CHAPTER – III

ORGANIC FARMING

The intensification of agriculture in conventional production systems has resulted in major ecological, environmental and sociological, health and food safety problems in the recent decades. Low stability, climate change and global warming, decreasing biodiversity, accelerated soil erosion by wind and water, chemical fertilizers mainly nitrogen, phosphorus and pesticides in groundwater and on food, the pesticide “treadmill” caused by development of pest resistance to pesticides, routine use of antibiotics for animals leading to antibiotic-resistant strains of organisms, pesticide contamination of farm workers and agro-ecosystem health are some examples of those problems.\(^1\)

Additionally, an overreliance on grain crop monocultures and loss of crop diversity in the aftermath of the “green revolution” has resulted in a loss of well-balanced diets.\(^2\) On the other hand, the conventional approach of increasing dependence on off-farm inputs, including fertilizers, pesticides and energy for food, feed and fiber production is of questionable sustainability resulting in environmental degradation. Therefore, development of alternative production systems that can preserve productivity and minimize the negative biological and environmental consequences and long-term sustainability problems associated with agricultural practices has a


high priority in agriculture world-wide. The challenge facing agriculture today is to increase the quantity and quality of food produced, with limited impact on sustainability and the environment. Organic farming is a very small, but expanding sector and could have an increased global significance in future by creating a sustainable agro-ecological system based on local resources. Organic crop and soil management practices are generally beneficial for the environment, biodiversity and food quality.

Emergence of Organic Farming

Interest in organic farming increased in the twentieth century among farmers, politicians and consumers worldwide. Organic farming developed for several years before it became important in mainstream agricultural research, and it went largely unnoticed by the public. It is important to bear in mind that organic farming is an old farming system, common before the widespread use of agrichemicals, and that the ideas behind it have been around since the 1920s. The term ‘organic’ was first used in relation to farming by Northbourne (1940) in his book *Look to the Land*: “the farm itself should have a biological completeness; it must be a living entity, it

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must be a unit which has within itself a balanced organic life”.\textsuperscript{8} Clearly, Northbourne was not simply referring to organic inputs such as compost, but rather to the concept of managing a farm as an integrated, whole system. The use of organic in reference to agricultural production and food is legally constrained in many countries. Many farmers in less developed countries may have been practicing organic farming by tradition based on their indigenous method of production. However, The International Food Standards set by Codex Alimentarius in association with International Federation of Organic Agriculture Movements (IFOAM) and Food and Agriculture Organization (FAO), define organic farming as 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. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system.\textsuperscript{9} The continued existence of a social and political role for organic farming suggests it is more than just an organic industry.\textsuperscript{10} Organic farming is in fact the original mainstream agriculture. “Conventional” industrial agriculture is actually the one that parts from the original practices. The commonly used term “conventional farming” refers to the standard, dominant

\textsuperscript{8} Northbourne, L., \textit{Look to the Land} (London: Basic Books), 1940.
http://www.fao.org/unfao/bodies/COAG/Coag15/x0075e.htm
farming approaches practiced by farmers throughout the world. The term conventional masks the great diversity of management strategies used; for example, a conventional farmer may use mineral fertilizers but also use herbicides to control weeds. Usually conventional farming imposes no restrictions on management other than those required by law. While there is a continuum of thought from the earliest days to the present, the modern organic movement is radically different from its original form. It now has environmental sustainability at its core in addition to the funders concerns for healthy soil, healthy food and healthy people. Since the 1970s, when organic farming re-emerged as eco-agriculture, institutional strengthening and diversity became a part of movement. Much of it focused on the certification of farmers. Formation of IFOAM in 1972 proved that the movement had come of age and that it was going to grow and make a place for itself in the early decades of 21st century, thus taking part of overall world agriculture.11

Principles of Organic Farming
Organic production and processing is based on a number of principles12,13,14 that constitute a radical break with the productivist concept. The principles are divided into four main principles: the principle of health, the principle of ecology, the principle of fairness, the principle of care (Table 3.1) and each principle is articulated through a statement followed by an explanation. 

12 Lampkin, N. H., Organic Farming, op. cit.
principles are to meet all health regulations, work in harmony with the environment, build biological diversity and foster healthy soil and growing conditions. In another word, they articulate the contribution that organic farming can make to the world and a vision to improve all agriculture in a global context. The principles include agricultural, environmental, food processing and social issues. The principles make organic farming a “proper” strategy, applying all production components in one approach, while other ecological farming systems such as integrated pest management (IPM), integrated plant nutrition systems (INPS) and conservation tillage are not. In these systems one component is applied, such as pest ecology, plant ecology or soil ecology, while in organic farming all these components are applied in one approach. This approach means that organic farming focuses on the food web relations and element cycling, aims to maximize the agro-ecosystem’s stability and homeostasis, and has the potential to provide various benefits such as environmental protection, conservation of non-renewable resources, improved food quality, reduction in output of

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18 Dahama, A.K., Organic Farming for Sustainable Agriculture, op. cit.
surplus products, and the reorientation of agriculture towards areas of market demand.\textsuperscript{22}

Table 3.1
Organic Farming Principles (IFOAM 2007)\textsuperscript{23}

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<tr>
<th>Principle of Health</th>
<th>Principle of Ecology</th>
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<td><strong>Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible.</strong> This principle points out that the health of individuals and communities cannot be separated from the health of ecosystems; healthy soils produce healthy crops that foster the health of animals and people. Health is the wholeness and integrity of living systems. It is not simply the absence of illness, but the maintenance of physical, mental, social and ecological well-being. Immunity, resilience and regeneration are key characteristics of health. The role of organic agriculture, whether in farming, processing, distribution, or consumption, is to sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings. In particular, organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well-being. In view of this it should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects.</td>
<td><strong>Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them.</strong> This principle roots organic agriculture within living ecological systems. It states that production is to be based on ecological processes, and recycling. Nourishment and well-being are achieved through the ecology of the specific production environment. For example, in the case of crops this is the living soil; for animals it is the farm ecosystem; for fish and marine organisms, the aquatic environment. Organic farming, pastoral and wild harvest systems should fit the cycles and ecological balances in nature. These cycles are universal but their operation is site-specific. Organic management must be adapted to local conditions, ecology, culture and scale. Inputs should be reduced by reuse, recycling and efficient management of materials and energy in order to maintain and improve environmental quality and conserve resources. Organic agriculture should attain ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity. Those who produce, process, trade, or consume organic products should protect and benefit the common environment including landscapes, climate.</td>
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Principle of Fairness

Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.

Fairness is characterized by equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings. This principle emphasizes that those involved in organic agriculture should conduct human relationships in a manner that ensures fairness at all levels and to all parties – farmers, workers, processors, distributors, traders and consumers. Organic agriculture should provide everyone involved with a good quality of life, and contribute to food sovereignty and reduction of poverty. It aims to produce a sufficient supply of good quality food and other products. This principle insists that animals should be provided with the conditions and opportunities of life that accord with their physiology, natural behavior and well-being. Natural and environmental resources that are used for production and consumption should be managed in a way that is socially and ecologically just and should be held in trust for future generations. Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs.

Principle of Care

Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.

Organic agriculture is a living and dynamic system that responds to internal and external demands and conditions. Practitioners of organic agriculture can enhance efficiency and increase productivity, but this should not be at the risk of jeopardizing health and well-being. Consequently, new technologies need to be assessed and existing methods reviewed. Given the incomplete understanding of ecosystems and agriculture, care must be taken. This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture.

Science is necessary to ensure that organic agriculture is healthy, safe and ecologically sound. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge offer valid solutions, tested by time. Organic agriculture should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones, such as genetic engineering. Decisions should reflect the values and needs of all who might be affected, through transparent and participatory processes.

