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Organic Farming: Approaches and Possibilities in the Context of Indian Agriculture



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Introduction

During the era of Green Revolution, introduction of high-yielding varieties, extension of irrigated areas, use of high analysis NPK fertilisers and increase in cropping intensity, propelled India towards self-sufficiency in food production. In the process, relative contribution of organic manures as a source of plant nutrients *vis-à-vis* chemical fertilisers declined substantially. With increase in cost of production inputs, inorganic fertilisers became increasingly more expensive. Another issue of great concern was the sustainability of soil productivity as land began to be intensively tilled to produce higher yields under multiple and intensive cropping systems. Waterlogging and secondary salinisation have been the banes associated with excess and irrational irrigation. Groundwater table declined sharply as more and more deep bore wells were drilled. Recharging of groundwater has also been reduced due to severe deforestation. Indiscriminate use of chemical pesticides to control various insect pests and diseases over the years, has destroyed many naturally occurring effective biological control agents. An increase in resistance of insect pests to chemical pesticides has also been noticed. Health hazards associated with intensive modern agriculture, such as pesticides residues in food products and groundwater contamination are matter of concern. The occurrence of multinutrient deficiencies and overall decline in the productive capacity of the soil due to nonjudicious fertiliser use, have been widely reported. Such concerns and problems posed by modern-day agriculture gave birth to new concepts in farming, such as organic farming, natural farming, biodynamic agriculture, do-nothing agriculture, ecofarming, etc. The essential feature of such farming practices imply, i.e., back to nature.

Organic Farming and Countrys' Food Security

The primary concern of all organised communities and civilised societies is to meet the food requirements of its people. The cultivated area, required to maintain the present level of foodgrain production in India without using the fertilisers, reaches more than the total geographical area of the country. At present, there is a gap of nearly 10 million tonnes 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 in 2020, even if we continue to use chemical fertilisers, maintaining present growth rates of production and consumption. The most optimistic estimates at present, show that only about 25-30 per cent nutrient needs of Indian agriculture can be met by utilising various organic sources. It is proved beyond doubt that on long-term basis, conjoint application of inorganic fertilisers along with various organic sources is capable of sustaining higher crop productivity, improving soil quality and soil productivity. The organic sources should be used in integration with chemical fertilisers to narrow down the gap between addition and removal of nutrients by crops as well as to sustain soil quality and to achieve higher crop productivity. The food security demand of the country requires that inorganic fertilisers be used in balanced doses.

Issues

Organic farming has the twin objective of the system being sustainable and environmentally benign. In order to achieve these two goals, it has developed some rules and standards which must be strictly adhered to. There is a very little scope for change and

flexibility. Organic farming thus, does not require best use of options available but the best use of approved options. These options are usually more complex and less effective than the conventional ones. The philosophy of the proponents of organic farming presents considerable difficulty to the scientists as the organic movement generally resists the comparisons between the two systems.

The organic farming movement presents a challenge to the scientists who cannot and would not want to abandon a scientific approach. The present lower productivity of the system is a result of constraints that its practitioners have put upon themselves. Difficulty faced is with evangelising statements, that the products of the organic farming system—food and fibre—are in some way better than those from conventional agriculture. The Indian farmer should get the advantage of emerging global market on organic farming which is at present around 26 billion US dollars, and is expected to grow to 102 billion US dollars in 2010. Currently, 130 countries are producing certified organic products. A vast scope for promotion of organic farming in the export market, without compromising with the national food security exists in the country, as farming by tribals and under rainfed conditions is generally organic, since very little chemical inputs are used.

Organic farming as a concept/philosophy is well tested in some of the western countries, though the same is not unknown to most of the nations. But in the Indian context, it needs to be looked into more critically, seeking answers to the following questions: What level of crop productivity is acceptable? Is it suitable for a country like India with such a large population to feed or can it fit in the niche areas? Are available organic sources of plant nutrients sufficient for organic farming in the form it is advocated? Are organic farming technologies sustainable in the long run?

