

ADOPTION OF TECHNOLOGY CAN CHANGE AGRICULTURE FROM SUBSISTENCE TO COMMERCIAL

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Agriculture need to be commercialised to make it profitable so that it can attract people. Technology and high revenue could make agriculture attractive to the younger generation. Presently, most of the farmers are doing subsistence farming which hardly earns them enough to meet the requirements of their family. There is need to convert farming from subsistence to commercial so that people thriving on it could have surplus money for a secured and decent life. Though share of agriculture to overall GDP in India has come down to 14 per cent, still 66.2 per cent of rural males and 81.6 per cent of rural females are engaged in agriculture as cultivators or labourers. Agribusiness is the sum total of all operations involved in the manufacture and distribution of farm supplies; production activities on the farm and the storage, processing and distribution of farm commodities and items made from them. It refers to various businesses involved in food production, including farming, seed supply, agrochemicals, farm machinery, processing, marketing and sales. Thus, agriculture based industries are very important for creating value addition in our agricultural produce and also create enormous job opportunities for the rural youth. Our exports in agricultural products in 2012-13 were \$41

billion against agri-imports of \$20 billion, giving a net trade surplus of \$21 billion.

Food Processing: Processing of agricultural produce is an important aspect of commercialisation in agriculture. Value addition of the agricultural produce can fetch higher price to the producer. Presently, processing of fruits and vegetables is only 2 per cent in India in comparison to 80 per cent in USA and Malaysia, 78 per cent in Philippines, 70 per cent in France and Brazil, 40 per cent in China and 30 per cent in Thailand. Food processing sector is an important segment of the economy, constituting a share of around 9–10 per cent of gross domestic product (GDP) in agriculture and manufacturing sector. In India, the raw material is in plenty as the total food production is likely to double in the next 10 years with the country's domestic food market estimated to reach US\$ 258 billion by 2015. With a huge agriculture sector, abundant livestock, and cost competitiveness, India is fast emerging as a sourcing hub for processed food. The Indian food processing industry accounts for 32 per cent of the country's total food market. **Food Processing Industry in India is currently growing at a rate of 14.9 per cent.** Residents in urban areas are the



largest consumers of processed food, consuming 78 per cent of all packaged food in 2011. According to data released by the Agricultural and Processed Food Products Export Development Authority (APEDA), Indian agricultural and processed food exports during April–December 2013 stood at US\$ 16,578.91 million as compared to US\$ 15,206.22 million during the same period last year. The share of food processing export in total exports from India is around 12 per cent. The Ministry has launched a Centrally Sponsored Scheme namely, National Mission on Food Processing (NMFP) during the 12th Plan. The Ministry is implementing a scheme for Human Resource Development (HRD) in the food processing sector on developing technologists, managers, entrepreneurs and manpower for quality management in the sector. The annual manpower requirement in the industry is estimated at about 5.3 lakh persons. With the objective of providing incentive to create integrated cold chain and preservation infrastructure facilities in the country, the Ministry is implementing the Scheme of Integrated Cold Chain, Value Addition and Preservation Infrastructure.

Hybrid seed market: Seed production is also a commercial venture with lot of potential for the farmers and other entrepreneurs. Quality seeds production is important skill in which the young can be trained in to augment their farm income. This will present them with more options in the farming sector. While seed production is a high income venture than crop production, hybrid seed production is much more lucrative with still higher returns. The Indian hybrid seed sector is now pegged at around Rs 12,500 crore. Among different crops, hybrid maize only accounting for little over Rs 1,500 crore and it could more than double to two lakh tonne a year from 90,000 tonne now in the next two years thanks to expanding demand from poultry and industrial sectors. The Indian hybrid seed market, with over 300 companies opens lot of opportunities to the farmers to produce quality certified seed of different crops. Seed market is growing at 15-20 per cent annually over the past several years and is projected to reach around Rs 18,000 crore by 2018. National Seeds Corporation (NSC) is a Government owned company and there are about 8000 registered seed growers all over the country under NSC alone who are undertaking the seed production programmes in different agro-climatic conditions. About 10 domestic and multinational companies control over 80 per cent of the market. To provide more opportunities to the

farmers, hybrid seed companies should have sound research and development capabilities. Different seed companies usually have contract farmers with assured consumption of their produce. All seed grown by contract growers for seed corporations meeting the specified standards attract a premium price over and above the commercial grain price for that crop. The premium can vary between 25 percent for cereals to over 100 percent for hybrids. There is huge potential for export of crop seeds as world market of seed is estimated of Rs. 2, 20,000 crores.