These principles mean that organic farming also gains different advantages such as the fact that the market price for such products is higher\(^\text{24}\), the methods of production involve less intensive use of land\(^\text{25}\), there is a better


balance between supply and demand, a better quality of food products, better protection of the environment, and it is more labor-intensive than conventional farming providing on-farm employment. The advantages can be divided into natural capital and human capital. The natural capital advantages include improvement in the structure and fertility of the soil, operation of closed cycle systems using local resources, livestock conditions that conform to their needs, maintenance and encouragement of wildlife and their habitats, reduction in the use of non-renewable resources and pollution. The human capital advantages include production of food of high nutritional quality in sufficient quantity, enabling producers to earn a living and to develop their potentials, systems that are aesthetically pleasing, and decentralized systems for local processing, distribution and marketing. Another advantage is that organic farming does not ignore the knowledge of farmers. This knowledge is down-valued and dismissed in the productivist paradigm. Cabaret argues that the process of organic conversion involves farmers in a new set of relationships in which their local knowledge is

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29 Ibid.
It can be maintained that farmer actions are primarily knowledge-based and divided into four types of knowledge:

1. Know-what: knowledge of facts;
2. Know-why: scientific knowledge of principles and laws of nature;
3. Know-how: this refers to the ability to do something;
4. Know-who: this involves information about who knows what and who knows how to do something.

Organic farming, on the other hand, has some downsides. Rigby, Young, and Burton concluded that organic farming practices could be associated with different problems such as yield reductions; higher weed, pest and disease infestation; lower livestock performance; lack of marketing opportunities and premium prices; refusal of loans or insurance for organic production; and lack of legislation, subsidies and certification bodies. Research studies have also demonstrated that without proper management, organic farming practices can create environmental problems as conventional farming practices do. Potential environmental concerns associated with the practice of organic farming have been traced to the transition period from conventional farming to organic farming practices, unmanaged applications of manure, improper timing of green manure plow down and improper

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31 Ibid., pp. 107-109.
storage of manure or compost materials. Problems might also arise when general organic farming management concepts are implemented in a prescriptive manner that does not account for the local context. Moreover, Bellows pin-points five environmental problems that may be associated not only with conventional farming but also with the merely prescriptive implementation of organic farming practices. These are: nutrients leaching and runoff, soil erosion, pathogens transport into water bodies, pesticides leaching or runoff, and heavy-metal accumulation in soil. Litterick, Watson, and Atkinson confessed that crop protection in organic farming systems is not a simple matter. They further stressed that weed, pests, diseases control could be some of the problems militating against organic farming practices. For instance weeds are more prevalent on organic farming systems. Another related issue is that some botanical pesticides used in organic farming systems are toxic to non-target organisms. For example, Rotenone is toxic to fish and pyrethrum kills beneficial as well as disease-causing insects, while Diatomaceous earth controls insect pests because of its irritant, physically-disruptive properties, however it can also be a strong irritant of human lung tissue if not handled with care. Also if plant nutrients and substances with relatively low toxicity are applied at excessive rates,

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34 Ibid.
they would be contaminants especially if they were close to water sources or during times when heavy rainfall or flooding is expected\textsuperscript{36}.

**Myths and Reality About Organic Farming**

There are several apprehensions about organic farming in mindset of scholars and researchers itself. A large number of debates are going on between the proponents of organic farming and a section of the community who questioned the scientific validity and feasibility of organic farming. The most common question one would expect is about food security issue in the world. But, today organic agriculture is based on a sophisticated combination of traditional knowledge, modern science, and innovation. Therefore, adopting organic agriculture doesn't mean going back to the pre-industrial yields of our great-grand parents. Many studies carried out in several parts of the world actually show that organic farms can be almost as productive as conventional farms (in developed countries) and sometimes even more productive (especially in developing countries). A 21-year long study carried out in Switzerland by the FiBL (*Forschungsinstitut für biologischen Landbau*) Institute showed that the yields in organic farming are only 20 percent less than in conventional farming. Reviewing more than 200 studies carried out in the US and Europe, Per Pinstrup Andersen (Professor at Cornell University and winner of the World Food Prize) and his colleagues reached the conclusion that yields in organic agriculture are around 80 percent of conventional yields.\textsuperscript{37} Another study reviewing a global dataset of

\textsuperscript{36} Bellows, B., *Protecting Water Quality on Organic Farms*, op. cit.

293 examples found that in developed countries organic systems, on average, produce 92 percent of the yields produced by conventional agriculture.\textsuperscript{38}

The second most important question one would ask is regarding the labor intensive nature of organic farming. It is true that organic farming is often more labor intensive than conventional agriculture. For instance, organic agriculture encourages the maintenance of soil fertility through methods (such as compost and manure application and anti-soil erosion landscaping) which are labor intensive. In developing countries, these practices are generally performed by hand or with limited technologies, which imply the availability of an adequate workforce. However, in many areas of the World, land and capital (rather than labor) are the limiting factors. In most developing countries labor tends to be cheaper than chemical inputs. In fact, there are many a range of labor saving technologies and methods that can be applied in the developing countries. They include use of cover crops to control of weeds and protect against soil erosion, the use of direct mulching with crop residues, and reduced tillage. For example,\textsuperscript{39} if properly managed, green manure/cover crops can produce from 50 to 140 ton/ha (green weight) of organic matter with limited work.

The third question is related to its relevance to Indian farming system. India has high comparative advantage in organic food production to compete in the international market. Only 35% of India's total cultivable area is covered with fertilizers where irrigation facilities are available and in the remaining


65% of arable land, which is mainly rain-fed, negligible amount of fertilizers are being used. Farmers in these areas often use organic manure as a source of nutrients that are readily available either in their own farm or in their locality. The north-eastern region of India provides considerable scope and opportunity for organic farming due to least utilization of chemical inputs. It is estimated that 18 million hectare of such land is available in the North-East, which can be exploited for organic production. With the sizable acreage under naturally organic/default organic cultivation, India has tremendous potential to grow crops organically and emerge as a major supplier of organic products in the World's organic market. Need is for putting up a clear strategy on organic farming and its link with the markets.40

Growing Global Perceptions Towards Organic Farming

The International Fund for Agricultural Development acknowledged in its Rural Poverty Report that improved bio-technology and water control brought millions of people out of poverty between 1965 and 1990. On the other side, the same report stresses that the rural poor gained little from this achievement.41 Further, the progress being made to reduce rural poverty through increasing agriculture production has slowed down around the world. In another landmark study by IFAD on potential contributions of organic farming to help serve the small farmers left out of the green revolution loop in India and China, confirmed the positive contributions of organic farming for the sustenance of rural livelihoods. It made a strong plea for advocating organic farming options amongst small farmers across

developing countries. Organic farming initiates self sustenance, rural development and nature conservation. The thread that weaves together this ambitious goal is the sustainable use of biodiversity; in terms of both agriculture's contribution to biodiversity and vice-versa. Organic farming is a Production Management System that aims to promote and enhance the ecosystem's health, including biological cycles and soil biological activity. Typically, farmers experience some loss in yields after discarding synthetic inputs and converting their operations from the conventional systems to organic production. Before restoration of full biological activity, pest suppression and fertility problems are common. The degree of yield loss varies and depends on inherent biological attributes of the farm, the farmer's expertise, the extent to which synthetic inputs were used under previous management and also the state of natural resources. It may take years to restore the ecosystem to the point where organic production becomes economically viable. Transition to organic is difficult for farmers to manage without financial compensation, especially on input intensive and environmentally degraded farms. After the conversion period, organic farming produces higher yields and requires low external inputs. However, with increasing knowledge and improvements, the system's stability increases. In the longer term, performance of organic farming increases commensurate with improvements in ecosystem functions and management skills. On the demand side, promotion and marketing strategies of retailers and supermarkets, in particular of major food-retailing chains, have created new market opportunities for organic products in industrial countries.