Various aspects relating to organic farming were addressed and discussed in a workshop organised by the NAAS.* Following issues were taken up:

- Redefining the concept of organic farming in Indian context.
- Opportunities and constraints in organic agriculture.
- Organic agriculture perspective and future challenges.
- Soil quality, biodiversity and fertility in organic farming system.
- Standards in organic farming and quality markers for organic produce.
- Setting up of certification and accreditation agencies for export.
- Setting up of testing units for soil and organic produce for chemical residues and quality control.

* NAAS organised a workshop under the Convenership of Prof. P.K. Chhonkar, Head of the Division, Soil Science and Agricultural Chemistry, IARI on 25th-26th November, 2004 at NAAS, New Delhi. The workshop was organised in a panel discussion mode bringing together about 50 experts having different shades of opinion on organic farming, ranging from those in fertiliser/pesticide industry to practicing organic farmers & NGOs promoting organic farming, on a single platform to discuss various issues relating to organic farming. A concept paper developed by the Convener was sent to the participants in advance to set the agenda for discussion. Various issues related to organic farming were discussed in six sessions spread over two days. Each session had a lead paper followed by a presentation from each of the panelists and open house discussion.

- Market development and assessment of organic produce for export.
- Evaluation of organic/biodynamic farming *vis-à-vis* integrated nutrient and pest management.
- Documentation and confirmation of existing Indigenous Technological Knowledge (ITK) on biodynamic farming.
- Development of biocontrol measures for various plant diseases and pests.
- Research agenda for comparing organic and conventional agriculture.
- Holistic approaches in organic farming research and development.

Recommendations

Major recommendations that emerged from the workshop are listed below:

1. Organic Farming: Prospects and Limitations

- For India with its ever increasing population, the sustainable agriculture has to be based on site-specific balanced and adequate fertilisation, and an integrated plant nutrient supply system (IPNS) involving organics, inorganics and biofertilisers. What the country needs today, is the conjunctive use of organic and inorganic sources of plant nutrients for sustainable productivity.
- Organic farming is a market demand-driven agriculture, aimed to cater to the foreign export and affluent section of the society in the country. However, in order to make a dent in the export market, we need to develop high-tech organic technology with strict quality control, meeting international quality standards prescribed for organic produce.
- Niches of the organic farming need to be identified. However, the real niches will be determined by the market infrastructure and the international links. The practice should be considered for lesser endowed regions of the country rather than in resource endowed regions which serve as the backbone of the country's food security.
- The availability of organic manures in adequate amounts and at costs affordable by the farmers is a major problem. The increased mechanisation has further reduced the availability of manures with the farmers and this problem will become more acute in future. In such circumstances, post-harvest residues should be utilised to the fullest extent. However, to accomplish this objective, feasible technologies are needed for *in situ* recycling/rapid composting of on-farm residues and wastes, in addition to extension efforts to change the mindset of the farmers. Possibilities of using non-traditional organic sources e.g., slaughter house waste, should be exploited to partly supplement, plant nutrient needs of the organic farming systems.
- Changing cropping patterns with area under legumes is going down, shrinking area under green manures due to economic considerations, and reduced availability of loppings from forests, seriously restricts wide scale use of green manures. Inclusion of legumes in intensive cereal-cereal production systems as short duration grain or forage crops, as substitute to one of the cereals or as break crops, needs to be promoted.

2. Organic Farming: Its Relevance to Indian Agriculture

- In Indian context, organic farming has to be practiced without synthetic pesticides, but complete exclusion of fertilisers may not be advisable under all situations. A holistic approach involving integrated nutrient management (INM), integrated pest management (IPM), enhanced input-use efficiency, and adoption of region-specific promising cropping systems would be the best organic farming strategy for India.
- As organic farming is attracting worldwide attention, and there is a potential for export of organic agricultural produce, this opportunity has to be tapped with adequate safeguards so that the interest of small and marginal farmers is not harmed.
- Organic farming may be practiced in crops, commodities and regions where the country has comparative advantage. To begin with, the practice of organic farming should be for low-volume high-value crops, like spices, medicinal plants etc., beside fruits and vegetables, for which R&D support is required.
- Organic farming should not be confined to the age old practice of using cattle dung, and other inputs of organic/biological origin, but an emphasis needs to be laid on the soil and crop management practices that enhance the population and efficiency of below-ground soil biodiversity to improve nutrient availability. Performance of cultural techniques for weed control and that of biopesticides for pest management need to be evaluated under field conditions, preferably under cultivators' management conditions. Besides the identification of regions suitable for the adoption of organic farming, the crops and their products should also be identified which are amenable for production through organic ways and have the potential to fetch a premium price in the international organic market.

