Chapter: I

Introduction
# Chapter: I

## Introduction

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1.1 Introduction:

The agriculture sector is pro-vital in every country’s economic development, countries like developed, developing or least developed. So, agricultural development leads to the development of many other sectors of the economy. It has an important role in providing food, fodder, employment and income and also in the area of international trade. It is also an important contributor to national income and a crucial factor in containing inflation. India is one of the agricultural based countries with more than 54.6 percent of the population pertaining to agricultural sector. The share of agriculture in country’s Gross Domestic Product (GDP) registered a steady decline from 50 percent in 1950-51 to 13.9 percent in 2013-14. Even though large number of farmers and farm labours are migrating from this sector; a survey indicates that 54.6 percent of the people are still in farming contributing only 13.9 percent to GDP. This reveals clearly that there is no chance to have growth in income of farmers and farm labours.

Before 1960, in India only organic farming practice was followed without use of chemical fertilizers and pesticides. Thereafter, late 1960s, there was threatening to food security due to population raise and frequent droughts. Government of India had entered collaboration with USA for reforming farming practices by adding chemical products for cultivation, diseases and weed management. The policy is known as High Yielding Verity (HYV) seeds. There was increase in production and productivity in chemical or conventional farming and our country was able to satisfy partly the food security. After 30-40 years, production and productivity reduced drastically with abnormal input costs and the farming sector turned to be unfavourable occupation to all concerned. Soil degradation, more diseases, uncontrollable weeds, high water consumption, unfavourable price and with several natural and manmade issues, conventional farming turned to be unworthy for farmers. The existing farming practice is called conventional farming or chemical farming using chemical fertilizers, pesticides, mechanical implements for various processes and modern agricultural science and holds 98 percent of share in farming.

Due to various severe problems arising in conventional farming, most of developed countries and few developing countries are returning to harmless organic farming practice during the last 15 years or more. It is found in developed countries, the growth of organic farming practice is fast and upon 10 to 15 percent already converted. But in India, organic farming practice is less
than two percent since Government, Agricultural Universities and Research Institutes are not prepared to support organic farming in whole heartedly.\(^3\)

The present study deals with organic farming, as a means of attaining sustainable agricultural development with special reference to India’s agriculture scenario, in the post-green revolution era (1980 onwards). The study makes an inquiry into the economic benefits of organic sugarcane farming. After having introduction we now turn to a brief history of organic farming in India.

**1.2 History of Organic Farming in India:**

The concept of organic farming originated out of the organic movement that existed in the 1930s and 1940s. The organic movement was actually an anti-synthetic fertilizer movement. Synthetic fertilizers were used widely in those days for agricultural purposes, whereas organic farming prohibits the application of synthetic fertilizers and pesticides. Thus, organic farming is a very old concept and a developed practice in India. In fact, it was implemented in India much before the organic movement began. So organic farming has ancient roots. The principles of ‘Rishis Kheti’ were followed, where the farmer looked upon the soil as his mother. The importance of organic manures was well-known, and also finds mention in ancient Indian scriptures like the ‘Rigveda’ and ‘Atharvaveda’.\(^4\)

However, it was during the British rule that Sir Albert Howard (1873-1947) was sent to India as the imperial chemical Botanist of the Government of India from 1900, 1924 to 1931. The first agricultural experiments directed by the British government were carried out in India by Sir Albert Howard. He also observed and studied the organic agricultural practices in India, which he later documented in his famous book, ‘An Agricultural Testament’ published in 1940. Howard’s work in organic farming was a landmark, not only in India but also in the global organic farming movement. Sir Albert Howard can be said to be the true founder of this movement.\(^5\) He is considered as true father of organic farming. After showing the brief history of organic farming in India, let’s discuss about global scenario of organic farming.

**1.3 Global Scenario of Organic Farming:**

While discussing the global scenario of organic farming, it shows that various writers, scientists, agriculturalists participated in various movements
Rudolf Steiner in his book, 'Spiritual Foundations for Renewal of Agriculture', published in 1924, has clearly elaborated on the process of organic farming. He states that it is the farmer's job to ensure a healthy and bountiful interaction between plants, animals and soil; that in order for animals to be healthy, plants have to be healthy, for which soil has to be healthy. Soil becomes healthy when it obtains essential nutrients from animals in the form of manure.

Similarly, in the year 1939, the first experiment with organic farming was carried out, where Lady Eve Balfour carried out organic farming and chemical farming on two adjoining pieces of land to compare their processes. These findings were published in her book, 'The Living Soil' in the year 1943. In 1939 Lord, Northbourne coined the term organic farming in his book Look to the Land published in 1940, out of his conception of "the farm as organism", to describe a holistic, ecologically-balanced approach to farming- in contrast to what he called chemical farming, which relied on "imported fertility" and "cannot be self-sufficient nor an organic whole". The work made by J. I. Rodale in the early 1940s, which said to have triggered the organic movement in the United States of America. J. I. Rodale was an entrepreneur, publisher, editor and farmer. He was influenced by the philosophy of Sir Albert Howard and started a magazine in 1942 entitled, "Organic Farming and Gardening" with Howard as the associate editor. In addition to this, his Rodale Press published many other magazine, which became a major source of information on organic farming to many home gardeners in the mid-1960s.

In 1962, a prominent scientist and naturalist Rachel Carlson published her book 'Silent Spring'; showed the effects of DDT and other pesticides on the environment. A bestseller in many countries, including the US, and widely read around the world, Silent Spring is widely considered as being a key factor in the US government's 1972 banning of DDT. The book and its author are often credited with launching the worldwide environmental movement.

