Chapter 1

Organic Farming: Global Scenario

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1. Introduction

The ever increasing demand for safe and healthy food, free from pesticide and other residues due to indiscriminate use of agrochemicals giving concerns on environmental pollution, are the major reasons responsible for the interest in alternate systems of farming in modern agriculture. The global market for organic food is about US $ 30 billion and projected to grow to 100 billion US $ in another five years. The demand for the organic food is increasing both in the developed and developing countries with annual average growth rate of 20-25 per cent. The premium price for the organic foods in international market enables the farmers to realize higher returns from organic production systems. Therefore, it is due to several advantages of organic farming over the modern agricultural practices, which is often high input demanding, that farmers across the globe are converting in to organic farming. This system of managing agricultural holdings restricts the use of chemical fertilizers, pesticides, growth regulators and livestock feed additives.

Varied crop farming practices such as cultural, mechanical and biological methods are practiced to achieve sustainable agricultural production by encouraging and enhancing biological cycles within farming system involving soil flora and fauna, plants and animals. The holistic approach also provides social and ecological advantages with the conservation of soil and water and enhancing long term fertility of 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 supplied through fertilizers and therefore, the approach should be to 'feed the soil to make it living' rather than 'feeding the plants'. Often, organic farming has been criticized on the grounds that with the application of organic inputs alone, farm productivity and profitability might not be improved

as the availability of organic sources is highly restricted. Though availability of organic resources is limited, it could be possible to raise various kinds of organic manure crops and prepare compost in the farm itself and apply to the crops.

Organic farming relies up on the basic concept of living soil. Therefore, the role of soil flora and fauna is given due recognition in this system of production as they are the prime drivers for various processes resulting in enhanced physical, chemical and biological health of soil. The emphasis in organic farming will be on the adoption of agro-management practices based on soil biodiversity aimed at enhancing the natural nutrient cycles and utilization of specific soil-plant-microbial associations in managing the soil in organic production. Organic farming is often considered as one that uses only organic inputs to meet the requirement of nutrients and management of pests and diseases. In fact, it is a specialized form of diversified agriculture, wherein farming is managed using local on farm resources to the extent possible.

In the larger context, organic farming is a production system which relies upon soil management techniques (*e.g.* mulching), crop rotations, various cropping systems (*e.g.* inter cropping), agro forestry (where woody perennials are grown in association with crop/livestock), recycling of crop residues, animal and green manures, legumes, recycling of on farm waste resources (*e.g.* fodder, organic wastes *etc*),mechanical cultivation, biofertilizers to maintain soil productivity, to supply nutrients, and to control weeds *etc*. The system also relies upon adoption of various other means of pest and disease management practices including cultural, mechanical and biological measures than use of any synthetic chemicals.

2. Organic Agriculture: Worldwide

Organic agriculture is being practiced in 172 countries in an area of 43.7 million hectares of organic agricultural land (including in-conversion areas) during 2014 with Oceania leading the list with 17.3 million hectares(40 per cent of the world's organic agricultural land) followed by Europe (11.6 million hectares, 27 per cent), and Latin America (6.8 million hectares, 15 per cent) followed by Asia (3.6 million hectares, 8 per cent), North America (3.1 million hectares, 7 per cent) and Africa (1.3 million hectares, 3 per cent). Among the countries with the most organic agricultural land, Australia (17.2 million hectares), Argentina (3.1 million hectares), and the United States (2.2 million hectares) are the top three leaders.

The organic share of total agricultural land is around one per cent in the countries surveyed by Helga and Lernoud (2016) and this is the highest in Oceania (4.1 per cent) followed by Europe with 2.4 per cent and Latin America with 1.1 per cent. In the other regions (Africa, Asia and North America), the share is less than one per cent. By region, the highest organic shares of the total agricultural land are in Oceania (40 per cent) and in Europe (27 per cent). In the European Union, 5.7 per cent of the farmland is organic. However, some countries reach far higher shares: Falkland Islands (36.3 per cent), Liechtenstein (30.9 per cent), and Austria (19.4 per cent). There were 2.3 million organic producers in the world during 2014 of which 40 per cent are in Asia, followed by Africa (26 per cent) and Latin America (17 per cent), Europe(15 per cent) and North America as well as Oceania (1 per cent each).

