

Organic farming for sustainable agriculture: Global and indian perspective

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ABSTRACT

Organic farming is developing rapidly and is now practised in more than 120 countries of the world. Globally 30.4 million ha of the agricultural land, are currently managed organically. India ranks 33rd in total area under organic cultivation. India has now become a leading supplier of organic herbs, organic spices, organic basmati rice, etc to the developed nations. The export realization during 2007 - 08 was around 78 million US \$ registering a 200 % growth over the previous year. Though organic farming is an inevitable phenomenon, it alone cannot feed the billion population of India. To ensure the food and nutritional security, rather than promoting organic farming *enmasse* and universally, it would be desirable to carefully delineate areas for organic farming. In India, there is ample scope for pure organic farming in the rainfed areas, where there is little or no use of fertilisers and other agro-chemicals. The Government of India has taken considerable efforts to promote the organic farming without compromising the food grain production to feed the ever growing population in India. Launching of "National Programme for Organic Production" (NPOP) and the dedication of "National Institute of Organic Farming" (NIOF) were the landmark achievements in the arena of organic farming in India.

Key words: Agriculture, Organic farming, Perspective.

Green revolution of India has undoubtedly changed the scenario of food grain production from 'ship-to-mouth' status to self-sufficient and surplus status. The food grain production in India has been doubled during the post green revolution period with virtually no increase in net cultivated area; it increased from 95 million tonnes (m t) in 1967-1968 to 209 mt in 1999-2000 from the same net area under cultivation (140 ± 1 m ha). This marvellous achievement in agricultural production was mainly due to the increased use of inputs like fertilisers, pesticides and farm machinery. As time went by, extensive dependence on chemical farming has shown its darker side. The land is losing its fertility and is demanding larger quantities of fertilizers. Pests are becoming resistant and warrant frequent sprays, which resulted in residues much above the safety levels. Further stringent standards for non-organic food in European and US markets have led to the rejection of many Indian food consignments in the recent past and this brought to the attention of ill-effects of modern agriculture, and paved the way for organic farming.

Organic farming has entirely different perspective between developed and developing countries. Developed countries are endowed with surplus resources, but limited population with high purchasing power. Hence, a consumer in a developed country expects enough food of highest possible quality that has been produced without

any serious ecological impact and harmful residues. Thus organic farming may be the best answer to fulfil such expectations in rich countries (Marwaha and Jat, 2004). However, on the other hand, for a resource poor, highly populous country like India, with ever growing demand for food, the primary concerns may be enough availability of food at affordable prices with reasonable quality. In this backdrop, considerable efforts have been taken to promote the organic farming in India without compromising the food grain production to feed the ever growing population. Present paper deals with the issues and opportunities in implementing the organic farming in India.

Area under organic farming : global statistics

Organic agriculture is developing rapidly and is now practised in more than 120 countries of the world. Its share of agricultural land continues to grow in many countries. Globally 30.4 million ha, which constitutes 0.65% of the agricultural land, are currently managed organically. The continent with most organic land is Australia (11.9 ha) followed by Europe (7 m ha), Latin America (5.8 m ha), Asia (almost 2.9 m ha), North America (2.2 m ha) and Africa (almost 0.9 m ha). As of 2006, Australia ranked first in area under organic agriculture, (Table 1) while Liechtenstein (29.1%) ranked first in percentage share of organic land to the total agricultural land (Table 2). The percentage share of organic land to the total agricultural land in India was 0.3% in 2006 (Willer, 2008).

Area under organic : India scenario

Currently, India ranks 33rd in total land under organic cultivation and 88th position for agricultural land under

Table 1. Top ten countries in terms of area under organic farming (As of 2006)

Country	Area under organic agriculture (m ha)	% of organic land to total agricultural land
Australia	12.290	2.8
China	2.300	0.4
Argentina	2.220	1.7
USA (2005)	1.620	0.5
Italy	1.150	9.0
Uruguay	0.931	6.1
Spain	0.926	3.7
Brazil	0.880	0.3
Germany	0.826	4.8
UK	0.605	3.8

Source: FiBL Survey, 2008.