In the 1970s, global movements concerned with pollution and the environment increased their focus on organic farming. As the distinction between organic and conventional food became clearer, one goal of the organic movement was to encourage consumption of locally grown food, which was promoted through slogans like "Know Your Farmer, Know Your Food". The
International Federation of Organic Agriculture Movements (IFOAM) was created in the year 1972 in Versailles, France, that promotes and exchanges the knowledge of organic agricultural practices across the world. In 1975, Fukuoka released his first book, The One-Straw Revolution, with a strong impact in certain areas of the agricultural world. His approach to small-scale grain production emphasized a meticulous balance of the local farming ecosystem, and a minimum of human interference and labor. During the 1970s and 1980s, in the USA, J. I. Rodale and his Rodale Press (now Rodale, Inc.) were primary leaders in getting Americans to think about the side effects of nonorganic methods and the advantages of organic ones. The press's books offered how-to information and advice to Americans interested in trying organic gardening and farming. In the 1980s, around the world, farming and consumer groups began seriously pressuring for government regulation of organic production. This led to legislation and certification standards being enacted through the 1990s and to date.\textsuperscript{11}

Since the early 1990s, the retail market for organic farming in developed economies has been growing by about 20 percent annually due to increasing consumer demand. Concern for the quality and safety of food, and the potential for environmental damage from conventional agriculture, are apparently responsible for this trend.\textsuperscript{12}

These developments led to increasing pressure among all parts of the world on governments for intervention to regulate laws relating to organic farming practices, which finally led to the establishment of specific standards to regulate it. With regulations increased the worldwide knowledge of organic farming and its benefits, and the market for organically grown products began to increase by the 1990s.

After describing the global scenario of organic farming, let's discuss about different form of agriculture such as conventional agriculture, sustainable agriculture, alternative agriculture, industrial farming and organic farming.

1.4 Different forms of Agriculture:

- **Conventional Agriculture:**
  
  This is the existing farming practice adopted by more than 98 percent of our Indian farmers. In this system, chemical fertilizers and pesticides are applied
in addition to the farmyard manure. Agriculture Universities are involving to
develop new products and process designs to increase productivity in a scientific
way. Various tools and techniques are being developed and put in practice in the
farming to improve the production as well as productivity. Our Indian farming
sector was practicing organic farming up to 1960. A stage had come during
1960s due to draught and ever expanding population, the country was suffering
for want required food and famine was severe throughout our nation in early
sixties. Government had approached developed countries especially USA to
overcome the food shortage. USA was practicing inorganic farming practice
with chemical fertilizers; pesticides in scientific manner and their productivity in
all their crops were very high up to 2 to 3 times than of India.

Government of India and USA made agreements to import wheat
immediately to meet the shortage of food as well as technology continuously to
implement in India to meet the ever growing demand for food. The production
of food crops had increased up to 220 million tonnes from 70 million tonnes in
1970s. This increased performance of agriculture was called as Green
Revolution in India. For the last 40 years, our indigenous organic farming
slowly step by step was forgotten and converted into conventional farming to
increase agricultural products especially wheat and rice to fulfil the requirements
of food to our total population. In the conventional farming, farmers are guided
to increase production with increased use of fertilizers and pesticides. These
have affected soil health and fertility.

Further due to the effect of privatization, globalization and liberalization,
agriculture turned to be loss making sector requiring huge subsides and support
from the government. The present status of conventional farming in our nation is
alarming with several issues of manmade like threatening food security,
contaminated food, mal-nutrition, injury to health of all living beings,
decreasing production of important crops, decreasing productivity, polluted
water, shortage of water cultivation, more failures of crops, increased input
costs, more weeds, more diseases, severe shortage of farm labour and natural
calamity like draught, flood etc.

The term ‘conventional farming’ refers to a production system which
employs a full range of pre- and post-plant tillage practices (e.g. plough, disc
plant, and cultivator), synthetic fertilizers and pesticides. It is characterized by a
high degree of crop specialization. In contrast, organic farming is characterized by a diversity of crops.

Conventional agriculture used knowledge-based technologies to produce food crops that were safe, high yielding, and cost effective. Conventional agriculture depends on synthetic nitrogen (N), potassium (K), and phosphorous (P) fertilizer, pesticides, and heavy machinery driven by fossil fuels. Heavy reliance on chemical inputs has, unfortunately, resulted in increased production costs and has detrimentally impacted ecosystems by introduction of agrochemicals, raising serious concerns for human and animal health. There has been a continuing reliance on the use of pesticides, particularly for fruits and vegetables, as a means of preserving yield and quality. Conventional agriculture has relied heavily on chemical inputs that have negatively impacted the environment and increased production costs. Transition to agricultural sustainability is a major challenge and requires that alternative agricultural practices are scientifically analyzed to provide a sufficiently informative knowledge base in favor of alternative farming practices.\(^{13}\)

**Sustainable Agriculture:**

Sustainable agriculture is defined as agriculture that maintains the environmental and ecological integrity of the soil, water and land systems in the area while providing sufficient income to farmers through the intercropping of different perennials in combination with other perennial trees and or annual crops.

Sustainable agriculture is necessary to attain the goal of sustainable development. According to the Food and Agriculture Organization (FAO), sustainable agriculture "is the successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of environment and conserving natural resources". All definitions of sustainable agriculture lay great emphasis on maintaining an agriculture growth rate, which can meet the demand for food of all living things without draining the basic resources.

Sustainable agriculture can be defined in many ways, but ultimately it seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. Sustainable agriculture fits into and complements modern
agriculture. It rewards the true values of producers and their products. It draws and learns from organic farming. It works on farms and ranches large and small, harnessing new technologies and renewing the best practices of the past.

