STRATEGY PAPER 7

Vegetable Oil Economy and Production Problems in India

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI
December 2017

Vegetable Oil Economy and Production Problems in India

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI

December 2017

CONVENER	:	Dr C.D. Mayee, Vice-President, NAAS and former Chairman, ASRB
CO-CONVENERS	:	Mr Bhagirath Choudhary, Director, SABC, New Delhi Dr K.S. Varaprasad, Former Director, ICAR, Hyderabad
EDITORS	:	Dr K.K. Vass Dr V.K. Bhatia
CITATION	:	NAAS 2017. Vegetable Oil Economy and Production Problems in India. Strategy Paper No. 7, National Academy of Agricultural Sciences, New Delhi: 20p.

Published by Dr Anil K. Bawa, Executive Director on behalf of
NATIONAL ACADEMY OF AGRICULTURAL SCIENCES
NASC, Dev Prakash Shastry Marg, New Delhi - 110 012
Tel: (011) 25846051-52; Fax: (011) 25846054
Email: naas@vsnl.com; Web site: http://www.naasindia.org

Vegetable Oil Economy and Production Problems in India

1. BACKGROUND

1.1 Indian Oil Economy

Plant based oils are indispensable in the human food as also in several industrial uses. The oilseeds sector constitutes an important determinant of agricultural economy in the country. The demand for edible oils being highly income and price-elastic, the increase in population coupled with rise in income levels have led to demand growth at a faster rate than the growth in production of edible oils in India. The demand-supply gap in the edible oils necessitated for huge imports accounting to 70 per cent of the country's requirement costing the exchequer nearly Rs.75,000 crores with estimated import of 14.8 million tons (mt) in 2015-16 (Table 1). Overall the agriculture imports have increased six times faster than exports in the past 20 years. Large imports in FY 2017 are of edible oil (US$10.9 billion), pulses (US$ 4.2 billion) and fruits like apple, kiwi, almonds and cashew (US$3 billion).These three groups account for 73% of the total imports and amongst them 60% is edible oil only. Though the domestic production of the nine annual oilseed crops including

Table 1: Domestic Production, Per Capita Consumption and Import of Edible Oils

Year	Domestic availability (mt)	Per capita consumption (kg/annum)	Import of edible oil (mt)	Value of Import (Rs. in Crore)
2004-05	7.25	10.2	4.75	11077
2005-06	8.32	10.6	4.29	8961
2006-07	7.37	11.1	4.27	9540
2007-08	8.65	11.4	4.90	10301
2008-09	8.46	12.7	6.72	15837
2009-10	7.95	13.3	8.03	26483
2010-11	9.78	13.6	6.91	29860
2011-12	8.96	13.8	8.45	46255
2012-13	9.22	15.8	11.01	61106
2013-14	10.19	16.8	10.43	56489
2014-15	9.20	18.3	13.85	-
2015-16	8.63	-	14.8	-

Source: Agricultural Statistics at Glance 2016-17 soybean, castor, rapeseed mustard, sesame, groundnut, sunflower, niger, linseeds & safflower enhanced at compound annual growth rate (CAGR) of 3.89%, it could not match the ever increasing per capita demand (~6%) resulting from a per capita consumption of about 18 kg of edible oil. India produces 30.3 mt of oilseeds annually from an acreage of 26.88 million hectares (mha) of which 64% are rainfed.

The current vegetable oil requirement is around 21-22 mt and it is estimated that by 2050 the requirement shall rise to more than 39 mt including the annual estimated requirement of 10.65 mt for non-industrial use (Table 2). Consumption growth is pegged at 5% and it is estimated that with current levels of production scenario the country would need to import more than 22 mt while the domestic availability would be only 9 mt by 2030 . Therefore, the annual oilseeds production from the nine annual oilseed crops has to be produced in the tune of more than 75 mt. For meeting the current requirement of 21-22 mt of vegetable oil, the country imports 14.8 mt of edible oil (Table 1). When we analyzed the historical trends in oil imports it is seen that the country opened up oil imports under open general license (OGL) when the total consumption was just 10.5 mt in late nineties. Of this the imported component was only 4.5 mt. But with rising income levels and changing food habits coupled with competitively priced palm oil, demand for edible oils skyrocketed taking the import component to nearly 70% of the total requirement. The mismatch between demand and supply has grown much faster over last 20 years.

Table 2: Projected Vegetable Oil Requirements in Next Few Decades

	2020	**2030**	**2040**	**2050**
Projected population (Billion)	1.32	1.43	1.55	1.68
Per capita consumption (Kg/year)	15.33	15.88	16.43	16.97
Vegetable oil requirement for direct consumption (mt)	20.24	22.71	25.47	28.51
Vegetable oil for industrial use (mt)	3.57	6.34	8.88	10.65
Total Vegetable oil requirement (mt)	23.81	29.05	34.35	39.16

