Agriculture and Food Security: Crises and Challenges Today

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India's strategy of agricultural development and approach to food security has proved its resilience in the wake of recent global food crisis, which has created political and social unrest in several countries of the developing world. The same had earlier helped India tide over the severe food crisis of the mid-sixties within a period of one and half decade and had also proved its aptness in the wake of economic liberalisation and globalisation since the early nineties. Though India's performance in terms of reducing hunger and malnutrition has not been remarkable given the political and socio-cultural milieu, the achievements have indeed been significant. Indian agriculture has undergone a phenomenal transformation during the past five decades. The metamorphosis was brought by not only technological changes such as the green revolution, but also by institutional innovations in delivering farm inputs and marketing of output. Contract farming is one such institutional initiative undertaken in recent years to address some of the problems faced by Indian farmers. The National Agricultural Policy (2000), announced by the Government of India, seeks to promote contract farming by involving the private sector to accelerate technology transfer, capital inflow and assured marketing of crop production (Asokan, 2005).

India's Food Security

Food security both at the national and household levels has been the focus of agricultural development in India ever since the mid-sixties when import dependence for cereals had gone upto 16 per cent and the country faced severe drought continuously for two years. The new approach intended at maximising the production of cereals and involved building a foundation of food security on three key elements, namely,

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provision of an improved agricultural technology package for the farmers, delivery of modern farm inputs, technical know-how and institutional credit to the farmer. For achieving these objectives, several policy instruments were used that influenced the production potential.

South Asia, including Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka has high population pressure on land and other natural resources to produce food and meet other developmental needs. South Asian countries have made significant advancement in food production during the past three decades, transforming the region from a food deficit to a food self-sufficient region. This could occur due to developments in agriculture research and effective dissemination of research output. These changes have been elicited by the green revolution in South Asia, involving the development and diffusion of high yielding varieties (HYVs), especially of rice and wheat, from the mid- 1960s, accompanied by the use of increased levels of inputs, principally irrigation, fertilisers and tractors, and policy support. Government investment in infrastructure, research and extension, price and other policies along with strategies for crop, livestock and fisheries production have drastically helped to increase food production and its availability. In spite of these attainments, producing additional food with limited land and providing economic access to food at the household level for ensuring food security would continue to be a major challenge for South Asian countries. At the same time, the food consumption pattern has been changing with wider availability of food choices, sustained economic growth and increasing urban population. Such changes in consumption pattern are likely to influence the crop choice, production, productivity, prices, international trade and environment. This in turn calls for an examination of the changes in agricultural productivity and future sources of agricultural growth accounting.

Current Agricultural Scenario

Agriculture is the basis of economy and sustenance of life of the people of India. Sustainable agriculture may be regarded as the successful management of resources for agriculture to satisfy the changing human needs while maintaining or enhancing the quality of environment and conserving natural resources. Sustainable agriculture integrates three main goals: environmental health, economic profitability, and social equity. Success in promoting sustainable agriculture can be achieved on seven

fronts, namely, crop diversification, genetic diversity, integrated nutrient management, integrated pest management, sustainable water management, post harvest technology and sound extension programmes (FAO, 1991).

It is generally believed that India has maintained a satisfactory level of food production in the 1980s. Food grain production in India has witnessed a steady increasing growth rate during the 1970s and 1980s from the rate of the previous decades, but the 1990s has witnessed a sharp fall in the growth rate. In fact, the growth rate of food grain production during the 1990s has been close to the annual population growth rate, which implies a stagnant per capita production level (Rao, 1997; Sawant, 1997). A comprehensive analysis of agricultural performance and productivity of Indian agriculture by Kumar (2001) has revealed that the changes in cropping pattern have been taking place as a result of substitution of low productivity crops by those which have shown impressive performance in productivity growth. Some of these crops are paddy, wheat, maize, groundnut, rapeseed and mustard and sugarcane. Coarse cereal and pulses have shown a steady decline in their area. Changes in the cropping pattern had contributed to output growth considerably. Future source of food supply would be the enhancement of yield through technological change (Kumar, 2001).