3. Organic Farmers and NGOs

- Region-specific resource inventory, including animal wealth, farm residues/by products and their competitive uses, nonconventional nutrient sources of organic/biological origin etc., has to be prepared, for development of rational technology packages of organic farming.
- A strong technological back-up by scientific community should be provided in order to verify, confirm and further refine some selected ITKs like, *Agnihotra*, *Panchgavya*, pertaining to organic farming.
- Crop-specific and farming situation-specific package of practices for organic cultivation should be developed and after thorough on-farm validation, recommended for adoption. Such proven technology packages need to be documented in regional languages.
- Entrepreneurial potential with respect to production of organic inputs, processing and marketing of organic food should be fully exploited.

4. Trade and Certification Issues

- Certification of organic produce is an important issue that is central to organic production itself, as the prime goal of organic farming is and will be to fetch premium price in domestic and international market for the producers.
- For desired economic gains out of organic farming, the upcoming global market on organic produce has to be exploited, for which strict phytosanitary measures have to be followed.
- A strong research back up has to be put in place to develop and improve national standards for organic farming. The policy documents brought out so far by APEDA and DAC, including the report of Task Force on Organic Farming etc., should be considered in developing such scientifically sound standards, mainly for the crops and commodities that have export potential. The national standards should be the same for domestic market and for export.
- Weak links in the certification systems have to be identified and researchable areas flagged.
- Whereas organic certification will continue to be a process certification, strong research set-up/laboratories are required to monitor the quality of organic produce so as to prevent the sale of substandard material in the name of organic produce, and to save the interests of producers and consumers.
- Organic produce fetches premium price owing to better quality, and for credibility in the market it ought to be quality goods. Therefore, there should be adequate provision for their grading, packaging, storage and transportation. Marketing outlets on the lines of milk unions, may be established.
- There is a need to organise Producers' Cooperative Marketing Societies and establish credible marketing channels for steady flow of organic foods and materials in accordance with the demand, as also to safeguard the interest of small farmers opting for organic agriculture.

5. The Quality Aspects of Organic Food

- There is an urgent need to compare the quality of organically produced food with conventionally produced food. There appears to be a widespread perception amongst 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 meagre 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 analysed 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 analysed for pesticide residues and microbiological safety i.e., presence of pathogenic organisms which could pose health hazards.

6. Research Agenda

- Develop package of practices for integrated pest management for organic farming in different agroclimatic regions for specific crops involving components like bioinoculants, pheromones etc., among others.
- The issue of microbial contamination of food arising from the use of manures has to be addressed, and measures suggested to mitigate it.
- It is frequently documented that fertilisers and pesticides applied at recommended rates have had no adverse effect on soil biological activity, and that integrated farming systems are best for nutrient management, yield sustainability and soil biodiversity conservation. There is thus, a need to develop modern organic farming system integrating the best available options.
- There is a need to establish referral laboratories for analysis of pesticides, heavy metals and mycotoxins in the produce with appropriate accreditation to help organic farming movement. The maximum residue limits in organic food must be set in accordance with the CODEX standards.
- The Green Revolution technologies have been alleged to have caused depletion of soil organic carbon. The critical values of soil organic matter that can support the sustainable crop production under organic management have to be worked out.
- The patterns of rate and amount of nutrients released from various organic sources and their goodness of fit with the nutrient requirement of the crops at different growth stages need to be worked out. This information could be used in evolving appropriate nutrient management schedule, so as to ensure optimal nutrient supply to the crop at active physiological stages having peak nutrient demands.
- Allelopathic effects of various plant species need to be tapped, particularly for weed and pest management.