Concerns about growth-stimulating substances, genetically modified foods, and livestock epidemics have given further impetus to organic food demand as consumers increasingly question the safety of conventional foods. Many consumers perceive organic products as safer and of higher quality than conventional ones. These perceptions, rather than “science”, drive the market. The market opportunities arising from these concerns have also opened possible niche markets for many countries. Europe, the United States, and Japan offer good prospects for suppliers of organic products. The future growth of organic agriculture will depend more on supply constraints than on developments in demand, at least over the medium term. The tendency, so far, has been for the rate of demand growth to outstrip the rate of growth in available supplies. Many Asian countries are just starting to benefit from organic market opportunities. Organic food trade might be discouraged by difficulties in complying with stringent standards and costly control systems of the importing countries, especially if international equivalency is not established. Access to inspection and certification, as well as the need to develop new methods of processing organic food, are major challenges that are likely to be taken up by large and established food companies. It is hard to make estimates on future expansion of area under organic management. Expansion will depend on acceptability by farmers, technological innovations, and unforeseen factors that challenge agricultural development as a whole. It took 30 years for organic agriculture to occupy 1% of agricultural land and food markets, but food safety concerns resulted in its recent spectacular and unforeseen
increase. 43

Potentials of Organic Farming

Organic Farming and Yield

Yields relative to comparable conventional systems are directly related to the intensity of farming of the prevailing conventional systems. This is not only the case for comparison between regions, but also between crops within a region, and for individual crops over time. 44 An over simplification of the impact of conversion to organic farming on yield indicates that:

In intensive farming systems, organic farming decreases yield; the range depends on the intensity of external input use before conversion. 45,46,47

I. In the so-called green revolution areas (irrigated lands), conversion to organic farming usually leads to almost identical yields. 48,49

II. In traditional rain-fed agriculture (with low external inputs), organic farming has shown the potential to increase yields.\(^{50,51}\)

A number of studies have shown that under drought conditions, crops in organic farming systems produce significantly higher yields than comparable conventional agricultural crops, often out-yielding conventional crops by 7–90\%.\(^{52}\) A survey of 208 projects in developing tropical countries, in which contemporary organic practices were introduced, showed average yield increases of 5–10\% in irrigated crops and 50–100\% in rain-fed crops\(^{53}\). The so-called organic transition effect, in which a yield decline in the first 1–4 years of transition to organic agriculture, followed by a yield increase when soils have developed adequate biological activity\(^{54,55}\), has not been borne out


in some reviews of yield comparison studies.56,57 Trials conducted on organic cotton at Nagpur indicated that after the third year, the organic plot, which did not receive fertilizers and insecticides, produced as much cotton as that cultivated with them.58 Similarly, studies conducted in Punjab, clearly indicated that organic farming gave higher or equal yields of different cropping systems compared to chemical farming after an initial period of three years.59

**Organic Agriculture and Food Security**

The common claim that large-scale conversion to organic agriculture would result in drastic reduction in world food supplies or large increases in conversion of undisturbed lands to agriculture60, has not been borne out in modeling studies. Conversion studies showed that domestic food consumption would not suffer, exports would vary depending on crop, but the structure of farming would definitely change with more diversification of agriculture.61 Widespread conversion to organic farming would result in crop yield increase over the current averages as a result of increased investment in

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In northern Europe domestic food demand could be met with organic methods, but food would be more expensive. Similar conclusions were also reached in studies in the US. Several studies have proved the benefits of vegetarian diet over non-vegetarian in terms of energy consumed for food production as well as other nutritional advantages. Organic farmers grow a variety of crops and maintain livestock in order to optimize use of nutrients and the space between species. This ensures economic advantages through low crop production or yield failure due to biotic and abiotic factors in all of these simultaneously. This can have an important impact on local food security and resilience. In rain-fed systems, organic farming has demonstrated to out-perform conventional agricultural systems under environmental stress conditions. Under the right circumstances, the market returns from organic agriculture can potentially contribute to local food security by increasing family income. At the global level, especially in developing countries with high population pressure, and

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with the present state of knowledge and technology, organic farmers cannot produce enough food for everybody.

Nutrient Management in Organic Farming

Organic farming is often understood as a form of agriculture with use of only organic inputs for the supply of nutrients and management of pests and diseases. In fact, it is a specialized form of diversified agriculture, where in problems of farming are managed using local resources alone. The term organic does not explicitly mean the type of inputs used; rather it refers to the concept of farm as an organism. Often, organic farming has been criticized on the grounds that with organic inputs alone, farm productivity and profitability might not be improved because the availability of organic sources is highly restricted. True, organic resources availability is limited; but under conditions of soil constraints and climate beggaries, organic inputs use has proved more profitable compared to agrochemicals. Organic farming systems rely on the management of soil organic matter to enhance the chemical, biological and physical properties of the soil. One of the basic principles of soil fertility management in organic systems is that plant nutrition depends on ‘biologically-derived nutrients’ instead of using readily soluble forms of nutrients; less available forms of nutrients such as those in bulky organic materials are used. This requires release of nutrients to the plant via the activity of soil microbes and soil animals. Improved soil

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biological activity is also known to play a key role in suppressing weeds, pests and diseases. Animal dung, crop residues, green manure, bio-fertilizers and bio-solids from agro-industries and food processing wastes are some of the potential sources of nutrients of organic farming. While animal dung has competitive uses as fuel, it is extensively used in the form of farmyard manure. Development of several compost production technologies like vermin-composting, phosphor-composting, N-enriched phosphor-composting, etc. improves the quality of composts through enrichment with nutrient-bearing minerals and other additives. These manures have the capacity to fulfill nutrient demand of crops adequately and promote the activity of beneficial macro- and micro-flora in the soil. There are several doubts in the minds of not only farmers, but also scientists about whether it is possible to supply the minimum required nutrients to crops through organic sources alone. Even if it is possible, how are we going to mobilize the organic matter? At this juncture, it is neither advisable nor feasible to recommend the switch over from fertilizer use to organic manure under all agro-ecosystems. Presently, only 30% of our total cultivable areas have irrigation facilities where agrochemicals use is higher compared to rain-fed zones. It is here that ingenuity and efforts are required to increase crop productivity and farm production despite recurrence of environmental constraints of drought and water scarcity. The basic requirement in organic farming is to increase input use efficiency at each step of the farm operations. This is achieved partly through reducing losses and adoption of

new technologies for enrichment of nutrient content in manure. \textsuperscript{72} Technologies to enrich the nutrient supply potential from manure, including farmyard manure three to four times are being widely used in organic farms. According to a conservative estimate, around 600 to 700 million tonnes (mt) of agricultural waste is available in the country every year, but most of it is not used properly. We must convert our filth into wealth by mobilizing all the biomass in the rural and urban areas into bio-energy to supply required nutrients to our starved soil and fuel to farmers.\textsuperscript{73} Organic farms and food production systems are quite distinct from conventional farms in terms of nutrient management strategies. Organic systems adopt management options with the primary aim to develop whole farms, like a living organism with balanced growth, in both crops and livestock holding. Thus nutrient cycle is closed as far as possible. Only nutrients in the form of food are exported out of the farm. Crop residues burning is prohibited; so also the unscientific storage of animal wastes and its application in the fields. It is, therefore, considered more environments friendly and sustainable than the conventional system. Farm conversion from high-input, chemical-based system to organic system is designed after undertaking a constraint analysis for the farm with the primary aim to take advantage of local conditions and their interactions with farm activities, climate, soil and environment, so as to achieve (as far as possible) closed nutrient cycles with less dependence on off-farm inputs. This implies that the only nutrients leaving the farm unit are those for human

\textsuperscript{72} All-India Coordinated Research Project on Microbiological Decomposition and Recycling of Farm and City Wastes, \textit{Progress Report}, Indian Institute of Soil Science, Bhopal, India, p. 85.

consumption. Crop rotations and varieties are selected to suit local
conditions having the potential to sufficiently balance the nitrogen demand
of crops. Requirements for phosphorus, sulphur and micronutrients are met
with local, preferably renewable resources. Organic agriculture is, therefore,
often termed as knowledge-based rather than input-based agriculture.
Furthermore, organic farms aim to optimize the crop productivity under a
given set of farm conditions. This is in contrast to concept of yield
maximization through the intensive use of agrochemicals, irrigation water
and other off-farm inputs. There are ample evidences to show that
agrochemical-based, high-input agriculture is not sustainable for long
periods due to gradual decline in factor productivity, with adverse
impact on soil health and quality.74,75

Environmental Benefits of Organic Farming

The impact of organic farming on natural resources favors interactions
within the agro-ecosystem that is vital for both agricultural production and
nature conservation. Ecological services derived include soil forming and
conditioning, soil stabilization, waste recycling, carbon sequestration,
nutrient cycling, predation, pollination and habitats.76 The environmental
costs of conventional farming are substantial, and the evidence for
significant environmental amelioration via conversion to organic farming is

74 Subba Rao, I. V., “Soil and Environmental Pollution – A Threat to
Sustainable Agriculture”, Journal of Indian Society of Soil Science, 1999,
75 Stockdale, E. et al., “Agronomic and Environmental Implications of Organic
76 International Federation of Organic Agriculture Movements, opt. cit.
overwhelming. A review of over 300 published reports showed that out of 18 environmental impact indicators (floral diversity, faunal diversity, habitat diversity, landscape, soil organic matter, soil biological activity, soil structure, soil erosion, nitrate leaching, pesticide residues, CO2, N2O, CH4, NH3, nutrient use, water use and energy use), organic farming systems performed significantly better in 12 and performed worse in none. There are also high pre-consumer human health costs to conventional agriculture, particularly in the use of pesticides. It is estimated that 25 million agricultural workers in developing countries are poisoned each year by pesticides.

