Chapter No. 1

Introduction and Research Methodology

Agriculture has always remained the backbone of the Indian Economy and despite concentrated industrialization in the last six decades; agriculture still occupies a place of pride. Indian agriculture is reaching the stage of development and maturity with the advanced countries of the world has embarked on the path of progress. It contributes sizeable share to National Income from domestic as well as exports sources. It provides employment to around 60 percent of the total workforce in the country. The significance of agriculture in the national economy can be explained by considering the role of agriculture under different heads.

No doubt with faster development of the non-agriculture sectors in recent years, the share of agriculture in National Income has fallen. Yet, it continues to be significant at about 18 percent at present. In 1950-51, agriculture and allied occupations contributed 59 percent of the National Income. In 1980-81, its contribution in national income was 40 percent of the GDP. As the progress of industrialization and economic growth gathered momentum under the five year plans with manufacturing and service sectors growing rapidly and agricultural sector limping along, the percent share of agriculture in GDP declined and reached at the level of 20 percent at present. Its share in GDP is falling, but its role in the economy continuous to be quite significant.

Agriculture is not just a food producing machine, but it is the backbone of the country and it is the main source of our livelihood. Agriculture is the science also art of cultivating the soil, growing and harvesting crops and raising live stocks. Agriculture is a soul of any country to raise its economic condition for supply of food, supply of raw materials, for industries, agriculture is the important foundation of the country like India, where agriculture is the main occupation and therefore, it is necessary to adopt advanced scientific method of cultivation in order to improve the agriculture.

Agriculture dominates the economy to such an extent that a very large proportion of working population in India is engaged in agriculture. Data provided by the Census of India reveals that in absolute terms, agriculture has provided employment to 98 million people in 1951. In 1961, 68.9 percent of working population was engaged in agriculture. Whereas,
64.2 percent in 1981 and 59.9 percent working population in 1999-2000, out of total working population was engaged in agriculture sector. The employment generation accelerates the economic activities towards prosperity condition.

Agriculture contributes a sizeable part to export and is an important segment of impacts of the country. Agricultural products like tea, sugar, oilseeds, tobacco, spices, fruits etc., contribute to the main items of export of India. The exports of agricultural products have been quite large and rising all through these years, particularly since the 1970’s. These exports at present constitute 15 to 20 percent of the total exports of the country. Broadly speaking, the proportion of agricultural goods, which were exported, came to 50 percent of our exports, and manufactures with agriculture contribute another 20 to 50 percent and the total comes to 70 percent of Indians exports in 1950-51. But with diversification of exports especially after the introduction of agricultural exports, which were 18.5 percent in 1990-91 rose to 20.3 percent in 1996-97 and therefore indicated a continuous decline and were of the order of only 10.8 percent in 2005-06. This makes it an important contributor to the foreign currencies. Not only has it earned a sizeable amount of foreign exchange, but is enhancing development. It is because its earning are available for the impact of non-agricultural itself needs little imports as its inputs.

Agriculture has been the source of supply of raw material to our leading industries. Industry depends directly or indirectly on agriculture. Cotton and Jute textile industries, sugar, flour mills, vanaspati and plantations, all these depend on agriculture directly. There are many other industries, which depend on agriculture in an indirect manner. Many of our small-scale and cottage industries like handloom weaving, oil crushing, rice husking etc., depend upon agriculture for their raw materials all together they account for 50 percent of income generated by the manufacturing sector in India. But then, in recent years, the significance of agriculture to industries is going down as many new industries have come up, which are not dependant on agriculture. However, in recent years, the importance of food processing industries is being increasingly recognized both for generation of income and for generation of employment.

Agriculture provides food surplus to the expanding population. The demand for food increases at a faster rate, because of the heavy pressure of population and its rapid increase. The existing level of food consumption in these countries is very low and with a
little increase in per capita income the demand for food rises steeply. Therefore, unless agriculture is able to continuously increase its marketed surplus of food grains, a crisis is likely to emerge.

Agriculture also makes available resources for investment. This contribution is more significant, because without it, no capital formation can take place. Saving is created by raising the productivity of agriculture. The productivity of agriculture can be increased with little additional cost. As a result, farmers save some amount of agricultural surplus, then they invest their savings in non-agricultural sector, which is very helpful for capital formation. Thus, agriculture can play an important role in pushing up the rate of capital formation. If it fails to do so, the whole process of economic development will suffer a setback. Therefore, economic development will ultimately depend on increasing the agricultural productivity considerably. In absolute terms the gross capital formation in a year is at present about Rs.165000 crore. As such, it is not surprising to find out that the matter of investment for this sector has an important place.

