

EMERGING TRENDS IN INDIAN AGRICULTURE

Rayamane A.S.

Professor, P.G. Dept. of Geography, Bangalore University, Bangalore-560 056.

Abstract

Agricultural growth is critical for sustainable and inclusive economic growth in India, as the vast majority of the population depends on the agricultural sector for their livelihood. Close to 60 percent of India's labor force is employed in agriculture, according to the 2011 census. The majority of landholdings are small. Some 82 percent were classified as small scale in 2006; and farms less than two hectares occupied 40 percent of India's agricultural land (GoI 2011). Key development challenges for the coming decades are meeting the growing and diversifying food demand, especially for livestock and horticultural products, managing natural resources sustainably, and raising the productivity of rain fed agriculture.

Keywords: *Agricultural growth, Food Security, Food demand, Land holdings, Challenges, Livestock, Horticulture.*

Introduction

Agricultural growth is critical for sustainable and inclusive economic growth in India, as the vast majority of the population depends on the agricultural sector for their livelihood. Close to 60 percent of India's labor force is employed in agriculture, according to the 2011 census. The majority of landholdings are small. Some 82 percent were classified as small scale in 2006; and farms less than two hectares occupied 40 percent of India's agricultural land (GoI 2011). Since the Green Revolution era, India has achieved impressive growth in agricultural production, boosting national food security and reducing poverty (Fan, Gulati, and Thorat 2008). But the agricultural sector still faces crucial challenges. Growth in agricultural production continues to lag behind the targeted 4 percent, and poverty and malnutrition remain widespread. Key development challenges for the coming decades are meeting the growing and diversifying food demand, especially for livestock and horticultural products, managing natural resources sustainably, and raising the productivity of rain fed agriculture. Indian agriculture is undergoing rapid transformation since the introduction of green revolution technology. The recent policy of liberalization and globalization has opened up new avenues for agriculture modernization.

This has not only stressed on improving agricultural inputs, infrastructural facilities in rural areas but liberalizing inputs reducing subsidies, loosening ceiling laws and generating agricultural surplus for home and international markets. In view of the increasing prosperity in the rural areas demands are being raised for agricultural taxation and according industry status to agriculture.

Recent key trends

India has one of the largest and well coordinated public agricultural research systems in the world. Its primary agencies are organized under the Indian Council of Agricultural Research (ICAR) and state agricultural universities (SAUs).

Strong government commitment has resulted in a near doubling of public investment in agricultural research and development (R&D) since the mid-1990s. Funding is expected to increase further in the coming years.

Public agricultural R&D is almost completely funded by the federal and states governments.

The number of researchers declined by 17 percent during 2000–09, which was most pronounced at the SAUs.

Private investment in agricultural R&D has increased fivefold since the mid-1990s.

Strong empirical evidence demonstrates that India's agricultural sector benefited considerably from past government investments in agricultural research and development (R&D) (Pal, Mathur, and Jha 2005). Evidence also indicates that investments in agricultural R&D have performed equally well or better than other public-sector investments in the agricultural sector (Fan, Gulati, and Thorat 2008). These facts have been essential in mobilizing increased government funding for agricultural R&D. But as Byerlee and Pal (2006) point out, the focus of agricultural research in India has widened and become more complex. The research system now grapples with the need to incorporate issues such as sustainable management of natural resources, food quality and safety, household food and nutritional security, and poverty reduction. Notwithstanding the rising trend in government funding for agricultural R&D, more resources will be needed to meet the needs of the growing population.

The tradition of strong government support to science and technology (S&T) has produced an excellent S&T infrastructure in India. The Indian public agricultural research system has two tiers. The first tier is at the federal level and comprises mainly a network of close to 100 institutions coordinated by the Indian Council for Agricultural Research (ICAR). ICAR has been credited with ushering in the Green Revolution in India. The institute has also played a major role in promoting excellence in higher agricultural education (ICAR 2011). The second tier is at the regional level and consists of a system of state agricultural universities (SAUs) mandated to deliver state-specific research and education.