Table 1.1: Organic Agriculture 2016: Key Indicators and Top Countries

Indicator	*World*	*Top Countries*
Countries with organic activities	2014: 172 countries	New countries: Kiribati, Puerto Rico, Suriname, United States Virgin Island
Organic agricultural land	2014:43.7 million ha (1999: 11 million ha)	Australia (17.2 million ha-2013), Argentina (3.2 million ha), US (2.2 million ha-2011)
Organic share of total agricultural land	2014: 0.99 per cent	Falkland Islands (Malvinas)-36.3 per cent Liechtenstein -30.9 per cent Austria-19.4 per cent
Wild collection and further, non-agricultural areas	2014: 37.6 million ha (1994: 4.1 million ha)	Finland (9.1 million ha), Zambia(6.8 million ha), India (4.0 million ha)
Producers	2014: 2.3 million (1994:0.2 million)	India (650,000-2013), Uganda (190,552), Mexico (169,703-2013)
Organic market size	2014: 80 billion USD (1999: 15.2 billion US dollars)	US (35.9 billion, 27.1 billion euros), Germany (10.5 billion USD, 7.9 billion euros), France (6.8 billion USD, 4.8 billion euros)
Per capita consumption	2014: 11 USD (14 euros)	Switzerland (221 euros), Luxembourg (164 euros) Denmark (162 euros)
Number of countries with organic regulations	2015: 87 (2008: 73)	
Number of IFOAM affiliates	12015: 784 from 117 countries (2008: 734), (2000: 606)	Germany: 91 affiliates, China: 57 affiliates; India: 44 affiliates; United States: 40 affiliates

Source: FiBL Survey 2016.

Table 1.2: Region-wise Percentage Distribution of Organic Agricultural Land and Organic Producers (2014)

Region	*Organic Agricultural Land*	*Organic Producers*
Africa	3	26
Asia	8	40
Europe	27	15
Latin America	15	17
North America	7	1
Oceania	40	1

Source: FiBL Survey 2016.

African countries had around 1.3 million hectares of certified organic agricultural land during 2014 (three per cent of the world's share) with almost 0.6 million producers. Among the various countries, Uganda had the largest organic area (> 0.24 million hectares) and with the largest number of organic producers

(0.191 million). The main crops organically cultivated are coffee, olives, nuts, cocoa, oilseeds, as well as cotton and the major share of certified organic production in Africa is destined for export markets. There is a growing recognition among policymakers of African countries that organic agriculture has a significant role to play in addressing food insecurity, land degradation, poverty, and climate change in Africa. Asian countries maintained 3.6 million hectares of total organic agricultural area during 2014 (eight per cent of the world's share) with more than 0.9 million producers; most of these being in India (0.6 million). The leading countries with organic cultivation by area are China (1.9 million hectares) and India (0.7 million hectares). Organic production and domestic markets have established themselves throughout the region, and Asia has the third-largest market for organic products.

As of 2014, European countries had 11.6 million hectares of agricultural land (27 per cent of the world's share) which were managed organically by almost 0.34 million producers. The countries with the largest organic agricultural areas are Spain (1.7 million hectares), Italy (1.4 million hectares), and France (1.1 million hectares). Eight countries have more than 10 per cent organic agricultural land: Liechtenstein has the lead (30.9 per cent), followed by Austria (19.4 per cent) and Sweeden (16.3 per cent). Retail sales of organic products totaled approximately 26.2 billion euros in 2014. The largest market for organic products in 2014 was Germany, with retail sales of 7.9 billion euros, followed by France (4.8 billion euros), and the UK (2.3 billion euros). In Latin America and the Caribbean, almost 0.39 million producers managed 6.8 million hectares of agricultural land organically in 2014. This constituted 15 per cent of the world's organic land and 1.1 per cent of the region's agricultural land. The leading countries are Argentina (3 million hectares), Uruguay (1.3 million hectares), and Brazil (0.7 million hectares, 2012). The highest shares of organic agricultural land are in the Falkland Islands/Malvinas (36.3 per cent), French Guiana (8.9 per cent), and Uruguay (8.8 per cent). Many Latin American countries remain important exporters of organic products such as bananas, cocoa and coffee.More than 3 million hectares of farmland were managed organically by 0.17 million producers in North America during 2014, which is seven per cent of the world's organic agricultural land. United States and Canada are the leading countries in the list.