Furthermore, good crops imply large purchasing power with the farmers, which lead to greater demand for manufacture and, therefore, better prices. In other words, prosperity of the farmers is also the prosperity of industries. Likewise, damage of crops lead to a suppression in business. Generally, it is the failure in the agricultural front that has lead to failure of economic planning in particular periods. Further, agricultural growth has direct impact on poverty eradication. It is also an important factor in containing inflation, raising agricultural wages and for employment generation.

It is clear, therefore, that agriculture has been the backbone of the Indian economy.

1.1 Types of Farming

Different types of farming exist as per the different conditions in different regions. The following types of farming have been discussed in following manner.

1.1.1 Peasant Proprietorship

Small scale practice of farming on private farm means peasant farming. The farmers cultivate the farm in this type. The ownership of farm obtains by him by hereditary. He has the right to transfer this ownership of farm to another person, if he has the wish. Mostly, small holding farms include in this type. This small land is all to the farmers, therefore, they are considered as a support to the family rather than means of income. They employ
all family members on this farm other than hiring labour. This method does not only has economic significance but also has social and emotional significance. The major features of this farm are;

1.1.1.1 Farmers have permanent ownership of this farm.
1.1.1.2 This ownership is transferable and hereditary.
1.1.1.3 All practices in the farm are undertaken by family members. Therefore, the farmers do not depend on external labours.
1.1.1.4 All the decisions regarding the various practices and functions of the farm are taken by farmer.
1.1.1.5 Total output of this farm is kept by farmer for consumption his personal purpose. However, where farmers take cash, they sell these products and purchase food grains.
1.1.1.6 High Capital equipments are not applicable due to small size of the farm.

1.1.2 Estate Farming

This type of farming is an example of unexist Jamindary. In this method, the farm is owned by a person known as Jamindar. Land may be divided in different parts. Further, this landlord himself does not participate in the cultivation of this farm. This farm is cultivated through hired labour, which leads to exploitation them.

In this method, farm is cultivated by two methods. In first method the labour is hired by landlord and all the work is completed. He takes all decisions about, money, input, type of product etc. Labors do not have any relation with profit, but, landlord has to concentrate in the farm due to profit motive. He can exploit the workers by giving minimum wages.

In second method he gives his land to cultivate on certain amount of money. It is an agreement between farmer and landlord. It is no business of landlord after agreement about crops, input, and profit and loss, etc., is done. Exploitation has more scope in this method. Further, farmer employ in this lands more than optimum level due to profit.

1.1.3 Corporate Farming

Corporate farming is similar to estate farming. The land holding under this method is large scale, which leads in large scale output. Modern techniques and machines are applied in this type of farming. Therefore, various benefits of mechanism can be enjoyed by
farmers. Whereas, the workers hired for work and the nature of their work is similar to industrial workers. The defects of the estate farming are avoided in this farming, because mechanization requires much capital, which is available easily, which leads in more land productivity, which leads in more output for sale. Efficiency in such farming may be more due to professional approach. The experience of this type of farming in America is satisfactory.

The major limitation of this farming is that the use of machines in this method leads to unemployment among workers. Second limitation is that, even though, output under this method is increases, which benefits the rich persons, which can’t avoid exploitation of workers. This method widens the gap between richer and poor persons.

1.1.4 Joint Farming

It is a private type of farming, which is found in China and India. This type of farming is carried out among interrelated persons or communities. The land of the farming is not owned by individuals, but owned by group or community. For the cultivation purpose everyone is distributed with a specific acre of it. Those persons work on the farm, which get payment and share of output, because they have the share in joint ownership. But no one from the community has the right to sell the land. If selling of the land is essential, then it transfers to the group, because land is not distributed in different parts. Further that, there is no guarantee to get same land for cultivation. Therefore, it is impossible to sell this land to external person.

Major benefit of joint farming is that the optimum size of the land. There is no problem of subdivision of the land, due to lack of the process of distribution. Another thing is that more significance is given to community’s welfare than individual welfare. Therefore, the community enjoys the economies of large size of land.

