



Organic Farming Beneficial to Biodiversity Conservation, Rural Livelihood and Nutritional Security

KEYWORDS

Biotechnological innovations, decentralization planning Green growth, Intensive agriculture, Inclusive development, micronutrients, Organic agriculture Sustainable development

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ABSTRACT *Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes, the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. Organic farming emerged as a potential alternative for meeting food demand, maintaining soil fertility and increasing soil carbon pool. Organic production systems are particularly suitable to smallholder farmers as these systems depend on the sustainable use of local resources and on farmers' traditional knowledge and social networks. The shift to organic farming also offers health benefits for consumers and contributes to biodiversity conservation and climate change mitigation. Food security as a priority for organics may also involve enabling women's empowerment since they hold a central role in providing nutrition for the household.*

1. Introduction

Organic farming is the oldest as well as the most modern system of agriculture. Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes, the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems.

The recent economic and trade liberalization are exerting heavy pressure on India's land resource partitioning in sectors such as forestry, agriculture, pasture lands, human settlements and industries. Thus, the coupled effect of meeting food demand under limited arable area and toxin-free agricultural produce have become an important forcing factor for countries like ours to explore possibilities for opting 'conventional agriculture', the dominant farming approach promoted by most government and agribusiness groups throughout the world or 'organic agriculture' a holistic production management system which is supportive to environment, health and sustainability. Organic farming system emphasis on the use of organic matter for enhancing soil properties, minimizing food chain associated health hazards and attaining closed nutrient cycles, the key factors for sustainable agriculture (Cardelli et al., 2004). According to the International Federation of Organic Agriculture Movement (Willer et al., 2008) the major objectives of organic farming include:

- Production of high quality food in sufficient quantity in harmony with natural systems and cycles,
- Enhancing biological cycles within the farming system involving microorganisms, soil flora and fauna, plants and animals,
- Maintaining long-term soil fertility and genetic diversity of the production system and its surroundings including plant and wildlife,
- Promoting healthy use with proper care of water resources and all life therein,
- Creating harmonious balance between crop production and animal husbandry, and
- Minimizing all forms of pollution.

Organic farms although yield on an average 10-15% less than conventional farms, the lower yields are balanced by

lower input costs and higher margins. Its annual growth rate has been about 20% for the last decade (Lotter, 2003). Organic agriculture is now being practiced in more than 130 countries with a total area of 30.4 million hectare, about 0.65% of total agricultural land of the world (Willer et al., 2008). With respect to the area under organic agriculture, Australia occupies the prime position followed by China, Argentina, USA, Italy and many other countries (Willer et al., 2008).

India, although comes at second place with respect to total number of certified organic farms (44,926), occupies 13th position as far as the area under organic agriculture concerns. In India, about 528,171 hectare area is under organic agriculture (including certified and area under organic conversion) accounting for about 0.3% of total agricultural land. Despite the economic boom our country is witnessing from last few decades, there remain three important and interrelated issues that need serious concern for agriculture sector:

- Although the cereal production increased over 4.5 folds during last 60 yrs (Lal, 2004), our country need to meet the expected food demand of 300 million tons of cereals by 2050 from continuously shrinking land resources,
- There is rapid degradation of water and land resources leading to reduction of use efficiency of fertilizer, irrigation, tillage etc, along with rising emission of pollutants and greenhouse gases, and
- Agricultural release of toxic chemicals, contamination of food stuffs and associated health problems.

The cropland areas represent over 60% of the total land area in the country although a major portion of land is divided in small farm holders (Lal, 2004). The country is undergoing rapid industrialization and urban growth and consequently minimizing the possibility of expansion of cropland area. Furthermore, the urgency of meeting demand of agricultural produce and by implication, the increased fertility mining practices such as residue removal, imbalance application of plant nutrients, uncontrolled and excessive grazing are exacerbating the soil degradation.