In Oceania region, more than 0.22 million producers managed 17.3 million hectares, which is 40 per cent of the world's' organic land. More than 98 per cent of the organic land in the region is in Australia (17.2 million hectares) followed by New Zealand (0.11million hectares). The rapidly growing overseas as well as domestic demand has strongly influenced the growth in the organic industry in Australia, New Zealand, and the Pacific Islands.

3. Global Market for Organic Produce

According to Organic Monitor, the global retail sales of organic food and drink during 2014 were 80 billion US dollars and North America and Europe together constituted around 90 per cent of the same. The countries with the largest organic markets were the United States (27.1 billion euros). Germany (7.9 billion euros), and France (4.8 billion euros). The largest single market is the United States (approximately 43 per cent of the global market), followed by the European Union

(23.9 billion euros, 38 per cent) and China (3.7 billion euros, 6 per cent). By region, North America has the lead (29.6 billion euros), followed by Europe (26.2 billion euros) and Asia.

4. Plantation Crops

Out of the 43.7 million hectares of organic agricultural land, organically cultivated permanent crops account for more than 3.4 million hectares, which is 2 per cent of the world's permanent cropland. With around eight per cent share of the organic agricultural land, permanent cropland has a higher share in organic agriculture than in total agriculture. Most of the permanent cropland is in Europe (1.4 million hectares), followed by Latin America (0.8 million hectares), and Africa (0.6 million hectares). The most important crop is coffee, with more than 0.76 million hectares reported and constituting almost one quarter of the organic permanent cropland. Cocoa and coconut have 0.16 and 0.25 million hectares, respectively.

Table 1.3: Region-wise Land Area (ha) under Organic Management in the World (2014) (Permanent crops)*

Region	*Cocoa*	*Coffee*	*Coconut*	*Tea/Mate etc.*
Africa	38,609	2,23,351	8,501	5,140
Asia	3,282	1,13,061	1,21,781	58,084
Europe	–	–	–	3,897
Latin America	2,06,242	4,07,776	13,689	1,903
North America	–	–	–	–
Oceania	1,060	18,728	12,401	–
Total	2,49,193	7,62,916	1,56,372	69,024

* Data available for a few plantation crops.

Source: FiBL survey 2016.

As per FAOSTAT about 0.25 million hectares of cocoa are grown organically during 2014, which constitutes 2.5 per cent of the world's harvested cocoa beans from an area of 10 million hectares (2013). The organic cocoa bean area has grown almost fivefold since 2004 (approximately 0.05 million hectares) and thus faster than most other crops/crop groups. The available data on the conversion status indicate that at least 3 per cent of the organic cocoa area was in conversion in 2014 (6'200 hectares). Thus, a slight increase in the supply of organic cocoa in the near future may be expected. Though the world's leading cocoa producers are Cote d'Ivoire (2.5 million hectares), Indonesia (1.8 million hectares), Ghana (1.6 million hectares), and Nigeria (almost 1.2 million hectares), the largest organic cocoa areas are in the Dominican Republic (0.12 million hectares), Peru (over 0.03 million hectares) and Mexico (0.02 million hectares). Over 83 per cent of the world's organic cocoa area is in Latin America.

The world's leading coffee producers are Brazil (2.1.million hectares), Indonesia (1.2 million hectares), Colombia (0.8 million hectares), Mexico (0.7 million hectares),

and Vietnam (almost 0.6 million hectares). According to FAOSTAT, almost 0.76 million hectares of coffee are grown organically during 2014, which is 7.7 per cent of the world's harvested coffee area from 9.9 million hectares (2013). The organic coffee area has more than quadrupled since 2004. More than 50 per cent of the world's organic coffee area is in Latin America and almost 30 per cent in Africa. In organic farming, the largest areas are in Mexico (0.24 million hectares), Ethiopia (0.15 million hectares), and Peru (0.09 million hectares). Nepal had the highest share, with almost 46 per cent of organic coffee, followed by Timor-Leste (45 per cent), Bolivia (37 per cent), and Mexico (almost 35 per cent). Some of these high percentages must be attributed to the fact that coffee is grown more extensively in organic agriculture, and often in association with other crops.