Table 2. Top ten countries in terms of percentage of organic area to the total agricultural land (As of 2006)

Country	% share of agricultural land
Liechtenstein	29.1
Austria	13.0
Switzerland	11.8
Italy	9.0
Estonia	8.8
Greece	7.6
Portugal	7.3
Swedon	7.1
Latvia	7.0
Timor Leste	6.9

Source: FiBL Survey, 2008.

organic crops to total farming area. As per 2006-07 data, the cultivated area under certification was 3,39,113 ha. Including wild collection area, the total area under certification was around 2.8 million ha (www.apeda.com). Madhya Pradesh has 1.63 lakh ha of area under organic certification followed by Maharashtra (1.15 lakh ha).

Global organic movement

At global level, the roots of organic farming can be traced back to the first quarter of the early 20th century in Europe (Stockdale *et al.*, 2001). In 1924, the Austrian philosopher Dr Rudolf Steiner conceptualized and advocated organic agriculture and in 1927 a trademark 'Demeter' was introduced for organically produced food. The formation of the International Federation of Organic Agriculture Movements in 1972 gave framework for the discussion and codification of internationally recognized principles of organic farming.

Table 3. Area (ha) under organic certification in different states of India

State	Certified Area	Under Conversion	Total
Andhra Pradesh	5,561.2	4,925.9	10,487.1
Arunachal Pradesh	65.9	632.8	698.7
Assam	2,526.6	540.2	3,066.8
Chhattisgarh	279.2	28.7	307.9
Delhi	3,632.6	1,830.4	5,463.0
Goa	4,100.5	2,849.8	6,950.3
Gujarat	7,102.3	658.5	7,760.8
Haryana	3,382.5	15.8	3,398.2
Himachal Pradesh	69.0	9,507.7	9,576.7
Jammu and Kashmir	32,541.8	0.0	32,541.8
Jharkhand	10.5	2,253.4	2,263.9
Karnataka	8,735.1	2,976.8	11,711.8
Kerala	11,631.9	3,112.7	14,744.7
Manipur	913.7	5,105.9	6,019.6
Maharashtra	41,390.5	72,238.4	1,13,628.9
Madhya Pradesh	87,536.0	59,875.8	1,47,411.8
Mizoram	0.0	16,802.5	16,802.5
Meghalaya	0.0	304.4	304.4
Nagaland	0.0	878.9	878.9
Orissa	66,625.4	7,959.7	74,585.1
Punjab	347.6	698.4	1,046.0
Rajasthan	15,034.3	9,697.5	24,731.8
Sikkim	274.8	1,531.9	1,806.7
Tamil Nadu	3,414.1	1,652.4	5,066.5
Uttar Pradesh	5,589.5	1,700.6	7,290.1
Uttarakhand	3,178.6	5,250.9	8,429.5
West Bengal	7,332.7	3,147.2	10,479.9
Other	510.5	966.3	1,476.8
Total	3,11,786.9	2,17,143.4	5,28,930.3

The main principles of organic farming are: (i) to produce food of high quality in sufficient quantity, (ii) to interact in a constructive and life-enhancing way with natural systems and cycles, (iii) to consider the wider social and ecological impact of the organic production and processing systems, (iv) to encourage and enhance biological cycles within the farming system, involving micro-organisms, soil flora and fauna, plants and animals, (v) to maintain and increase the long-term fertility of soils, (vi) to maintain the genetic diversity of the production system and its surroundings, including the protection of wildlife habitats, (vii) to promote the healthy use and proper care of water, water resources and all life therein, (viii) to use, as far as possible, renewable resources in locally organized production systems, (ix) to give all livestock conditions of life with due consideration for the basic aspects of their innate behaviour, (x) to minimize all forms of pollution and (xi) to progress towards an entire production, pro-

cessing, and distribution chain which is both socially justifiable and ecologically responsible.