Organic farming emerged as a potential alternative for meeting food demand, maintaining soil fertility and increasing soil carbon pool. However, Indian organic farming

industry is almost entirely export oriented, running as contract farming under financial agreement with contracting firms, and as per the latest report (Ramesh et al., 2010), about 585,970 tones of organic products worth US\$ 6.8 million are being exported from India. Most of the farmers are opting organic farming due to price margins which may shift motive of the commercial farmers towards economic vantage rather than for safe agricultural produce to competitively discourage small farm holders. Additionally, limitations regarding bulk availability of organic supplements further constrain organic farming in India. Despite these issues, the increasing market demand and institutional support coupled with growing inclination of farmers to go organic have resulted in rapid growth in certified organic area during last 2-3 years. The objective of this review is to assess the status and potential of organic farming and the constraints therein impeding the adoption of this sustainable agricultural practice in India. Organic farming is well recognized for its contribution to improving food security and alleviating poverty, proactively creating new local and export markets, and driving sustainable rural development through the empowerment of farmers and their organizations.

Organic production systems are particularly suitable to smallholder farmers as these systems depend on the sustainable use of local resources and on farmers' traditional knowledge and social networks. The shift to organic farming also offers health benefits for consumers and contributes to biodiversity conservation and climate change mitigation. Food security as a priority for organics may also involve enabling women's empowerment since they hold a central role in providing nutrition for the household (IFOAM, 2009). The ecological, social and economic benefits of organic farming are also recognized by IFAD.

Organic farming systems have attracted increasing attention over the last one decade because they are perceived to offer some solutions to the problems currently besetting the agricultural sector. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of nonrenewable resources and improved food quality. Countries like Europe have recognized and responded to these potential benefits by encouraging farmers to adopt organic farming practices, either directly through financial incentives or indirectly through support for research, extension and marketing initiatives. As a consequence, the organic sector throughout Europe is expanded rapidly (24% of world's organic land). But, in the developing countries like India, the share is around 2 per cent only (included certified and wildlife). However, there is considerable latent interest among farmers in conversion to organic farming in India. Organic farming systems have attracted increasing attention over the last one decade because they are perceived to offer some solutions to the problems currently besetting the agricultural sector. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of nonrenewable resources and improved food quality.

2. The research study

An organic farming system grows on the inherent equilibrium in nature. On an average organic area shows 30 percent more species and 50 percent more individual (Bengtsson, J 2005). Rare plant species are also frequently & highly noticed in higher density on organic farms. The research study is being undertaken in an integrated manner with the help of substantial and extensive fieldwork. Quantitative and qualitative methodologies are applied to determine the potential contribution of organic farming to nutritional food & livelihood security. Quantitative methodologies included household surveys while qualitative methodologies involved group sustainable livelihoods analyses.

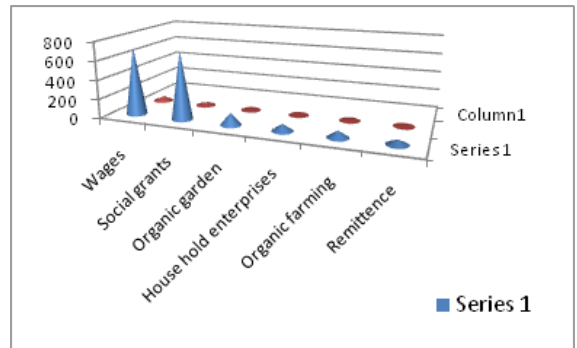


Fig-1: Column graph monthly household income vs. contribution of income sources to total household

3. Working with the Nature

More diversified farm structure and rotation supports most insect pests have natural enemies to keep their population check. Natural enemies include insect predators (insects that consume part or all of pest insects), parasites (insects that use other insects to produce their offspring, thereby killing the pest insect in the process), and pathogens (diseases that kill or decrease the growth rate of insect pests). Predatory insects on organic farms include lady beetles, lacewings, and spiders. Parasitic insects include wasps and flies that lay their eggs in/on pest insects, such as larvae or caterpillars. Beneficial insects exist naturally on farms; or they can be purchased from commercial insectaries and released seasonally.