5. Definitions and Principles of Organic Agriculture

The word "organic" is legally protected in some countries. In the EU, for example, this word has been protected since the early 1990s in English-speaking countries. The equivalent in French, Italian, Portuguese and Dutch-speaking countries is "biological" and "ecological" in Danish, German and Spanish-speaking countries.

5.1. IFOAM Definition

The International Federation for Organic Agricultural Movements (IFOAM), established in the early 1970s, represents over 600 members and associate institutions in over 100 countries. IFOAM (1996) defines the "organic" term as referring to the particular farming system described in its Basic Standards.

5.2. US Definition

In 1980 the US Department of Agriculture defined the concept of organic agriculture as follows: ".a production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic agriculture systems rely upon crop rotations, crop residues, animal manure, legumes, green manure, off-farm organic wastes, mechanical cultivation, mineral bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests'. The report also included the following observation: "The concept of the soil as a living system which must be "fed" in a way that does not restrict the activities of beneficial organisms necessary for recycling nutrients and producing humus is central to this definition."

5.3. CODEX Definition

Most recently, the Codex Committee on Food Labeling has debated "Draft Guidelines for the Production, Processing, Labeling and Marketing of Organically Produced Foods"; for adoption of a single definition for organic agriculture by the Codex Alimentarius Commission. According to the proposed Codex definition, "organic agriculture is a holistic production management system which promotes

and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. 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."

6. Principles of Organic Farming (IFOAM)

1. To produce food of high nutritional quality and sufficient quantity;
2. To interact in a constructive and life enhancing way with all natural systems and cycles;
3. To encourage and enhance biological cycles within the farming system, involving micro organisms, soil flora and fauna, plants and animals;
4. To maintain and increase long-term fertility of soils;
5. To promote the healthy use and proper care of water, water resources and all life therein;
6. To help in the conservation of soil and water;
7. To use, as far as is possible, renewable resources in locally organized agricultural systems;
8. To work, as far as possible, within a closed system with regard to organic matter and nutrient elements;
9. To work, as far as possible, with materials and substances which can be reused or recycled, either on the farm or elsewhere;
10. To give all livestock conditions of life which allow them to perform the basic aspects of their innate behaviour;
11. To minimize all forms of pollution that may result from agricultural practices;
12. To maintain the genetic diversity of the agricultural system and its surroundings, including the protection of plant and wildlife habitats;
13. To allow everyone involved in organic production and processing a quality of life conforming to the UN Human Rights Charter, to cover their basic needs and obtain an adequate return and satisfaction from their work, including a safe working environment;
14. To consider the wider social and ecological impact of the farming system;
15. To produce non-food products from renewable resources, which are fully biodegradable;
16. To encourage organic agriculture associations to function along democratic lines and the principle of division of powers;
17. To progress towards an entire organic production chain, which is both socially just and ecologically responsible.

The Key Characteristics are that Organic Farming

1. Relies primarily on local, renewable resources;
2. Makes efficient use of solar energy and the production potential of biological systems;
3. Maintains the fertility of the soil;
4. Maximises recycling of plant nutrients and organic matter;
5. Does not use organisms or substances foreign to nature (*e.g.* GMOs, chemical fertilisers or pesticides);
6. Maintains diversity in the production system as well as the agricultural landscape;
7. Gives farm animals life conditions that correspond to their ecological role and allow them a natural behaviour.

Organic farming is also a sustainable and environmentally friendly production method, which has particular advantages for small-scale farmers. Organic farming contributes to poverty alleviation and food security by a combination of many features, such as:

1. Increasing yields in low-input areas;
2. Conserving bio-diversity and natural resources on the farm and in the surrounding area;
3. Increasing income and/or reducing costs;
4. Producing safe and varied food;
5. Being sustainable in the long term.