Source: Adapted from ICAR-IIOR Vision 2050

Productivity of our major edible oil crops including mustard and soybean remained one third of global average. Other edible oil crops fetch much lower produce per hectare than other part of the world (Table 3). India also remained isolated from the technological revolution in edible oil crops except cotton where approval of insect resistant cotton hybrids played a considerable role in increasing supply of cotton oil from 0.5 mt in 2002 to 1.5 mt in 2015. Unfortunately, India bypassed technological revolution led by genetic modification that was adopted widely by edible oil producing countries including Argentina, Australia, Brazil, Canada and USA. Ironically, India is still debating the cultivation of GM crops like soybean and mustard that have been in global market for more than two decades now. The GM mustard developed by Delhi University scientists is held up for socio-political consensus while the country is importing GM soya oil to the tune of 4.5 mt, 0.3-0.5 mt of GM canola and consuming domestically produced GM cotton seed oil to the tune of 1.5 mt constituting a total GM oil component of nearly 5-6 mt out of 21 mt annual edible oils consumption. In fact, there are some countries, who are planning their oilseed crop cultivation only to meet India's requirement. The import composition is dominated by palm oil followed by soya oil, canola and sunflower oil. Palm oil import reached almost 80% of the total oil import but now is reduced to 60% in recent years. It is also interesting that India imposes the differential import duty structure on the crude and refined palm oil (CPO and RBD respectively). In 2016, out of 8.3 mt of palm oil import the share of CPO was 5.7 mt while the RBD palm oil was 2.6 mt. The import of other edible oils vary, depending upon the prevailing prices internationally. Although the overall import of vegetable oils during the oil year 2016-17 is lesser to some extent owing to good monsoon for Kharif oilseeds crop, the issues of climate change looming large on the agricultural production will certainly upset the production potential at any time in future and self sufficiency in vegetable oil appears to be a dream unless some effective steps are taken on production and policy fronts.

Table 3. Comparison of average yield of different edible oils in India with other edible oil producing countries (Tons/ha)

Average Yield (Tons/ha)				
Crop	**India**	**World**	**Highest**	**Country**
Soybean	1.10	2.5	2.9	Brazil
Groundnut	1.24	2.2	4.5	USA
Mustard	1.25	2.0	3.9	Germany
Sesame	0.55	1.5	2.2	
Safflower	0.58	1.6	2.1	
Sunflower	0.70	2.5	3.5	

Source: Agricultural Statistics at Glance 2015-16

1.2 Production and productivity of oilseed crops

The performance of oilseeds sector has never been as good as cereal crops in India like wheat and rice. Somehow there was never a breakthrough in the productivity of oilseeds crop neither through the genetic enhancement nor from other production technologies. There is no significant increase in area, production and productivity of oilseed crops in the last 15 years (Table 4). A large number of oilseeds crop that are grown in India, some are conventional but a few have been non conventional. Majority are the annual crops but some oil sources are also from perennial crops (Table 4a). However, major contributors to annual oilseeds production comes from three annual crops; soybean, groundnut and rapeseed-mustard. Global average productivity of soybean, groundnut and mustard are 2.5, 2.2 and 2.0 tons/ha respectively (Table 3). Highest productivity of soybean (2.9 tons/ha), groundnut (4.5 tons/ha) and mustard (3.9 tons/ha) are reported from Brazil, USA and Germany, respectively. The average productivity of all these major crops range from 1160 Kg/ha to 1420 Kg/ha, much below the world average and incomparable with the highest productivity recorded in some countries (Table 3). Highest productivity for sesame (2.2 tons/ha) is reported from China while average productivity of sesame in India is 550 Kg/ha. Current levels of productivity of soybean (1000 Kg/ha), groundnut (1240 Kg/ha), rapeseed mustard (1250 Kg/ha), sesame (550 Kg/ha) and safflower (580 Kg/ha) can be enhanced to 1600, 2000, 1820, 750 and 950 Kg/ha, respectively with appropriate technology transfer, policy and price support.

Table 4: Area, Production and Yield of Oilseed Crops for the period 2001-2016

Years	Area (mha)	Production (mt)	Productivity (Kg/ha)
2001-02	22.64	20.66	913
2002-03	21.49	14.84	691
2003-04	23.66	25.19	1064
2004-05	27.52	24.35	885
2005-06	27.86	27.98	1004
2006-07	26.51	24.29	916
2007-08	26.69	29.76	1115
2008-09	27.56	27.72	1006
2009-10	26.96	24.88	958
2010-11	27.22	32.48	1193
2011-12	26.31	29.80	1133
2012-13	26.48	30.94	1168
2013-14	28.05	32.75	1168
2014-15	25.59	27.51	1075
2015-16	26.13	25.30	968

Source: Agricultural Statistics at Glance 2015-16

1.3 Other Sources of Vegetable Oils

Contribution to edible oil pool from secondary sources is around 3.9 mt (Table 5) and it has a potential to grow. Amongst the secondary sources of edible oils, palm oil has scope to further enhance the availability. Oil palm has got a very high genetic yield potential of up to 18 tons of crude palm oil per hectare per year. Oil palm starts yielding from third year onwards and produces two types of oils viz., crude palm oil and palm kernel oil. Oil palm is cultivated on 2,68,659 hectare in India after its introduction in late seventies. Major states contributing to area are Andhra Pradesh, Karnataka, Tamil Nadu, Mizoram and Telangana. With production of 20 tons of Fresh Fruit Bunch (FFB) per year per hectare normally obtained in India is definitely uneconomical and hence mono-cropping of oil palm is not much profitable unless it is combined with intercropping and also dairy component. Among the secondary sources for oil, cotton and rice bran oil contribute significantly to edible oil with almost negligible R&D input.