4. Multiple Tactics Work Best

High biodiversity promotes higher pollination and balances ratio of harmful and beneficial insects. Weed management is key to a successful organic crop. Most organic farmers rely on multiple tactics for their weed management. Allelopathic crops, cultivation, mulching, and flame burning are methods available to organic farmers. Depending on the crop, cultivation offers the least labor intensive method of weed management. Timely cultivation is important otherwise weeds will proliferate without specific schedules. Biodynamic preparations, agnihotra and different traditional organic practices including mulching with straw or wood chips are a common practice in many horticultural operations..

5. Advantages of Organic Farming

Organic farming is more cost effective. It reduces the production cost by about 25-30%, because it does not involve the use of synthetic fertilizers and pesticides. Some are as follows:

- It retains 40% more top soil, thus increasing the crop yield up to five-fold within five years.
- Organic farming is more profitable because it reduces water use, nutrient-contamination by pesticides, and reduced soil erosion.
- It also enables the farmers to use the soil for a longer period of time to grow crops as soil fertility is maintained for a long time.
- Cattle grazing on organic farmlands have been found to be less prone to diseases, and they yield more healthy milk.
- Products or foodstuffs produced from organic farming do not contain any sort of artificial flavors or preservatives.
- Due to the absence of synthetic fertilizers and pesticides, the original nutritional content of food is preserved.
- Organic farming also helps reduce the occurrence of many ailments, and speeds the recovery process by boosting the immune system.

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6. Nutritional food security

The primary concern of all organized communities and civilized societies is to meet the food requirements of its people. The cultivated area, required to maintain the present level of food grain production in India without using the fertilizers, reaches more than the total geographical area of the country. At present, there is a gap of nearly 10 million tons between annual addition and removal of nutrients by crops which are met by mining nutrients from soil. A negative balance of about 8 mt of NPK is foreseen by 2020, even if we continue to use chemical fertilizers, maintaining present growth rates of production and consumption.

There is an urgent need to compare the quality of organically produced food with conventionally produced food. There appears to be a widespread perception among consumers that organically produced foods are of superior nutritional quality. However, to prove or disapprove this contention, very limited research has been conducted, and whatever meager scientific data is available, is often out-dated or based on inadequate study designs, lacking proper controls. In view of this, the following points merit consideration. No clear-cut evidence is available to support consumer perceptions regarding potential health benefits of organic foods. An in-depth research on quality aspects is required to arrive at any valid acceptable conclusion.

- Valid nutritional quality comparisons between organic and conventional food requires that plants be cultivated in similar soils, under identical climatic conditions, be sampled at the same time, pretreated similarly, and analyzed by validated methods.
- Well-designed controlled studies in animal models and human subjects are needed.
- It is also necessary to undertake well-controlled studies to evaluate sensory properties, shelf life, and nutrient load of organic produce *vis-à-vis* produce from the conventional farming techniques.
- More importantly, organically and conventionally produced food should also be analyzed for pesticide residues and microbiological safety i.e., presence of pathogenic organisms which could pose health hazards.

7. Livelihood security

A livelihood comprises the abilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities to the next generation; and contribute net benefits to other livelihoods at the local and global levels in the long and in the short term.

Ability will be adequate to provide livelihood only if there exists a favorable constellation of circumstances including the materials needed to put those abilities to use, the existence of a market for the eventual product or service produced etc. Assets include land, equipment, animals and money – assets that a person may legally possess, his/her rights to natural resources around him/her and access to public goods and services. The rights to use or to access common property resources such as forests, rivers and ponds, etc, are defined in tradition and modified by institutions of social custom and law. Activities are to be understood in the sense of individual and group activities that transform materials using the abilities and resources to produce goods and or services that can be exchanged for a price.

A rights-based approach to livelihoods is consistent with the modern acceptance of the universality of human rights. This acceptance is symbolized in numerous charters and declarations of the United Nations. There has been much discussion in civil society in India about the fundamental right to work. In summary, the rights-based approach would assert that everyone has a right to a livelihood consistent with human dignity and attempt to ensure that the state takes necessary action for enabling every citizen to enjoy this right.