Agri-inputs: Production and supply of inputs required in agriculture is also a commercial venture with lot of scope to the farmers and unemployed youth in the country. Agricultural marketing system composes of two major sub-systems viz., product marketing and input marketing. In the product marketing, major players include farmers, village/primary traders, wholesalers, processors, importers, exporters, marketing cooperatives, regulated market committees and retailers. The input generation system includes input manufacturers, distributors, related associations, importers, exporters and others who make available various farm production inputs to the farmers. In agriculture, fertilizers, crop protection chemicals and farm machinery are the major inputs. Fertilizers are the critical inputs of agriculture and present consumption is more than 27.63 million tonnes (2011-12).

There is large chain of distribution across the country which provides avenues to thousands of people. Indian crop protection market has also lot of potential in the trade for the manufacturers and suppliers. Crop protection market is estimated at \$ 3.8 billion in FY12 with exports constituting about 50 per cent of the market. The crop protection market has experienced strong growth in the past and is expected to grow further at approximate 12 per cent per annum to reach \$ 6.8 billion by the year 2017. Bio-pesticides also provide lot of opportunities to the individual farmers to establish small units of production for the local consumption as there is increasing awareness for their use. Bio-pesticides, which currently represent only 4.2 per cent of the overall pesticide market in India, are expected to exhibit an annual growth rate of about 10 per cent in the coming years as our country is home to highest number of neem trees in the country also to number of such plants with pesticidal properties. In India, there are about 125 technical grade manufacturers (10 multinationals), 800 formulators, over 145,000

distributors. Farm machinery is also important input of our agriculture with lot of potential for its use in our future agriculture. The Indian farm machinery industry constitutes 10 per cent of the global market and is growing at about 5 per cent per annum. Farm machinery can create commercial venture for the youth in production of farm implements and retail distribution of all type of machinery. In addition, repair of farm machinery also provide commercial ventures to the farmers and the youth. Today, farm machinery and power industry accounts for over Rs. 50,000 crore of annual sales excluding farm implements and machinery manufactured/fabricated by the village craftsmen. Farm Machinery on the one hand will benefit the individuals engaged in different ventures and on the other hand will tremendously help to increase our farm yields. Impact analysis of some popular farm technologies showed that annual monetary benefit to the country through the use of these equipment/ technologies has reached the level of about Rs. 100,000 crore. Laser assisted land levellers, seed and fertilizer drills, paddy seeders, transplanters, rotavators, sprayers, weeders, irrigation pumps, micro-irrigation systems, reapers, combine-harvesters, sugarcane harvesters and threshers are some popular farm machineries in India.

Protected Cultivation

Protected cultivation in polyhouses or greenhouses is also one of the important facets of commercial agriculture where the farmer can get 4 to 5 times higher yield which will be quality wise better. Protected cultivation or greenhouse cultivation has improved crop production qualitatively and quantitatively world over in the last few decades. Presently, Spain, the Netherland and Israel are the leaders in the cultivation of crops in polyhouses and greenhouses. Spain has maximum area of around 70, 000 ha under protected cultivation. In India, the area under protected cultivation is presently around 25,000 ha while the greenhouse vegetable cultivation area is about 2 000 ha. The Netherland is having less area than India under flower cultivation but in world's flower export, the Netherland's contribution is 70 per cent and India's contribution is around 1 per cent. It is because of advanced technology of poly houses in the Netherland. In the Netherlands, glasshouse cultivation covers less than 1 per cent of agricultural land but accounts for 40 per cent of the annual gross income from agriculture with annual crop revenue as high as 600,000 €/ha. There are

many successful examples and success stories of high-tech protected cultivation in India in places like Bangalore, Pune and Sonapat. In Pune in Marashtra, the Japan International Cooperation Agency is helping the local women to produce strawberry in computer controlled protected cultivation. Here, Strawberries are grown in a greenhouse equipped with an advanced nutriculture system. In this novel cultivation method, instead of soil coco peat is used which is abundant in India. The coco peat system is superior to cultivation using soil in every aspect: Almost no pesticide is necessary, there is minimal risk of disease, pests or root rot, and there is no need for professional knowledge or hard labour. Such greenhouses can be constructed even on barren land. Haryana Government has established Indo-Israel Centre for Excellence in Vegetables at Gharaunda near Karnal and is spread across six hectares. In these high-tech greenhouses, potential productivity of 302 MT per ha in Tomato, 211 MT in Capsicum and 151 MT in Cucumber. Now, India and Israel have now joined hands for setting up a centre for fruits at Mangiana village in district Sirsa, which is spread over an area of 72 acres. Saplings of citrus fruits, pomiegranate, olive, guava and date had been planted in this centre. In Kerala, hi-tech farming is used for the cultivation of salad cucumber, capsicum, tomato, bitter gourd and beans. Around one tonne cucumber can be produced in 100 square feet which can ensure Rs 1.5 lakh as profit to the farmers.