However, sustaining a steady growth rate of yield would require efficient and optimal resource use of land, surface and ground water, and genetic resources, greater attention to cropping systems than individual crops, revamping the research and extension systems towards varietal improvement for dry land crops, strengthening adaptive local research, emphasis on biodiversity and ecological balances, improving rural infrastructure including processing, marketing and storage, education and access to mass media, and development of rural financial markets (Vaidyanathan, 1994).

Agricultural Production Performance

Increased availability of food is a crucial and essential condition for achieving food security in food deficit countries. Since continued dependence on imports to ensure availability is not desirable based on economic, social and political considerations, enhanced agricultural production has been a stated objective of the national policy of many developing countries including India. In this context, it is important to

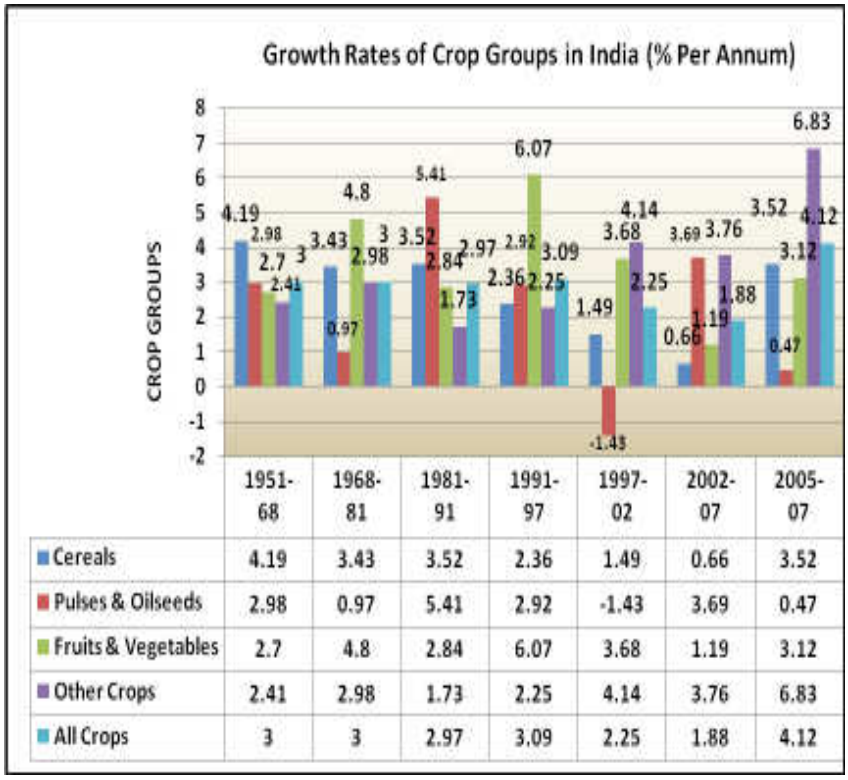
review the production performance of Indian agriculture with a view to understanding the trends and identifying the major constraints in achieving physical access to food.

Since agriculture today is constrained by the less availability of land, productivity remains the most crucial factor based on which is the future of India's food security. In the past, the major sources of growth in agricultural production were area and yield. However, the future growth has to be essentially driven by increase in yields. The evidence is that rapid growth in public investment in irrigation and other infrastructure, research and extension along with crop production system and policy support have helped to increase yield and agricultural production. Long-term food security goal can only be attained if there is sustainable agriculture. A sustainable farming system is a system in which the natural resources are managed so that potential yield and the stock of natural resources do not decline over time (Kumar and Mittal, 2006). At the farmers' level, sustainability concerns are being expressed that the input levels have to be continuously increased in order to maintain the yield level. This poses a threat to the economic viability and sustainability of crop production.