ICAR was established in 1929, but it was renamed after India's independence and all federal agricultural research institutes were brought under its jurisdiction. ICAR is responsible for planning and coordinating agricultural research and education in the country, as well as managing the research of its 97 agencies. Together, these accounted for more than half of India's public agricultural R&D spending and about one-third of the country's agricultural researchers. Four of these agencies are deemed universities, 45 institutions, 17 national research centers, 25 project directorates, and 6 national bureaus (ICAR 2010). These entities vary considerably in size. With 318 FTE researchers in 2009, the Indian Agricultural Research Institute (IARI) is by far the largest institute in the ICAR system, followed by the Indian Institute for Horticultural Research (IIHR, 137 FTEs), the National Dairy Research Institute (NDRI, 116 FTEs), the National Bureau of Plant and Genetic Resources (NBPGR, 105 FTEs), and the Central Arid Zone Research Institute (CAZRI, 103 FTEs).

To address the emerging challenges facing Indian agriculture, a strategy must be devised that emphasizes key areas such as promoting innovations, strengthening institutional capacity, adapting to climate change, and fostering linkages and collaboration across Institutions within and outside of the agricultural research system. To some extent the required research linkages are already in place. India has a number of private-sector businesses and international organizations such as the centers of the Consultative Group on International Agricultural Research (CGIAR). ICAR manages 62 All India Coordinated Research Projects (AICRPs), most of which are based at and under the administrative control of the SAUs. AICRPs are a mechanism to build nationwide cooperative, interdisciplinary research networks.

India, China, and Brazil have become major forces in the global agricultural economy. It is therefore useful to compare Indian agricultural R&D investment trends with those in these two other emerging economies. India's recent spending growth in public agricultural R&D was impressive at 25 percent during 2000–07, but did not keep pace with China, where

spending almost doubled during the same period. Brazil has one of the most well established and well-funded research systems in the developing world, although spending levels there have fluctuated over the past two decades. Rapid growth, particularly in China, has meant that investments by the three countries combined accounted for at least half of the developing world's total public investment in agricultural R&D in 2000 (Beintema and Stads 2010).

Diversification of agriculture

Another emerging trend in the Indian agriculture is leading towards diversification which is opening up the prospects for dairying, horticulture, truck farming, floriculture, aquaculture, sericulture, apiculture and agro-forestry etc. This has been made possible due to the development of irrigational facilities as a result of which multi-cropping has become the order of the day. Farmers can no longer afford to go for fallowing. Instead they prefer crop-rotation on scientific lines i.e., nitrogen consuming crops (cereals) followed by nitrogen fixing crops (pulses and beans) or striking a proper combination of tree crops-cereal crops, horticulture-animal husbandry - pisciculture etc.

Among horticultural products grapes, mangoes, oranges, bananas and apples etc. have great export potential. Export of grapes from Maharashtra to the Gulf countries is an encouraging feature.

There is enough scope for encouraging floriculture and enhance the quantum of export especially to the Gulf Countries where there is great demand for flowers. There are areas in the country where gladioli can be grown round the year. India has 200 varieties of roses and 370 varieties of aroids.

The Government of India has lifted import duty from the import of seeds, tubers, saplings and cuttings of flowers. A floriculture development project covering 200 ha of area and an investment of Rs. 420 million has been initiated near Bangalore with technical assistance from Holland which will be the largest floriculture project in Asia.

There is great potentiality for the development of aquaculture in India which will not only generate employment opportunities, improve the economic conditions of the rural poor but will also improve the quality of the diet and fetch valuable foreign exchange.

Apiculture is a subsidiary occupation to supplement farmers' income and to generate additional jobs for rural youths. In India about 100 million kg of honey is produced annually whose 10 per cent is derived from the Khadi and Village Industries. Majority of this production comes from Himachal Pradesh, Maharashtra. In India five varieties of bees are found of which is most important. Now melanoma and trogon varieties are gaining popularity. A number of centers have been established in the country to provide technical assistance and training for bee keeping. Two such centers are functioning at Almora and Haldwani in Uttar Pradesh.