1.1.5 State Farming

The control and management by public sector in case of agriculture is known as State Farming. In this type of farming, the management and ownership is in hands of state, decision about output, selection of inputs, to decide the types of crops etc., are also taken by state. Various labors are appointed to complete various works. The conditions of this labour differ than agricultural labour. Various benefits can be received out of large scale output because of large size of land. Modern machines and equipments can be used by state. State
can easily provide the irrigation facility and provide capital. The state undertakes research and development activities also.

This type of farming is found in various countries including India. The example of state farming in Russia is famous. Major criticism of this farming is the inefficiency of government mechanism. The other sector where state interferes is the state mechanism disappointment for delay in mechanism, corrupted mechanism etc., is found in state mechanism. All these defects enter in agriculture sector, which leads to cut down in agricultural productivity.

1.1.6 Co-operative Farming

It is an effective method of solving the problems created by small, uneconomic holdings. Holdings subdivided in to small and non-viable farms can be pooled together through this method and joint cultivation on the pooled land enables the members to reap benefits of large-scale farming. Major characteristics of co-operative farming are;

1.1.6.1 Members come together and jointly cultivate the land.
1.1.6.2 To collect the land and other productive inputs for collective management.
1.1.6.3 Physical and management work by society.
1.1.6.4 Payment is given for labour and property.
1.1.6.5 It obtains the economies of large scale.

Economic, social and political benefits can be reaped in co-operative farming. The adoption of co-operative farming is likely to inculcate the spirit of co-operation among members, which can go a long way in inspiring mutual confidence, collective action, joint thinking and feeling of fraternity and friendship among the members.

1.1.7 Collective Farming

Collective farming is a type of large scale joint farming. It came in existence in Russia after 1917 revolution. After that socialist countries accepted this farming with little difference. Collective farming means an organization of farmers on the basis of democratic method. In this method, farmers collect their land and capital and start farming on large scale. The net income from this business is distributed among farmers as per their quantity and quality of labour. The size of this farm is not fixed, but the optimum size of this farm is accepted from which farmers get benefits of large scale output than diseconomies from it.
Every separate collective farming has a separate charter, which includes organizational design of society, responsibilities of members etc.

1.2 Methods of Farming

There are many methods of farming on the basis practices in the farms. But we can categorize all these methods only in two methods i.e. nature friendly (Eco friendly) and nature degradable (uneco friendly) methods. Both methods have been discussed in following manner.

1.2.1 Nature Friendly Methods of Farming

1.2.1.1 Natural Farming

Natural farming was developed in Japan in 1930 by Masanabu Fukuda. It is similar to organic farming in many ways. In natural farming the means of production is the power of nature; one almost feels that natural farming means production by nature for the benefits of nature. It involves neither tilling nor the use of fertilizers. It does not need watering or weeding. In natural farming one has the sensation of slipping unobtrusively into a long skipping rope without getting stuck, the equivalent of humans sliding into the circle of nature. Further, it includes special emphasis on soil health through compost rather than organic fertilizers.

Mr. Fukuda expounded it, rests on a belief in the universal life, giving powers that the elements of fire, water and earth confer on the soil. The portent’s of soil created over a span of eons had required life sustaining properties, in accordance with the principle of the invisibility of the spiritual and the physical realm’s which provide the life force that enables plant to grow.

1.2.1.2 Organic Farming

Organic farming is a system, which aims to create sustainable habitats by organic patterns. It is defined world wide as farming system without the addition of synthetic chemicals i.e. the ones that have been manufactured chemically e.g. fertilizers, pesticides, growth regulators etc. It avoids the use of synthetic chemicals as well as genetically modified organisms and usually subscribes to the principle of sustainable agriculture.

Sir Robert Howard is called as father of organic agriculture. He said such practices are superior to modern agricultural science and recorded them in his book in 1940, then
other researchers also gave concrete shape to the organic farming. It is similar to natural, biological and biodynamic farming in many ways. It is based on minimizing the use of external inputs through the use of on-farm inputs. Thus, it is the king of agriculture that is based on application of organic inputs and it avoids the synthetic inputs.

1.2.1.3 Biological Farming

Biological farming has become synonymous with farmers using the farm fertility system as the basis for crop production. The reams system is based on the Lomotte Margan soil test and use of rock phosphate, calcium carbonate and compost to achieve nutrition ratios of 7 : 1 of calcium to magnesium, 2 : 1 of phosphorus to potassium and so on. Biological farming allows the use of selected chemical fertilizers and adopts low input approaches with the help of herbicides and insecticides.