Safety and Quality of Organically Produced Food

There is a growing demand for organic foods driven primarily by the consumer’s perceptions of the quality and safety of these foods and to the positive environmental impact of organic agriculture practices. The ‘organic’ label is not a health claim, it is a process claim. It has been demonstrated that organically produced foods have lower levels of pesticides and veterinary drug residues and in many cases lower nitrate contents. No clear trends have, however, been established in terms of organoleptic quality differences.

between organically and conventionally grown foods. There have been many claims that eating organic foods increases exposure to microbiological contaminants. 82 Organic foods must meet the same quality and safety standards applied to conventional foods. These include the CODEX General Principles of Food Hygiene and Food Safety Programs based on the Hazard Analysis and Critical Control Point. 83 Analysis of pesticide residues in produce in the US and Europe has shown organic products have significantly lower pesticide residues than conventional products. 84,85,86 Nitrates are significant contaminants of foods, generally associated with intensive use of nitrogen fertilizers. Studies that compared nitrate contents of organic and conventional products found significantly higher nitrates in conventional products. 87 There are also claims that food produced by organic methods tastes better and contains a better balance of vitamins and minerals than conventionally grown food. It is a known fact that the quality of crops is controlled by a complex interaction of factors, including soil type and the ratio of minerals in added compost, manure and fertilizer.

84 Ibid.
**Economics of Organic Farming**

The replacement of external inputs by farm-derived resources normally leads to a reduction in variable input costs under organic management. Expenditure on fertilizers and sprays is substantially lower than in conventional systems in almost all the cases.\(^8\)\(^9\) In a few cases, higher input costs due to the purchase of compost and other organic manure have been reported.\(^9\) Studies have shown that the common organic farming combination of lower input costs and favorable price premiums can offset reduced yields and make organic farms equally and often more profitable than conventional farms.\(^9\)\(^1\)\(^2\) Studies that did not include organic price premiums have given mixed results on profitability.\(^9\) Gross margins, the difference between farm output and variable costs are generally similar or, where there are favorable price premiums, higher in organic agriculture. The economics of organic cotton cultivation over a period of six years indicated

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that there is a reduction in cost of cultivation and increased gross and net returns compared to conventional cotton cultivation in India.94

Consequences of In-Organic / Conventional Farming

Impact of Green Revolution

The misplaced glory of Green Revolution was on the basis of the use of High Yielding Varieties (HYV), heavy doses of chemical fertilizers, pesticides, and heavy farm mechanization that led to unprecedented pressure on our natural resource base. Green Revolution has encouraged an increase in the production of mainly two crops, wheat and rice, but the cost paid was in terms of destruction of other crops (especially coarse cereals and pulses) and over exploitation of precious water resources and fertile soils. The high dosage application of fertilizers (Figure 3.1) deteriorated the physical, chemical and biological properties of soil on one side, on the other, increased soil salinity and pollution of ground water resources.95

The use of pesticides has been posing serious environmental and health problems. Due to the changed mode of traditional agriculture, disappearance of cattle from the farms, reducing biodiversity, reducing biological productivity and nutrient recycling creating a crisis of non-sustainability, both economical and ecological. Monoculture of crops by exploiting the natural resources and ignoring the externalizing ecological and environmental costs with a false image of crop yields. After the withdrawal of initial subsidies, the external/high cost input combination of crop

production cannot be sustainable in the long run. This is clearly evident in pushing the farmers into a debt trap or high dependency on credit. ⁹⁶

**Figure 3.1**

**Fertilizer Production and Consumption in India, 1951-52 to 2007-08**

![Graph showing fertilizer production and consumption in India from 1951-52 to 2007-08.](image)

*Source: Sharma and Hrima, 2009*

**Impact on Soil Characteristics**

The indiscriminate use of fertilizers increases the phosphate, nitrate and heavy metals content in soil. The excessive inorganic elements accumulate in the soil lead to immobility of many essential nutrients, finally forms a kanker pan in the terrestrial ecosystem. Example, application of DAP immobilize the phosphate and is strongly adsorbed in the soil surface. Another problem of phosphate is absorption of heavy metals in the soil. Heavy doses of application of fertilizers caused irreversible damage to the soil structure over

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the years. When the soil productivity graph declined, the poor farmers resorted to increase the dosage of chemical fertilizers to sustain farm production. The increased chemical inputs resulted in soil toxicity, disturbed the soil micro-environment and thereby impeded organic matter recycling in the soil.

**Impact on Climate**

In agro-ecosystems, mineral nitrogen in soils is the driver of crop productivity in many cases. Crop productivity has increased substantially through utilization of heavy inputs of soluble fertilizers – mainly nitrogen and synthetic pesticides. However, only 17 percent of the 100 Mt N produced in 2005 was taken up by crops. The remainder was somehow lost to the environment. Between 1960 and 2000, the efficiency of nitrogen use for cereal production decreased from 80 to 30 percent. High levels of reactive nitrogen (NH₄, NO₃) in soils may contribute to the emission of nitrous oxides and are main drivers of agricultural emissions (Figure 3.2).

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The efficiency of fertilizer use decreases with increasing fertilization because a great part of the fertilizer is not taken up by the plant but instead emitted into the water bodies and the atmosphere. The emission of GHG in CO2 equivalents from the production and application of nitrogen fertilizers from fossil fuel amounted to 750 to 1080 million tonnes (1 to 2 percent of total global GHG emissions) in 2007. In 1960, 47 years earlier, it was less than 100 million tonnes. In summary, each year, agriculture emits 10 to 12 percent of the total estimated GHG emissions, some 5.1 to 6.1 Gt CO2.

Source: Smith, et al., 2007
equivalents per year. Smith, et al.\textsuperscript{98} and Bellarby, et al.\textsuperscript{99} have proposed mitigation options for GHG emissions, finding that both farmers and policymakers will face challenges from the GHG-related changes needed in agriculture.

\textit{Reduction in Genetic-Diversity and Threat of GM Crops}

Prior to the Green Revolution, diversity in crops was a key factor in agricultural systems in India. It provided stability and resilience to the systems as well as economic security to the farmers. However, after the introduction of modern technology, more emphasize upon mono-cropping, high mechanized farming focused on single function of single species. This resulted in the erosion of genetic diversity base of agro-ecosystems. The destruction of agro-biodiversity has resulted in depriving the marginal farmers getting multiple products from the farms. Many research studies have proved that reduction in genetic-diversity lead to more susceptibility to pests and diseases. Genetically Modified (GM) foods are prepared by altering the genetic make-up of plants by inserting genes from one species artificially into another one. The essential reason they were introduced because it was assumed that they would ensure an adequate food supply for the world population that is growing at an alarming rate. These foods increase resistance to pests and herbicides and therefore help in eliminating


the use of chemical pesticides and various time consuming and expensive processes to destroy weeds. More importantly, in countries like India, it is believed by experts that these foods would also help in removing malnutrition as normal foods can be genetically engineered to contain additional vitamins and minerals. Though it is argued that these foods are a sure shot way to reduce hunger in developing countries like India, but, many people believe that if hunger could be solved by technology alone green revolution would have done it long ago. Genetically modified foods would just succeed in strengthening corporate control over agriculture research and contributes significantly to developed countries and not to the resource-poor farmers in developing countries. Qaim also highlighted the pattern of adoption these technologies in developing countries and summarized their possible influences in three folds: a. Intellectual Property Rights (IPRs) b. associated with new environmental and health risks and c. modern biotechnology permits a separation between the act of developing a specific crop trait and breeding of locally adapted germplasm.

