseeds

The average realisable yield, i.e. yield realised at farmers' field with improved package of practices under FLDs, had increased for the oilseed crops like groundnut, mustard, sunflower, safflower, nigerseed and soybean, while it declined in case of castorseed and linseed (Table 4). The average yield at the national level also increased for all the oilseed crops with linseed being an exception. The yield gap has also increased for the crops like groundnut, sunflower, safflower and nigerseed, however it decreased in the case of crops like mustard, soybean, sesamum, castorseed and linseed. The potential gap in production of oilseeds has been worked out at 14.66 million tonnes during five year average ending (FE) 1994-95, and had increased to 16.86 million tonnes during FE 2011-12. If the yield gap of the oilseed crops can be reduced to half the current level, an additional 8.5 million tonnes of oilseeds can be produced in the country. This will also improve the efficiency of land and labour use, reduces production costs and increases sustainability. The higher yield gap is mainly due to lower adoption of improved crop production technology; moreover, other factors that cause exploitable yield gaps in oilseeds include physical, biological, socio-economic and institutional constraints, and can be effectively improved through participatory research and government interventions. Low potential and high gap states require concerted extension efforts to enhance adoption level of crop-specific technologies among the farmers (Chand *et al.*, 2004; Venkatkumar, *et al.*, 2009 and Jha, *et al.* 2011). Adoption level for several components of the improved technology is considerably low, emphasising need for better dissemination (Kiresur *et al.*, 2001).

TABLE 4. YIELD GAP ANALYSIS OF OILSEED CROPS

| | 1990-91 to 1994-95* | | | | 2007-08 to 2011-12 | | | |
|---|---|---|---|---|---|---|---|---|
| Crop | Mean realisable yield with IT (kg/ha) | Av. yield (kg/ha) | Realisable yield gap (kg/ha) | Potential gap (million tonnes) | Mean realisable yield with IT (kg/ha) | Av. yield (kg/ha) | Realisable yield gap (kg/ha) | Potential gap (million tonnes) |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Groundnut | 1724 | 950.8 | 773.8 | 4.80 | 2200 | 1274 | 926 | 5.38 |
| R&M | 1326 | 873 | 453 | 2.81 | 1453 | 1128 | 325 | 1.98 |
| Soybean | 1850 | 939 | 911 | 3.26 | 1882 | 1166 | 716 | 6.85 |
| Sunflower | 1175 | 557 | 618 | 1.29 | 1504 | 676 | 828 | 1.14 |
| Sesamum | 614 | 303 | 311 | 0.71 | 669 | 387 | 282 | 0.54 |
| Safflower | 781 | 494 | 287 | 0.21 | 1240 | 636 | 604 | 0.17 |
| Nigerseed | 409 | 302 | 107 | 0.65 | 1269 | 413 | 856 | 0.33 |
| Castorseed | 1854 | 929 | 925 | 0.68 | 1784 | 1451 | 333 | 0.32 |
| Linseed | 852 | 325 | 257 | 0.25 | 694 | 278 | 416 | 0.16 |
| Oilseeds | | | | 14.66 | | | | 16.86 |

*Source*: * Bansil, 1997, yield gap for the period 2007-08 to 2011-12 was calculated from the data collected from reports on Frontline Demonstrations for Oilseeds, various years, DOR, Hyderabad.

IT= Improved Technology

### *Total Factor Productivity Growth of Oilseeds*

The total factor productivity (TFP) growth for soybean during post-TMO period was 0.83 and declined to 0.62 during post-WTO period. In the case of groundnut, TFP increased during post-WTO period (1.30) compared to post-TMO period (0.55). There was no growth in TFP during post WTO period (0.08). The value of marginal product of oilseed research stock was found to be less than Rs. 1 during all the periods, and started declining during post-TMO and continued to decline during post-WTO periods. The internal rate of returns through oilseeds research investment was around 18 per cent for groundnut during all the periods, while it continuously declined for mustard crop from 27 per cent during pre-TMO period, 17 per cent during post-TMO period and 13 per cent during post-WTO period (Chand *et al.* 2011). The lower growth in total factor productivity for oilseeds can be attributed to lower investment in oilseeds research. Indian research system invests merely 4.2 per cent of total agricultural research investment on oilseeds research (Chandel and Rao, 2003), whereas oilseeds contribute about 10 per cent of total value of output from agriculture crops. Even within oilseed crops research resource allocation was found to be disproportionate. The share of research investment for mustard and sesame had increased, while share of all other oilseed crops had declined. The research investments for crops like rapeseed and mustard, groundnut and soybean were lower than their contribution in value of output (Chandel and Rao, 2003).

