

# Improvising Green Growth through Agri-Organic and Biotech Innovations for Sustainable Development

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**Abstract**— Organic agriculture is the oldest form of agriculture and organic agribusiness is expanding fast worldwide. As green growth promoter it offers some solutions to the problems currently besetting the agricultural sector and sustainability. Organic farming has the sound potential to provide benefits in terms of promotion of green growth, mitigation & adaptation of climate war, environmental protection, conservation of non-renewable resources, improved food quality and livelihood security. The research work focuses mainly on the integrated issues like economic security, livelihood security, food security green growth and sustainability. In most developing countries, agriculture continues to be the most important sector of the economy, accounting for the biggest proportion of employment (Båge, 2005). As such, unless effective strategies for agriculture development are successfully implemented, ending rural poverty will remain a distant goal. With regards to Organic agriculture contribution to improvements in livelihood security, food security, and environmental sustainability, the linkages are fairly well-defined and there is sufficient empirical and anecdotal data to support these. Organic agriculture contribution to improved profitability and therefore income, due to premium price and lower cost of production, is widely documented. Organic agriculture contribution to environmental sustainability is now a generally known fact and has been the main basis for subsidies program to support Organic agriculture in Overall, it is concluded that the unit cost of production is lower in organic farming.

**Index Terms**— Biotechnological innovations, decentralization planning Green growth, Intensive agriculture, Inclusive development, micronutrients, Organic agriculture Sustainable development

## 1. INTRODUCTION

Of the world's 1.09 billion extremely poor people, about 74 % or 810 million live in marginal areas and rely on small-scale agriculture for their livelihood. India is mainly an agricultural country, where agriculture contributes to about 14.6 percent in gross domestic product (GDP) and support over 58 percent of nation's population for livelihood (GOI, 2010). Promoting the organic agriculture is of paramount importance to protect biodiversity and cultural diversity of India. In most developing countries, agriculture continues to be the most important sector of the economy, accounting for the biggest proportion of employment (Båge, 2005). India is the seventh-largest country by geographical area, the second-most populous country with over 1.2 billion people, and the most populous democracy in the world. The Indian economy is agriculture based, is the world's tenth largest economy by nominal GDP and fourth largest economy by purchasing power

parity. Following market-based economic reforms in 1991, India has become one of the fastest growing major economies, and is considered a newly industrialized country; however, it continues to face the challenges of poverty, illiteracy, corruption and inadequate public health. **Seventy two percent (72%) of India's population lives in villages and is dependent on agriculture based economy.** It is this segment which has not progressed as much as their counterparts in cities, including those who migrated to the cities in the past few years when the liberalization of economy resulted in good growth of the country as a whole. In fact the slow progress rate and lack of opportunities in the villages has caused mass migration to the cities, resulting in overcrowding there too. Thus the poor and not so well educated, have been the worst sufferers whether in villages or in the cities. Unfortunately, anyone and everyone who got educated have been looking for greener pastures, not in the villages, but in the maze of high-rise buildings.

For Mahatma Gandhi, a free India meant the existence of thousands of self-sufficient small communities who rule themselves without hindering others. Presently this has remained a utopia. The lopsided development process needs to

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be corrected by taking the education to the village poor and giving them access to the latest in technology, so as to enable them and empower them. Rural development implies both the economic betterment of people as well as greater social transformation. In order to provide the rural people with better prospects for economic development, increased participation of people in the rural development programmes, decentralization of planning, better enforcement of agriculture & land reforms and greater access to credit are envisaged by the Government of India under its various schemes for rural development. Here again, the main hindering factor remains the correct knowledge dissemination at every level.