Contamination of Food and Decline in Nutritive Values

The incessant application of chemicals not only polluting the grains but also

100 GM Foods: Bane or Boon, Science, April 13, 2009.
the food we consume.\textsuperscript{104,105} The process of bio-magnification and bio-concentration has lead to the accumulation of these chemicals both in the tissues of the crops and also of the humans. The wide spread application of chemicals lead to genetic mutation of pests and develop resistance to these chemicals. According to Pimentel, 1995 only 0.1\% of pesticide actually reaches the target pests and the rest go to non-target sectors. The details of consumption of pesticide (technical grade) in India from 1991 to 2007 are presented in Figure 3.3.

\textbf{Figure 3.3}
\textit{Consumption of Pesticides in India, 1991-92 to 2006-07}

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{fig3_3}
\caption{Consumption of Pesticides in India, 1991-92 to 2006-07}
\end{figure}

\textit{Source:} www.indiastat.com

The total consumption of pesticides in India has come down from 72.13 to 37.95 thousand tones between the period 1991-92 and 2006-07. There was a

significant decline (almost half) in the consumption of total pesticides in the country over a span of 15 years. The reduction in the consumption may be due to the introduction of Integrated Pest Management (IPM) technologies and conduct of awareness programs by the Department of Agriculture, Government of India. But, according to All India Coordinated Research Project on Pesticide Residues (AICRPPR) report on Pesticide Safety: the evaluation and monitoring identified only 2 percent of food commodities worldwide were found to be above Minimal Risk Levels (MRL), but in India this figure was as high as 20 percent. In states like Uttar Pradesh and Kerala, food samples exceeding MRL were as high as 46 percent and 53 percent respectively. In general, fruits and vegetables and milk are India’s most contaminated food items. With the pressures from Green Revolution, two major distortions have occurred in the food basket. They are the disappearance of traditional food crops (ragi, foxtail millet and banyan millet) and loss of nutrients from our food dishes. The changes in the eating habits are pronounced in more nutrition deficiencies.\textsuperscript{107,108} Modern/conventional agriculture practices have adversely affected the quality of our food supply. Growing foods with methods designed to increase production or to facilitate transportation and storage is often detrimental to

\begin{flushright}


\end{flushright}

149
their nutritional value. Organic foods have been shown to have a higher nutritional value than conventionally grown foods.\textsuperscript{109}

The above problems in modern/conventional farming coupled with liberalization and globalization of markets have aggravated the crisis in Indian agriculture. The impact of these have translated in to high costs of production and collapsing prices for farm produce is basis for “suicidal economy” where thousands of farmers committed suicide across the country. It has been witnessed in each and every corner of the country. There were at least 16,196 farmers, suicides in India in 2008, bringing the total since 1997 to 199,132, according to the National Crime Records Bureau (NCRB). The share of the big five States or “suicide belt” in 2008 - Maharashtra, Andhra Pradesh, Karnataka, Madhya Pradesh, and Chhattisgarh - remained very high at 10,797, or 66.6 percent of the total farm suicides in the country.\textsuperscript{110} The epidemic of farmer’s suicide is the real barometer of the stress under which Indian agriculture and farmers have been put by globalization\textsuperscript{111} Further, it is also proved that modern agriculture cannot be sustainable in long run because of the adverse changes being caused to the environment and the ecosystem.\textsuperscript{112,113} These implications are also experienced by declining crop

yields and instability in crop production.\textsuperscript{114} The necessity of having an alternative agriculture method which can function in friendly eco-system while sustaining and increasing the crop productivity is realized now. Organic farming is recognized as the best known alternative to the modern/conventional agriculture. Due to the rising input costs involved in modern farming and its un-sustainability due to overcapitalization has made organic farming a necessity in many agriculturally grown regions.\textsuperscript{115} Organic farming has been found to be as or more viable than conventional farming in the USA and European countries due to either higher yield or lower cost or higher market prices. Modern organic techniques have the potential to stabilize and even increase sustainable farm yields with increasing soil fertility, environmental sustainability and preserving biodiversity of the ecosystem. It will also increase the nutritional value of the produce and reduces the pesticide residues in it.\textsuperscript{116}

\textbf{Status of Organic Farming in the World}

Organic agriculture is developing rapidly, and statistical information is now available from 164 countries of the World. Its share of agricultural land and farms continues to grow in many countries. According to the latest survey on organic farming worldwide, there were 37.5 million hectares of organic agricultural land in 2012, including in conversion areas (Figure 3.4).

\begin{itemize}
  \item Lampkin, N. H., \textit{Economics of Organic Farming}, op. cit.
\end{itemize}
The regions with the largest areas of organic agricultural land are Oceania (12.2 million hectares, 32 percent of the world’s organic agricultural land) and Europe (11.2 million hectares, 30 percent), Latin America has 6.8 million hectares (18 percent) followed by Asia (3.2 million hectares, 9 percent), North America (3 million hectares, 8 percent) and Africa (1.1 million hectares, 3 percent). The countries with the most organic agricultural land are Australia, Argentina, and the United States.

In 2012, the organic agricultural land increased by almost 0.2 million hectares or 0.5 percent. There has been an increase of the organic agricultural land in Africa and Europe; in Europe the area grew by 0.6 million hectares (6 percent). In Asia, there was a major drop in organic land in 2012; 0.47 million hectares less were reported. In Latin America, the organic land decreased, mainly due to a decrease of organic grazing areas in Argentina. Apart from agricultural land, there are further organic areas.

![Figure 3.4: Top Ten Countries with Organic Land](image)

Source: FiBL-IFOAM Survey, 2014
most of these being areas for wild collection. Other areas include aquaculture, forests, and grazing areas on nonagricultural land. The areas of non-agricultural land constitute more than 31 million hectares. In total, 69 million hectares (agricultural and non-agricultural areas) are organic. There were more than 1.9 million organic producers in 2012 (Figure 3.5).

**Figure 3.5**  
The Ten Countries With the Largest Number of Organic Producers 2012  

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Producers</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>600,000</td>
</tr>
<tr>
<td>Uganda</td>
<td>189,610</td>
</tr>
<tr>
<td>Mexico</td>
<td>169,707</td>
</tr>
<tr>
<td>Tanzania</td>
<td>148,610</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>134,626</td>
</tr>
<tr>
<td>Turkey</td>
<td>57,259</td>
</tr>
<tr>
<td>Peru</td>
<td>47,211</td>
</tr>
<tr>
<td>Italy</td>
<td>43,852</td>
</tr>
<tr>
<td>Spain</td>
<td>30,462</td>
</tr>
<tr>
<td>Poland</td>
<td>25,764</td>
</tr>
</tbody>
</table>

*Source: FiBL-IFOAM Survey, 2014*

Thirty-six percent of the world’s organic producers are in Asia, followed by Africa (30 percent) and Europe (17 percent). The countries with the most producers are India (600,000), Uganda (189,610), and Mexico (169,707). About one third of the world’s agricultural land (10.8 million hectares) and more than 80 percent (1.6 million) of the producers are in developing countries and emerging markets. Global demand for organic products remains robust, latest research finds international sales of organic food and
drink approached US 64 billion in 2012. Although organic products are now produced in the four corners of the world, demand is concentrated in two regions. According to FiBL and IFOAM, the largest single market was the United States (44 percent), followed by the European Union (41 percent) of the global market. International sales of organic products have grown from almost nothing to over 60 billion US dollars over 30 years (Figure 3.6).

**Figure 3.6**

**The Ten Countries With the Largest Market for Organic Food 2012**

Organic products resonated with consumers as they are produced by a highly ecological form of agriculture. Organic foods also gave assurances to consumers anxious about food origins, production methods and provenance. However, there now are a number of food eco-labels and sustainable production schemes that compete directly with, or indirectly with, organic standards.
Asia Statistics

The area of organic agricultural land in Asia is slightly more than 3.2 million hectares, which is 0.2 percent of the total agricultural area in the region. Nine percent of the global organic agricultural land is in Asia. Compared with 2001 (300,000 hectares), the organic land has increased tenfold (Figure 3.7).

