BioSpectrum the business of Bio & Health Sciences

Moving towards GM Oils

19 January 2016 | Features | By BioSpectrum Bureau

Moving towards GM Oils

By Narayana Kulkarni

The Genetic Engineering Appraisal Committee (GEAC), an apex body in India authorized to approve the use of genetically modified (GM) crops or organisms in the country, at its meeting in July 2014, had approved the import of refined soybean oil derived from transgenic soybean by three companies - Bayer Bio-Sciences, BASF India, and Monsanto Holdings. The GEAC had given a clean chit after the samples of refined soybean oil were tested at Central Food Technological Research Institute (CFTRI) and approved. However, so far no import of transgenic refined soybean oil has taken place.

The three global agricultural companies which received the approval are offering agricultural solutions to farmers all around the world. Since 1996, these companies have received approvals for commercial cultivation of soybean in about six nations. But the transgenic crop is available for food, feed and processing use in over 20 nations excluding European Union and Russian Federation. It is a mandate that all traits need to be cleared/de-regulated for trade, worldwide. Hence these companies have submitted biosafety information with GEAC about the events and got approval from the regulatory agency. This will help the trading companies or processing units who are looking for import of transgenic soybean oil to get green signals for their applications without delay.

According to Soybean Processors Association of India, popularly known as SOPA, the only national level body representing the soybean processors, farmers, exporters and brokers in India working towards the aim to strengthen soybeans as a viable crop, there are 112 processing units in India processing soybean with modern processing technology.

"As a responsible technology developer and owner, Monsanto submitted event-based scientific data as per regulatory guidelines, to facilitate soybean oil commerce and industry. We would like to clarify that Monsanto does not engage in any manufacture of soybean oil nor does it manufacture or trade for the same in India. With soybean oil forming a sizable share of India's edible oil imports, we believe this decision by the GEAC will help in partially meeting India's edible oil demand," said spokesperson from Monsanto India.

Expressing similar views BASF spokesperson said, "It is a mandate that all traits need to be cleared/ de-regulated for trade, worldwide. That's why we applied for the approval from GEAC. However, BASF is not a producer or exporter of transgenic soybean oil. Since August 2015, BASF in partnership with the Brazilian Company for Agricultural Research (EMBRAPA), is commercialising the Cultivance Production System, which consists of herbicide tolerant soybeans varieties. At the moment, the commercialisation of the Cultivance Production System is only available to Brazilian farmers."

Sharing his views on the need for soy consumption Dr Suresh Itapu, CEO, NutriTech Consulting Services, said, "Soybean has been considered as nature's nutritional gift packed with lot of health benefits. It is one of the very few plant food sources that provide a high quality protein with minimum saturated fat. Soybean helps people feel better and live longer with an enhanced quality of life. Soy protein is the only commonly consumed plant protein that is 'complete', meaning it contains all of the essential amino acids in sufficient quantities to meet human requirements. In India protein and energy malnutrition is rampant and we are also a predominantly vegetarian country. Therefore, it makes sense for us to use soybeans regularly in our diet."

"Ordinarily, the nutrition composition should not change with GM or Non-GM. However, other aspects that affect health cannot be put forth in the absence of scientific study. In the absence of such investigation, indication on either way may not be appropriate," said Dr SD Kulkarni, Centre of Excellence on Soybean Processing and Utilization, Central Institute of Agricultural Engineering (CIAE), Bhopal, while sharing his views on nutritional aspects of transgenic soybean oil.
The five events that received the GEAC's approval include two each from Bayer Bio-Sciences and Monsanto and one event from BASF India. The GEAC's approval for these events is for two commercial traits (Singular) Herbicide Tolerance (Liberty Link soybean - A2704-12 and A5547-127, Cultivance - CV127, Genuity Roundup Ready 2 Yield- MON89788) and (Stacked) Herbicide Tolerance + Insect Resistance (Intacta Roundup Ready 2 Pro - MON87701 x MON89788).

The event A2704-12 traded under the name Liberty Link soybean from Bayer CropScience has got the regulatory approval from AVA - Approved GMOs Singapore, European Food Safety Authority, Food Standards Australia New Zealand, Health Canada, Japan Biosafety Clearing House, US Department of Agriculture - APHIS and US Food and Drug Administration for food, feed and domestic cultivation. This event received the first approval in 1996 for domestic cultivation from the USA authority and got the approval for direct feed and food use and processing in 1998.

Later many developed countries like Canada and Australia gave approval followed by developing nations like Thailand, Malaysia, and Brazil. Besides, Russian Federation and European Union, this event has received approvals from 21 nations. So far six countries have given approval for commercial cultivation for this event
first being the US in 1996, followed by Canada in 1999, Japan in 2006, Brazil in 2010, Argentina in 2011 and Uruguay in 2012.