Table 4a: Commonly Used Edible Oils in India

Conventional	Non-Conventional	Conventional (Relatively New)
Soybean Groundnut Rapeseed-Mustard Castor Sesame Sunflower Linseed Safflower Niger Coconut (Plantation)	Rice Bran Cotton Seeds Olive (Plantation)	Oil Palm (Plantation) Tree & Forest Origin (For Tribals and Special)

Maize also can contribute to edible oil, currently the crop is more focused for food security as against oil source. Linseed, though cultivated as oilseed crop in a limited area (less than one lakh hectares), it is more viewed as a health crop and is an excellent vegetarian source

Table 5: Contribution to Edible Oil Pool from Secondary Sources (mt)

CROP	2014-15	2015-16
Coconut	0.48	0.43
Cotton seed	0.13	0.10
Rice bran	0.92	0.99
Solvent extracted oil	0.30	0.35
Tree & forest origin	0.16	0.15
Total	**3.08**	**3.90**

Source: Agricultural Statistics at Glance 2015-16 of Omega-3 fatty acids. Linseed oil is mostly used in paint industry and crop is also grown for its fiber-the linen. However, the quality of Indian linseed fiber is not suitable for textile industry and linen is imported by the textile industry. Recently four varieties have been identified with fiber quality equivalent to imported fiber. Niger is a tribal crop mostly grown at high altitude regions and has tremendous export potential as bird feed. Among the non-edible oilseed crops, castor both in Kharif and Rabi is selectively promoted as cash crop bringing profitability to farmers. However it is restricted as commercial crop in Gujarat and erstwhile Andhra Pradesh.

Tree Borne Oilseeds (TBOs) are cultivated in the country under different agro-climatic conditions in a scattered form in forest and non-forest areas as well as in waste land, deserts and hilly areas. Over 125 species of tree borne oilseed crops are known in India. India has enormous potential of oilseeds of tree origin like Mahua, Neem, Simarouba, Karanja, Ratanjyot, Jojoba, Cheura, Kokum, wild Apricot, wild Walnut, Kusum and Tung etc., which can be grown and established in the wasteland and varied agro-climatic conditions. These have domestic and industrial utility in agriculture, cosmetic, pharmaceutical, diesel substitute, cocoa-butter substitute etc., but they are not being utilised fully due to lack of awareness of their uses, collection, proper processing facilities and organized marketing sector.

2. PRODUCTION WOES OF OILSEEDS CULTIVATION

Majority of oilseeds are cultivated under rain-fed ecosystem (~64%) predominantly under low and uncertain rainfall situations and input starved conditions coupled with poor crop management. The decelerating area under oilseeds in general is due to their relative lower profitability against the competing crops of maize, cotton, chickpea etc., at the prevailing crop growing and marketing situations. The small and marginal land holding of farmers growing oilseed crops have some critical issues like low seed replacement rate (SRR), low-to-no mechanization, inadequate nutrient supply, biotic–abiotic stresses and lack of adoption of new cultivars. The National Mission on Oilseeds and Oil Palm approved in principle by the then Planning Commission in 2012 and operation initiated in 2014 by the Government of India to enhance the oilseeds production and productivity. However the outcome of the project to improve the productivity is yet to emerge and remain questionable. Under the increasing demands on agricultural land from various crops and enterprises, the production of oilseeds will increase only when productivity and profitability is improved. Some of the interventions contemplated include use of micro-irrigation to improve water use efficiency, integrated nutrient and pest management, development of special quality e.g. high olic groundnuts, confectionary sunflower seed, double purpose linseed, zero erucic and double zero mustard and so on. The challenges are many for reaching self-sufficiency or reducing dependency on import to save foreign exchange and to make oilseeds cultivation profitable to farmers. Serious efforts are needed on the part of Government of India to reverse the situation of imports in vegetable oils. In 2014, the Technology Mission was converted in to National Mission on Oilseeds and Palm Oil (NMOOP), under this program the central Government supports the States for increasing the productivity through demonstrations, pilot projects and FLD's. Simultaneously there are flexible import duty structures to encourage the farmers; in 2017 the Government increased the duty by 50-100% on both crude and refined oils of all types. Enhancing the yield and quality through innovative research and technology outreach under favorable policy environment could achieve the targets. Some critical areas that need special attention by researchers, development agencies, farmers, processors and the policy makers are enumerated and prioritized in the document to enhance the current level of domestic vegetable oil production to meet the twin challenge of reducing dependence on imported oil and meeting the demand of edible oil from within the sources of the country.