Organic movement in India

Organic farming was practised in India since thousands of years. The great Indian civilization thrived on organic farming and was one of the most prosperous countries in the world. In traditional India, the entire agriculture was practised using organic techniques, where the fertilizers, pesticides etc., were obtained from plant and animal products. At that time organic farming was the backbone of the Indian economy. The country had witnessed a tragic Bengal famine in 1942-43 that claimed millions of lives due to starvation. India's annual food grain production in 1950-51 was only about 50 m t. In this backdrop, modern agriculture played a vital role in alleviating the hunger through green revolution. India's achievement in agricultural production after the green revolution has been exemplary and mainly due to the increased use of inputs like fertilisers, pesticides and farm machinery. The food grain production in India itself more than doubled during the post-green revolution period with virtually no increase in net cultivated area. The intensive modern agriculture for the past five decades has led to several environmental and health issues. The land is losing its fertility and is demanding larger quantities of fertilizers. Pests are becoming resistant requiring the farmers to use stronger and costlier pesticides. The over-use of pesticides resulted in residues much above the safety levels and this brought to the attention of ill-effects of modern agriculture, and paved the way for organic farming. According to the Agricultural and Processed Food Products Export Development Authority (APEDA), around 2.8 m ha of land was under organic farming in India in 2007. Further, there are over 15,000 certified organic farms in India. India therefore is one of the most important suppliers of organic food to the developed nations. No doubt, the organic movement has again started in India.

Status and scope of organic farming in India

According to Marwaha and Jat (2004), the organic farming probably is seldom practised and there is dearth of data on comparative yield and economics of crops with pure organic farming versus intensive farming. Whatever little organic farming that is being practised in India seems to be taken up mainly as a part of contract farming. In India, the area under organic farming is estimated to be only 0.3% of total cultivated area. Even in Europe and other developed countries of the world, despite serious efforts and incentives, the area under organic farming is generally less than 5%. Organic farming may be far from reality for 3 reasons firstly, the limited availability of organic sources;

secondly, for getting optimum yields, crop plants require nutrients in sufficient quantities and in readily available form. This could be best possible through fertilisers, and hardly through organic sources. Thirdly, for plant protection, the organic sources and biological methods that have been tried so far have not met with considerable success in the country. Marwaha and Jat (2004) were of the opinion that, organic farming may be promoted in selected rainfed areas and for export oriented crops in India.

In India, only about 38% of the cultivated land is irrigated and in rest of the rainfed where there is little or no use of fertilisers and other agro-chemicals on account of associated risk in farming and poor resources. So, almost of such areas of the country may be regarded as akin to organic farming. Similarly, some areas under tea, coffee, spices and cashew may be easily brought under organic farming with a thrust on export of organic produce. Thus, rather than promoting organic farming *enmasse* and universally, it would be desirable to carefully delineate areas for organic agriculture, which provides better profitability and boost to the export (Marwaha and Jat, 2004).

Several states in India had already initiated steps to encourage the organic farming among the farming communities. Among the state governments, Madhya Pradesh took early lead in organic farming followed by Uttarakhand (declared as organic state) and other states. The 'Organic Farming Council of Punjab' established in 2006 is taking lead in promoting organic farming: *Sesbania/Crotolaria* - green manuring Pusa basmati - chickpea cropping system under organic mode has been identified as a complete rotation to be followed in *Tarai* region of Uttarakhand. Wheat, lentil and mustard were some of the important crops successfully grown under organic mode with yield realization of 2.6, 1.3 and 1.0 t respectively at Pantnagar. An overview of organic agriculture in India is presented in Table 4.

Regulation of organic production: global perspective

Organic agriculture is based on the commitment of farmers and processors to work according to set standards and regulations, which define the organic production system. Further, organic agriculture is based on transparency to make the production system comprehensive and reliable. Finally, organic agriculture needs the consumer confidence for market development. Certification and accreditation systems primarily serve as tools to enhance trade, market development and foster confidence among the consumers (Herrmann and Rundgren, 2007). The first international standards for organic products were published by International Federation of Organic Agriculture Movements (IFOAM) in 1980. The first legislative initiatives

Table 4. An overview of organic agriculture in India (2004-05)

Organic agriculture	Accountability
Area under certified (m ha)	2.5
Total certified product (tonnes)	1,15,238
Number of processing units	158
Accredited inspection and certifying agencies	11
Number of products exported	35
States involved in organic export	
Kerala	1,232
West Bengal	937
Karnataka	476
Tamil Nadu	471
Punjab	541
Himachal Pradesh	521
Maharashtra	375
All India total organic export	6,472
Premium collected against organic export crores (tentative)	Rs 80-90

Source: Bhattacharyya and Chakraborty (2005).

were developed by some European countries (e.g. Austria, France) in 1980s. In 1991, the European Countries (EC) passed the organic regulation 2092/91 and set standards with major implications for international trade, and included not only production standards, but also standards for labelling and inspection. Various countries in Europe, Latin America and Asia introduced legislation in the 1990s. In 1999, Codex Alimentarius approved the first guidelines for organic plant production. In the new millennium, most major economies have implemented legislation on organic production. Currently more than 60 countries have a regulation. In India the regulations for organic agriculture is implemented only for export commodities (Huber *et al.*, 2007).