Dr. John E. Ikerd, Extension Professor at the University of Missouri, offers his view of sustainability: "A sustainable agriculture must be economically viable, socially responsible and ecologically sound. The economic, social and ecological are interrelated, and all are essential to sustainability. An agriculture that uses up or degrades its natural resource base, or pollutes the natural environment, eventually will lose its ability to produce. It's not sustainable. An agriculture that isn't profitable, at least over time, will not allow its farmers to stay in business. It's not sustainable. An agriculture that fails to meet the needs of society, as producers and citizens as well as consumers, will not be sustained by society. It's not sustainable. A sustainable agriculture must be all three-ecologically sound, economically viable and socially responsible. And the three must be in harmony."

"A sustainable agriculture is one that, over the long term, enhances environmental quality and the resource base on which agriculture depends; provides for basic human food and fibre needs; is economically viable; and enhances the quality of life for farmers and society as a whole."

- American Society of Agronomy

“The capacity of available resources and technologies to satisfy the demands of this growing population for food and other agricultural commodities remains uncertain. Agriculture has to meet this challenge, mainly by increasing production on land already in use and by avoiding further encroachment on land that is only marginally suitable for cultivation.

- United Nations Earth Summit 1992

“Sustainable agriculture is one that produces abundant food without depleting the earth’s resources or polluting its environment. It is agriculture that follows the principles of nature to form systems for raising crops and livestock that are, like nature, self-sustaining. Sustainable agriculture is also the agriculture of social values, one whose success is indistinguishable from vibrant rural communities, rich lives for families on the farm, and wholesome food for everyone.”

- ATTRA National Sustainable Agriculture Information Service
"The concepts of sustainable agriculture are to better maintain environmental health, economic profitability, and social and economic equity. Achieving this ideal can be difficult, since so many elements affect the function and integrity of agro-ecosystems. Central to all sustainable systems is the issue of time. Success is measured over generations or even centuries. Understanding the ecosystem and function of alternative agricultural systems is essential in making a smooth transition towards sustainable agriculture. While sustainable agriculture is an ideal goal that many people aspire to, achieving this may be extremely difficult in practice since sustainable agriculture involves many different elements and dimensions, some of which may come into conflict with one another."

- UF/IFAS Sustainable Agriculture, Agricultural Ecology and Cover Crops

Sustainable agriculture is the act of farming using principles of ecology, the study of relationships between organisms and their environment. The phrase was reportedly coined by Australian agricultural scientist Gordon Mc Claymont. It has been defined as "an integrated system of plant and animal production practices having a site-specific application that will last over the long term:

- Satisfy human food and fiber needs
- Enhance environmental quality and the natural resource base upon which the agricultural economy depends
- Make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls
- Sustain the economic viability of farm operations
- Enhance the quality of life for farmers and society as a whole

Therefore the ultimate goal of sustainable agriculture is "to develop farming system that are: (a) productive, (b) profitable, (c) conserve the natural resource base, (d) protect the environment, and (e) enhance soil health and safety over a long term’. Hence, this can be referred as Eco-friendly Agriculture."
• **Alternative Agriculture:**

In 1989, the Board of agriculture of the National Research Council of Untied States published a study called alternative agriculture. Alternative agriculture is not a single system, but a combination of systems, which deal with emphasis on management practices and on biological relationships, with minimum use of synthetic and inorganic inputs. This philosophy believes that natural processes occur in the ecosystem and farmers should take advantages of these natural processes, rather than try to circumvent them or destroy them with chemicals.

Alternative agriculture includes the following practices:

- Reduced or minimum use of chemical fertilizers and pesticides.
- Tillage that minimises soil erosion.
- Integrated pest management (IPM)
- Management systems, such as crop rotations, to help control weeds and pest resurgence.

The term 'Alternative agriculture ' as it applies to the area of agriculture can be defined as 'A systematic approach to farming intended to reduce agricultural pollution, enhance sustainability, and improve efficiency and profitability. Overall, alternative agriculture emphasizes management practices that take advantage of natural processes (such as nutrient cycles, nitrogen fixation, and pest-predator relationships), improve the match between cropping patterns and agronomic practices on the one hand and the productive potential and physical characteristics of the land on the other, and make selective use of commercial fertilizer and pesticides to ensure production efficiency and conservation of soil, water, energy, and biological resources. Examples of alternative agricultural practices include use of crop rotation, animal and green manures, soil and water conserving tillage systems, such as no-till planting methods, integrated pest management, and use of genetically improved crops and animals. Consonant with sustainable agriculture, alternative agriculture focuses on those farming practices that go beyond traditional or conventional agriculture, though it does not exclude conventional practices that are consistent with the overall system'.

15
• Cook (1991) defines alternative agricultural practices as being “those, which take advantages of the biological relationship, which occur naturally environmental balance”.  

**Industrial Farming:**

Industrial farming is a form of modern farming that refers to the industrialized production of livestock, poultry, fish, and crops. The methods of industrial agriculture are techno scientific, economic, and political. They include innovation in agricultural machinery and farming methods, genetic technology, techniques for achieving economies of scale in production, the creation of new markets for consumption, the application of patent protection to genetic information, and global trade. These methods are widespread in developed nations and increasingly prevalent worldwide. Most of the meat, dairy, eggs, fruits, and vegetables available in supermarkets are produced using these methods of industrial agriculture.

The industrialized production of livestock, poultry, fish, and crops is called industrial agriculture. Industrial agriculture includes techno scientific, economic, and political methods. Methods like inventing new agricultural machines, adopting new farming methods, creation of new markets for consumption, ensuring patent protection to genetic information, using genetic technology and global trade are used in industrial agriculture. It is using these methods that most of the meat, dairy, eggs, fruits, and vegetables available in supermarkets nowadays are produced. Industrial agriculture is also called as industrial farming.