The performance of agriculture has not been satisfactory. The share of agriculture in the Gross Domestic Product (GDP) has registered a steady decline from 36.4 per cent in 1982-83 to 17.8 per cent in 2007-2008. But agricultural sector continues to support more than half a billion people providing employment to 52 per cent of the work force (GOI, 2007-08). The growth in agriculture over a period of time has remained lower than the growth in non-agricultural sector and this decelerating trend is a cause of concern. The gap between the growth in agriculture and non-agriculture sectors began to widen in 1981-82, and more particularly, since 1996-97, because of acceleration in the growth of industry and services sectors (Economic Survey, 2008). The crop sector's growth rate was around 3 per cent per year till mid 1990s, after which it decelerated to 1.88 per cent during 2002-2007. However, it has picked up during the last three years to more than 4 per cent. Crop group wise analysis of growth rates (Chart: 1) shows that while fruits–vegetables recorded reasonable growth rates, growth rate of cereal sector started decelerating in 1990s. During 1997 to 2002, it came down to a level of 1.49 per cent which was marginally

lower than the growth of population. This endangered the staple food security of the country. However, the trend was reversed during the last three years after a series of new initiatives taken by the government.

Chart: 1



	1951-68	1968-81	1981-91	1991-97	1997-02	2002-07	2005-07
Cereals	4.19	3.43	3.52	2.36	1.49	0.66	3.52
Pulses & Oilseeds	2.98	0.97	5.41	2.92	-1.43	3.69	0.47
Fruits & Vegetables	2.7	4.8	2.84	6.07	3.68	1.19	3.12
Other Crops	2.41	2.98	1.73	2.25	4.14	3.76	6.83
All Crops	3	3	2.97	3.09	2.25	1.88	4.12

Source: Planning Commission, 2007.

In a nutshell, the performance of Indian agriculture can be said to have gone through three phases of growth – area - based growth up to the late sixties; yield - based growth up to the early eighties; in the third phase, the thrust is for the development of dry land agriculture, which plays an important role in the progress of agriculture in the Indian economy. In India 68 per cent of the total net sown area (136.8 million hectare) comes under dry lands spread over 177 districts. Dry land crops account for 48 per cent area under food crops and 68 per cent area under non-food crops. Nearly, 50 per cent of the total rural work

force and 60 per cent of livestock in the country are concentrated in the dry districts (Dhan Foundation, 2006). In general, the economic policies of the developing countries in the past years have led to negative effects on development in the dry land regions. Development strategies have shifted resources away from dry land to irrigated production and from rural to urban areas. The consequences of adverse macro-economic policies fall disproportionately on them in spite of the fact that they are often the primary producers of food crops.

Agricultural Productivity Performance

Indian agriculture is undergoing a rapid transformation with rising per capita income and urbanisation, increasing population and changing consumers' preferences. Global market environment and integration with global economy are offering several opportunities and posing challenges to agricultural growth and market development. In this context, the behaviour of supply side constraints in Indian agriculture needs a critical assessment. Development of viable strategies and approaches for ensuring adequate and efficient supply of inputs and services for accelerated agricultural growth will be quite challenging in the new circumstances.

Productivity growth in agriculture is essential for the development of this sector. However, there are also issues of equity and justice involved. Around 70 per cent of India's poor live in rural areas; tackling poverty implies addressing the problems faced by the rural poor. A majority of the rural population are farmers who depend on agriculture and allied activities for sustenance. In many situations, small farmers are able to make efficient production choices, if they are not constrained in choosing optimal input and output levels. Increased production does not necessarily lead to higher incomes, particularly where prices fluctuate widely, where markets are unorganised and inefficient, market access is limited, or bargaining power is weak. There is an intense feeling that in the era of liberalisation and globalisation, small farmers are being completely neglected and marginalised from high value agri-business activities and hence are unable to derive maximum benefits due to the fragmented and uneconomic size of holdings and inadequate access to external inputs and services (Nagaraj, et al, 2008).

In the post economic reform era, Indian agriculture has been subjected to various external and domestic forces that have compelled the farmers

to change their farming practices. Distress has set in the rural economy in many areas, forcing farmers to commit suicide in extreme cases. The major changes that have directly impacted the agricultural sector are financial sector reforms, decontrolling of fertiliser prices, freeing of imports of agricultural commodities, etc. Of these, the financial sector reforms have been crucial in view of its influence on rural credit delivery. Rural credit plays a very crucial role in agriculture and rural economy; any disturbance in its delivery mechanism can cause enormous effects. Demand for credit emanates from demand for inputs and services needed for various farm operations. A thorough overhauling of the rural credit system and its restructuring is the need of the hour. However, it cannot be effective if done in isolation, without revitalising Indian agriculture itself (Satyasai, 2008).