3. STRATEGIES OF IMPROVING PRODUCTIVITY AND PROFITABILITY

3.1 Technology application and adoption

Development of new hybrids and varieties using double haploid approach, marker-assisted breeding/selection and other biotechnological approaches to solve viability (sunflower and soybean) and seed production issues should receive top priority amongst the researchers. Encourage network research involving private and public institutes nationally and globally towards development of products with identified market partners and also consolidate research funding from various sources (ICAR, DBT, DST and from international sources). Focusing on product development for water and nutrient use efficiency, mitigating monsoon withdrawal and terminal drought and other related climate variability issues, eco-friendly biotic stress management, value chain improvement and developing health tagged varieties, developing specific nutrition and micro-irrigation schedules based on soil health, fertility and physical properties (soil test based, site specific nutrient management and length of growing period) and developing new cropping systems for profit (apiculture in mustard, sunflower and niger, thalamus from sunflower, petals from safflower and eri silk from castor) based on market access. Focus on soybean and mustard for research and development is likely to pay more dividends for edible oil than groundnut. Undisputedly, sesame is the next crop on which we need to invest time and money for rich dividends. There are several approaches of transgenic and molecular breeding being adopted internationally. Noticeably, GM soybean and GM canola account for nearly 104 mt or 94% of 110 mt of global trade in soybean and canola, 15 mt or 22% of 70 mt of global edible oil trade and 64 mt or 80% of 80 mt of global animal feed trade. Transgenic technologies have been a major success in oilseed crops. The successful example of Bt cotton is before us as it has indirectly contributed to 10% growth in oil availability in India. The timely approval of GM mustard hybrid and deregulation of barnase–barstar technology will be a milestone decision to strengthen Indian brassica research and accelerate the process of deploying genetic gains. The impact of commercial release will have resounding effect on the entire GM research in country as due to its delay, scientists are demoralized and discouraged to research on new technologies, which are developed by many public sector research labs in India. From drought tolerance to biotic stress and fatty acid composition, research on transgenic oilseed crops is in advance stages. The scientists are awaiting green signal from the planners for commercializing the technologies.

In fact there are several proven production technologies, which have potential for up-scaling. For example soil and water conservation practices and rain water harvesting, vertical mulching in vertisols, zero tillage practices for mustard, sunflower and linseed in paddy fallows, use of broad bed furrows (BBF), quality seed production and expansion of drip irrigation are a few but very successful technologies that can enhance the yield of oil crops from 10 to 40%. It has been shown that micro-irrigation in oilseed crops alone enhanced the productivity in all the oilseed crops from 16 to 45%. In case of nutrition, it has been observed that only 35% of the nutrients needs are met in current practices. Continuous mining of nutrients from soils also makes the crops vulnerable to micronutrient deficiencies. Nearly 75% soils are deficient in Sulphur, which can be met by replacing DAP with SSP. Yet another issue that is not fully resolved in cultivation of these crops is SRR because the seed chain is often missing in crops like groundnut, safflower, linseed, sesame and soybean.

3.2 Cultivable area expansion

Oilseed crops are stagnant over the years in respect of area in spite of several opportunities to expand cultivable area. These crops can be grown as intercrops in some states (Table 6_A), in nontraditional areas (Table 6_B), and also in rice fallows (Table 6_C). Nearly 12 mha area is available under rice fallows, leaving some for pulses; some area would certainly be available for oil bearing crops.

The green revolution effect has resulted in intensive cultivation of rice-wheat (R-W) rotation in the entire North Indian irrigated belt particularly Punjab, Haryana and Utter Pradesh. This system being an assured in respect of output and income, many other states like MP, Chhattisgarh, and even canal irrigated areas of Rajasthan are following rice–wheat rotation. However, it has come to notice that the R-W system is deteriorating the soil, environment and water availability. Oilseeds and pulses are considered as excellent sources of crop diversification. In Kharif, rice can be replaced with soybean in most of the areas. Similarly in Rabi, cultivation of largely mustard and to some extent linseed can be cultivated as

Table 6: Proposed Areas for Oilseeds Expansion

A. Intercropping systems

Crop	Specific area	Potential area (mha)
Soybean	Maharashtra, Telangana & Karnataka	0.70
Groundnut	AP, TN, Karnataka, UP (Bundel.), Gujarat, Maharashtra, MP, Rajasthan, Bihar, Punjab, NEH, Kerala	2.80
Rapeseed-Mustard	UP, Bihar, Rajasthan, MP	0.95
Castor	Telangana, TN	0.50
Sesame	AP, TN, Karnataka	0.80
Sunflower	Karnataka & Maharashtra	0.50
Safflower	AP, Maharashtra, Karnataka, MP, CG	0.50
Linseed	UP, MP, Gujarat, Rajasthan, Maharashtra	0.80
Total		**7.5**

B. Non-traditional areas

Crop	Non Traditional Areas	Potential area (mha)
Soybean	Maharashtra, Rajasthan, Telangana, Jharkhand, Gujarat, NEH	2.00
Groundnut	UP (C&W), Gujarat, WB, Assam	0.51
Rapeseed-Mustard	Karnataka, Rajasthan (S), Ratlam (MP) & Vidarbha (Maharashtra)	0.30
Sunflower	West Bengal, Bihar and Odisha	0.30
Sesame	NEH	0.50
Safflower (salinity)	Gujarat, MP and CG	0.10
Castor	TN, Haryana, Karnataka & Odisha	0.50
Linseed	NEH	0.03
Niger	AP, Karnataka & TN	0.05
Total		**4.39**

C. Rice Fallows

Crop	Area of rice fallows	Potential area (mha)
Soybean	Punjab	2.00
Groundnut	TN, AP, Odisha, WB, Goa	0.50
Rapeseed-Mustard	UP, Bihar, WB, NEH, Jharkhand, Odisha, CG	1.20
Sunflower	AP, Karnataka, Odisha and WB	0.50
Sesame	WB, Odisha, Gujarat, TN, AP	1.00
Linseed for Utera situation	CG, WB, Odisha, Bihar, Assam	1.00
Total		**6.20**

substitute to wheat. Such diversification has distinct advantages for halting the ill effects of R-W system and also meets the demand of vegetable oil of the country. Experimentally it has been proved that there is a possibility of Rabi castor cultivation in Tamil Nadu and Karnataka as it requires very limited water.

