

celebrating

WORLD FOOD DAY

BY DR. SHIVENDRA BAJAJ,
EXECUTIVE DIRECTOR, ABLE-AG

It's been almost five decades since the Green Revolution started in India. Since then India's food grain population has grown almost five times. We have a strong affinity for cereals, primarily rice and/or wheat as the primary food source. This bears out in terms of policy focus as well. Our granaries overflow with millions of tonnes of rice and wheat. In the 1950s and 1960s India had to rely on food imports. This was the precursor to the Green Revolution and the focus on ushering in food security. The Green Revolution saw an influx of fertilisers, high-yielding seeds, on-farm equipment and subsidies for water and electricity. As a result, India's agricultural production exploded, securing the state's food self-sufficiency by the late 1970s. However, we have not kept that pace and demand for food is growing rapidly. Changing consumption patterns, a larger population and urbanisation all influence growing demand. However, we still face the challenge of hunger, malnutrition and other great inefficiencies that surround the agriculture sector that feeds more than a billion people in the country. According to latest FAO estimates in "The State of Food Insecurity in the World, 2015" report, 194.6 million people are undernourished in India. By this measure India is home to a quarter of the undernourished population in the world. These disparities have contributed to India ranking 136th out of 186 countries in the 2013 UNDP Human Development Index and 94th out of 119 countries in the Global Hunger Index.

According to UN Food & Agricultural Organization (FAO) the global population by 2050 is expected to increase by 40% while associated global food production needs will expand by more than 70% with a rapidly growing middle-class in developing countries. By 2050 India is likely to be home to 1.6 billion people and with the increase in population in the country, there will be intense pressure on agriculture to produce more in lesser land area. In addition, the challenges of future, will be much different than the ones in past because of various factors like climate change, reducing availability of land and water, soil degradation and changing food preferences of people. So the solution sought to be is very different.

Indian agriculture needs to change – both in terms of increasing production to feed a growing population and also ensuring that food inflation is reduced. A multi-pronged approach is needed to revitalise Indian agriculture as it is today. Crop improvement by using Science and modern technologies, improving agronomic practices and resource efficiency in food production would be the critical criteria in agriculture during the next few decades. We must adopt new technologies to keep up with the challenges of safeguarding our environment and resources. Agricultural biotechnology is a part of the package of solutions that we need to use in this endeavour.

The agricultural biotechnology in India has tremendous potential. It is a sector where technologies are not only developed globally but are also developed locally by both private sector and public institutions can have significant and positive impact on the sustainable improvement in the productivity of Indian agriculture. According to a report by Mackenzie, it is estimated that adoption of hybrids along with biotechnology can contribute annually up to 25600 crore in 2025. Globally it has increased farmer profit by 68%.

It is important for the government to focus on ensuring farming to become a lucrative occupation for the farmer. To do this, farmers need to be encouraged to shift from cereal crops to vegetables, fruits, oilseeds and pulses. Increased production will ensure a reduction of expensive imports drive up prices and increase food inflation.

Adoption of agricultural biotechnology in some of the other crops in the country can bring increase in crop productivity. The importance of rice to India needs no mention. So it is another important crop for the country which can achieve desired yield through introduction of agri-



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cultural biotechnology. Introduction insect resistance rice will see a major reduction in the use of pesticides with the associated environmental benefits. Transplanted rice is also the single crop that consumes the maximum amount of water and with increasing shortage of water in the country it is time to find technological solutions to weed management in rice so that we can reduce cultivation of transplanted paddy and increase direct seeded rice cultivation. Herbicide tolerant technology in rice can help us in achieving saving of significant amount of water. It is also necessary to keep increasing our rice production. Development of high yielding varieties of rice through agricultural biotechnology should complement the existing efforts of increasing rice production through traditional breeding. Newer technologies to produce hybrid rice can also result in yield increase as well as bring new traits to cultivated rice.

Pulses and Oilseeds are also the key crops in India which lacks self-sufficiency. Agricultural biotechnology can play a significant role to produce sufficient volume of pulses and oilseeds to meet our increasing domestic demand. At present India is the largest importer of pulses (4 million tons/annum) approx. value of INR 14000 crore per annum and the consumption is increasing every year. Pulses are majorly attacked by Lepidopteran insects. Therefore, introduction of biotechnology trait such as insect resistance in some of the pulses will play a significant role in increasing production thereby bridging the production gap currently prevailing in the country and help in saving valuable foreign exchange. It is estimated that only introduction of Bt chickpea can result in increase in production by 2 million tonnes per annum thereby reducing imports worth Rs 6000 crore per year. It is remarkable that India also imports edible oil worth INR 60,000 crore and introduction of Bt cotton has resulted in increase of cotton seed oil from 5 lakh Mt in 2002-2003 to 14.8 Mt in 2013-14. Increase in production of oilseed crops such as mustard and soybean through biotechnology can increase the edible oil production by 7.75 lac tonnes thereby reducing our edible oil imports resulting insignificant savings of foreign



exchange worth Rs 4000 crore. Development of hybrid GM mustard by public sector in India could increase the yield which will significantly help in bridging the gap.

In the recent time due to increase in demand for domestic consumption in the feed industry the demand for corn has increased and export opportunities prevailing there is a need to look at using modern biotechnology for better insect and weed management in corn. It is projected that we will be running short of corn production by 2020 and will have to resort to imports. Currently, our corn yields of 2 tons/ha are much below the world average of 4.8 tons/ha. Using modern biotechnology can help us in this crop. Due to introduction of biotechnology in maize countries like Philippines has resulted cost advantage of 10% to the farmers over a period of more than a decade. For developing country like India similar gains can be achieved, if not more, by adopting GM Maize in the country.

Every year farmers in the rainfed cultivation areas of the country are highly vulnerable to crop losses due to uncertain weather conditions. So introduction of technologies which can benefit the farmers in rainfed areas need to be given highest priority. It is estimated that by 2025 more than 1.8 billion people globally will living in the regions of water scarcity. Drought tolerance technology could be a boon to these farmers since it can help them to grow crops with almost 25-30% less water. Another important factor which needs to be addressed on an urgent basis is to optimise the use of fertilizers in the country to save the soil structure from excessive use of it. Biotechnology can help in production of crops which have better fertilizer use capability, which would help in better plant performance, lesser variability in yield, reduce soil pollution and more importantly reduce government expenditure on subsidy significantly.

Also a high dose of technology coupled with more dynamic farming methodologies aligned to India's farm requirements is required (while being less harsh on the environment). Use of less water intensive crops and improved irrigation methods such as drip irrigation and use of IT to facilitate 'smart agriculture' that combines with renewable energy to create 'green agriculture' would be a good start. Crop biotechnology is enabling this and India boasts of some of the world's best agri research institutes who are working tirelessly to enable this. Agricultural biotechnology can be the other side of the coin that helps usher in a new wave in India's agriculture sector. The last requirement is of creating an integrated network of cold-chain facilities to ensure that Indian farmers reduce crop-loss due to poor storage therefore are able to improve access to both local and export markets. A combination of all the above will ensure a sustainable increase in food production, enhance farmer incomes and bring down food inflation.



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