The agricultural growth performance could not be sustained during the 1990s because of the deceleration in yield and output growth rates in both food and non-food crops. A comparison of the decadal growth in area, production and productivity of foodgrains since 1950s reveals that India has been experiencing stagnation or negative growth in these crops. Increasing agriculture productivity perhaps remains the single most important determinant of economic growth and poverty reduction, and hence provides the key to Millennium Development Goals (MDG). Improvements in productivity come from adoption of new technologies and increase in production efficiency. 'Precision farming' or 'precision agriculture' aims at increasing productivity, decreasing production costs and minimising the environmental impact of farming. The management of in–field variability in soil fertility and crop conditions for improving crop production and minimising the environmental impact are the crux of precision farming (Maheswari, et al, 2008).

Towards a Food Secure India

Ever since independence in 1947, agricultural development policies in India have aimed at reducing hunger, food insecurity, malnourishment and poverty at a rapid rate. Keeping this overarching goal in mind, the emphasis which was initially on keeping food prices low, shifted to macro food security and subsequently to household and individual food security. Later, the food security of vulnerable, sustainable use of natural resources, and equity between rural and urban or farm and non-farm population became the issues of dominant discourse related to agricultural development. Several new initiatives have been taken during the last

few years to tackle the situation and to bring back farmers' confidence in farming in general and cereal production in particular.

Indices for economic and social status are composite indicators of the economic and social well-being at the community, state and national levels. These social indicators are used to monitor the social system and help in the identification of problem areas that need policy planning and require intervention to alter the course of social change.

If the existing trends in high population growth, low agricultural development, wide disparities in income, huge environmental degradation, and high incidence poverty continues, India's food, agriculture, environment, and quality of human life will be seriously threatened in the coming years. Poverty and malnutrition are likely to remain as major problems. Pressure to produce more food from less land, use of more natural resources, enormous growth in the population and unequal distribution of income will harm the environment in the years to come.

Agriculture sector reforms should be initiated on a war-footing, to bring together all the best that is available and make agriculture an organised unit to give farmers the maximum benefits. Turning agriculture into an organised business with the farmer as the entrepreneur should be the key to the second green revolution and for the much desired evergreen revolution in India. Farming should be taken up with the motive of profit making rather than just making a subsistence living. With huge diversity in the number and variety of crops that we produce, variations in agro-climatic conditions, soil type, prevailing inequalities in the state growth levels, it is most essential to implement the development plans through micro level initiatives and proper coordination between all the stakeholders. These issues need to be considered to meet the targets laid out in the Eleventh Plan strategy to raise agricultural output. Therefore, the prevailing policy instruments need to be re-looked at, re-defined and efficiently implemented to enhance agriculture productivity and especially dry land farming. There is an urgent need to reduce the regional disparity through appropriate policy planning for a balanced development of the country. There is a need to motivate more private investment into the agriculture sector and incentives like tax concessions or benefits can be proposed to them. There is also a strong need for public-private partnership, not only to start new projects but also to support and maintain the existing public structure.

Performance of agriculture plays a key role in the progress of the economy in achieving the development goals of eradicating poverty, faster and sustainable growth and modernisation of society. Agricultural sector is the backbone of the country's development and sustenance for 65 per cent of the population in rural areas and approximately more than 58 per cent of the population is still dependent on agriculture. Besides this, to achieve an ambitious rate of growth for the country of as high as 9-10 per cent in the Eleventh Five Year Plan, the country needs a strong pull-up support to agriculture sector which should grow at least at the rate of 4 per cent per annum, all the more, since in 2005-06 the growth in agriculture was merely 2.2 per cent which is feared to go even negative next year (Mittal, 2007). The following are suggested for not only improving productivity but also for ensuring food security.