There are 33 cotton growing districts where the productivity is just half of the national average i.e less than 300 Kg lint per ha. These districts are basically rainfed and cover nearly 45% of the total cotton area. Some of these districts can be identified for cultivation of sesame, soybean and sunflower.

3.3 Effective technology transfer

In spite of several efforts to bring harmony and coordination among the public institutes such as central research institutes, state agricultural universities (SAUs) and state departments, ground realities are not matching with expectations. Major funds released to the state departments for development activities do not have appropriate linkage for technology transfer with the universities and local research institutes. Among the improved variety/hybrid options to farmers from private and public bred products based on local tests are not largely available from the universities or central research institutes. Access to newly released public bred products is major issue, though licensing process initiated recently did not make much headway in oilseeds group. Community managed seed systems needs a fresh look. Productivity improvement in oilseed crops can be achieved by some known technologies such as improving seed replacement ratio, large scale adoption of new varieties, dead furrow contour cultivation, paired row planting and reduced or zero tillage, herbicide based integrated weed management (IWM) for effective weed management in all soil types, adoption of integrated pest management (IPM) modules with bio-intensive approaches, providing micro-irrigation infrastructure at critical stages can be useful in increasing the productivity of all the oilseed crops (Table 7). A long term study reported a existing yield gaps, ranging from 24 to 41% between farmers practices and improved technology, and 6 to 70% between improved technology over the average yields of these crops. Several small interventions such as seed pelleting for lowering seed rate, cluster based oil extraction and marketing in non-traditional areas, enabling small farm mechanization and custom hire services, leveraging ICTs for dissemination of knowledge/technology transfer largely through mobile and short video films in public access, development of model farms and contract farming, educating farmers with proper input and technology supply, yield can be doubled in about a million hectare under cultivation. Sesame and safflower are potential profitable crops with technology readily available and has potential to replace several unprofitable Rabi crops facing moisture stress.

Table 7: Outreach of Technologies- Realizable Productivity and yield gaps (2010-15)

Crop	Improved technology yield (Kg/ha) (IT)	National Average yield (Kg/ha) (NAY)	Increase in yield due to IT over NAY (%)
Groundnut	2264	1439	57
Soybean	1603	1182	36
Rapeseed mustard	1692	1181	43
Sunflower	1742	700	149
Sesame	536	447	20
Safflower	1061	567	87.1
Niger	406	313	29.7
Castor	2032	1647	23.4
Linseed	1090	484	125.2
Average	1541	1019	51.3

Source: Reddy, A.V., 2017. Production Problems and Way Forward for Enhancing Productivity: Sunflower, Sesame, Niger, Safflower and Linseed, Presentation at Strategy workshop, NASS

4. PROTOCOLS FOR QUICK DISSEMINATION

Following interventions and cropping systems protocols can contribute to increasing oilseeds production in all major edible oil crops in India;

- Use of ridges-furrows or BBF in all rainfed cultivated area with sowing on the onset of monsoon
- Use of bio-fertilizers such as Rhizobium, Azotobacter, Azospirillum, PSB, SSB & Mycorrhiza etc., which at lower cost supplement Nitrogen up to 40 Kg N per ha and up to 25 kg P per ha.
- To achieve the optimum plant population per ha, it is essential to use seed priming, hardening techniques and also as per the requirement either thinning or gap filling has to be done.
- Use Neem, Sulphur or Coal tar coated urea for enhancing the nitrogen (N) use efficiency
- Under extremes of natural resources & investment limitations, it is natural to follow integrated farming system model on small holdings to have assured income from oilseed crop based cropping
- Weed management is a critical issue especially in the initial growth stages and need to be adopted either mechanically or using the herbicides

- Weather forecasting and forewarning system to be used for determining the operations and also the pest and diseases early detection is must to reduce the heavy losses
- Boron application has been recommended for sunflower which has shown to increase the yield by 15-25% across several locations and hence it should be a compulsory package of practice in the schedule of cultivation of sunflower.