A5547-127 another event traded under the name Liberty Link soybean from Bayer Crop Science received approval from 19 nations including European Union in 2012 and Russian Federation in 2008. The USA authority gave the approval for food, feed and domestic cultivation in 1998. In 2014, India, China and Malaysia gave approval for food and feed use while Singapore gave approval in 2015 for food and processing use.

CV127 traded under Cultivance from BASF, the event has been commercially cultivated in six countries since 2009 in Brazil, Canada in 2012, Argentina in 2013 and Paraguay, the US, and Uruguay in 2014. But this event has been approved for food, feed and processing use in 20 countries. European Union gave the approval only this year.
Monsanto's Intacta Roundup Ready 2 Pro - MON87701 x MON89788 event is being allowed for cultivation in four nations since 2010 in Brazil, 2012 (Argentina and Uruguay) and Paraguay in 2013. This event is approved in 15 nations for food, feed and processing use for having (Stacked) Herbicide Tolerance + Insect Resistance trait.

The GEAC which met under the chairmanship of Hem Pande, Additional Secretary, Ministry of Environment, Forests and Chairman, GEAC has also given the green signal for field trials of genetically modified (GM) rice, cotton, chickpea and brinjal including mustard.

Besides allowing the import of transgenic refined soybean oil, the government is considering allowing commercial cultivation of GM mustard crop, called DMH 11 (Dhara Mustard Hybrid 11), and developed by the Centre for Genetic Manipulation of Crop Plants (CGCMP), Delhi University, with support from the Department of Biotechnology(DBT) and the National Dairy Development Board.

Mustard is an oilseed, vegetable and fodder crop grown on around 5.5 to 7 million hectares in India. It is mostly grown as a rabi or winter crop in India. While it is sown as a sole crop in some regions, it is also grown as an intercrop in others. Brassica (rapeseed/mustard) has slowly taken over soybean and groundnut as the most important edible oilseed crop in India. While

soybean oilseed production was 14.66 million tonnes in 2012-13 and 11.99 million tonnes in 2013-14, in terms of oils, it was only second to rapeseed and mustard (R&M): soybean was 2.35 million tonnes while R&M was 2.49 million tonnes in 2012-13; this further fell to 1.92 million tonnes of soybean in 2013-14, with R&M being 2.47 million tonnes in 2013-14. The average annual growth rate of R&M between 2008-09 and 2013- 14 has been 3 percent in area, 7.3 percent in production and 3.9 percent in yield.

Mustard oil is reported to have the lowest amounts of saturated fatty acids and contain adequate amounts of linoleic and linolenic fatty acids. In terms of conversion to oil from seeds, R&M has a 33 per cent conversion rate which is higher than several other oilseeds like soybean, groundnut etc. The conversion to oilseed cake (used for cattle feed as well as soil fertility input) is 67 percent.

Reacting to the GEAC's approval, Dr S D Kulkarni said that in the absence of information on actual back
GEAC ground it is difficult to be precise on the indication. However, he pointed out that there may not have been alternative sources of edible oil, to transgenic soybean oil, in abundance in the world market to meet the requirement of edible oil of our country. The transgenic soybean oil might be available at appreciably low cost compared to other alternatives of edible oil available for import.

India has been an importer of edible oil for long years because of a mismatch between demand and domestic production. In recent years, the supply shortfall has widened rapidly, driven by rising incomes and population pressure. Every increase in income translates to a rise in demand for food products including cooking oil. Consumption-driven demand growth has outstripped domestic supply growth, increasing the country's import dependence to nearly 60%.
According to Oil World, a global market research on oilseeds, oils and meals, India has become the world biggest importer of vegetable oils, with an import volume of 14.1 million tonnes in 2014-15. According Solvent Extractors' Association of India, import of vegetable oils during Oil Year 2014-15 (Nov 2014 to Oct 2015) i.e. edible oil and non-edible oil, set a new record level of 14.61 million tonnes compared to 11.82 million tonnes for the same period of the previous year, up by 23.64%. Oil year 2014-15, has set a new record for highest import of palm products as well as soft oils like soybean, sunflower and rapeseed (canola) oils.

