

INDIAN SEED INDUSTRY

WAY FORWARD: GM, MULTIPLE MODERN TECHNOLOGIES

The organized commercially traded seed industry in India is estimated to be Rs. 18000 crore approximately. This is no authentic estimate of the market size. These are estimates made by some members of the industry. This excludes the value of the informally traded and exchanged seeds. The Indian seed market stands at the fifth position in the world today with well developed breeding, production and marketing infrastructure and capabilities.

The public sector units, viz. National Seeds Corporation, Seeds Corporations of various states and others take care of the bulk of the supply of public varieties in essentially open pollinated crops like Soybean, Ground Nut, Rice, Wheat, Mustard, Pulses, Jowar and Vegetables. The private sector invested more in the development of hybrids in crops like Cotton, Maize, Sorghum, Pearl Millet, Rice, Vegetables and others. Private sector has more than 70% of the value share of the market. Both these sectors contribute to the food security of the country by catering to the needs of different sets of farmers.

Cotton and Maize account for about 16% each of the seed market. Vegetables are the largest segment with 35% share in the market. The Rice market consisting of hybrids and research varieties contributes to about 12% of the Indian seed market. Southern, western and north-western parts of the country are well developed seed markets. Bihar surprised everyone in the seed industry by becoming the most valuable market for Hybrid Maize. Hybrid Rice development happened



Gene editing has the potential to solve multiple challenges quickly. The information and know-how from various plants can be applied to make crop plants climate resilient, low input consuming, pest resistant and sustainable for the environment. Devastating diseases can be addressed using editing. Crops can be improved to yield better with lesser fertilizer and water inputs and withstand extreme climate conditions

more in traditionally low-yielding states in north and eastern parts of the country. Seed Replacement Rates have been going up rapidly in the last ten years in crops like Rice, Wheat, Soybean and Mustard.

Technology and Research Landscape

Entry of GM technology and the passage of PPV&FR Act, coincidentally both happening in 2002, paved the way for a major change. Bt Cotton has transformed the cotton story of India. It has doubling the yield, tripled production and made India the largest cotton producer and exporter in the world. Protection of plant varieties has given the confidence to corporates to invest more in research. Despite this, our research investment is considerably lower at 4% of revenue compared to the International benchmark of 10-12% and needs to be stepped up.

Climate Change, preserving natural resources, increasing labour cost and stagnant yields will be the challenges of this decade. Research and innovation are the key to bringing cutting edge varieties and technologies to help the farmer in facing these challenges. The industry has to increase research investment to at least 8% of revenue by the end of this decade. The onus also lies on the government to provide a supportive implementation and enforcement of PPV&FR towards this end.

The seed industry must play a critical role in making research investments in some of the following areas, which, in turn, will drive the growth of the sector.

- Labour availability and cost issues have already increased the need for mechanization of farming. Varieties with suitable plant architecture for mechanization need to be developed.
- There is an urgent need to stop flood irrigation and move into large scale use of micro irrigation systems like Drip, Hose Reel, etc. Crop varieties suitable to such irrigation systems need to be developed to get the best results.
- Varieties suitable for new agronomic practices like Direct Seeded Rice, Minimum Tillage cultivation, High Density Planting Systems, have to be developed by the industry.
- We import significant amount of vegetable seeds for green house cultivation. There is need to bring a broad portfolio of veg crops for cultivation in greenhouses by developing suitable varieties through research efforts.
- Nutrition-enhanced foods will be in demand as the global population shifts to plant based nutrition in this decade. The new agri reforms that promote contract cultivation will help in ensuring an identity preserved supply chain system for crops produced with such output traits. The Industry must work on the development of such varieties.
- Special attention must be paid to oilseed crops to increase yields and enhance the country's edible oil production for import substitution.
- Improve the grain quality of hybrid rice, which should help in greater penetration of hybrids in rice. This will be critical to improving our rice yields to that of China and others.

GM technology provides solutions like Water

fun FACT



- Loves the dhaba food along the GT Road. Especially the stuffed parathas. **Makhan Maarke!**
- Favourite city in the world: Paris
- Played Cricket. Pace bowling all-rounder!

Use Efficiency, Fertilizer (Nitrogen, Phosphorus) Use Efficiency, Insect Resistance and Herbicide Tolerance traits. These solutions save water and soils, reduce chemical pesticide use and provide better weed management systems. By efficiently handling these stresses, the crops shall be empowered to improve their yields. A combination of multiple modern technologies including GM is the way forward.

Besides identifying and collecting germplasm with variation, breeders have been generating random variations using chemical and radiation mutagenesis. In the recent years, gene editing (SDN1 type) has also been used to generate variations at a target genetic region. Double haploid technology is another way of characterizing variations. Post identification of variants, they are crossed and a population is generated for selection. Molecular techniques like MAS (Marker assisted selection) and GWAS (Genome Wide Association Study) help in bringing down the time, cost and effort in the selection process. In spite of all these technological advances the basics of breeding remain the same, with the requirement of multiple back crosses to remove the unwanted background traits.

Gene editing has the potential to solve multiple challenges quickly. The information and know-how



Mr Ram Kaundinya is the Director General of Federation of Seed Industry of India



from various plants can be applied to make crop plants climate resilient, low input consuming, pest resistant and sustainable for the environment. Devastating diseases can be addressed using editing e.g greening disease of oranges, panama disease of banana, viral disease of tomato, nematode infections of soybean, etc. Crops can be improved to yield better with lesser fertilizer and water inputs and withstand extreme climate conditions. The first gene edited crops that are in the market carry improved consumer traits like better quality soybean oil and non-browning mushroom. Many other crops with enhanced consumer traits are in the pipeline, including low gluten wheat, high fibre wheat, tomatoes with enhanced flavour, berries without seeds and thorns, non-browning apples and potatoes etc.

If we want to be at the cutting edge of technology, we should invest in the above technologies. The regulatory regime has to support new technology introduction with predictable and science-based decision making. If we do not put this in place our farmer will be the ultimate loser, as it has happened with GM technology in the last ten years.

Research is driven by size. Large

investments are required to obtain good results from research programmes. A fragmented industry structure does not help this cause. The following measures can be taken urgently to achieve this:

- a) Research collaborations with other research organizations and corporates in India and globally
- b) Providing policy support for them to come and invest in India
- c) Intellectual Property protection
- d) Facilitative provisions in the Biodiversity Law

Future Scenario

We are expected to maintain a CAGR of 10% through this decade, taking our seed market size to Rs. 50,000 crore approximately by 2030. Increasing hybridization, Seed/Variety Replacement and adoption of modern technology are expected to drive this growth. The new Seed Act will make varietal registration mandatory. This should improve the quality of varieties available in the market.

India should also aim for a 10% share in the global seed trade by following a specific strategy to build the country as a seed export hub which can deliver an export of Rs. 10,000 crore by 2030.

The industry should pay attention to seed production in order to meet future demand. Diversification of seed production areas and adopting modern technology in seed production will be very important. Modern seed treatment systems and seed enhancement technologies have to be brought in. International quality seed production for both domestic and export markets should be high on agenda. Respecting IP in seed production fields must become a part of our culture and enforcement mechanism.

Digitization of operations of seed companies will be required on a large scale during this decade. Seed traceability systems should be put in place to help in increasing exports of agricultural produce, processed foods and seeds. Human Resource development is another key area of focus to develop our organizations to be modern, ethical, legally compliant and farmer-centric.

The future cannot be an extension of the past. We have to think transformational to visualize a seed industry of the next level which will be confident and will deal with the world on equal terms.