5. POLICY INSTRUMENTS FOR IMPROVING EDIBLE OIL ECONOMY

Efforts are needed to implement the Minimum Support Price (MSP) along with bonus for enhancing the net income of the oilseed farmers. In spite of a regular enhancement in MSP of oilseed crops, lack of a defined procurement policy does not encourage the farmers to take up the cultivation of these crops. Like rice and wheat procurement system operated in North Indian States, an assured purchase of the produce would stimulate oilseeds producers to expand area and adopt improved technologies for better yields. Attempts for price realization based on the oil content can enhance the net income of the oilseed farmers. However, the efforts of linking price with oil content largely proved disadvantage to farmers (particularly in mustard) for various reasons of setting unrealistic standards and implementation of oil content estimation in the markets. Edible oils, except coconut and palm oil, were kept under Open General License (OGL) and import duty was substantially reduced. The heavy imports of edible oils had a cascading effect on edible oil economy. Import duty was 12.5% on crude oils, 20% on refined oils and 30% on raw material (sunflower and rapeseed) for crushing. The industry association (SEA) demand is to raise the import duty on refined oils to safeguard the interest of farmers and higher capacity utilization of refiners, which currently operate at 40 to 50% of the capacity only. In order to overcome the shortage of raw material for crushing and feed, the industry had suggested to encourage import of oilseeds by lowering duty to 5% from 30% at present and reduce the duty on oilcake, rice bran and oil bearing materials from 15% to nil to make their import commercially viable to encourage value addition and employment within the country. However these policies in long run have discouraged to grow these crops as they did not find their cultivation remunerative. The fluctuating and counter directional policies with respect to imports and domestic prices have left the stakeholders unsure of any long term planning by both the producers and processors. The Government of India has recently made some welcome corrections in the import policies of vegetable oils such as enhancing the import duty on crude as well as refined edible oils by 40-100%. This will be encouraging to growers to take up cultivation of edible oil crops as they would be much competitive to cereals in dryland areas. Every option of risk mitigation like easy availability of inputs and credit, MSP and assured procurement, crop insurance, policies linking farmers to markets, buffer stock options and their commodity price stabilization schemes and free technical guidance need to be put in place for oilseeds sector on priority if the country has to reduce its foreign reserves on the import of edible oils.

Accelerated progress and focus on enhancing the profitability, stability, and sustainability of the major oilseed crops based farming systems rather than productivity focus alone of each crop is likely to yield long term benefits. Policies always favored the oil consumer by checking price rise but they have not been kind to the oilseed producer, the farmer.

6. RECOMMENDATIONS

Recognizing that oil economy of the country is dependent on import of vegetable oil, it is essential to make special efforts to boost productivity and production of domestic oilseed crops for enhancing local availability of the edible oil. The participants of the strategic workshop on “Vegetable Oil Economy and Production Problems in India” deliberated on several issues pertaining to, the means of enhancing production, availability though research, extension and key policy instruments for MSP, import structure and developing effecting value chain linkages. Major recommendations are summarized below:

- Regulate the import of edible oil through appropriate inventions in policy as has been done for the current oil year. The vegetable oil should be viewed beyond the export & import balance with the goal of achieving self-sufficiency to a greater extent. The domestic availability should be viewed in the context of improved livelihood, farmers’ profitability and for processing industry of the country.
- The mechanism of minimum support price (MSP) though available is not in operation in major oilseed producing states. Therefore ensuring the market intervention for effective implementation of MSP through procurement of oilseeds in case of fall in open market prices is needed.
- The potential of public-private partnership (PPP) through linkages in all aspects of production, processing, marketing needs to be harnessed. PPP model can be useful in several aspects of oil economy such as seed production, forward-backward linkages for processing, value addition, contract research in niche areas, contract farming and joint ventures for higher order derivatives and specialty products and so on. Therefore it is essential to create an enabling environment for private participation in such areas.
- The export of oil meals for animal feed and castor oil has to some extent plugged the import bill of vegetable oil. However the policy of exporting oil meal may not be desirable in long run as the domestic animal industry is deprived of high value feed to increase the milk and meat production. There are also arguments that instead of importing crude or refined oil, why not import oilseeds so that the local crushing industry also prospers and at the same time oil cake as animal feed is also made available. However policies that balance all these factors could be formulated through PPP mode.

- Greater emphasis on innovations and application of new techniques of genetics and biotechnology need to be harnessed to achieve quantum jump in productivity. Use of transgenic in soybean, cotton rapeseed-mustard and maize has been globally accepted and currently 83% soybean, 75% cotton, 29% maize and 24% canola grown in the world are transgenics. India need to take a bold and defined stand based on science to allow the technology use in edible oil crops. Indian scientists have already succeeded in developing GM mustard, which has been thoroughly assessed and approved by the regulatory committee and waiting for the political green signal. Similarly, GM groundnut resistant to biotic and abiotic stresses, sunflower resistant to viruses, safflower and castor transgenics are being developed in the Indian public sector institutions. They need to see the light of the day and waiting for the first GM oilseed crop, mustard to get clearance so that others can follow.
- Research priorities should focus also on developing short duration genotypes for better adoption to climate change and in rainfed situations through integration of modern tools of biotechnology such as marker assisted selection and transgenic breeding supplementary to conventional breeding.
- Institutional convergence would be a key to effective transfer of technology in oilseed sector. For this strengthening the linkages between the research and extension is required where the linkage of NARS-KVK needs to created for validation, upscaling and transfer of research outputs with accountability.
- Model Oilseeds Technology Farms developed through mission funding at State levels and managed by ICAR and KVK's would be torch bearer for technology, showcasing as has been successfully done during green revolution period for transfer of technologies of rice and wheat.
- Develop contingency seed banks at selected districts either through seed village concept or in PPP mode. Seed production in private sector is already being done in soybean, hybrids of sunflower, mustard and castor. There is need to encourage private participation in groundnut and other minor oilseed crops.
- Promote oilseed cultivation in nontraditional areas, rice fallows and in off seasons. They could be best substitutes for diversification in rice-wheat belt. Eastern regions offer good scope for expansion of area. The entire dryland cultivation offers an opportunity for intercropping with cereals, cotton and pulses.
- Large scale production of small machinery though Government support is necessary to improve adoption of farm machinery in oilseeds cultivation. There are now excellent examples of group farming in many States where the system of common machinery hiring is adopted because of shortage of labour. These are giving good results. Government should catalyze such processes to promote farming especially with small farm holders.