## 2 ORGANIC FARMING AND GREEN GROWTH

Organic agriculture avoids nutrient exploitation and increases soil organic matter content. The soil organic carbon (SOC) in cultivated soils is less than 5 mg g<sup>-1</sup> compared to 15-20 mg g<sup>-1</sup> in uncultivated soils. This available potential of 10-15 mg g<sup>-1</sup> soil-C sink could balance net emission from fossil fuel combustion. In consequence soils under organic farming capture and store more water than soils under conventional cultivation (Niggli et al. 2008). In the modern period economic security often affected by the worst economic downturn, the organic industry has remained in positive growth territory and has come out of the recession hiring employees, adding farmers, and increasing revenue. The organic industry has grown from \$3.6 billion in 1997 to \$29 billion in 2010, with an annual growth rate of 19 percent from 1997-2008. The organic agriculture sector grew by 8 percent in 2010. Organic farms bring economic benefits to their communities by providing expanding employment opportunities. The latest data indicate that 96 percent of organic operations nation-wide are planning to maintain or increase employment levels in 2011. Organic farms hired an average of 61 year-round employees compared with 28 year-round employees hired on conventional farms, according to a recent survey of organic and conventional farmers in Georgia, North Carolina, South Carolina, Alabama, and Mississippi. Organic farming requires over 15% more labor than traditional farming and therefore provides rural job

opportunities (Pimental et al., 2005). Some of the commonly used organic farming techniques such as strip farming, non-chemical weeding, and production, collection and transportation of organic supplements all requires significant labor. The labor scarcity and cost involved therein, may constrain adoption of organic farming in developed countries and also for cash-poor farmers in developing countries. However, for countries like India, labor as well as the cost involved therein is not a constraint. Instead, organic farming can generate employment opportunity for a vast section of rural communities. In India, women constitute an important component of labor work force in agriculture. The organic farming has made credible performance in the current decade that is playing balancing role to the ill effects of chemical agriculture. The 11<sup>th</sup> five year plan documents and the report of National Farmers Commission have strongly recommended organic farming as a viable tool for evergreen revolution that will promote green growth.

## 3 INCLUSIVE OR HARMONIOUS DEVELOPMENT

Inclusive or harmonious development is recognized as one of the most important goals of socio-economic development in most of the developing countries whether India, China, Brazil or South Africa. There are several ways of conceptualizing inclusion by: serving their needs through public interventions; drawing upon their skills and resources in developmental programmes; building their skills base so that they get absorbed in emerging private or public economic ventures; or by enabling them to take up entrepreneurial ventures. Inclusion can thus take place by treating economically poor and disadvantaged people as:

1. Consumer of public policy of assistance and aid for basic needs,
2. Consumer of products at low cost made by large corporations or state or other enterprises.
3. Building their capacity to produce what they already know and do; and/or
4. Enabling them to convert their innovations and outstanding traditional knowledge either as such, or by blending /bundling it with knowledge of

others, into products marked by them or other enterprises.

5. Linkage with modern institutions of R&D to receive technologies or products developed by them.
6. Adding value to their knowledge, innovation or practices for developing new products/services for eventual diffusion through commercial or non-commercial channels can also help inclusion.

One of the most important means of expanding inclusion is to expand the public domain. Local innovators alone or in groups, explore the potential of using either available knowledge and/or resources to generate new solutions for wider use has been of much importance. How social networks propel some to give up, and embolden others to overcome the same constraints through innovations or creative use of traditional knowledge needs to be understood better to expand people's choices. Most such individuals or communities do not try to restrict the diffusion of their innovations to their kith and kins but share their ideas widely with outsiders for promoting further innovation and diffusion, in almost an open source manner.

In this extension & development project, instead of treating disadvantaged people as a 'sink' of assistance, aid or low cost externally manufactured products, they are treated as 'source' of ideas, innovations and unique traditional knowledge which can generate opportunities for livelihood as well as meeting larger societal needs. *Poor as Providers* is a concept that is contrary to the vision of treating them only as consumers. There is no doubt that not all disadvantaged people are creative or innovative so as to solve their problems on their own optimally or even sub-optimally. But some indeed are very creative. And for many of them, innovation is imperative. Prakriti Bharti has mobilised numerous of innovations and traditional knowledge practices all over the country. Many of these have been diffused with or without value addition or business development support in local languages through various media.