TABLE 5. TOTAL FACTOR PRODUCTIVITY GROWTH OF OILSEED CROPS

| Crops<br>(1) | 1975-85<br>(2) | 1986-95<br>(3) | 1996-05<br>(4) | 1975-05<br>(5) |
|---|---|---|---|---|
| TFP Growth | | | | |
| Soybean | | 0.83 | 0.62 | 0.71 |
| Groundnut | 0.49 | 0.55 | 1.30 | 0.77 |
| R & M | 1.88 | 0.74 | 0.08 | 0.79 |
| VMP of Research stock (Rs.) | | | | |
| Groundnut | 0.73 | 0.78 | 0.63 | 0.71 |
| R & M | 1.64 | 0.62 | 0.40 | 0.89 |
| IRR (per cent) | | | | |
| Groundnut | 18 | 19 | 17 | 18 |
| R & M | 27 | 17 | 13 | 20 |

*Source*: Chand *et al.* (2011).

Trade Policies, Prices and Edible Oil import

Import of edible oils was negligible in India till 1975-76 (5 to 8 per cent of total edible oil consumption), but there was a sudden spurt in import during the period 1976-77 to 1988-89, on account of faster growing demand (high expenditure elasticity of edible oils) and decrease in domestic production (Figure 1). Import policies of edible oils prior to 1994 were governed by quantitative restrictions, that is, imports were controlled directly by State Trading Corporation (STC) and subject to state-imposed import quotas. Edible oil import levels were determined by the government, and had been the monopoly of STCs, on the basis of domestic and international market conditions, producer versus consumer interests, and foreign exchange availability. With the initiation of import substitution policy and launching of TMO, the goal of self-sufficiency in edible oils was achieved in early 1990s (Gulati, *et al.* 1996; Persaud and Landes, 2006). However, edible oils trade policy reforms in the mid-1990s followed by declining domestic oilseed production fuelled the resurgence of imports (Dohlman *et al.* 2003).

In the year 1994 the country eliminated the state monopoly on imports and placed imports under a privatised open general license (OGL) system, and also agreed to eliminate import quotas and placed upper ‘bound’ (maximum) limits on tariff levels. These changes made the rules governing edible oil imports more transparent and imports more responsive to market forces (Chand *et al*. 2004; Reddy, 2009; Thomas *et al*. 2012). After placing edible oil imports under the OGL system in 1994, permission had been given to private traders to import any quantity of vegetable oils, subject only to a tariff. The tariff was initially set at 65 per cent on all edible oils, but was significantly below the implied tariff when imports were under quantitative controls.

India’s tariff structure was relatively simple and increasingly liberal until 1998 with a common applied *ad valorem* tariff for all oils and that was progressively lowered to a uniform rate of 16.5 per cent by the middle of 1998. To protect the domestic oilseed producers and processors from imports and to smother the effect of international price variations on domestic market, India started making frequent tariff adjustments in 1998. The applied tariff was changed several times in a short span of time, initially from high rates (65-85 per cent) during 1994-95 to lower rates (20-30 per cent) during 1996-2000 and again high tariffs (60-80 per cent) during 2001-04. Currently, the tariffs are at a lower side (2.5-10 per cent). There were several cases of under-reporting of edible oils imports (and also crude v/s refined) to take advantage of tariff complexities by importers (EPW, 2003). To curb this phenomenon government established a tariff rate value (TRV) system for palm oil in August 2001 and for soybean oil in September 2002, and also established government reference price for tariff calculations. The reference prices are being revised periodically to reflect actual market prices may be with some delay.

With the setting up of Technology Mission on Oilseeds, production of oilseeds increased and India became self-sufficient during early 1990s. Import of edible oils was almost negligible (2 per cent of total consumption) during 1992 (World Bank 1997; Bansil, 1997; Ramasamy and Selvraj, 2002 and Reddy, 2009). This increased the oilseed production and made India self-sufficient by early 1990s. During the post-WTO period, import started increasing and the domestic production of edible oils started to decline due to fall in real prices (Chand, *et al.* 2004). During the post-ISOPOM, there was a surge in imports and currently country imports about 60 per cent of its total edible oil consumption requirement due to fast increasing consumer demand with the increase in income. The increased dependence of of India on edible oil imports exerted pressure on world prices and the real world edible oil price index had increased from 67 in 2001 to 254 in 2011 (Figure. 1).

Oilseeds production in India, particularly rapeseed and soybean, were found to be fairly competitive, while oils are on a shakey ground (World Bank, 1997 and Chand *et al.*, 2004). Expected prices and price risks are important determinants of oilseed production. The price elasticities of oilseed production were positive varing between 0.26 for Soybean in Madhya Pradesh to 0.88 for Sunflower in Maharashtra and for

Mustard in Rajasthan (Pandey *et al.*, 2005). The world prices of edible oils are more volatile than the domestic prices (Srinivasan, 2004b).