- Oilseed crops also offer opportunities for additional income through various products like table purpose groundnuts, sunflowers & safflower petals, linseed fibre and omega-3 substitutes which can be exploited so that back ward linkage in production can occur.
- Oil palm cultivation should be extended in some areas where it can give higher yield. Simultaneously processing facilities should be promoted so that this could be a good source of oil for the total vegetable oil pool.
- Promote scientific processing of cotton seed for higher recovery and to get high protein retention (42%) compared to traditional processing (22%). Cotton seed contains nearly 21-24% edible oil but the current cultivars have only 17-18%. There are genotypes where oil is the primary product and fibre is secondary with no gossypol. To meet the oil demand such cotton cultivars offer a good source. Also it is recommended that processors should improve the efficiency of extraction of oil through solvent extraction for hard seeds and expeller extraction for soft seeds.
- Currently, there is no linkage between the oil expeller industry and producers. A model of sugarcane available can be followed for oilseeds too. The oil industry should go in to contract with farmers for assured supply of raw material at predetermined prices which will encourage farmers to take up cultivation on modern footing. The industry should also be involved in supporting the technology generation and dissemination.

7. CONCLUSION

Edible oil Industry is one of the most important industries of agriculture sector in India. The country plays an important role in the global edible oil market, accounting for 10-12% share of consumption, 6-8 % share of edible oil production and 12-14% share of world's edible oil imports for the oil year 2015. India is fourth largest oil seed producing country in the world after USA, China and Brazil. Of the nine, soybean, groundnut and mustard are the main oilseed crops grown in the country. The growth of edible oil consumption and increasing population coupled with limited availability of oilseeds and fluctuating yields resulted in continuous demand-supply gap, which is being met by imports. Further, the imports of vegetable oils are subject to change in custom duty rates between crude oil and refined oil which do affect the domestic producers and refiners. Apart from the custom duty structure the edible oil industry is also susceptible to the policies of exporting countries.

The oilseed production is constrained by several factors like grown on depleting soils, deprived of nutrition, water and other inputs. Nearly 64 % of these crops are grown as rainfed and hence occasionally suffer from drought under erratic rainfall. The cultivation also suffers due to low adoption of improved cultivars and modern technologies. Unorganized marketing, price fluctuations and inoperative minimum support price (MSP) mechanism make the oilseed cultivation an unattractive proposition. Also Government policies should be so designed that they are more in favour of producers and domestic refiners than the consumers alone. Though the duty differential between crude and refined palm oil increased in recent years, edible oil sellers are finding it more convenient to import refined palm oil and sell it in the domestic market thus placing the edible oil units to operate at hair line margins or in worst case scenario wherein the units are small the operations have become unviable. The performance of the companies in edible oil sector for medium term period will depend upon the demand of crude palm oil in India post recent increase in import duties on refined oils, movements of domestic edible oil prices, and profitability margins from the specialty-fat business with comprehensive product range, including bakery shortening's, chocolate and confectionary fats, ice cream fats and a range of cooking oils.

8. REFERENCES CONSULTED

Agriculture Statistics at a Glance (2015-16) Ministry of Agriculture and Farmers' Welfare, Department of Economics and Statistics, Government of India, pp107

Annual Reports of All India Coordinated Projects on Oilseeds, Directorate of Soybeans, Groundnut, Rapeseed-Mustard and IIOR from 2014-2016

Ardhey (2017) India oilseeds and products. Annual USDA GAIN Report no IN7039 (https//gain.fas.usda.gov/Recent20gain%Publication/Oilseeds/productsAnnual_NewDelhi_3-28-2017pdf

Barwale, Raju (2016) Changing India's pulses and oilseed fortune. *Agriculture Today*, Jan 2016: 52-53.

Chaturvedi, Atul (2016) Demand projections for edible oil and feed by 2025. A blog on Agrocommodities.

FAO (2011) Oilseeds and oilseed products. OECD-FAO Agriculture Outlook 2011-2020, Food and Agriculture Organization of the United Nations, Rome, Italy, pp118

Gupta, P.S.; Choudhary, B. and Gheysen, G. (2015) Removing Bt eggplant from the face of Indian regulators, *Nature Biotechnology*, **33 (5)**: 994-995.

ISAAA (2016) Global Status of Commercialized Biotech/GM Crops, 2016. ISAAA Brief No.52 ISAAA, Ithaca, NY pp125.

Jha, G.K.; Pal, S.S.; Mathur, V.C.; Bisaria, G.; Ambukkani, P.; Burman, R.R. and Dubey, S.K. (2012) Edible oilseeds supply and demand scenario in India, Implications for policy. IARI, pp99, ISBN 978-81-88708.

Mayee, C.D. (2017) GM mustard is a step forward. Hindu Business line, May 30, 2017.