India ranks second in silk production in the world after China. It has the unique distinction of producing all the four commercial varieties (mulberry, tasar, eri and muga) of the silk, of which the first alone accounts for about 90 per cent of the total production. The total raw silk production during 1991-92 was 11,748 tones (10,667 tones as mulberry silk). The main producing states are Karnataka, Andhra Pradesh, Tamil Nadu, West Bengal and Jammu and Kashmir. To farmers in several parts of the country, sericulture is now one of the attractive vocations. It is best suited to the areas with temperate climate. The National Sericulture Project (NSP) covers 17 states. The objective of the project is to increase the raw silk output, improve its quality and introduce sericulture to new areas considered suitable for this

industry. Under the project a new set of laboratories are under construction in Karnataka for bi voltage sericulture.

Agro-forestry is a co-activity with agriculture which can not only supplement farmers' income but also utilise barren and wastelands into productive uses, ensure fuel and wood supply to rural folks, provide employment to rural youths and improve the quality of the environment. The programme involves integration of silviculture with horticulture, agriculture and animal husbandry etc. It will not only check further degradation of forests but will build the ecological infrastructure necessary for sustained development. Under the agro-forestry programmes such trees are planted on vacant, degraded agricultural lands which are commercially remunerative and may yield profitable returns.

Horticulture-Raise production of fruits by 50 per cent and vegetables by 100 per cent to meet the full nutritional requirements of the population, besides achieving 25 per cent exportable surplus, through the establishment of 2000 model horticulture production and processing centers covering three million hectares of irrigated land, yielding an average of Rs.18,000 per hectare of profit for three million farmers, generating an equal number of year-round jobs and raising a total of six million families above the poverty line.

Aquaculture-Raise inland fish production by 4.5 million tons (66% of projected domestic demand) through the development of 50,000 hectares of intensive fish farms, yielding a profit exceeding Rs.10 lakhs per hectare for 2.5 lakh families and providing full-time employment to one million persons.

Sericulture-Double mulberry silk production by establishing 500 integrated model silk village clusters, each cultivating 175 hectares of mulberry, yielding an average net income of Rs.30,000 per family for 2.5 lakh families (80 per cent of whom are landless) along with 7.5 lakh additional full-time jobs.

Oilseeds-Add three million hectares to the area under irrigated oil seeds and produce an additional 7.5 million tones to fully meet the domestic demand.

Dairy, poultry, plantation crops and marine fisheries-double the production.

Food grains-Raise production to 220 million tons (sufficient to meet projected domestic demand) by increasing per hectare yield of wheat from 2.3 tons to 3.1 tones and rice from 1.76 tons to 2.15 tones and bringing another two million hectares of irrigated land under high yielding varieties, resulting in a rise in employment per hectare by 50 per cent.

Sugar-Add 1.6 million hectares to the area under sugarcane, raise yield per hectare from 60 to 80 tones and take sugar production from 11 to 26 million tones, lifting exports to a level of 3-4 million tonnes annually.

Cotton-Triple the area under irrigated cotton with an addition of 4.5 million hectares to double production from the present 13 million bales. Increase spinning and weaving capacities in powerloom, mill and handloom sectors to meet 50 per cent increase in per capital cloth consumption, resulting in employment to 11 .million persons and export surplus worth Rs. 25,000 crores in cotton textiles.

Forestry, fodder and wasteland reclamation-Reclaim eight million (out of 160 million) hectares of wastelands to meet the entire projected demand for industrial wood and animal feed (Raghavan, 1992, p. 15).

Eco farming also called organic farming or sustainable agriculture is being popularised as an alternative to both (a) high cost and high productivity based Green Revolution, and (b) low cost and low productivity oriented traditional cultivation. According to USDA "organic farming is a production system which avoids or largely excludes the use of synthetic fertilizers, pesticides, growth regulators and livestock feed additives.