The International Federation of Organic Agriculture Movements (IFOAM) has formulated four broad principles of organic farming, which are the basic roots for organic agriculture growth and development in a global context. These principles of organic agriculture serve to inspire the organic movement in its full diversity. The principles are to be used as a whole, which are composed as ethical principles to inspire action. They are:

6.1. Principle of Health

Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible. It is the maintenance of physical, mental, social and ecological well-being. 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. It should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects.

6.2. Principle of Ecology

Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help to sustain them. 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. 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, habitats, biodiversity, air and water.

6.3. 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. Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs.

6.4. 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. It 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.

7. Conversion to Organic Farming

Organic farming is a process of developing a viable and sustainable agro-ecosystem, and the establishment of an organic management system and building of soil fertility requires an interim period. The time between the start of organic management and certification of crops and/or animal husbandry is known as the conversion period. Though the conversion period may not always be of sufficient duration to improve soil fertility and re-establish the balance of the ecosystem, but it is the period in which all the actions required to reach these goals are started. The whole farm, including livestock, should be converted according to the standards over a period of time. A farm may be converted step by step but both crop production and all animal husbandry should be converted into organic. If the whole farm is not converted, the certification programme shall ensure that the organic and conventional parts of the farm are separate and inspectable. All the standards requirements shall be fulfilled during the conversion period itself. Before products from a farm/project can be certified as organic, inspection is to be carried out during the conversion period.

8. Length of the Conversion Period

The length of conversion period depends largely on the past land use and the ecological situation. It shall be at least 12 months before sowing or planting in the case of annual production, 12 months before grazing or harvest for pastures and meadows and 18 months before harvest for other perennials. Plant products may be used or sold as "in-conversion" provided that they have undergone a 12 month conversion period. Products under conversion are to be sold as "Produce of organic agriculture in process of conversion", or a similar description, when the National Standards stipulations have been met for at least 12 months. Animal products may be sold as "product of organic agriculture" only after the farm or relevant part of it has been under conversion for at least 12 months and provided the organic animal production standards have been met for the appropriate time. With regard to dairy and egg production, this period shall not be less than 30 days. Animals present on the farm at the time of conversion may be sold for organic meat if the organic standards have been followed for 12 months.

9. Issues in Organic Farming

Although, world over, the commercial organic farming with its rigorous quality assurance system is a new market controlled, consumer-centric agriculture system, it has grown almost 25-30 per cent per year during the last decade. Though the movement initiated in the developed world is gradually picking up in developing countries as well, the demand is still concentrated in developed and economically advanced countries. With the increasing awareness about the safety and quality of foods, long term sustainability of the system and experiences of being equally productive, the organic farming has emerged as an alternative system of farming which not only addresses the quality and sustainability concerns, but also ensures a profitable livelihood option to the farmers. The main bottlenecks experienced by many farmers to switch over to organic farming are non-availability of sufficient amount of organic supplements, bio-fertilizers *etc.* for use in fertilization and soil amendments, as well as for plant pest and disease control, the lack of unrestricted veterinary medicines and the lack of experience in marketing organic products. Absence of recognized/established marketing channels leads to poor quality as well as adulteration of organic inputs. Application of poor and adulterated organic inputs looses the confidence of the farmers on organic farming due to their poor performance. Besides, lack of access to guidelines, lack of market information and vocational training, risk of low yield, high cost of certification and inputs coupled with capital-driven regulation by contracting firms strongly discourage farmers of small holdings to switch over to organic farming. The domestic market for organic products is not yet well developed as that of export market. The products available in the domestic organic market are mostly cereals, pulses, fruits, vegetables and a few plantation crops (tea, coffee). The small farmers, spread across the country, often can offer only an incomplete product range that is mostly available as local brand. On the other hand, in countries like the US and Europe, every supermarket houses a complete range of certified organic products. Therefore, organized retailing and marketing from the prevalent unorganized pattern is very much needed.

The growing demand for organic products in industrialized countries, particularly, the EU, United States and Japan, has lead to a growing international trade over the past 15 years. Apart from the producer-driven approach to organic farming, a market-driven approach is taking shape in developing countries. However, the typical character of Indian organic food market, which is in the nascent stage, compared to the developed countries, is that it is buyers/consumers driven rather than producers/supply driven. This calls for creating awareness about organic food and its benefits when compared to conventional food. The development of organic farming will not occur at fast pace as expected, but will be responsive to technological advancements, which can take care of unforeseen factors that will challenge agricultural development as a whole. Within Europe, the development of organic agriculture took 30 years to occupy 1 per cent of agricultural lands and food markets. Success in organic farming depends greatly on local conditions. One of the main characteristics of organic agriculture is the use of local resources to optimize present and future output. Therefore, deciding up on the suitability of organic farming must include agro-ecological, economic, and social and institutional considerations.