National Academy of Agricultural Sciences (2016) Policy brief to accelerate utilization of GE technology for food and nutrition security and improving farmer's income. Policy Brief 1. Pub. NAAS, pp12.

Patel, G.G. (2017) India's oilseed crop scenario 2017-18 & Demand–supply of edible oils. Annual General Meeting of SEA, 2017.

Paroda, R.S. (2013) The Indian oilseeds scenario: Challenges and opportunities. First Dr. M.V. Rao memorial Lecture. IIOR, Hyderabad, pp25.

Singh, A.K. (2017) Towards oilseeds sufficiency in India: Present status and way forward. *Journal of Agrisearch*, **4(2)**; pp80-84.

SABC (2017) Biotechnology innovations to strengthen competitiveness of mustard farming in India. Rapeseed Mustard Conclave 2017, the Solvent Extractors' Association of India, March 24-25, 2017, Jaipur, Rajasthan.

Srivastava, A. (2017) How to double farmer's income. The Times of India, New Delhi, Nov 28, 2017.

Swaminathan, S.A.A. (2016) Moving matches won't help farmers, GM crops will. The Times of India, 17-04-2016.

Srinivasrao, Ch. and Vittal, K.P.R. (2007) Emerging nutrient deficiencies in different soils in rainfed regions of India. *Indian Journal of Fertilizers*, **3:** pp37-46.

Srinivasrao, Ch.; Ravindra C.; Mishra, P.K.; Subba Reddy, G.; Sarkar, G.R.M.; Venkateswarulu, B. and Sikka, A.K. (2014) Rainfed Farming – A compendium of doable technologies. All India Coordinated Research Project for Dryland Agriculture. ICAR-CRIDA, Hyderabad, pp194.

Important URL for further reading and statistics on edible oil in India:

1. http://eands.dacnet.nic.in/
2. http://eands.dacnet.nic.in/PDF/Glance-2016.pdf
3. www.dgciskol.nic.in
4. www.Indiabudget.nic.in/es2016-17/echapter.pdf
5. www.seaofindia.com/stats
6. www.icar.org.in
7. http://www.icar-iior.org.in/
8. https://iisrindore.icar.gov.in/
9. http://www.dgr.org.in/
10. http://www.drmr.res.in/
11. http://www.ncap.res.in/
12. www.nmoop.gov.in
13. https://www.seair.co.in

14. https://gain.fas.usda.gov/
15. https://iopepc.org/
16. http://shodhganga.inflibnet.ac.in/bitstream/10603/30315/11/11_chapter%203.pdf
17. http://www.downtoearth.org.in/blog/improving-india-s-oilseeds-production-55366
18. http://www.sopa.org/india-oilseeds-area-production-and-productivity/
19. http://www.sabc.asia/high-yielding-ge-mustardtechnology.html
20. http://www.otai.org/

LIST OF PARTICIPANTS

1. Dr R.B. Singh, Past President NAAS, New Delhi
2. Dr C.D. Mayee, Vice President NAAS, Nagpur
3. Dr J.K. Jena, DDG (Fisheries) and Secretary NAAS, New Delhi
4. Dr K.V Prabhu, Joint Director (Research), IARI and Secretary NAAS, New Delhi
5. Dr K..K. Vass, Editor, NAAS, New Delhi
6. Dr Vijay Kumar Bhatia, Editor, NAAS, New Delhi
7. Dr Arvind Kumar, Vice Chancellor, Rani Laxmibai Central Agricultural University, Jhansi
8. Dr S.S. Banga, ICAR National Fellow, Department of Plant Breeding & Genetics, PAU, Ludhiana
9. Dr V.S. Bhatia, Director, ICAR-Indian Institute of Soybean Research, Indore, M.P.
10. Dr R.K. Mathur, Director, ICAR-Indian Institute of Oil Palm Research, Pedavegi, AP
11. Dr Deepak Pental, Former Vice Chancellor, Delhi University, and currently Professor, Centre for Genetic Manipulation of Crops, Delhi University, Delhi
12. Dr K.S Varaprasad, Former Director, ICAR-IIOR, Hyderabad. Telengana
13. Dr Anupam Barik, Additional Commissioner. Govt of India, Krishi Bhavan, New Delhi
14. Dr A.V. Reddy, Director, ICAR-Indian Institute of Oilseeds Research, Hyderabad, Telengana
15. Dr T. Radhakrishnan, Director, ICAR-Directorate of Groundnut Research, Junagarh, Gujarat
16. Mr Vijay Sardana, VP & Head, Agribusiness Policies and Projects, United Phosphorus Ltd., Mumbai

17. Mr Bhagirath Choudhary, Director, South Asia Biotechnology Centre (SABC), New Delhi
18. Mr V.R. Kaundinya, Director, South Asia Biotechnology Centre, Hyderabad, Telengana
19. Dr S.V. Ramana Rao, Head (Social Sciences) and Principal Scientist, Agriculture Economics, ICAR-IIOR, Hyderabad, Telengana
20. Mr Sanjay Deshpande, General Manager (Corporate), Mahyco, New Delhi
21. Dr Shivendra Bajaj, Executive Director, ABLE AG, New Delhi
22. Dr G Ramamohan, Policy and Stakeholder Engagement, Monsanto India, New Delhi
23. Mr Atul Chaturvedi, President SEA India, New Delhi