Unlike in developed nations, agriculture is still the single largest contributor to the GDP in India, contributing 14.5 per cent as against developed nations where the contribution of

agriculture to GDP is less than 5 per cent. Although the contribution of agriculture has been gradually declining, the trend has been more visible in last decade. Infact there has been almost twofold increase in the number of persons dependent on agriculture, resulting in less per capita holding which retard effective utilization of resources. This implies that the growth in economy has not benefited the majority of population and the economic disparity is increasing instead of decreasing. The growth rate for the agriculture last decade is just around 2 per cent at par with what it was prior to the economic liberalization.

Commercialization of agriculture

With the introduction of Green Revolution in 1960s and consequent generation of agricultural surplus a new trend of commercialization started emerging in the Indian agriculture which was contrary to the traditional subsistent nature. Conscious farmers to day grow crops not exclusively for their own use but for selling the same in the market and obtain as much profit as possible. They are not interested in the cultivation of those crops which are non remunerative or whose yield is very low. The decline in the area of coarse grains may be cited as an example.

Pulses which have comparatively longer growing period and lower yield also fail to get favorable treatment. So, the glut in the production of a crop one year has adverse effect on its areal coverage and output in the following year. Higher remunerative prices in non-food crops are encouraging farmers to go for horticulture, floriculture, sericulture, viniculture, apiculture and similar activities as a result of which the areal coverage of food crops is declining in some areas. The area under cash crops as a percentage of total holding will increase. Many farmers are already combining social-forestry, livestock and poultry industry to support their income. This trend is likely to accelerate further.

Organic farming is one subject that has generated considerable interest among the farmers as well as general populace. As there is increasing awareness about the hazards of use of fertilizers and pesticides in the western countries, the demand for organically produced commodities is on the rise. India here has an advantage because unlike in developed nations, the size of holding is very small. As such the farmers are already not able to provide the necessary inputs for their crops. If the market is assured and the prices are higher, they can very easily shift to organic cultivation. Some positive trends are emerging in this activity. There is a significant area under the organic cotton in the Yavatmal district of Maharashtra and the cultivation is managed by a co-operative society. Their importance is likely to increase further as they mean higher reward for the farmers

March towards Grey Revolution

After the success of Green, Yellow, Blue, Brown and White Revolution India is marching towards what is called as Grey Revolution i.e. use of information technology in agriculture. All the above revolutions have been with the single objective of increasing production. The extensions activity was limited to providing physical inputs viz. fertilizers, seed, pesticides, among others. The government intervened heavily in the market to ensure fair price to the farmers and to make available goods to the consumers at an affordable price, bearing heavy subsidy burden in the process. However all this is undergoing a change. The extension efforts are now directed towards providing farmers with the knowledge of the market conditions, so as to enable him to decide what to produce, how and , how much to produce, when and where to sell. The farmer can also avail information regarding the weather conditions and decide his farm operations. The use of GIS is also being promoted in a big way, which will be helpful in precision farming.

Increasing Importance of Contact Cooperative Farming

With the entry of MNCs in the agriculture sector and their specific requirement of raw materials it is expected that the contract farming will receive a shot in the arm. Although the Pepsi experiment in Punjab has not been entirely successful, for lack of backward linkages, this sector seems to be lucrative one. This will also result in increased farm mechanization and will result in greater economies of scale. Further it will decrease the percentage of population depend on agriculture will decline. Cooperative farming is also making a comeback. The sugar cooperative in Maharashtra, milk cooperatives in Gujrat are the path breakers. Many horticultural products are now marketed by cooperative societies, which reduce the cost of marketing for the farmers by eliminating middlemen. Cooperative farming also reduces the cost of inputs, farm operations and makes possible increased farm mechanization.