After analysing the different form of agriculture now we discuss about meaning and thereafter definitions of organic farming. Different agronomists, writers and institutions or organizations have defined organic farming in different ways. Some of the popular definitions have been listed below.

1.5 **Meaning and Definitions of Organic Farming:**

The word ‘organic’ means origin from a living thing and farming with the philosophy of organic is to make production system alive with long life. It is not just to replace fertilizers and pesticide with manure and predators but it is an ongoing dynamic process for making healthy soil, and ultimately a vital living system of the world.
Organic farming is a food production system where with traditional wisdom and ancient knowledge of Indian farming such as crop rotations, mixed cropping, mixed farming, organic manure, residue recycling, agro-forestry system etc. are amalgamated with modern practices of crop cultivation and livestock management to enhance the profitability without dependence on off-farm resources.

Organic farming refers to that type of agriculture, which completely eliminates the use of agro-chemicals and relies on natural inputs like Farm Yard Manure (FYM) and animal manure, and natural and biological pest control. It uses practices such as inter-cropping and crop rotation.

Organic farming methods combine some aspects of scientific knowledge and highly limited modern technology with traditional farming practices; accepting some of the methods of industrial agriculture while rejecting others. Organic methods rely on naturally occurring biological processes, which often take place over extended periods of time, and a holistic approach; while chemical-based farming focuses on immediate, isolated effects and reductionist strategies. Organic farming is one of the widely used methods, which are thought of as the best alternative to avoid the ill effects of chemical farming.

Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture. Many techniques used in organic farming like inter-cropping, mulching and integration of crops and livestock are not alien to various agriculture systems including the traditional agriculture practiced in old countries like India. However, organic farming is based on various laws and certification programmes, which prohibit the use of almost all synthetic inputs, and health of the soil is recognised as the central theme of the method.18

As far as possible, organic farmers rely on crop rotation, green manures, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control pests. Organic agricultural methods are internationally regulated and legally enforced by many nations, based in large part on the standards set by the International Federation of Organic Agriculture Movements.

The various international institutes and organizations have defined organic farming concepts differently; some important definitions of organic farming are as follows:
Definitions of Organic Farming:

**International Federation of Organic Agriculture Movements (IFOAM)** defines "Organic agriculture includes all agricultural systems that promote the environmentally, socially and economically sound production of food and fibres. These systems take local soil fertility as a key to successful production. By respecting the natural capacity of plants, animals and the landscape, it aims to optimise quality in all aspects of agriculture and the environment. Organic agriculture dramatically reduces external inputs by refraining from the use of chemo-synthetic fertilisers, pesticides, and pharmaceuticals. Instead it allows the powerful laws of nature to increase both agricultural yields and disease resistance".  

Another definition of **IFOAM** is that "Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved".

**Codex Alimentarius Commission** defines that "Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasises 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 fulfil any specific function within the system".

**According to United States Department of Agriculture (USDA)** "A production system which avoids or largely excludes the use of synthetically compounded fertilisers, 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 tilt, to supply plant nutrients, and to control insects, weeds, and other pests'. The USDA definition includes 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". 22

Another definition is given by USDA defines organic agriculture as “a production system that is managed to respond to site-specific conditions by integrating cultural, biological and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity”. 23

As per the definition of the United States Department of Agriculture (USDA) study team on organic farming “Organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives and biological system of nutrient mobilization and plant protection”. 24

According to National Organics Standards Board (NOSB) "Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and soil biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony.

‘Organic’ is a labelling term that denotes products produced under the authority of the Organic Foods Production Act. The principal guidelines for organic production are to use materials and practices that enhance the ecological balance of natural systems and that integrate the parts of the farming system into an ecological whole. Organic agriculture practices cannot ensure that products are completely free of residues; however, methods are used to minimise pollution from air, soil and water.

Organic food handlers, processors and retailers adhere to standards that maintain the integrity of organic agricultural products. The primary goal of organic agriculture is to optimise the health and productivity of interdependent communities of soil life, plants, animals and people”. 25

Food and Agriculture Organisation (FAO) defines “Organic farming or organic agriculture as a unique production management system which promotes
and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs”.26

According to NPOP “Organic products are grown under a system of agriculture without the use of chemical fertilizers and pesticides with an environmentally and socially responsible approach. This is a method of farming that works at grass root level preserving the reproductive and regenerative capacity of the soil, good plant nutrition, and sound soil management, produces nutritious food rich in vitality which has resistance to diseases”.27

According to British Organic Farmers and Organic Growers Associations, “organic farming seeks to create an integrated sustainable agricultural system, relying first and foremost on ecological interactions and biological processes for crop, livestock and human nutrition and protection from pests and diseases”.28

A modern definition of organic farming provided by Lampkin (1994), states that the aim is “to create integrated, humane, environmentally and economically sustainable production systems, which maximise reliance on farm-derived renewable resources and the management of ecological and biological processes and interactions, so as to provide acceptable levels of crop, livestock and human nutrition, protection from pests and disease, and an appropriate return to the human and other resources”.29

According to Hodgas (1981), Organic Farming is defined as a system that attempts to provide a balanced environment, in which the maintenance of soil fertility and control of pest and diseases are achieved by the enhancement of natural processes and cycles, with moderate inputs of the energy and resources while maintaining the productivity.30

Bajpal J. and Ranjan S. (2011) define organic agriculture represent a broad set of practices that emphasizes farming based on ecosystem management, integrated cropping and livestock system, diversity of products and reliance on natural pest and disease control without the use of synthetic inputs.31
Solooja M. and Yadav S. (2010), explained that organic agriculture is a sustainable and environment friendly production system that offers cultural benefits.