Figure 3.7

Asia: Development of Organic Agriculture Land 2000 to 2012


The country with the largest organic agricultural area is China (1.9 million hectares), and the country with the most producers is India (600,000 producers). The countries with the highest share of organic agricultural land are Timor-Leste (6.6 percent) and Palestine (1.7 percent). In 2012, 40 percent of all organic farmland was used for arable crops (1.3 million hectares), 0.7
percent for grassland/grazing areas (22,000 hectares), and 18 percent (585,000 hectares) for permanent crops (Figure 3.8).

**Figure 3.8**

**Asia: Use of Organic Agriculture Land 2012**

![Graph showing land use types and key crops](image)

Source: FiBL-IFOAM survey 2014

The key arable crop group is oilseeds, with 233,000 hectares reported in total. Most oilseeds were grown in China (150,000 hectares) and Kazakhstan (82,500 hectares). Cereals are also an important crop group grown on at least 187,000 hectares - mainly in Kazakhstan and Thailand. Organic coffee was grown on at least 60,000 hectares in 2012; with Indonesia and Timor-Leste as the key producing countries. Almost 18 percent of the organic farmland was used for permanent crops; most of this land used for tea, coffee, and nuts.
Organic Time is Coming in India

At a time when India is talking about crisis in the agricultural sector, indicated by slow growth rate, organic farming is taking roots in the fields of Indian farmers. From a state of unknown opportunity in agriculture at the beginning of the century to being talked about as a viable alternative tool to address some of the ills of Indian agriculture, organic farming has made credible advances during these eight years. Due to the combined effects of farmers efforts, NGO work, Government interventions and market forces the Indian organic movement has reached a stage where it is swiftly moving to secure a niche in Indian agriculture by 2015.\(^\text{117}\)\(^\text{118}\) India has a long tradition of ecological agriculture in many different forms. India Organic Pathway \(^\text{119}\) explains the logic in the perception that organic agriculture in India can become a potent small holder endeavour. Around 80 percent of its small and marginal farmers are either using few or no chemicals. What we see in India now are two kinds of strong undercurrents of organic farming:

a. A limited, though rapidly increasing, number of certified organic farms mainly producing for premium prices in the domestic or export market.


b. A large number of non-certified organic farmers, which produce for their own household food needs. They supply to local market if there is a surplus.

The organic farmers’ associations emphasize on both the economic benefits, as well as the intrinsic ecological benefits of organic agriculture, such as improved soils, fewer toxic chemicals and harmony with nature. Organic agriculture is, thus, expected to provide hope to small farmers to move from a vicious cycle of poverty and land degradation to a virtuous cycle of food, income security and environmental quality. Partap\(^{120}\) emphasized the fact that the number of organic farmers in India is increasing every season. India has already converted more than 0.5 million hectares of farmland into organic. About 15,000 certified organic cotton farmers alone contributed to the conversion of more than 40,000 hectares of cropland to organic agriculture by the end of 2005. Today, there are many organic farmers’ associations all over the country. It is the first time in 50 years that farmers have taken a lead in adopting and spreading a technological alternative themselves. This has happened particularly because of the weak institutional support to promote organic agriculture. Trade undertaken by the Indian organic industry was estimated at about US$20 million (Rs. 100 crore) in 2002.\(^{121}\) It has grown nearly fivefold from then until the end of 2005. Though it is still a nascent industry, indications are that the Indian organic sector is growing rapidly and has already made inroads into the world organic market in certain key sectors such as tea, coffee, spices, fruits and vegetables,

\(^{120}\) Ibid.

cotton, cereals such as basmati rice, neem, dried nuts, oil seeds such as sesame, pulses and sugar. Indian organic agriculture accounts for a very negligible part of total Indian agriculture production. However, under the World Trade Organization (WTO) regime, organic exports will offer India opportunities to add value to its exports for various crops, especially tropical products.

In nine states of India, Government agencies are presently busy either promoting organic programs or formulating organic policies. Interestingly, these changes happened over the last three years. Some states like Uttrakhand moved to make organic farming a thrust area for agricultural development and states like Mizoram and Sikkim declared intention of the states to go totally organic. Karnataka farmed its own organic strategy to reach out each district in partnership with NGOs. Meanwhile, Maharashtra allocated considerable resources to work in partnership with constituents of Maharashtra Organic Farmers Forum (MOFF) in a state wide effort to strengthen institutional capacity for promoting organic farming. It is one of the few states where institutional efforts are underway to build supply chains to link its producers to consumers.

Using a case study of organic cotton in India, Eyhorn drawing on his three years of research, wrote his PhD thesis on organic farming for sustainable livelihoods of small farmers. The research assesses the potential and the constraints of organic farming for improving rural livelihoods. It is one of the most in-depth and comprehensive works on the socio-economic impact
of organic farming in India.\textsuperscript{122} Eyhorn's work is a significant and motivating message for furthering the use of organic production methods in India. The interest of several states in promoting organic farming indicates that organic agriculture is being viewed as a precursor to dynamic change for an otherwise stagnant agricultural sector.\textsuperscript{123} Another significant development is that organic farming does carry different meaning to different states in India implying that there exists a diversity of state perspectives on organic agriculture.\textsuperscript{124}

- Organic farming in the hilly states of India, such as Uttarakhand, revolves around securing livelihoods on small rain fed farms. As a result there is increased ecological sustainability, economic security and access to markets.
- To desperate farmers of Maharashtra, Madhya Pradesh and Karnataka organic provides them with an alternative as low cost farming avoid debt trap and suicides.
- Organic farming to farmers in the states of Punjab and Haryana means adopting an alternative method of farming to improve soil health, which has deteriorated immensely.
- To farmers and agencies in states like Kerala, organic farming means adopting the export agribusiness development route, as most of the organic spices black pepper, cardamom, nut meg, etc., are exported from Kerala.

\textsuperscript{122} Eyhorn, F., \textit{Organic Farming for Sustainable Livelihood in Developing Countries: The Case of Cotton in India}, V df Hochschulverlag AG an der ETH Zurich, 2007.


\textsuperscript{124} Ibid.
The factors attracting private and public attention to organic farming and agribusiness enterprises include:

a. Increasing prospects for organic agribusiness because of increasing demand for safe food;
b. An approach to sustainable development of farming based rural livelihoods in marginal areas and for small farmers.

The first factor dominates the organic priorities of the developed World and the second factor dominates organic farming priorities of the developing world. Even though developing countries started late during the last eight years organic as farming and as agribusiness tool has spread to over 140 countries. Global figures on the growth of this sector are astounding. Even though it has only taken 1-2 percent of the agricultural sector so far, but its growth has been exponential (15-25%). What is more important to note is that the first initiatives in organic were taken by farmers, NGOs and the private agribusiness sector players. Government institutional intervention largely came in response to the trade needs. Initially the government started with institutionalizing quality assurance mechanisms, but later expanded to supporting conversion to organic production as well. India today produces a range of organic products from fruits and vegetables to spices, food grains, pulses, Reid and organic cotton. In addition Indian produce also includes wild harvest of medicinal, aromatic and dye plants. Some of these organically cultivated products are exported from South India. While data for export commodities is available, data on domestic availability of organic

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commodities sell relies on best guesses of stakeholders. Organic is emerging with organic retail stores, supermarkets and packaged deliveries visible in big cities and small towns.\textsuperscript{126}

It is perhaps for these reasons that the National Commission on Farmers considered it as a tool for the second green revolution in the rain fed and hilly areas of the country. Reports by the National Commission on Farmers indicate that the multi dimensional crisis in agriculture has made it necessary for India to make a paradigm shift in agriculture development. The Farmers Commission recognized organic farming as one of the potential options to help solve the agrarian crisis. Keeping in mind the need for scaled up public interventions to promote organic farming; the commission estimated an investment of over Rs. 2500 crore during the 2007-2012. The Commission has recommended that 25,000 Organic Villages with niche commodities should be developed in the hills over the next five years. Furthermore local farm graduates and youth should be involved in it as entrepreneurs (Item 4.6.2 pages 1334-134 of the National Commission on Farmers Fifth and Final Report Volume 1, 2006). The report highlights that organic farming is especially suitable for hill agriculture, high value horticulture crops and other cash crops such as medicinal and aromatic plants and spices. Under item 4.6.3. of the fifth report, the Commission commented that "the institutional interventions for promoting organic farming are as yet far from satisfactory". Hence, it recommended the launch of focused national movement on organic agriculture which must be fully backed by a credible certification process to maintain quality assurance. The movement should include organic trade

awareness and literacy sine qua non for mainstreaming and integrating organic farming in the national agricultural economy.127

Expanding organic farming sector -why and how?