Diagnostic instruments to monitor plan and soil conditions are frequently used in biological farming. Based on the collection of data, foliare sprays containing bio stimulants and soluble nutrients are applied.

1.2.1.4 Permaculture

It is a contraction of permanent agriculture. The term permanent agriculture reveals the sustainable agriculture. This practice of farming is similar to natural farming and organic agriculture. Australians Bill Mollison and David Holmgren coined the term in 1978. Permaculture is concerned with designing ecological human habitats and food production system. It follows specific guidelines and principles in the design of this system. Permaculture is also about careful and contemplative observation of nature and natural systems. It deals with recognizing universal patterns and principles, then learning to apply these ‘Ecological Truisms’ to one’s own circumstances.

Thus, permanent agriculture defined as a system of farming that holds the prospects of sustained rather than temporary yields from the land. Mollison (1989) states, “Sustainable use of land cannot be separated from the personal lifestyle and philosophical matter”. It encourages a style of farming that puts pressure on the land for short term gain, which is detrimental to its long-term ability to produce food.
1.2.1.5 Bio-dynamic Agriculture

This is a holistic system of agriculture that seeks to connect nature. Bio-dynamic farming method has been developed since 1922, on a foundation of advice and instructions given by Rudolf Steiner, a German Philosopher. The name ‘Bio-dynamic’ refers to cosmic energies that create and maintain life. Which consider farm as a living system and where one actively affects the other. The term was derived from two Greek words ‘bios’ (life) and ‘dynamics’ (energy). The use of the word ‘method’ indicates that one is not dealing merely with the production of another fertilizer, which is organic, but rather involves certain principles. These principles on practical application can provide healthy soils and healthy plants that in turn produce healthy food for man and animals. A unique feature of this method is the use of eight specific preparations derived from the cow manure, silica and herbal extracts to treat compost pills, soils and crops.

1.2.1.6 Traditional Farming

Traditional farming in India dates back to the Neolithic age of 7500-6500 BC. The farmers of ancient India were known to have evolved nature friendly farming practices. They considered the Earth as a living being; Agriculture was not developed just as a production system, but as a culture. Great attention was paid to agricultural technologies and agronomic practices. Sophistication came in through genetic diversity, crop rotation and mixed cropping system.

Animal husbandry was an integral part of the farming practices. Classical Indian Plant Science, Vrikshayurveda (science of plants) and margayurveda (science and animals) in the form of Sanskrit hymns are a corpus of rich textural knowledge. This knowledge system is alive even today among million farmers.

1.2.1.7 LEISA Farming Approach

A more recent approach in agriculture, propagated by Information Centre for Low External Input and Sustainable Agriculture of ETC foundation, the Netherlands, is the LEISA (Low External Input and Sustainable Agriculture) farming. It states that when modern external inputs are not available, farming has to depend on optimal use of local resources, human and animal labour, ecological process, recycling and site-specific genetic resources. Production levels have to be raised, but at the same time it is necessary to stop depletion and degradation of the resources based on self reliance, local economies, strong
local institutions and local “agri-culture” are important to prevent loss of sustainability. Intensification and increase of efficiency is possible to a certain extent by natural nitrogen fixation, mobilization and concentration of nutrients, diversification and better integration of different elements and activities. However, an important precondition is that the nutrient flows are kept in balance.

1.2.1.8 Integrated Intensive Farming Approach

The Integrated Intensive Farming system provides the pathway to achieve an evergreen revolution in agriculture. According to Prof. Swaminathan, Chairman of M. S. Swaminathan Research Foundation, Madras. This approach involves agriculture intensification, diversification and value addition. It helps to improve physical and economic access to food, thereby fostering sustainable food security at the level of each individual use of farm. IIFS involves intensive use of farm resources. To be ecologically sustainable, such intensification should be based on techniques, which are knowledge intensive rather than capital intensive and which replace to the extent of market purchased chemical input with farm grown biological inputs.

1.2.1.9 Regenerative Farming Approach

Regenerative farming is similar to organic and natural farming systems. In regenerative agriculture bunds on nature own inherent capacity to copy with pests, enhance soil fertility and increase productivity. It implies a continuing ability to recreate agriculture using low-input and organic farming system as a framework to achieve these goals.