The agro-ecological considerations include availability of natural resources (land, soil quality, vegetation, access to material which can be used in compost and mulch *etc.*); suitability of enterprises (crops to be grown or livestock to be raised, based on the availability of natural and other resources); and problems likely to occur (which pests are common, what is the cause, what can be done to avoid them within available resources *etc.*). Suitability of organic farming depends on its profitability and, therefore, the main economic considerations include the availability of labour (quantity and timing of labour); total net return (income from main and other crops as well as livestock); long-term productivity of the system (effect of present production on the soil and implications for future yields); and marketing possibilities. The major social and institutional constraint is the belief among the farmers, scientists, researchers, and extension officers that organic farming is not a feasible option to improve food security. Unless this attitude is changed, no positive consideration towards this farming system can be expected. The performance of organic farming on production depends on the previous management practices adopted by the farmer. In developed countries, where the intensity of use of external inputs before conversion is high, the organic systems is found to decrease yields, whereas, conversion to organic farming usually leads to almost identical yields in irrigated lands and in traditional rain fed agriculture (with low-input external inputs), organic agriculture has the potential to increase yields.

10. Benefits of Organic Farming

Although, there are several benefits of changing over to organic farming from traditional/conventional farming practices, yet all these advantages, in general, may not be feasible considering the rural economy of many countries. However, some are really feasible enough to be considered as benefits for organic farming conditions. The following are some of the advantages that are relevant.

10.1. High Premium for the Produce

Very often, the organic food is priced 20 - 30 per cent higher than conventional food, thus, there is ample scope for organic farmer to get a high premium so that the farm family income could be increased to higher level.

10.2. Low Investment

The capital investment needed for organic farming is not that high as compared to the traditional chemical farming techniques. Moreover, no sophisticated techniques are required for the production of organic manures, and pesticides which could mostly be produced locally in the farm itself. The farm family labour also is put to use in the organic farms, which could turn out to be highly productive.

10.3. Synergy with Life Forms

Organic farming involves synergy with various plant and animal life forms inside the organic farms. Small farmers can understand this synergy very easily and hence find them easy for adoption.

10.4. Traditional Knowledge

The rich heritage of traditional knowledge in farming practices, especially that for management of pests and diseases, the farmers of developing countries have, and traditional land races, can be utilized very successfully to reap rich benefits in organic farming.

11. Biodiversity and Organic Farming

Organic farming utilizes locally available resources to minimize competition for food and space between different plant and animal species. Thus, the manipulation of the temporal and spatial distribution of biodiversity is the main productive "input" of organic farmers. Organic farmers are both custodians and users of biodiversity at all levels as locally adapted seeds and breeds are preferred for their greater resistance to diseases and resilience to climatic stress; diverse combinations of plants and animals optimize nutrient and energy cycling for agricultural production; and the maintenance of natural areas within and around organic farms and non utilization of chemical inputs create suitable habitats for wildlife. Reliance on natural pest and disease control measures maintains rich species diversity, especially that of beneficial natural enemies and avoid the development of pest species that are resistant to chemical control methods. Ultimately, the diversity of landscape and wildlife brings people in the form of eco-tourism, providing an important source of off-farm income.