**National Standards Board of the US Department of Agriculture (USDA)** defines the word “Organic”, an ecological management production system that promotes and enhances biodiversity, biological cycles and activity. It is based on the minimal use of off-farm inputs and on management practices that restore, maintain and enhance “ecological harmony”.

According to **UNCTAD-UNEP** (2008), organic production is particularly well suited for smallholder farmers, who comprise the majority of the world's poor. It makes resource-poor farmers less dependent on external resources and helps them enjoy higher and more stable yields and incomes, which enhances food security. Moreover, organic agriculture in developing countries builds on and keeps alive farmers’ rich heritage of traditional knowledge and traditional agricultural varieties. Organic farming has also been observed to strengthen communities and give youth an incentive to keep farming, thus reducing rural-urban migration.

Many scientists at different levels have elaborated the concept of Organic Farming; the important descriptions are as follows:

Description offered by Lampkin (1990) has been found to be the most comprehensive one covering all essential features of Organic Farming. According to Lampkin, “Organic Farming is a production system which avoids or largely excludes the use of synthetically compounded fertilizers, growth regulators and live stock feed additives. To the maximum extent, feasible Organic Farming systems rely on crop rotations, crop residues, animal manures, legumes, green manures, off farm organic wastes and aspects of biological pest control to maintain soil productivity and tilt to supply plant nutrients and to control insect pests’ diseases and weeds. Thus, the Organic Farming implies recycling of waste and residue to the native soil itself, replenishing the nutrients depleted from the soil during the crop growth, encouraging the growth of microorganisms which could regulates phased release of stored nutrients in the soil to the crop growth in right proportion, maintaining soil health by balancing the soil moisture and soil aeration and ensuring soil fertility by firmly binding the nutrient elements in the complex organic molecules.
According to Funtlana (1990) “Organic Farming is giving back to the nature what is taken from it”. It is not mere non-chemicalism in agriculture; it is a system of farming based on integral relationship. Therefore, one should know the relationship among soil, water, plant and micro flora and overall relationship between plants animal kingdom. It is the totality of these relationships, which is the backbone of the Organic Farming.\textsuperscript{36}

According to FAO (1998) and Scottish Agricultural College (2005), organic farming (also known as ecological or biological farming) is commonly recognised as a farming system that excludes the use of synthetic fertilisers and pesticides. This is a rather simplistic view of organic agriculture as it differs from other farming systems around the management of the entire system. Organic farming is a clearly defined production system that takes a holistic approach to production, considering the entire farm or production system as an ecological unit. Central to the organic farming system, in terms of physical production, is the management of the soil. Soil is managed in such a way as to optimise soil health through the management of the inorganic and organic soil processes to enhance biological processes that improve plant health. This is primarily based on the exploitation of natural biological cycles in the soil (e.g. nitrogen fixation and nutrient cycling in the soil). Crop combinations and rotations are also managed in such a way as to improve plants’ competitive ability and create a favourable environment for the presence of natural predators of crop pests. In livestock, animals are managed to enhance natural resistance to pests and diseases though good nutrition and management practices such as interrupting host pathogen relationships. These kinds of practices reduce the necessity for external inputs to manage disease and fertility.\textsuperscript{37}

Scottish Agricultural College (2005) stated that organic farming is not only about managing the soil-plant environmental interaction in a holistic manner- it also has food quality, human health, animal welfare and socio-economic aims. As a result of these principles and philosophies, organic food has a strong brand image in the eyes of the health, environment and socially conscious consumer. Organic agriculture is therefore, is not only driven by farmers’ philosophical approaches to agriculture, but is also drawn by consumer demand. This strong brand image combined with generally limited supply means that organic produce can command higher prices for retailers and farmers than conventionally produced food.\textsuperscript{38}
As there are many definitions of organic farming, but a commonly accepted definition is “farming without the addition of artificial chemicals”. An artificial chemical is one that has been manufactured or processed chemically; for example super phosphate (one of the world’s most important fertilisers). Organic farmers cannot use any chemical herbicides at all.

The International Federation of Organic Agriculture Movements (IFOAM), the umbrella body for organic agriculture worldwide, defines organic as the farming system described in its basic standards. IFOAM outlines the principle aims of organic agriculture as follows:

- To produce food of high nutritional quality in sufficient quantity;
- To interact in a constructive and life enhancing way with all natural systems and cycles;
- To encourage and enhance biological cycles within the farming system, involving micro organisms, soil flora and fauna, plants and animals;
- To maintain and increase long-term fertility of soils;
- To promote the healthy use and proper care of water, water resources and all life therein;
- To help in the conservation of soil and water;
- To use, as far as is possible, renewable resources in locally organised agricultural systems;
- To work, as far as possible, within a closed system with regard to organic matter and nutrient elements;
- To work, as far as possible, with materials and substances which can be reused or recycled, either on the farm or elsewhere;
- To give all livestock conditions of life which allow them to perform the basic aspects of their innate behaviour;
- To minimise all forms of pollution that may result from agricultural practices;
- To maintain the genetic diversity of the agricultural system and its surroundings, including the protection of plant and wildlife habitats;
• 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;
• To consider the wider social and ecological impact of the farming system;
• To produce non-food products from renewable resources, which are fully biodegradable;
• To encourage organic agriculture associations to function along democratic lines and the principle of division of powers;
• To progress towards an entire organic production chain, this is both socially just and ecologically responsible. 39

IFOAM states that "Genetic engineering focuses on the genetic makeup without taking into account the complete organism or system in which the organism functions. It is thus a contradiction to the above mentioned principle aims of organic agriculture."