Declining Public Investment in Agriculture

The last decade has been a decade of economic reforms for India. It has also seen decline in the public investment in agriculture. Agriculture sector has not been touched by reforms. There is a feeling of receiving step-motherly treatment being meted out to the agriculture sector. If at all there is a talk, it is for all the wrong reasons like support price, subsidies etc. No serious efforts have been made to give a boost to agriculture production. During the ninth plan the Agriculture sector has been allotted 4.9 percent of the total outlay. However in the first four years of the plan the actual allotment has been nowhere near it. This is when we talk of growth rate of over 5 per cent in agriculture.

What the government has done instead is hiking the MSP for food grain under political compulsions and at the same dismantled PDS. Now the situation is such that food grain is rotting in FCI stores, while people continue to die of hunger. The increase in rice production in Assam and other eastern states is not the result of the government effort but because of increased private investment in the form of tube wells. The subsidies are likely of reduce further, which will mean that the cost of cultivation will increase. The Much talked crop-insurance scheme has failed to provide the farmers with much needed economic stability. In this regard the Kisan Credit Card (KCC) scheme must be launched. It helps the farmers to have an easy access to cash to procure farm inputs when needed.

It is labour intensive rather than capital intensive farming by increasing the diversification of crops in such a way that year round agricultural operations are carried on in place of monoculture promoted by Green Revolution which only generates seasonal employment. Eco-farming stresses on adopting ecologically suited crops and cropping practices *i.e.*, dry farming in arid and semi-arid areas rather than putting emphasis on intensive irrigation.

The main thrust of eco-farming so far has been on replacing chemical fertilizers and pesticides by biofertilizers and bio-pesticides. A whole range of biofertilizers, vermicompost, neem cake, powdered minerals and rock phosphate can be produced on the farm, thus reducing the cost of cultivation, biofertilizers such as azospirillum, azotobacter, rhizobium (for legumes), phosphohacterium, VAM and beneficial soil microbes improve the soil fertility. Simple vermicomposting technology can help in effectively recycling organic farm residues and provide rich manure. Vermicompost contains other growth regulating substances in addition to major nutrients, all of which are readily absorbed by the crops. Wood ash and rice-husk ash are good sources of potash. Tank and river silt also improve the soil fertility. In rice fields, the association of blue-green algae (bga) and azolla can benefit the crops. Neem cake can be used as top dressing for most vegetable crops and rice. Crops grown with

organic manures and biofertilizers are healthy, resistant to pests and diseases and are free from the maladies of the chemical fertilisers.

Agriculture: A source of employment.

Agriculture has been an important source of employment for the majority of our population. As mentioned above two-third of our population is directly or indirectly dependent on agriculture for its livelihood. Much of the employment in agriculture in India is a disguised employment meaning, it employs more than what is required and gives a false picture of employment generation. This is primarily due to availability of cheap labor, lack of alternative means of employment⁴. Majority of population thus employed is unskilled labour. This picture is undergoing a change increased farm mechanization has considerably reduced the need for manual labor, but increased cropping intensity thereby generated employment. The packing and processing industry have also emerged as alternative source of employment. The horticulture and medicinal crops have secular demand for skilled labor. It is now evident that the percentage of population dependent on agriculture will reduce considerably in the coming year, which is a welcome sign.

Growing Role of NGOs in Agricultural Development

The most heartening feature in the present situation is the increasing role being played by NGOs in agriculture and rural development. There are numerous success stories of it, SEWA in Gujarat Tarun Bharat Sangh in Rajasthan, Anna Hazare in Maharashtra are some examples of what NGOs can achieve if they have sincerity of purpose. More such examples are coming to light. As the farmers are primarily poor and backward they need a helping hand in their desire to march ahead. They are hesitant in approaching the government agencies as they do not trust it. NGOs are acting as bridge not only between the government and farmers but also between researchers and farmers. In the new millennium their importance is going to increase further and they will have a major role to play in agricultural and rural development.

Conclusion

After years of unidirectional march towards achieving self sufficiency in food grain production, Indian Agriculture is all set to change its track. There has been paradigm shift in the way agriculture is done in the last few years and the Indian farmer is gearing up himself to face the challenges of globalization.

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