12. Plantation Crops and Organic Farming

Plantation crops are, those crops, cultivated on an extensive scale in contiguous area, owned and managed by an individual farmer or a company. They are high value commercial crops having greater economic importance and play a vital role in improving economy, mainly because of their export potential, employment generation and poverty alleviation of millions of people, especially in the rural

Table 1.4: Summary of SWOT Analysis on Organic Farming

Parameter	*Potential Benefits*
Agriculture	Increased diversity, long-term soil fertility, high food quality, reduced pest/disease, self-reliant production system, stable production. Well-suited for smallholder farmers, who comprise the majority of the world's poor. Resource poor farmers are less dependent on external resources, experience higher yields on their farms and enjoy enhanced food security.
Environment	Reduced pollution, reduced dependence on non-renewable resources, builds soil fertility and enhances biodiversity on and around the farm, negligible soil erosion, wildlife protection, resilient agro-ecosystem, compatibility of production with environment, more resilient to climatic stress, including drought and floods, more energy efficient than conventional agriculture and holds carbon in the soil.
Social conditions	Farmers and other members of the families and labourers are no longer exposed to hazardous agro chemicals, which is one of the leading causes of occupational injury and death in the world. Improved health, better education, stronger community, reduced rural migration, gender equality, increase employment, good quality work.
Economic conditions	Stronger local economy, self-reliant economy, income security, increase returns, reduced cash investment, low risk.
Organizational/ institutional	Cohesiveness, stability, democratic organizations, enhanced capacity building.

Strengths	*Weaknesses*
Safety food	Productivity gaps
Comparative advantage in organic food production	Lack of established markets
Low cost of production	Poor quality management in production and processing
High quality and improved nutrition	Less incentives from Government
Improved soil health	Low R and D investments on Organic farming research
Premium prices	Organic market buyers/consumers driven market
Environmental sustainability	Lack of strategy for development of organic market
High water-use efficiency	Disjointed producers, processors and traders
Government policies (like NPOP)	Adulteration and poor quality of organic inputs
Preserves traditional varieties/species and high shelf-life	Large number of small farms with weak organizational building
	Intensive in nature and high labor costs
Opportunities	*Threats*
Big and growing market potential	High cost of organic food
Growing purchasing power of consumers	Costly and complex organic certification process
Growing health awareness	Lack of infrastructure facilities (like labs) and certification bodies
70 per cent of Gross Cropped Area is under rainfed agriculture	Only export regulated organic market
Reduce heavy subsidies on food and fertilizers	Low awareness about organic inputs
Control the nitrate losses and CO_2 emissions	Most of the fields are contiguous and problem of contamination
Earn high export earnings	Introduction of GM crops

sector. A range of plantation crops including arecanut, cashew, cocoa, coconut, coffee, oil palm, tea, rubber, and spices are cultivated in the humid tropics and tropical belts in different parts of the world. Plantation crops meet a wide variety of human needs such as food, fuel, oil, industrial raw materials, beverages and confectionery items. Arecanut, cashew, cocoa and coconut are the major small holder's plantation crops cultivated in India. The major socio-economic features in which these crops are cultivated include predominance of fragmented, small and marginal holdings, medium to resource poor farm environment, often with less marketable and marketed surplus.

The low level of adoption of management practices particularly chemical fertilizers by the farming community is the major factor responsible for low productivity in farmers' gardens especially in small holders' plantation crop like coconut. Lack of adequate resources is also another reason for low level of adoption of technologies.

Wherever continuous use of chemical fertilizers without application of adequate organic inputs and farming practices which leads to over exploitation of natural resources take place, degradation of soil takes place and results in poor productivity. Pollution of water bodies is also happening due to the leaching of chemicals from farm lands. Reduced crop and soil health due to poor organic matter content and micronutrient deficiencies are also being experienced by the farmers. All these factors point towards the urgent need for soil and plant health management to achieve sustainable production, protecting the environment and safeguarding the natural resources. It is also necessary to reduce the cost of cultivation and other inputs to enhance competitiveness in the international market under the changing global scenario.

Selected References

Anonymous (2012). *The IFOAM norms for organic production and processing.* Version 2012. Published in Germany by IFOAM. p.132.

Bhattacharyva, P. and Chakraborty, G. (2005). Current Status of Organic Farming in India and other Countries. *Indian Journal of Fertilizers.* **1** (9):111-123.

Elisa Morgera, Carmen Bullón Caro and Gracia Marín Durán (2012). *Organic agriculture and the law.* FAO Legislative Study 107,FAO, Rome. p.302.

Willer Helga and Julia Lernoud (2016). *The world of organic agriculture: Statistics, and Emerging trends-2016.* Research Institute of Organic Agriculture (FiBL Frick and IFAOM-Organics International, Bonn, p. 334.