As of 2006, around 395 organizations world-wide offer organic certification services. Most certification bodies are in Europe (160), followed by Asia (93) and North America (80). Many of the certification organizations also operate outside of their home country. The certification bodies 40 % are approved by the European Union, 32 % have ISO 65 accreditation, and 28 % are accredited under the US National Organic Program (Herrmann and Rundgren, 2007).

Lack of acceptance and recognition among the different certification and accreditation systems can contradict the objective of enhancing trade, market development and fostering confidence. An important initiative for international harmonization is the IFOAM Accreditation Programme, which assesses certification bodies against the IFOAM norms. The International Organic Accreditation Service (IOAS) is a non-profit independent organization registered in Delaware, USA that offers international

oversight of organic certification, through a voluntary accreditation process for certification bodies active in organic agriculture. The IOAS implements the IFOAM Accreditation Programme. Under this programme, applicant certification bodies are assessed against the IFOAM Norms - the Criteria for Certification Bodies and the IFOAM Basic Standards (Herrmann and Rundgren, 2007).

Current status of regulatory mechanism in India

National Programme for Organic Production

There is tremendous scope for cultivation and export of wide range of organic produce in India. Looking into its importance, Ministry of Commerce, Government of India launched National Programme for Organic Production (NPOP) in 2000. Declaring standards for organic production, policy on accreditation system, inspection and certification process and institution of logo were the major objectives of this programme at the initiation. A national organic logo "India Organic" was also developed that has been in use for certified organic products. During July, 2002, Ministry of Agriculture, Government of India has also circulated guidelines for promotion of organic farming (Bhattacharyya and Gehlot, 2004).

Accreditation agencies

As of 2004, Agricultural and Processed Food Product Export Development Authority, Coffee Board, Spices Board, Tea Board, Coconut Development Board, and Cocoa and Cashewnut Board were authorised by the Ministry of Commerce, Government of India as accreditation agencies for organic agriculture (Bhattacharyya and Gehlot, 2004).

Certifying agencies

At present there are 16 accredited certification bodies (www.apeda.com) in India (Table 5). In 2001, a group of organizations and corporate bodies took the initiative to set up the Indian Organic Certification Agency (INDOCERT). It has become an important element of the organic movement in India and mobilizes new forces and partnerships. In 2003, together with other partners, INDOCERT created the International Competence Center for Organic Agriculture (ICCOA), a service provider for networking, capacity building and market development in the organic sector in India. Among other activities, ICCOA implements the Indian Organic Market Development Project (2005-2007), the activities of which were focussed on awareness raising, market intelligence, developing organic market initiatives, and the India Organic Trade Fair (Kilcher, 2007).

Table 5. List of accredited certification bodies under National Programme for Organic Production

Name of the certification agency	Validity of current accreditation	Scope of accreditation
Bureau Veritas Certification India Pvt. Ltd. (Formerly known as BVQI (India) Pvt. Ltd.)	14-September-2009	NPOP; USDA; NOP
ECOCERT India Pvt. Ltd.*	22-August-2008	NPOP; USDA; NOP
IMO Control Pvt. Ltd.	27-September-2010	NPOP; USDA; NOP
Indian Organic Certification Agency (INDOCERT)*	24-October-2008	NPOP; USDA; NOP
Lacon Quality Certification Pvt. Ltd.*	31-September-2008	NPOP; USDA; NOP
Natural Organic Certification Agency (NOCA)	23-May-2009	NPOP; USDA; NOP
OneCert Asia Agri Certification Pvt. Ltd.	26-October-2009	NPOP; USDA; NOP
SGS India Pvt. Ltd.	01-May-2011	NPOP; USDA; NOP
Control Union Certifications [Formerly known as SKAL International (India)]*	28-May-2008	NPOP; USDA; NOP
Uttarakhand State Organic Certification Agency	13-November-2009	NPOP; USDA; NOP
APOF Organic Certification Agency (AOCA)	09-January-2010	NPOP
Rajasthan Organic Certification Agency (ROCA)	09-October-2010	NPOP
Vedic Organic Certification Agency	30-September-2011	NPOP
ISCOP (Indian Society for Certification of Organic Products)	30-November-2011	NPOP
Food Cert India Pvt. Ltd	30-September-2011	NPOP
Aditi Organic Certifications Pvt. Ltd	30-September-2011	NPOP