#### 4 POTENTIAL AREAS & INITIATIVES

##### 1. Soil Fertility & Soil Health Mission

India is the third largest producer and consumer of fertilizers in the world, after China and USA. It accounts for 12.2% of the world's production of nitrogenous (N) and phosphatic (P) nutrients and 12.6% of the world's consumption of NP & K (Potash) nutrients. However, India's consumption of nutrients per hectare (112.3 kg/ha of arable land in 2006-07) was marginally above the world average of 101 kg/ha (2004-05) and lower than consumption of these nutrients by most of the developing countries, including neighboring countries like China (277.7kg/ha), Bangladesh (177.5kg/ha), Sri Lanka (310.3 kg/ha) and Pakistan (138.9 kg/ha). Fertilizer consumption in India is highly skewed, with wide inter-state, inter-district and inter-crop variations. The NPK ratio, which is a measure of balanced use of fertilizer, shows wide inter-zonal and inter-state disparity.

While existing variation from the ideal ratio is nominal in the South and the East zones, it is very wide in the North and the West zones. ICAR studies indicate that partial factor productivity of fertilizers (i.e. additional kg of Salient Features of The National Project on Management of Soil Health and Fertility food grain production per kg of nutrient applied) has been continuously declining. Indian soils not only show deficiency of NPK but also of secondary nutrients (Sulphur, Calcium and Magnesium) and micro nutrients (Boron, Zinc, Copper and Iron etc.) in most parts of the country. Besides the three primary nutrients (N, P, K), deficiency of Sulphur and micro nutrients like Zinc and Boron in many of States, and of Iron, Manganese and Molybdenum in some States, has become a limiting factor in increasing food productivity. Intensive agriculture, while increasing food production, has caused second generation problems in respect of nutrient imbalance. Some such problems include:

- Greater mining of soil nutrients to the extent of 10 million tonnes every year depleting soil fertility,
- Emerging deficiencies of secondary and micronutrients,
- Decline of water table and its quality of water,
- Decreasing organic carbon content, and
- Overall deterioration in soil health.

##### 5 ORGANIC FARMING PROGRAMME

As per a survey certified organic farms in spite of the reduction in crop productivity by 9.2%, provided higher net profit to farmers by 22.0% compared to conventional farming. This was mainly due to the availability of premium price (20–40%) for the certified organic produce and reduction in the cost of cultivation by 11.7%. In cases, where such premium prices were not available and the cost of cultivation was higher primarily due to purchased off-farm inputs, organic farming was not found economically feasible. However, there was an overall improvement in soil quality in terms of various parameters, viz. physical, chemical, biological properties, availability of macro- and micronutrients, indicating an enhanced soil health and sustainability of crop production in organic farming systems. Organically managed farms recorded lower productivity and yield losses but there was an overall improvement in soil quality parameters, indicating better soil health. It is economically feasible to practice organic farming when the farmers are able to get premium price for their produce and with the reduced cost of cultivation by not depending upon the purchased off-farm inputs. Low productivity in organic farming highlights needs in the current international and national research activities. European countries, leaders in organic agriculture research, spend approximately €60 million per year on specific problems of organic food and farming<sup>27</sup>. Similar research efforts are required to improve the productivity of organic crops under Indian conditions. It is also worth examining the status of organic farming in different production systems and farming situations of the country with sufficient number of farms in each case for better appreciation of organic farming and to formulate research projects on a sound scientific basis.

## 6 STRATEGY FOR FOCUSED APPROACH

Deteriorating soil health, declining input use efficiency and growing imbalances in soil and environment necessitate development and adoption of environment friendly technologies. Soil health

assessment from organic and biological perspective and identification of key soil health indicators require attention. To give support to organic farming at its present stage, it is important to create technical capacity, generate scientific knowledge and identify constraints and strategies to overcome them. It is essential that organic farming promotion and technical capacity building is taken up with major focus on:

1. Scientific knowledge and technical capacity building;
2. Production, promotion and quality control of organic inputs;
3. Soil health assessment from organic and biological perspective;
4. Technology development and information generation through research and its dissemination;
5. Strengthening product quality assurance system; and
6. Mass awareness creation through print and electronic media.

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