In the meanwhile, constructive work to promote livelihoods enhancement can bring significant benefit to the millions of rural and urban poor and marginalized people. The situation regarding assets distribution is very complicated and often regarded as an unchangeable constraint. While abilities make the task easier, the poor in the rural and the urban setting need to act in some chosen manner to meet their basic needs.

In this research study livelihood is a focused activity. The word livelihood is used here for an occupation or engagement that provides lawful and gainful employment and a sufficient income to meet the basic food needs of a family.

8. The Need for Livelihoods

The need for the enhancement of livelihoods arises because the current overall endowments of the factors of production, distribution of productive assets and productive abilities are grossly out of alignment with what is needed. The economy is not in a position to automatically generate livelihoods for all those who seek it. Our country has surplus labor power and also insufficient investible capital. A large proportion of the people who need to get work are uneducated, unskilled and without any capital.. They can lift and carry things, but they are not trained for much else. And the numbers are burgeoning. For instance, during the decade of the 1980s, India's own population rose by 16 crore (from 68 crore in 1981 to 84 crore in 1991). All these people, plus migrants from other countries are now in an age group that require livelihoods. The quality of livelihoods sought also varies. Of these 160 million people, there are millions of youth in urban as well as rural areas who are literate but do not have saleable skills.

The problem of livelihoods is thrown up clearly because in the current organization of the economy there is insufficient productive work that can profitably engage the energies of the surplus labor of this kind in the country. The emerging economic trends in the country do not portend a very comfortable future on the livelihoods front. The situation regarding rural and urban livelihoods is shaped by several developments in the country. Many of these make the task of creating livelihoods an increasing challenge.

9. Conclusion

Organic agriculture is a holistic production and management system which is supportive to environment, health and sustainability. 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).

Most of the conventional farmers in the researched region showed little confidence in the future of farming, as decreasing net returns and increasing indebtedness jeopardized the economic viability of their farms. Accordingly, the main motivation of those who converted to organic farming was to secure and improve their livelihoods by improving soil fertility in order to stabilize yields, reducing production costs, get-

ting access to markets with higher prices and reducing their dependency on loans and money lenders. While adopters of organic farming perceived the long-term outcomes mainly as positive, during the transitional phase most of them were confronted with income losses and additional workload. In the initial 2–3 years of conversion, yields usually dropped by 10–50%, and the reduced production costs and the organic price premium were not sufficient to compensate for lower revenues. In the initial years of the project, therefore mainly wealthier farmers and farmers who were leaders in their community adopted organic farming, while marginal farmers hesitated to take the risk of conversion.

Managing the economic constraints of the conversion period emerged as an important entrance barrier to organic farming, especially for small and resource-poor farmers. In the long-term, however, smallholders are likely to be better off in the organic farming system, as they can substitute expensive off-farm inputs with farm-own resources and underutilized family labor. Lower production costs and stabilized incomes help them to reduce their vulnerability to drought and market price fluctuations. Eventually, the improved economic perfor-

mance enables them to get out of the previous debt-cycle and to re-invest in agricultural intensification and in diversifying their livelihood base. This not only improves their quality of life, but also their social status in the village.

The relatively large number of farmers who dropped out of the organic farmers group because they had used banned inputs demonstrates that not all farmers who once decided to convert to organic farming stick to this system. The fact that mostly farmers of high socio-economic status defaulted indicates that an opportunistic calculus is involved. At the same time, the particularly high indebtedness among defaulting farmers seems to stimulate opportunistic behavior.

The strong spread of coarse crops in the region further tempted many farmers to try out the alternative technology in order to reap fast benefits. In addition, defaulting farmers were probably less suited for organic farming in the long term, as they had lower availability of cattle and labor. In order to be sustainable, organic initiatives therefore need to select suitable farmers and strengthen their commitment to the organic farming system.

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