## VI

## CONCLUSIONS AND POLICY IMPLICATIONS

The oilseeds production in India has grown at a compound annual rate of 2 per cent during the period 1970-71 to 2012-13. The growth in area, production and yield of oilseeds, except linseed and safflower, increased during post-TMO period leading to decline in edible oil imports to almost negligible (2 per cent of total consumption) during 1992. During post-WTO period most of the oilseed crops witnessed negative growth in area and production, due mainly to lower real prices and edible oil import surge. During the post-ISOPOM, the production of soybean, castor and sesame increased positively, while growth of other oilseed crops continued to decline. Instability in area, production and yield of oilseed crops was found to be 8 per cent, 14 per cent and 9.5 per cent, respectively for the period 1970-71 to 2012-13. The production and yield instability had declined post-TMO and Post-ISOPOM periods for most of the oilseed crops. The expansion in yield levels have contributed nearly 60 per cent of the total increase in oilseeds production from TE 1970-71 to TE 2012-13, which was found to be lower during post-TMO period and even negative during post-WTO period and improved during post-ISOPOM period. Yield gap analysis revealed enough potention to be tapped provided consistent increase in research investment, policies upheaval and support services.

Edible oils import policies prior to 1994 were governed by quantitative restrictions and controlled by STC. Subsequently, the country placed edible oil imports under a privatised OGL system by removing import quotas. The applied tariff was changed several times in a short span of time, initially from high rates (65-85 per cent) during 1994-95 to lower rates (20-30 per cent) during 1996-2000 and again increasing tariffs (60-80 per cent) during 2001-04, and again lower rate (2.5-10 per cent) presently. Import of edible oils started increasing post-WTO and surged during the post-ISOPOM. Currently country imports about 60 per cent of its total edible oil consumption requirement due to fast increasing consumer demand coincided with the increase in income. The increased dependence of India on edible oil imports exerted pressure on world prices. To reduce the import dependence and encourage oilseeds producers the policy measures like, (1). Strategies to improve productivity like use of improved agro-techniques and improvements in input-use efficiency, protective irrigation, quality seed, effective technology dissemination, IPM, etc. needs to be promoted; and (2). To improve efficiency of oilseed production and to improve competitiveness, higher allocation of funds for oilseed research is required, planning for the long-term requirements needs to be implemented.

## REFERENCES

Acharya, S.S. (1993), "Oilseeds and Pulses: Price Policy and Production Performance", *Indian Journal of Agricultural Economics*, Vol.48, No.3, July-September, pp.317-333.

Bansil, P.C. (1997), "Oilseed Scenario: Some Issues", *Economic and Political Weekly*, Vol. 32, No.52, 27 December, pp.A191-A200.

Bastine, C.L. and K.P. Palanisami (1994), "An Analysis of Growth Trends in Principal Crops in Kerala", *Agricultural Situation in India*, Vol. 48, No.12, pp.885-891.

Chand Ramesh, P. Kumar and Sant Kumar (2011), *Total Factor Productivity and Contribution of Research Investment to Agricultural Growth in India*, Policy Paper No. 25, National Centre for Agricultural Economics and Policy Research, New Delhi.

Chand, R., D. Jha and S. Mittal (2004), "WTO and Oilseeds Sector: Challenges of Trade Liberalisation in India's Oilseed Sector and WTO", *Economic and Political Weekly*, Vol.34, No.6, pp.533-537.

Chandel, B. S. and D. Rama Rao (2003), "Investment in Oilseeds Research in India", *Economic and Political Weekly*, Vol.38, No.43, 25 October, pp.4618-4622.

Cuddy, J. and P.A. Della Valle (1978), "Measuring the Instability of Time Series Data", *Oxford Bulletin of Economics and Statistics*, Vol. 40, No.1, pp.79–84.

Dohlman, E., S. Persaud and R. Landes (2003), *India's Edible Oil Sector: Imports Fill Rising Demand*, OCS-0903-01, Electronic Outlook Report from the Economic Research Service, USDA.

Economic and Political Weekly (2003), "Edible Oils: Beyond Imports", Editorial in Economic and Political Weekly, Vol. 38, No.51-52, 27 December, pp.5308.

Ghosh, N. (2009), *Effects of Tariff Liberalization on Oilseed and Edible Oil Sector in India: Who Wins and Who Loses?*, Working Paper No. 2. Takshashila Academia of Economic Research, Mumbai.

Government of India (1981), Evaluation Report on Oilseeds Development Programme, PEO Study No. 116, Planning Commission, New Delhi.