Source: www.apeda.com

*Extended till next NAB meeting

National Institute of Organic Farming

The Indian Central Government set up a National Institute of Organic Farming (NIOF) in October 2003 in Ghaziabad, Uttar Pradesh. The National Biofertiliser Development Centre was renamed as the NIOF. The purpose of this institute is to formulate rules, regulations and certification of organic farm products in conformity with international standards.

Characteristics and components of organic farming

Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved" (IFOAM). Unlike chemical farming, organic farming aims at "feeding the soil" rather than "feeding the plant". It is a means of giving back to the nature what has been taken from it. Since organic farming aims at maintaining soil health, the highest yields can be obtained in a sustainable and eco-friendly manner in the long run.

A large number of terms are used as an alternative to organic farming. These are: biological agriculture, ecological agriculture, bio-dynamic and natural agriculture. Organic farming is characterized by the maximal, but sustainable use of local resources and minimal use of purchased inputs. It facilitates the basic biological functions of soil-water-nutrient-human continuum. In organic farm-

ing the ecological balance is maintained as the biodiversity is being sustained. Organic farming is a form of agriculture that relies on crop rotation, green manure, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control pests, excluding or strictly limiting the use of synthetic fertilizers, chemical pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. Enhancing soil health is the corner stone of organic farming.

Though the organic farms produce lower yields, they require no synthetic fertilizers and pesticides. The decreased costs on those inputs, along with the premiums, which consumers pay for organic produce, create higher profits to organic farmers. Moreover, it has already been realized in certain areas that the yields in organic farming are far greater than those obtained by chemical farming in the long run. There is often a loss in yield while converting a chemical farm in to organic farm, but after few years the yield will certainly increase and get stabilised at a level often higher than that achieved under a chemical regime. It is therefore recommended to convert gradually over 3 to 4 years, if income from the farm is a key issue (www.satavic.org).

Indigenous seeds, crop rotation, inter-cropping, multi-cropping, biological control of pests and diseases, botanical pesticides, reduced tillage, mulching, green manuring and green leaf manuring, composting, vermin-composting, biofertilizers, soil and water conservation are some of the techniques and practices integral to organic farming. This list is not complete in itself, and farmers can innovate and

adapt to suit their surroundings. There are certain researchable issues need to be addressed for popularization and subsequent successful implementation of organic farming in India are : Suitable land races / local cultivars of high value crops need to be identified for organic cultivation. Improved methods need to be standardized for enriching the nutrient status of the composts. Different cropping sequences need to be evaluated under various agro-ecological situations. The economics of compost preparation, cropping systems and seed production need to be worked out under various farming systems. Soil health, weed, pests and disease incidence need to be monitored regularly. The possibilities of incorporating location-specific livestock components in organic farming need to be studied and The indigenous technical knowledge (ITKs) need to be documented for further exploitation in organic farming.

Benefits of organic farming

The various benefits of organic farming all over the world and small farmers in India (<http://www.organicfacts.net>) are : *High premium*: Organic food is normally priced 20-30% higher than conventional food. This premium is very important for a small farmer whose income is just sufficient to feed his/her family with one meal. *Low investment* : Organic farming normally does not involve capital investment as high as that required in chemical farming. Further, since organic fertilizers and pesticides can be produced locally, the yearly costs incurred by the farmer are also low. It should also be noted that while shifting from chemical farming to organic farming, the transition might be costlier. *Traditional knowledge* : Small farmers have abundance of traditional knowledge with them and within their community. Most of this traditional knowledge cannot be used for chemical farming. However, when it comes to organic farming, the farmers can make use of the traditional knowledge. Further, in organic farming, small farmers are not dependent on those who provide chemical know-how.