Related Terms:
Additional terms that are linked to agricultural sustainability include:

• **Agro Ecology** – a generally more environmentally and socially sensitive approach to agriculture.

• **Agro forestry** – a system of combing the use of tree species and row crops in combination.

• **Best Management Practices (BMPs)** – established practices for the optimal management of a given system, based on required outcomes, but generally related to overall sustainability.

• **Agro Biodiversity** – includes the wide variety of species used by farmers as well as how biological diversity is exploited to produce and manage crops.

• **Biodynamic Farming** - a more spiritual approach to agriculture requiring specific practices and preparations to work within these spiritual
parameters. Biodynamic foods are certified through the Demeter Association.

- **Bio Intensive Farming or Mini Gardening** – a production system that enables one person to grow all their and or family’s needs on a small area without relying on non renewable resources.

- **Biological Farming / Ecological Farming** – in Europe, this refers to specifically to organic farming, while in other countries, it can refer to adopting specific practices that enhance the sustainability of farming.

- **Biotechnology** – the techniques of breeding and cultivation of plants to enhance a given trait or set of traits. This term has now been co-opted by GM interests and is invariably associated with genetically engineered organisms. There are factions who believe that Biotechnology will enhance the sustainability of agriculture, although this is a fiercely debated subject, and is included for this reason.

- **Carrying Capacity** – theoretical equilibrium population size at which resource production and consumption will stabilise i.e. the maximum size that can be supported indefinitely into the future.

- **Holistic Management** – a decision making process allowing people to make decisions that satisfy immediate needs without jeopardising future well being. A process which identifies deeply held values and uses this to create a vision and a long term picture towards which they will progress and assist in making decisions that are environmentally, socially and economically sustainable.

- **Integrated Farming Systems** – viewing farms as an integrated whole to make more efficient use of natural, economic and social resources.

- **Integrated Pest Management** – an ecologically based approach to pest control that uses a multidisciplinary knowledge of crop and pest relationships to keep pest populations within acceptable limits. IPM does, however, make use of pesticides.
• **Low Input Agriculture** – a system that seeks to optimise management and use of on farm inputs to reduce the need for external inputs to lower costs, avoid pollution and pesticide residues while maintaining and enhancing short and long term farm profitability.

• **Natural Farming** – based on the philosophy of Japanese farmer Masanobu Fukuoka and is a farming system with no tillage, fertilisers, pesticides weeding pruning and even very little labour.

• **Permaculture / Permanent Agriculture** – the emphasis is on design to produce an efficient, low maintenance integration of plants, animal’s people and structures applied at the scale of a home garden.

• **Precision Farming** – a management strategy employing detailed, site specific information for precise management of farm inputs to optimise (reduce) input use. This system has come under criticism in terms of sustainability due to high capital outlays and high technology requirements.

• **Regenerative Agriculture** – a term coined by Robert Rodale and refers to the regeneration of the renewable resources on the farm as well as regeneration related to economic sectors and social concerns.  

The principles and standards for organic agriculture draw on many elements of the above descriptions and philosophies for sustainable agriculture. After discussing the various terms of farming let’s see the important principles of organic farming given by International Federation of Organic agriculture Movement (IFOAM).

1.6 **Principles of Organic Agriculture:**
According to IFOAM (2005), the principles of organic agriculture are based on four fundamental principles:

1. **The Principle of Health:**

   Organic Agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible. The health of individuals and
communities cannot be separated from the environment. The role of organic agriculture is to sustain and enhance the health of ecosystems and organisms. Organic agriculture aims to produce high quality, nutritious food that contributes to preventive health care and well-being. It should avoid the use of fertilisers, pesticides, animal drugs and food additives that may have adverse health effects.

2. The Principle of Ecology:

Organic Agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. It is rooted within living ecological systems and production is to be based on ecological processes and recycling. Organic farming, pastoral and wild harvest systems should fit the cycles and ecological balances in nature and 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, habitats, biodiversity, air and water.

3. The Principle of Fairness:

Organic Agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities. Fairness is characterised by equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings. This principle emphasises that organic agriculture should conduct human relationships in a manner that ensures fairness at all levels and to all parties, should provide everyone involved with a good quality of life, contribute to food sovereignty and reduction of poverty. Animals should be provided with the conditions and opportunities of life that accord with their physiology, natural behaviour and wellbeing. Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs.
4. The 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 jeopardising 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 of care views precaution and responsibility as 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.\textsuperscript{41}

After discussing the principles of organic agriculture, let’s study about practices of organic farming system.

1.7 Practices:

The widely used organic manures, and methods of pest and weed control are discuss here:

A) Organic Manures:

Application of organic manures for maintenance of soil at high fertility level is almost essential. Organic manures improve physical, chemical as well as biological properties of soil. These are classified into two categories. The first refers to manures which are bulky in nature, but supply plant nutrients in small quantities. These known as bulky organic manures. The second category comprises those organic manures which contain a higher concentration of plant nutrients. These are known as concentrated organic manures.
I) Bulky Organic Manures:

   a) Farm Yard Manures  
   b) Green Manures    
   c) Compost Manures

II) Concentrated Organic Manures:

   a) Oil Cakes  
   b) Poultry Manure  
   c) Fish Meal  
   d) Meat Meal  
   e) Blood Meal  
   f) Bone Meal  
   g) Horn and Hoof Meal

III) Non-Traditional Manures:

   1) Bio-fertilizer a) Rhizobium b) Azotobacter c) Azospirillum  
  e) Blue f) Green Algae g) Azolla h) Mycorrhizae
   2) Soil Conditioners
   3) Vermi-compost
   4) Bio-gas and waste-treatment
   5) EM technique (Effective micro-organisms)

B) Organic Pest and Weed Control:

   Organic pest control refers to the use of organic pesticides, repellents and practices like inter-cropping and relying upon the natural prey-predator relationships. Organic pest control is preventive rather than reactive.