Poverty alleviation remains the single most important agenda for all development policies. Organic farming has the capacity to improve the economic conditions of small and marginal farmers. Numerous examples from across the states show how in the rainfed conditions costs have come down and production has increased. Organic is moving from being “a niche” market to securing a status in the mainstream. World organic market sees the enormous potential of India as a supplier of certified organic agricultural products in the coming decades. Because of the inherent organic mindset and practices of Indian farmers, conversion to organic farming in India will be easy.128 A survey conducted by the International Competence Centre for Organic Agriculture (ICCOA) in 2005 indicated that there is already a market worth Rs. 2300 crores for organic products in the country. The domestic market for food and grocery is estimated to be about Rs.6,75,000 crore and is growing at the rate of 5 to 6 percent per annum. Various estimates indicate that Organic products could take about 5 to 6 percent of the overall food and grocery market in the medium/long term. This translates into a market of about Rs 50,000 to 60,000 crore.129

The Organic Farmers of India

Few large-scale farmers and enterprises entered organic farming in its early stages with an aim to capture its export opportunities. It is only since small and marginal farmers embraced organic agriculture in recent years that there has been a concerted and growing Indian organic movement. Indian organic agriculture is unique in the sense that it follows a variety of systems or indigenous practices, broadly grouped into six types (Figure 3.9).

Partap\(^\text{130}\) categorized organic farmers of India into the following five categories:

**Category I:** Large farms and estates responding to the increasing demand for organic products in international markets, motivated by high price premiums that compensate for potential yield losses. Examples are tea estates, large basmati farmers in the Terai region of Uttrakhand, spice and coffee estates and cashew plantations in south India. These professional farmers also termed as “organic opportunists”. They are undertaking organic farming with an export focus and have benefited from the premium prices available in the niche markets.

**Category II:** Organic farmers in favorable production regions such as river plains and irrigated areas who face declining soil fertility (and thus reduced yields) because of loss of organic matter, poor structure, depletion of micronutrients, erosion, salinity and other factors due to intensive use of fertilizers and pesticides such as loss of ecological balance and increased resistance to pesticides. Examples include cotton farmers in Maharashtra

\(^{130}\) Ibid.
(Vidharba, Dhule regions), Madhya Pradesh (Narmada Valley) and Andhra Pradesh (Warangal), coconut and pepper growers in Kerala and farmers in the Gangetic plains. For them, organic farming is a way to re-establish soil fertility and thus stabilize yields and reduce production costs. These farmers are going organic because of their interest in “ecological farming”.

Figure 3.9

Organic Farming Practices Prevalent in India


Even without institutional support these farmers find organic farming a better alternative for sustaining their farming and livelihoods. Their produce goes to market in three separate supply chains with three different price tags. The
certified organic cash crop for export (if it is there, such as spices) fetches a price premium; while the other produce they sell in the domestic market have a lower premium. Organic vegetables and mink can be sold in the local market with or without a premium.

**Category III:** Organic farmers in marginal production regions such as arid and semi-arid non-irrigated areas and hill areas who continue to practice traditional subsistence farming ways to make a living. Many like to call them “organic by tradition”. Improved organic farming for them can be a way to increase the productivity of their farm lands. This could be through better crop rotation, efficient use of biomass, and better soil management resulting in higher infiltration, better moisture retention and nutrient exchange capacity. The farmers in many hilly and mountainous areas have been waiting for a farming technology that suited their farmlands, household economy and folk knowledge. The organic farmers of Uttarkhand and Northeast India are examples of this, where farming has otherwise become almost non-viable and villagers have been abandoning agriculture and their farmlands at an alarming rate in the absence of any institutional measures. Organic farming has brought new hope to these people to continue farming their lands by growing the same crops or diversifying - as the market demands indicate. Many such farmers are waiting to go organic. If there were to be institutional support, this is the area and these are the farmers who would play a crucial role in mainstreaming organic agriculture in India.

**Category IV:** Organic farmers who are small and marginal but have been able to grow cash crops, vegetables and fruits, with comparative advantage for several years. These farmers in less favorable areas, such as in the hilly areas of **Himachal Pradesh**, Jammu and Kashmir, Uttrakhand, Northeast
India and other semi-arid areas in the southern and western parts of India, now face the problem of diminishing returns. Increasing cost of cultivation clearly shows that the present system will not continue for long and finding alternatives is necessary. These farmers are willing to adopt organic farming practices, for economic, health and ecological reasons. However, institutional support, facilitating easy access to knowledge, skill enhancement opportunities, services and incentives are needed to encourage organic movement.

**Category V:** These are traditional farming communities, represented by the tribal farmers living in or near forest areas and who depend on forest resources for their livelihoods. They are not exposed to the use of synthetic inputs. They are also termed farmers who are organic by tradition. For them, modern organic farming methods can lead to improved production and sustainable livelihoods. Their farm production is supplemented by the wild harvest of food and medicinal value. Under international standards, wild-harvest has its own place in the organic hierarchy and there are defined ways to certify it and a high premium prices is placed on it. Thus, certified organic wild harvest can be an opportunity to improve their subsistent livelihoods. For that to happen, however, it would require strong institutional interventions to enable these societies to benefit from the opportunities lying dormant in their farms and forests.¹³¹

Partap¹³² also indicated that the numerous success stories of organic farming across the country are a result of the effort of many government and private initiatives. The examples include the economic value of organic farming and

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¹³¹ Ibid., pp. 11-13.
¹³² Ibid.
enterprises and involve restoring native endangered food crop which used to dominate the marginal farmlands of India. Partap\textsuperscript{133} summed up the progress made in this sector, as follows:

- Indian organic movement is moving towards mainstreaming.
- There are different reasons, both ecological and economic which are driving farmers towards organic farming.
- The small and marginal farmer's primary intention for going organic is to avoid the debt trap.
- There are also agribusiness oriented farmers who are going organic to capture export opportunities.
- Land degradation and abandonment of farm land is a crisis in the waiting in many parts of India. NGOs and farmers in some parts of the country are containing it by promoting organic ways of farming.
- Women farmers in many areas became dis-empowered during the spread of the green revolution, but households adopting organic farming have pleasant stories to share about the experiences of women empowerment and social equity.

**Status of Organic Farming in India**

India is bestowed with lot of potential to produce all varieties of organic products due to its various agro climatic regions. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market.

\textsuperscript{133} Ibid.
Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. The cultivated land under certification is around 2.8 million ha (2007-08, 1.9% of the GCA). This includes 1 million ha under cultivation and the rest is under forest area (wild collection) (APEDA, 2010).134

The organic land area has increased substantially between 2005 and 2006 and is now more than 500,000 hectares. Indian government has acquired both the USDA equivalence for the NOP and the EU third country listing in 2006. Furthermore, recognizing the difficulty smallholders face to access third party certification, the government launched a national Participatory Guarantee System (PGS) program, with the support of the FAO India office to facilitate organic assurance. The government is also implementing a National Project on Organic Farming (NPOF) for production, promotion, certification and market development of organic farming in the country. Financial assistance is being provided for the capacity building through service providers, setting up of organic input production units, promotion of organic farming through training programs, field demonstrations, setting up of model organic farms and market development.