1. Education and literacy: Role of education in improving farm efficiency and technology adoption has to be well established (Lockheed et al, 1980; Feder et al, 1985; Phillips, 1994). As agriculture transformed from subsistence to commercial level, farmers seek information on a wide range of issues to acquire knowledge or upgrade their skills and entrepreneurial ability. Literacy emerged as an important source of growth on adoption of improved technology components and production. The role of literacy is more pronounced during the liberalisation era than the pre -1990 period, where knowledge based decisions influence input use efficiency and productivity. Literacy emerges as an important source of growth in adoption of technology, and use of modern inputs like machines and fertilisers. Recognising that in the liberalised economic environment, efficiency and growth orientation will attract maximum attention, literacy will play a far more important role in the globalised world than it did in the past. An educated work force makes it easier to train and acquire new skills and technologies required for productivity growth. Thus, contribution of literacy will be substantial on yield growth and domestic supply of food (Mittal and Kumar, 2000).

2. Integrated Nutrient Management: Attention should be given to balanced use of nutrients. Phosphorus deficiency is the most widespread soil fertility problem in both irrigated and un-irrigated areas. To improve the efficiency of fertiliser- use, what is really

needed is enhanced location-specific research on efficient fertiliser practices, improvement in soil testing services, development of improved fertiliser supply and distribution systems and development of physical and institutional infrastructure (Kumar and Desai, 1995).

3. Water for sustainable food security: India, being crop - based, needs to produce more and more from less and less of land and water resources. Alarming rates of ground water depletions and increasing environmental and social problems pose acute threats to humankind. Improved management of irrigation water is essential in enhancing production and productivity, food security, poverty alleviation. In India, water availability per capita was over 5000 cubic metres per annum in 1950. It stood at around 2000 cubic metres during 2001 and was projected to decline to 1500 cubic metres by 2005. Further, the quality of available water is deteriorating faster (Kumar, 2001). Agriculture is the biggest user of water accounting for about 80 per cent of the water withdrawals. There are pressures for diverting water from agriculture to other sectors. It has been projected that availability of water for agriculture use in India may be reduced by 21 per cent by 2020, resulting in drop of yields of irrigated crops, especially rice, leading to price rise and threat to food security of the poor. The needs of other sectors for water cannot be ignored. As a result, it is necessary that an integrated water use policy is formulated and judiciously implemented.

4. Enhancing yield of major commodities: The yield of major crops and livestock commodities must be increased. There is a need to strengthen adaptive research and technology, assessment and refinement capabilities of the country so that the existing gaps in technology can be bridged. For this, an appropriate network of extension service will have to be created to stimulate and encourage both top-down and bottom-up flow of information among farmers, extension workers and researchers. The agronomic and soil research need to be intensified to deal with the area-specific problems as decelerating productivity growth in the major production systems. Research on coarse grains, pulses and oil seeds must achieve a production breakthrough. Hybrid rice, single cross hybrids of maize and pigeon pea hybrids offer new opportunities. Soybean,

sunflower and oil palm will help in meeting the future oil demands successfully. Forest cover must be preserved to keep off climatic disturbances and provide adequate fuel and fodder. Milk, meat and draught capacity of our animals need to be improved through management practices.

5. Increase in productivity: It is imperative for India to maintain a steady growth rate in productivity. As productivity increases, the cost of production decreases and the prices also decrease and stabilises. Both producer and consumer share the benefits. The fall in food prices will benefit the urban and rural poor more than upper income groups, because the former spends a much larger proportion of their income on cereals than the latter. All the efforts need to be concentrated on accelerating growth in productivity, whilst conserving natural resources and promoting ecological integrity of agricultural system. More than half of the required growth in yield to meet the target of demand must be met from research efforts by developing area-specific and low input use technologies with emphasis on the regions where the current yields are below the national average yield.

6. Making dry areas as green: Resource - poor farmers in the rain-fed ecosystems practise less intensive agriculture; they depend on local agriculture for their livelihood and benefit little from increased food production in the irrigated areas. To help them, efforts must be increased to disseminate the available dry land technologies and to generate new ones. Farming system research to develop location-specific technologies must be intensified in the rain fed-areas. (Singh et al, 2002). The Government of India has already extended high priority to watershed development programmes in rain-fed areas.