   Organic pest control also includes mechanical or physical control. The practices used under this type of control are:

   1) Manual Control  2) Mulching  3) Heat Treatment  4) Barriers  
   5) Tillage  6) Burning  7) Flooding  8) Cultural Control  
  a) Crop Rotation  b) Trap Cropping  c) Time of Planting  
  d) Application of soil Amendments  e) Strip Farming  f) Sanitation
Soil Association of UK asserts following organic farming facts:

**In organic farming:**

- Artificial chemical fertilisers are prohibited – instead organic farmers develop a healthy, fertile soil by growing and rotating a mixture of crops, adding organic matter such as compost or manure and using clover to fix nitrogen from the atmosphere.

- Pesticides are severely restricted – instead organic farmers develop nutrient-rich soil to grow strong, healthy crops and encourage wildlife to help control pests and disease.

- Animal welfare is at the heart of the system and a truly free-range life for farm animals is guaranteed.

- A diversity of crops and animals are raised on the farm and rotated around the farm over several seasons, including fallow periods. This mixed farming approach helps break cycles of pests and disease and builds fertility in the soil.

- The routine use of drugs, antibiotics and wormers is banned – instead the farmer will use preventative methods, like moving animals to fresh pasture and keeping smaller herd and flock sizes.

- Genetically modified (GM) crops and ingredients are banned.

**The key characteristics of organic farming include:**

1) Protecting the long term fertility of soils by maintaining organic matter levels, encouraging soil biological activity, and careful mechanical intervention;

2) Providing crop nutrients indirectly using relatively insoluble nutrient sources which are made available to the plant by the action of soil micro-organisms;

3) Nitrogen self-sufficiency through the use of legumes and biological nitrogen fixation, as well as effective recycling of organic materials including crop residues and livestock manures;
4) Weed, disease and pest control relying primarily on crop rotations, natural predators, diversity, organic maturing, resistant varieties and limited (preferably minimal) thermal, biological and chemical intervention;

5) The extensive management of livestock, paying full regard to their evolutionary adaptations, behavioural needs and animal welfare issues with respect to nutrition, housing, health, breeding and rearing;

6) Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats.

1.8 Importance of the Study:

There are several demerits of conventional farming which adversely affect the sustainable development of agriculture. So, it is essential to develop sustainable farming system such as organic farming. Because it gives long term assurance of production and also provides several benefits to consumers, farmers and even to the society. These benefits are Genetically Modified (GM) free healthy food, maintenance of soil fertility, reduction in the cost of production and betterment of the environment. But, the need of the hour is to create awareness among the consumers, farmers and society about organic farming. The present study is an attempt to highlight the economic benefits of Organic Sugarcane Farming (OSF).

1.9 Scope of the Study:

Increase in population compels to stabilize agricultural production and also to increase it further in sustainable manner. The scientists have realized that the ‘Green Revolution’ has reached a plateau and has diminishing returns. A natural balance needs to be maintained at all costs for to existence of life and property. Therefore, the present study gives ideas about organic sugarcane farming in terms of reducing the cost of cultivation and increases in net returns with sustainable yield. World Bank study in 2003 indicated that water level has gone down in India. Though sugarcane cultivation needs relatively more water, organic sugarcane crop comparatively requires less water and organic farming practices leads to sustainable development. The study will be helpful for the policy makers to frame suitable policies for organic sugarcane farmers. This study will also be of great use to the farmers to take appropriate farming decisions with respect to Organic Sugarcane Farming.
1.10 Need of the Study:

The present micro level study focuses on cost and return in crop cultivation, specific to one individual crop. It helps us to understand the ways with which we are able to increase yield of sugarcane cultivation. It brings economic benefits to the farmers such as Organic Sugarcane Farmers (OSF) or Conventional Sugarcane Farmers (CSF). The study shows the total cost of cultivation, per tonne cost of cultivation, total revenue, net returns and economic benefits of sugarcane production at farm level. Study is necessary for proper evaluation of the economic benefits of sugarcane farmers. It is worth to mention that proper investigation into cost and returns of sugarcane farmers would throw light on the economics of sugarcane cultivation. It will help to judge the economic benefits of organic sugarcane farming or conventional sugarcane farmers. Here, the thrust is on economic benefits of sugarcane farmers. Because, the researcher has used the concept of opportunity cost through which it is easy to find economic benefits.

1.11 Limitations of the Study:

The numbers of organic sugarcane producers are less. But this is Census study of sugarcane cultivators, who have maintained the organic sugarcane cultivation data or chemical fertilizer base cultivation (conventional sugarcane cultivation data) since 2004. The State Agricultural University, Colleges and Government Extension Agencies have promoted the conventional farming practices. The information about the organic farming practices from these sources is not encouraging.

1.12 Objectives of the Study:

Following are the main objectives of the study:

1) To find out per acre cost of cultivation of Organic Sugarcane Farming and Conventional Sugarcane Farming.

2) To find out per acre revenue of Organic Sugarcane Farming and Conventional Sugarcane Farming.

3) To find out per tonne cost of production of Organic Sugarcane Farming and Conventional Sugarcane Farming.
4) To find out per acre economic profits or benefits in Organic Sugarcane Farming and Conventional Sugarcane Farming.