In India more than 80% of the farmers are small and marginal farmers and many small farmers are practising organic farming; however, since they are unaware of the market opportunities they are not able to reap the benefits of organic farming mentioned above. Hence, necessary steps need to be taken to address this issue.

Limitations of organic farming

Though there are several benefits in adapting the organic farming, certain barriers hinder the adaption at farmers' level. Although the land resources can move freely from organic farming to conventional farming, they do not move freely in the reverse direction. Initial crop loss is one of the major constraints while transforming the land from chemical to organic agriculture. The biocontrol

agents may take 3 to 4 years to build up in a crop ecosystem. Moreover, their rate of success is in general, more in horticultural ecosystem but, in annual crop ecosystem their establishment is always questionable. Above all, farmers may afraid to adopt the organic agriculture without adequate support from the government and premium price for their produce. Thus, organic agriculture has its own limitations.

These limitations were studied by the Office of Evaluation and Studies, International Fund for Agriculture Development. They include : (i) Organic farming is labour intensive. Hence, it is beneficial for a small farmer who has abundant labour in his/her family. (ii) Organic farming may also turn out to be expensive, given the situation when a small farmer has to carry out the transition, modify the soil structure drastically or get a certification. (iii) Though a farmer can use a good deal of traditional knowledge in organic farming, since the practice is not as common as chemical farming, it is difficult for good scientific organic farming practices to propagate to the small farmers. (iv) Since organic produce is not traded in many markets, marketing the organic produce may be difficult for a small farmer. (v) In organic farming, soil fertility needs to be replenished with the application of organic fertilizers regularly. If the organic fertilizers are not produced locally, it might be difficult for the small farmer, who would purchase the fertilizers in small quantities to obtain them from elsewhere. Further due to low economies of scale, there might be a huge transportation cost associated with the organic fertilizers obtained from long distances. (vi) It has also been observed that organic food prices are not stable and keep fluctuating from time to time. In such a scenario a low price might affect a small farmer drastically. (vii) Since the volume of organic food production is low (about 1-2% of total food production), it is difficult to implement social security measures such as minimum support price. (viii) and Certification is also an important aspect of organic farming. In many cases, providing education related to necessary certifications and the guidelines that need to be followed for obtaining the certifications may be difficult. Since certification cost is exorbitantly high and inorganic input use is prohibited in the nearby areas, organic farming may not be so easy to practise by the small and marginal farmers who constitute about 80% of the Indian farming community (Fertiliser Association of India, 2004).

Organic farming in India : controversies

Organic farming and its implications on India's food security were well discussed by Chhonkar and Dwivedi (2004). Some of the salient issues are presented hereunder :

The widely publicised advantage of high income

through export of organic produce to the western markets appears lucrative, but not so easy in real sense. Indigenous organic food market is in infancy and may remain so in the future. There is a remote possibility of a resource-poor small farmer of a remote area getting premium price for his organic produce after successfully overcoming all the steps and formalities beginning from farm certification to the final export. The family demands of such farmers may compel them to ultimately dispose-off their organic produce in local markets without any premium.

Chhonkar and Dwivedi (2004) warned that if a section of pro-change farmers of agriculturally important areas currently engaged in foodgrain production began to convert their farms to organic with the intention of getting premium price, there will be no option left for the country other than importing food grains as it has practiced a few decades back.

Nitrate is the main end product of organic manure decomposition; moreover it is continuously released from the organic matter under decomposition. Since nitrate release is not synchronised with either crop demand or its uptake, it tends to accumulate in excess in soil and pose environmental risk. The ions irrespective of their origin whether organic or inorganic will behave similarly. There is no evidence that nitrate ions from organic sources are less mobile and have lower denitrification potential than from inorganic fertilisers. In addition, the trace elements and heavy metal concentrations present in the animal wastes and sewage sludges vary widely and at times very high and often exceed concentrations normally found in the inorganic fertilisers. Field application of these manures in large quantities may pollute the soil and there will be every chance to enter in to food chain and create health hazard.

The biggest myth about the organic farming as indicated by Chhonkar and Dwivedi (2004) is that the country has enough organics available to replace chemical fertilisers to sustain present level of crop production. All tappable nutrients from organic sources will be barely able to meet the deficit of nutrients in soil after crop removal at present level of production.