Floriculture: Floriculture is another commercial venture in agriculture which gives 2 to 3 times higher returns per unit of area in comparison to other conventional foodgrain crops. The floriculture industry in India is poised at about Rs 5000 crore. According to ASSOCHAM, India's floriculture industry is likely to cross Rs 8,000 crore mark by 2015 which is growing at a compounded annual growth rate of about 30 per cent. Presently, about 232.74 thousand hectares area was under cultivation in floriculture (2012-13). Production of flowers is estimated to be 1.729 million tonnes loose flowers and 76.73 million tonnes cut flowers in 2012-13. But, there is tremendous scope for expansion as India accounts for less than one per cent of the global floriculture trade, which is dominated by Kenya, Ethiopia, Ecuador, The Netherland and Colombia. Karnataka, Tamil Nadu and Andhra Pradesh are the leading flower producing states in the country. Regions around Bangalore and Pune are the major production centres for cut flowers like roses and

carnations. Uttarakhand, Himachal Pradesh and Mizoram are emerging as new centres for cut flowers. Government of India has identified floriculture as a sunrise industry and accorded it 100 per cent export oriented status. Owing to steady increase in demand of flowers, floriculture has become one of the important commercial trades in Agriculture. Hence, commercial floriculture has emerged as hi-tech activity-taking place under controlled climatic conditions inside greenhouse. Floriculture in India is being viewed as a high growth industry. Commercial floriculture is becoming important from the export angle also. The country has exported 22,485.21 MT of floriculture products to the world for the worth of Rs. 455.90 crores in 2013-14 and the major export destinations are United States, Netherlands, Germany, United Kingdom, United Arab Emirates, Japan and Canada.

Mushroom cultivation: Mushroom cultivation has become a profitable business with the produce fetching good returns in the market because of the rise in demand for edible mushrooms. Mushroom cultivation can be well augmented with other agriculture work as the crop is of only 3 to 4 months duration. India has tremendous potential as it generates over 600 million tonnes of agricultural residues and a large amount of it is either burnt in situ or left in the fields for natural decomposition. The annual world production of all types of mushrooms is estimated to be over 25 million tonnes. Our country produces only 0.12 million tonnes mushroom out of which button mushroom contributes about 85 per cent of the total mushroom production of country. There is need to use this vast reservoir of raw material, if 1 per cent of the available agricultural residues are utilized for mushroom production, the country can produce over 3 million tonnes of mushrooms and 10 million tons of organic manure annually. Commercial technology is available for production of about half a dozen varieties viz., button, shiitake, oyster, and wood ear and paddy straw mushrooms from temperate to tropical climates of the country. Mushroom has huge market in the domestic and international markets. In our country, per capita consumption of mushrooms is very low. However, per capita consumption has increased from 25 g to 40 g during the last decade and the domestic demand continues to grow at 25 per cent per annum. Mushrooms can play an important role contributing to the livelihoods of rural and peri-urban dwellers, through food security and income generation.

Mushrooms can make a valuable dietary addition through protein and various micronutrients and, coupled with their medicinal properties. Mushroom cultivation can represent a valuable small-scale enterprise option for the youth and women. On the other hand, mushroom cultivation can be done on large scale with big export oriented units also which can generate lot of employment opportunities for the farmers and unemployed youth. Presently, there are many commercial mushroom production units like Agro-Dutch Foods, Lalru (Punjab) with annual production capacity of 50,000 tonnes, Flex Foods, Dehradun (U.K.) (2,500 tonnes), Inventa Foods, Hyderabad (4,000 tonnes), Himalaya International, Idar Gujarat (10,000 tonnes), Paonta Sahib (H.P.) (2,000 tonnes), Wakefield Mushrooms, Pune (M.S.) (2,000 tonnes), Balaji Mushrooms, Baramati (M.S.) (1,500 tonnes), INKAA Foods, Nalagarh (H.P.) (1,500 tonnes) and S.R. Mushroom Industries, Allahabad (1,500 tonnes).

In the conclusion, I will emphasize that agriculture is technology intensive and infusion of technology can increase the per unit yield by many folds. It all depends on the strength of the technology. Latest example of very high end technology is from Japan. Here farming has been now termed as industrial farming where the technology has really fructified into a 100 times more bumper harvest per unit of area. The best example is of an indoor farms like Miyagi Prefecture in Japan which is world's largest indoor farm illuminated by LEDs to meet the light requirements of the plants. The farm is nearly half the size of a football field (25,000 square feet) and it is already producing 10,000 heads of lettuce per day in multi-layer vertical beds. In this farm, discarded produce has been reduced from 50 per cent to just 10 percent of the harvest compared to a conventional farm. As a result, the farms productivity per square foot is up 100-fold. By controlling temperature, humidity and irrigation, the farm can also cut its water usage to just 1 per cent of the amount needed by outdoor fields. Thus, our research and extension institutions of agriculture have to work hard to abreast such technologies with a pace, test the same according to our conditions and most important is to accelerate infusion of such technologies to make agriculture commercial venture.

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