India has imported highest quantity of soybean, sunflower and rapeseed oils this year due to its attractive price. The main reason for overall increase in import of vegetable oil are; i) Local consumption of edible oil further increased due to increase per capita consumption (4.5%) and population growth (1.76%). Also lower price of vegetable oils boosted the consumption of vegetable oils. ii) Oilseed production reduced due to deficit rain in last two years, resulted in lesser availability of oils in the country. iii) Excess supply of vegetable oils in international market coupled with low price, boosted import. iv) NIL export duty by Indonesia and Malaysia also boosted their export to India.
According to GG Patel & Nikhil Research Co, India's edible oil usage may total 21 million tonnes in 201516, with per-capita consumption growing at about 5 percent from 7.4 percent this year. Palm oil shipments may jump to 9.6 million tonnes in 2015-16 from 9.04 million tonnes, while crude soybean oil imports are seen rising 18 percent to 3.55 million tonnes. India's total vegetable oil availability may increase by 2 percent to 6.26 million tons next year, boosted by higher production of rapseed oil this year. Rapeseed production may jump 16 percent to 5.8 million tonnes, while soybean output will be unchanged at 8.5 million tonnes and the peanut harvest may drop 12.7 percent to 3.1 million tonnes. India meets more than half its cooking oil requirements through imports with palm oil shipped from Indonesia and Malaysia and soybean oil from the US, Brazil and Argentina.

Sharing his views on Indian oilseeds market at Globoil 2015, Atul Chaturvedi, CEO, Adani Wilmar said, "Oils....in the late nineties when India opened up oil imports under open general license our total consumption used to be only 10.5 million tonnes of this the imported component was only about 4.5 million tonnes. With rising income levels and changing food habits coupled with competitively priced palm oils demand sky rocketed and currently we are consuming almost 19 to 20 million tonnes of oil. Out of this the imports are almost 13.75 million tonnes. In other words local availability has practically shrunk to around 5.5 - 6 million tonnes. About 70 per cent of our requirement is met by imports which are growing at almost 1 million tonnes per annum valued at around $12 billion. Consumption growth is pegged at 5 percent and we would be consuming around 34 million tonnes of oil by 2025. The import requirement of oils would balloon to 25 million tonnes and domestic availability will only be 9 million tonnes at current rate of growth."
India has to exploit domestic resources to maximize production to ensure edible oil security for the country. Oil palm is comparatively a new crop in India and is the highest vegetable oil yielding perennial crop. Therefore, there is an urgent need to intensify efforts for area expansion under oil palm to enhance palm oil production in the country. Besides India needs to push the growth of oilseeds production for other crops like soybean, mustard, sunflower and rapeseed. According to the United States Department of Agriculture (USDA), India's soybean output at 11.5 million tonnes in 2015-16 as against 10.5 million tonnes estimated by India's Ministry of Agriculture for 2014-15.

"The global food demand will grow by 70 percent or more by 2050, according to Food and Agriculture Organization (FAO), along with a significant need for protein. Maintaining current protein production levels would cause strain on land, water and fossil, fuel resources. Soybeans produce more amount of usable protein per acre of farmland than all other forms of complete proteins. When comparing land impacted by production and end product, soy protein offers, a protein solution that is 17 times more effective. Soy is a perfect solution for the mankind with decreasing natural resources like water and land and increasing protein demand. It is very profitable nutrition and health wise to incorporate soy products in our daily diets as much as possible. Some of the Indian studies have shown that soy protein is more effective in Indian population compared to others," adds Dr Suresh Itapu.

Commenting on GM crops, Atul Chaturvedi said "India is a great debating country and debates can last for minimum two decades. The debate on GM has been going on for more than two decades and chances are that finally the government may bite the bullet in next decade. India currently has more than 11 million hectares of land under GM, much more than China. Tragedy is that all this land is under cotton. In future this may get extended to corn and oilseeds as well."

Kiran Mazumdar-Shaw, non-executive chairman of Association of Biotechnology Led Enterprises (ABLE), a not-for-profit pan-India forum that represents the Indian Biotechnology Sector said "If Bangladesh farmers are reaping the benefits of GM Mustard (developed by Indian geneticists) and no reports of 'harm' are evident then why should we pay heed to unscientific scaremongering of the tireless and tiresome so called environmentalists? Why should Indian farmers be disadvantaged?
However, Dr Dharini Krishnan, director, D V Living Sciences Enterprises and chairperson of the Registered Dietitian Board (RD) of the Indian Dietetic Association (IDA) quoting a French study opined "Mice, who were fed with a diet of Monsanto's genetically modified maize sprayed with Roundup were much more likely to die at an earlier age, in addition to other health problems. Hence I disapprove the need for going for GM crops in India."

On the other side echoing the voice of the industry involved in agribiotehcnology, Dr Shivendra Bajaj, Executive Director at The Association of Biotech-Led Enterprises-Agriculture Focus Group (ABLE-AG) said "Our view as an association of organizations conducting research in biotechnology is that we fully support biotech mustard or any technology that could lead increase in agricultural productivity in India. India needs biotechnology especially in oil seed crops and pulses. The success of Bt cotton has demonstrated that with this technology can lead to significant gains to farmers in general and to the country in general."