To maintain the present level of food grain production in India without input of inorganic fertilisers, the net additional area to be brought under cultivation will be more than the total geographical area of the country.

There are contentions that organic farming is unsustainable. The comparatively lower yields and dependence of manure from low-yield cattle has prompted criticism that organic farming is environmentally unsound and incapable of feeding the world population. Among these critics

are Norman Borlaug, father of the "Green Revolution," and winner of the Nobel Peace Prize, who asserts that organic farming practices can at most feed 4 billion people, after expanding cropland dramatically and destroying ecosystems in the process.

A few case studies pertaining to organic production of wheat, cotton, tea and coffee in India were reported by Marwaha and Jat (2004). The overall economics of these initiatives was not in favour of organic farming. It was also reported that in India, organic farming may be a myth, because of limited availability and restricted use of organic resources and ever growing need for food and feed.

Production and demand for organic products

Consumer demand for organic products is increasing across the globe. Global sales of organic food and drink have increased by 43% from US \$ 23 billion in 2002 to US \$ 33 billion in 2005. Although all regions reported healthy increase, the two major engines driving growth are the European and North American markets. Global production of organic crops has not kept pace with demand, with many sectors reporting undersupply. The North American market has been experiencing supply shortages for a number of years; however, Europe and Asia are now also affected. Thus, large volumes of imports are coming in from other regions (Sahota, 2007).

The increasing demand for organic food products in the developed countries and the extensive support by the Indian government coupled with its focus on agri-exports are the drivers for the Indian organic food industry. The Indian government is committed towards encouraging organic food production. It allocated Rs 100 crore during the Tenth Five-Year Plan for promoting sustainable agriculture in India. With the domestic consumption being low, the prime market for Indian organic food industry lies in the US and Europe. The APEDA coordinates the export of organic food in India. The NPOP standards for production and accreditation system have been recognized by European Commission and Switzerland as equivalent to their country standards. Similarly, USDA has recognized NPOP conformity assessment procedures of accreditation at par of US. With these recognitions, Indian organic products duly certified by the accredited certification bodies of India are accepted by the importing countries like US and European markets (www.apeda.com).

India has now become a leading supplier of organic herbs, organic spices, organic basmati rice, etc. India produced around 58,597 MT of certified organic products which includes all varieties of food products, viz. cereals, pulses, honey, tea, spices, coffee, oilseeds, fruits, vegetables and their value added products. The production is not limited to the edible sector but also produces organic

Table 6. Present status of organic products in India*

Total production (tonne)	5,85,970
Total quantity exported (tonne)	19,456
Value of total export (million Rs)	3,012.4
Total area under certified organic cultivation(ha)	3,39,113
Number of Farmers	1,41,904

*Status as per 2006-2007 records (Source: www.apeda.com)

cotton fibre, garments, cosmetics, functional food products, body care products, etc. India exported 35 items last year (2007-08) with the total volume of 19,456 MT (Table 6). The export realization was around 78 million US \$ registering a 200 % growth over the previous year. As many as 98 agencies are involving in the export of organic products in India. Organic products are mainly exported to European Union, United States of America, Australia, Japan, Switzerland, and Middle East. basmati rice leads among the products exported (5,139 t) (www.apeda.com). In February 2009, the export duty on export of Basmati rice has been withdrawn by the Government of India (Notification No. 10/2009-Customs) with a view to promote the organic products.

It is concluded that rainfed areas provide ample scope for pure organic farming. Moreover, there is a lacuna to show the comparative crop performance under pure organic farming and intensive agriculture in crop productivity and food quality. Hence, efforts need to be taken to address these issues with a view to promote the organic farming with great confidence in India. During the last four decades of the 20th century, the global population doubled from 3 to 6 billion and is estimated that by 2020, it will reach the 8 billion mark. Food and nutritional security is therefore a global concern. Neither conventional farming with inorganic alone nor the organic farming only with the use of organic inputs can face this challenge. The combination of both organic and inorganic is undoubtedly the best option as on today for developing country like India. Above all organic agriculture must be discussed with an open mind, with advantages and disadvantages being clearly considered to create positive mindset among the decision makers, because the most important factor that will enable organic agriculture to usefully contribute to food security is the attitude of decision-makers (Wynen, 1998).

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