Government of India (2014a), *Economic Survey 2013-14*, Ministry of Finance, New Delhi.

Government of India (2014b), Status Paper on Oilseed Crops, Directorate of Oilseeds Development, Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi.

Gulati, A., A. Sharma and D.S. Kohli (1996), "Self-Sufficiency and Allocative Efficiency: Case of Edible Oils", *Economic and Political Weekly*, Vol.31, No.13, 30 March, pp.A14-A24.

Jha G.K., R.R. Burman, S.K. Dubey and Gajab Singh (2011), "Yield Gap Analysis of Major Oilseeds in India", *Journal of Community Mobilization and Sustainable Development*, Vol.6, No.2, pp.209-216.

Jha, Girish Kumar, Suresh Pal, V.C. Mathur, Geetha Bisaria, P. Anbukkani, R.R. Burman and S.K. Dubey (2012), *Project Report on Oilseeds and Edible Oils Scenario in India*, Division of Agricultural Economics, Indian Agricultural Research Institute, New Delhi.

Kiresur, V.R., S.V.R. Rao and D.M. Hedge (2001), "Improved Technologies in Oilseeds Production– An Assessment of their Economic Potentials in India", *Agricultural Economic Research Revie*w, Vol. 14, No.2, pp.95-108.

Kiresur, V.R., S.V. Ramanna Rao and D.M. Hedge (2001), "Improved Technologies in Oilseeds Production-An Assessment of their Economic Potentials in India", *Agricultural Economic Research Review*, Vol. 14, No.2, pp.95-108.

Narula, S. and S. Vidyasagar (1973), "Methodology of Working out Contribution of Area and Yield in Increasing Production", *Agricultural Situation in India*, Vol. 27, No.3, pp.473-477.

Ninan, K.N. (1995), "Oilseeds Development and Policy: A Review", *Economic and Political Weekly*, Vol.30, No.12, 25 March, pp.A14-A20.

Pandey L.M., Sant Kumar and Mruthyunjaya (2005), "Instability, Supply Response and Insurance in Oilseeds Production in India", *Agricultural Economics Research Review*, Vol.18 (Conf.), pp.103-114.

Persaud, S. and M.R. Landes, (2006), *The Role of Policy and Industry Structure in India's Oilseed Markets*, Economic Research Report Number 17, Electronic Outlook Report from the Economic Research Service, USDA.

Ramasamy, C. and K.N. Selvaraj (2002), "Pulses Oilseeds and Coarse Cereals: Why They Are Slow Growth Crops?", *Indian Journal of Agricultural Economics*, Vol.57, No.3, July-September, pp.289-315.

Reddy, Amarender A. (2009), "Policy Options for India's Edible Oil Complex", *Economic and Political Weekly*, Vol. 44, No.41, 10-23 October, pp.22-24.

Shenoi, P.V. (1989), *Oilseeds Situation in India*. Department of Agricultural Research and Education, Ministry of Agriculture, Government of India, New Delhi.

Singh, G.V. and S.R. Asokan (2000), Competitiveness of Indian Oilseeds Under WTO, *Artha Vijnana*, Vol. 42, No.3, pp.240-249.

Singh, J.P. and D.V.S. Sisodia (1989), "Trends and Growth Analysis of Oilseed Production in Uttar Pradesh", *Agricultural Situation in India*, Vol. 44, No.7, pp.571-573.

Srinivasan, P.V. (2004a), *Managing Price Volatility in an Open Economy Environment: The Case of Edible Oils and Oilseeds in India*. International Food Policy Research Institute, MTID Discussion Paper No.69.

Srinivasan, P.V. (2004b), *Impact of Trade Liberalization on India's Oilseed and Edible Oils Sector*, Report prepared for IGIDR-ERS/USDA Project: Indian Agricultural Markets and Policy. Indira Gandhi Institute of Development Research (IGIDR), Mumbai.

Thomas, L., G.K. Jha and S. Pal (2013), "External Market Linkages and Instability in Indian Edible Oil Economy: Implications for Self-Sufficiency Policy in Edible Oils", *Agricultural Economics Research Review*, Vol.26, No.2, pp.185-198.

Venkattakumar, R.; S.V. Ramana Rao, M. Padmaiah and D.M. Hegde (2009), "Productivity Potentials and Profitability of Non-Monetary, Low-Cost and cost-Effective Oilseeds Production Technologies", *J. Oilseeds Res.*, Vol.26, No.2, pp.140-147

World Bank (1997), *The Indian Oilseed Complex: Capturing Market Opportunities,* Vols. I and II, Report No. 15677, World Bank, Washington D.C., U.S.A.