India produced around 3,96,997 MT (2007-08) of certified organic products (Table 3.2) which includes all varieties of food products namely Basmati rice, Pulses, Honey, Tea, Spices, Coffee, Oil Seeds, Fruits, Processed food, Cereals, Herbal medicines and their value added products.

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The production is not limited to the edible sector but also produces organic cotton fiber, garments, cosmetics, functional food products, body care products etc.

Table 3.2
Organic Food Productions in India, 2007-08

<table>
<thead>
<tr>
<th>Total production</th>
<th>9,76,646 M.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total quantity exported</td>
<td>37,533 M.T</td>
</tr>
<tr>
<td>Value of total export</td>
<td>USD 100.4 million</td>
</tr>
<tr>
<td>Total area under certification (including wild harvest)</td>
<td>2.8 million hectares</td>
</tr>
<tr>
<td>Total area under certified organic cultivation</td>
<td>0.45 million hectares</td>
</tr>
<tr>
<td>Share of exports to total production</td>
<td>4% approx.</td>
</tr>
<tr>
<td>Increase in export value over previous year</td>
<td>30% approx.</td>
</tr>
</tbody>
</table>


The commodity wise details of quantity exported and its value is presented in table 3.3. India exported 86 items last year (2007-08) with the total volume of 37533 MT. The export realization was around 100.4 million US $ registering a 30% growth over the previous year. Organic products are mainly exported to EU, US, Australia, Canada, Japan, Switzerland, South Africa and Middle East. Cotton leads among the products exported (16,503 MT). According to the Indian Centre for Organic Agriculture (ICCOA), a major reason for the growth in organic farming is increased awareness among consumers in the country, even though until recently food was mainly...
being exported. But over the last couple of years, the domestic market has started growing.

Table 3.3

**Commodity-wise Organic Food Exports, 2007-08**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Export Contribution (of volume)</th>
<th>Export Contribution (of value)</th>
<th>Export Contribution (Rs. Cr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton</td>
<td>43%</td>
<td>25%</td>
<td>123.88</td>
</tr>
<tr>
<td>Basmati Rice</td>
<td>15%</td>
<td>13%</td>
<td>59.20</td>
</tr>
<tr>
<td>Honey</td>
<td>11%</td>
<td>10%</td>
<td>46.41</td>
</tr>
<tr>
<td>Tea</td>
<td>8%</td>
<td>20%</td>
<td>92.13</td>
</tr>
<tr>
<td>Dry fruits</td>
<td>7%</td>
<td>18%</td>
<td>84.31</td>
</tr>
<tr>
<td>Processed food</td>
<td>5%</td>
<td>4%</td>
<td>17.99</td>
</tr>
<tr>
<td>Sesame</td>
<td>4%</td>
<td>2%</td>
<td>9.13</td>
</tr>
<tr>
<td>Spices</td>
<td>3%</td>
<td>4%</td>
<td>20.09</td>
</tr>
<tr>
<td>Medicinal &amp; Herbal plants/products</td>
<td>2%</td>
<td>2%</td>
<td>10.59</td>
</tr>
<tr>
<td>Others</td>
<td>2%</td>
<td>2%</td>
<td>5.05</td>
</tr>
</tbody>
</table>


**Constraints Identified in Organic Farming**

India's farmers are still mostly practicing organic methods, passed down for millennia. Organic fertilizer and natural pest control are the only tools available to most of these farmers, who have always lacked the financial resources to explore chemical solutions. But these farmers, whose produce is as organic as they come, cannot afford to pay the fees required to gain official certification. As the international community adopts standards for organic agriculture, the challenges faced by farmers in the USA versus farmers in India in order to adapt are very different indeed. The danger is that
the well-intentioned global move towards organic standards will make small organic farmers in countries like India, who have been never done anything but organic farming, no longer able to sell their crops.\textsuperscript{135}

According to Bhattacharyya\textsuperscript{136} several constraints have been identified in organic farming. These are:

1. Excessive cost of existing inspection and certification system which is not affordable by farmers.
2. Heavy metal content of urban compost.
4. Limited availability of sufficient quality of locally available inputs like farmyard manure, compost, vermicompost etc.
5. Limited domestic market and lack of commodity-wise market information on domestic global demand and supply.
8. Regulatory mechanism in this regard.
9. Risk of low production in initial years of organic farming.

Slow release of nutrients from organic sources which is not matching the nutritional demand of high-yielding varieties.

\textsuperscript{135} Gehlot, Dushyant, *Organic Farming: Components and Management* (India: Jodhpur, AGROBIOS), 2012, p. 12.

Future Prospects of Organic Farming

There is a growing concern about adverse effects of indiscriminate use of chemical fertilizers and chemical pesticides. Looking to ill effects of chemicals, stress is being given to promote organic farming. But the issue needs to be addressed carefully. A question has been raised: Are Indian farmers adding excessive fertilizers and pesticides as compared to other countries? The data indicate that per ha consumption of fertilizers and pesticides in India is 91.5 kg and 0.38 kg respectively which are far below than other countries. The population of India with a growth rate of about 2.3% has already crossed 100 cores. This unprecedented crisis in population will lead to increased demand of food. The projected population for 2020 is 154 cores or 1,540 million for which there will be a requirement of 385 million tones of food grains.\(^{137}\)

It is estimated that plant nutrients (NPK) addition during 2020 will be removal of 37.46 million tones nutrients by crops for which nutrient additions generally fall short of requirement, i.e. 7.86 million tones. In this context, tile project (2025) availability of plant nutrients trapppable from organic sources is 7.75 million tones. There are several reasons for people to adopt organic farming practices, however, there are some reasons that people farm organically like:

**Economics**

Demand is growing for organic produce. Most organic farms need fewer inputs from outside the farm, which saves money for the farmer. Prices are

\(^{137}\) Ibid.
often higher for organic produce, so profits may be satisfactory even if yields are lower.

**Beliefs**

Some people believe that organic farming is the “right” way to farm or that it is better for the long-term future of the earth.

**Lifestyle**

Not using any chemicals may lead to a more enjoyable lifestyle and better health. There may be more work to do, for example weeding with a scarifier or hoe instead of spraying.\(^{138}\)

Therefore, pesticides, insecticides, and chemical fertilizer should not be used in farm soil to ensure chemical free raw drug and subsequently end the product. For that, organic manure, bio-pesticides, and bio-herbicides are not so popular in India. Though, lot of research is going on in this area. At present farmers are using extracts of Neem, Datura, Balbidang, Vach, Chitrak, Gugulu, Cow Urine etc. for pesticidal problems. India’s National Agricultural Policy (NAP) 2000 envisaged that agriculture sector should be sustainable technologically, environmentally and economically, ... conserve our soil, water and biodiversity ... maximum benefits from export of agricultural products. Organic farming is appropriate technology for this purpose. In fact, promotion of organic farming and utilization of organic wastes has been one of the thrust areas of the Tenth Five Year Plan. For example Uttaranchal has been declared as the State of Organic farming. The

\(^{138}\) Ibid.
State Agricultural Department has taken a large-scale program to implement this concept in all parts of the state. The program on organic farming has been started from the year 2001-02 under centrally sponsored Macro mode management scheme as a bio-village program. Where, 224 villages were selected from all over the state. Uttar Pradesh has taken lead and somersault to opt organic farming though IPM and INM. Government of Madhya Pradesh has taken decision to promote organic farming on a large scale. For this purpose, 5 villages in each block have been selected to develop as organic agriculture village. In Chattisgarh, use of chemical fertilizers has been traditionally low due to various reasons including poor economic condition of small and marginal farmers. At present, there are almost 40 bio-fertilizer production units in the state with 8-10 thousand tones of annual production capacity. As consumption is concerned, 4-5 thousand tones of bio-fertilizers are consumed annually. Kerala has taken initiatives for promoting organic farming and bio-fertilizer. Koran Agricultural University has done good R&D in North-eastern region the consumption (g/ha) of bio-fertilizers in Meghalaya, Nagaland, Manipur, Arunachal Pradesh and Assam are 162.0, 62.6, 43.5, 28.0 and 5.6 respectively.139 Sikkim Pondicherry and many North-eastern States have declared their state as 100% organic farming state. It is necessary that all the States of India should be declared as Organic States.140