5) To compare organic farming and conventional farming on the basis of accounting cost and opportunity cost.

6) To study the model of ‘Youth Self Help Group’ and marketing of organic farming.

The researcher has surveyed the literature and also taken the field surveys to decide the hypothesis on which he would like to explore the data. The hypotheses of the study are as follows.

1.13 Hypotheses of the Study:

The hypotheses of the study are considered as follows:

- **Null Hypothesis:** -
  Organic farming and economic benefits are not related to each other.

- **Alternative Hypothesis:** -
  Organic farming and economic benefits are positively related to each other.

To test the hypothesis, the researcher has collected the data from farmers who cultivate organic sugarcane from more than a decade. The methodology and the method to explore upon the objectives and hypotheses, this is as follows.

1.14 Research Methodology and Methods:

The present research is based on Field Survey. Primary data are collected from conducting Personal Interviews of Organic Sugarcane Farmers (OSF) and Conventional Sugarcane Farmers (CSF) from Jalgaon and Pune districts from 2004-05 to 2013-14. The questionnaires are filled by the same farmers. The Organic Sugarcane Farmers (OSF) those who are involved in organic sugarcane farming practices for the last 10 or more years are selected for the research. Non-probability sampling method such as convenience sampling method is used for collecting primary data from Conventional Sugarcane Farmers (CSF) from the same districts.
The organic sugarcane farmers are well-known organic sugarcane farmers in Maharashtra, who are practiced organic sugarcane farming for the last 10 or more years. These expert farmers are providing guidance to other farmers regarding organic sugarcane practices. After analysing the statistical data and emphasising opportunity cost of organic sugarcane farmers the economic benefits are found out. The Statistical Package for Social Science (SPSS) software is used for the analysis of data. Different statistical methods and tools such as Pearson's correlation coefficient test, growth rate, average and percentage methods are used.

- **Pilot Survey** -

Initially, a pilot survey is carried out at ‘Nav-Nirman Nyas’, Pargaon, where the organic farming method was started by Mrs. Vasudha Sardar in 2004 with the ‘Youth Self Help Group’, and developed a marketing model. The marketing strategy of this ‘Youth Self Help Group’ model is studied in greater depth. Then economic benefits of organic farm cultivated are highlighted.

- **Primary Data Source** -

The primary data are collected from organic and conventional sugarcane farmers from two districts viz. Jalgaon and Pune from 2004-05 to 2013-14. The data are collected by conducting personal interviews from Organic Sugarcane Farmers (OSF) and Conventional Sugarcane Farmers (CSF) from the same districts. The comparison is made between the two types of farming on the basis of total cost of cultivation, yields, irrigation cost, per tonne cost of production, total revenue and net returns or profits. The economic benefits of organic and conventional farming are highlighted. Opportunity cost concept is used to focus upon the economic benefits of organic sugarcane farming.

- **Secondary Data Source** -

The secondary data is collected from various published sources like books, journals, reports published by Government and other national and international institutions or organizations, theses, dissertations, news paper articles and the internet. The chapter scheme of the thesis is as follows.
1.15 Chapter Scheme:-

The proposed thesis has five chapters.

Chapter I: Introduction

The present chapter comprises of a brief history of organic farming in India, global scenario of organic farming, meaning and definitions of organic farming, scope, importance, objectives, hypothesis and limitations of the study, research methodology, research method and chapter scheme.

Chapter II: Review of Literature

This chapter is divided into two sections. The first section discusses the marketing model of ‘Youth Self Help Group’ developed by Mrs. Vasudha Sardar at Pargaon village near Pune. And the second section presents the brief overviews on agronomic, sociological and ecological aspects of organic farming of the relevant studies conducted by various researchers, scientists, agronomist, environmentalist, journals, and institutes or organizations.

Chapter III: Analysis of Data

The present chapter is based on primary data which are collected from organic and conventional sugarcane farmers from two districts viz. Jalgaon and Pune from 2004-05 to 2013-14. The data are collected by conducting personal interviews with Organic Sugarcane Farmers (OSF) and Conventional Sugarcane Farmers (CSF) from the same districts. The comparison is made between the two types of farming on the basis of collected primary data in terms of per acre land preparation cost, seed cost, plantation cost, irrigation cost, inter-cultivation cost and weeding cost, fertilizer cost, total cost of cultivation or production, yields, per tonne cost of production, total revenue and net returns or profits of organic and conventional sugarcane farming from 2004-05 to 2013-14. Economic benefits of organic sugarcane farming are revealed through opportunity cost in two types of farming.

Chapter IV: Evaluation of Organic Farming

The present chapter evaluates the economic benefits of Organic Sugarcane Farming (OSF) and Conventional Sugarcane Farming (CSF) in terms of average and percentage on the basis of analysed primary data. The benefits of
both the farmers are evaluated in terms of land preparation cost, seed cost, plantation cost, inter-cultivation and weeding cost, fertiliser cost, irrigation cost, labour cost, total cost of cultivation, total revenue, yields, per tonne cost of production, net returns or profits.

Chapter V: Summary and Conclusions

This chapter presents the summary of each chapter and conclusion of thesis. Finally suggestions, future of organic farming and further guidelines for the research students who would like to work on organic sugarcane farming are also given.

Bibliography:

The lists of references which are used during research are given in the bibliography such as books, reports, journals, news paper articles and websites.

1.16 Summary

First of all the present chapter gives a brief history of organic farming in India, then global scenario of organic farming, different forms of agriculture, meaning and definitions of organic farming, scope, importance, objectives, hypothesis, and limitations of the present study. Therefore, research methodology, methods and chapter scheme are also given. We now move on to a detailed review of literature in the next chapter.
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