7. Emphasis on empowering small farmers: Contribution of small farm holders in securing food for the growing population has increased considerably even though they are the most insecure and vulnerable group in the society. Some definite human resource and skill development programme will make them better decision-makers and highly productive. Human resource development for increasing productivity of these small farm holders should be given high priority. Thus, awareness generation and skill development

of rural people in both agriculture and non agriculture are essential for achieving economic and social goals.

8. Targeted programmes: Raising agricultural productivity requires continuing investment in human resource development, agricultural research and development, improved access to information, better extension services and infrastructural development. Identification of need-based productive programmes are very critical. There is a need to develop demand-driven and area-specific programmes to meet the requirements of food and nutritional security of vulnerable population in the rural areas. Improved technology for agriculture, irrigation and livestock and higher literacy levels are the most important instruments for improving food and nutritional security of the farm households. Watershed development and water-saving techniques will have far-reaching implications in increasing agricultural production in rain-fed areas. Livestock sector should be given high priority with multiple objectives of diversifying agriculture, raising income and meeting the nutritional security of the poor farm households.

9. Safety net to small farmers and the poor: With the advent of globalisation and liberalisation reform and the WTO regime, the small farmers are liable to be more vulnerable and disadvantaged by the sheer scale of economy. Necessary safety nets need to be built in the structural adjustment processes. The policy of minimum guarantee prices, subsidy on food and some degree of subsidisation in modern inputs need to be guaranteed for small farmers and the rural poor.

   The direct food and nutrition support for the poor through a minimum safety net should be properly balanced with improvements in the quality of life of local people through investments in education, drinking water and sanitation, and health care. Further, future food security programmes should have a broad objective of increased agricultural production and enhanced access to food through a participatory approach of local people with emphasis on resource efficiency, social equity and preservation of the environment (George, 1996).

10. Support for risk management: Small farmers not only have few resources to invest, but also face higher level of risk in any capital

investment, as compared to wealthy farmers. The small farmers can be prevented to take extreme steps by creating the necessary policy environment to reduce risk, like diversification, generation of new livelihoods, off-farm income, institutional support, access to information, technology, inputs, credit and crop insurance.

India and most of the countries in South Asia have concentrated on enhanced production of a few food commodities like rice and wheat, which could quickly contribute to their total food agricultural production. The rice-wheat based cropping system, spread in the most fertile areas, is the backbone of food security in South Asia. All the efforts in the future have to be concentrated on breaking the yield plateau by conserving natural resources and promoting ecological integrity of the agricultural system. Producing more with less of inputs will be the major challenge in the next two decades. Research problems in the rain-fed unfavourable ecosystems and breaking of the current irrigated yield ceilings are more complex and challenging. To make headway in them will require mobilisation of the best of science and the best of scientists in the National Agricultural Research System. This needs higher investment in agricultural research.

An integrated approach of developing crop varieties with greater efficiency in utilisation of nutrients and other natural resources, ameliorating soil-related problems, incorporation of legumes in the cropping systems and enhancing water-use efficiency will be required to develop area-specific management practices to improve the factor productivity growth in the rice-wheat system. Legumes play an important role in improving the sustainability of the system. Ironically, rice and wheat have replaced the principal legumes over a period of time. With the availability of high-yielding and short duration varieties of improved legumes, there is a need to incorporate them in the rice-wheat cropping system to improve its sustainability. Therefore, future rate of investment in agricultural research will be the driving force for productivity growth in India.

Conclusion

Indian agriculture is facing a policy paradox. In order to be effective, the food security policy must evolve as a basic element of a social security policy with proper coordination among the various government departments, private sector and non-government organisations.

Centralised and state-level anti-poverty schemes should give way to local initiative and local participation based on the principles of efficiency, equity and environmental conservation.

India is the major producer and consumer of food in the South Asian region and possesses huge potential that remains highly under-realised. Therefore, India has to play a major role not only to maintain its own self-sufficiency in food production but also to meet the additional requirement of its neighbouring countries. The right research priorities and production strategies will promote future growth in agriculture and ensure sustainable food and nutritional security.

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