All the above methods are similar to each other in many ways. All these methods of farming are eco friendly, because these are favorable to nature rather than damage to nature and biodiversity

1.2.2 Nature Degradable Methods of Farming

1.2.2.1 Chemical Farming Approach

Chemical farming is a system of agricultural production, in which farmers use the synthesized inputs. This method has been developed after 1960-1970, after green revolution due to scarcity of food grains. In this method, farmers use purchased chemicals e.g. Fertilization, pesticides, insecticides, and chemically processed seeds etc. Further that, farmers use intensive chemical programmes and reliance is on mechanized production using special equipment and facilities. The products of chemical farming are tasteless, less
nutritious, contain toxic residues of chemicals. The farmers use capital intensive techniques, which is synthetic, harmful to environment and nutrient depleting.

The cost of chemical farming is high as compared to other farming practices. Because, this method uses capital intensive techniques and requires expensive synthesized inputs. But farmers have to accept lower prices of the products due to less quality and tasteless products of chemical farming.

1.2.2.2 Green House Farming Approach

A green house is built of glass or plastic. It heats up because of the sun's ultraviolet radiation warms plant's, soil and other things inside the building. Air warmed by the heat from hot interior surface is retained in the building by the roof and wall. The glass used for a green houses works as a selective transmission medium for different spectral frequencies and its effects is to trap energy within the greenhouse, which hates both the plant and ground. This process warms the air near the ground and this air is prevented from rising and flowing away, in addition to the fact that infrared radiation cannot pass through the greenhouse glass. This can be demonstrated by opening a small window near the roof of a green house, the temperature drops considerably. This principle is the basis of the auto vent automatic cooling system. Green houses are the work by trapping electronic radiation and preventing convection.

1.2.2.3 Hydroponics Farming Approach

Hydroponics is a crop production method with mineral nutrition solution instead of soil containing silt and clay. Terrestrial plants can be grown with their roots in the mineral nutrient solution or in an inert medium, such as sand, gravel or rock wool. A variety of techniques exist.

In this method plants absorb essential mineral nutrition as inorganic ions in water. In natural conditions, soil acts as a mineral nutrition reservoir but the soil itself is not essential to plant growth. When the mineral nutrition from the soil dissolves in water, plants roots are able to absorb them, when the required mineral nutrition is introduced in to plants coater supply artificially, soil is no longer required for the plant to thrive. It is also a standard technique in biology research and teaching and it is a popular hobby. There is little commercial Hydroponics crop production, because it is more expensive method than traditional agriculture.
1.3 Organic Agriculture

Organic agriculture is one amongst the broad spectrum of production methods that are supportive to the environment. Organic production system is based on specific standards precisely formulated for food production and aim at achieving agro-ecosystems, which are socially and ecologically sustainable. It is a method of farming system, which primarily aims at cultivating land and raising crops in such a way as to keep the soil alive and in good health by use of organic inputs with benefits such as to release nutrition to crops, to increase sustainable production in an eco friendly and pollution free environment. It is based on minimizing the use of external inputs through the use of on-farm resources efficiently as compared to industrial agriculture. Thus, the use of synthetic fertilizer and pesticides is avoided.

1.3.1 Concept of Organic Agriculture

The word ‘Organic’ means ‘Living’, ‘Earth Friendly’ or ‘Of Plant or Animal Origin’. It contracts with the farming where in chemical inputs are used. It also denotes the products that have been produced in accordance with certain norms and standards during cultivation. Sometimes the term ‘organic agriculture’ is used in place of ‘organic farming’. There is no difference in the meaning of these terms. In general, it is the kind of agriculture that is based on application of organic manures, natural inputs, and pesticides of plant origin. Further, it denotes the agricultural systems that follow the principles and logic of a living organism in which all elements (soil, water, air, plants, animal, farmer etc.) are closely linked with each other. There are a variety of definitions of organic farming, which have been proposed by experts and organizations. Among which very few definitions have been given in following manner.

1.3.1.1 According to IFOAM1, “Organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well being. In view of this it should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects”.

1.3.1.2 According to FAO2, “Organic agriculture is a holistic production management system, which promotes and enhances agro-ecosystem health, including biodiversity,

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1 International Federation of Organic Agricultural Movement.
2 Food and Agricultural Organisation of the United Nations.
biological cycles, and soil biological activity. It emphasizes the use for management practices in preference to the use of off-farm input, taking into account that regional conditions require locally adopted 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”. (FAO/WHO Codex Alimentarius Commission, 1999)

1.3.1.3 According to Limpkin (1994), “It is an authoritative source, states the aim to create integrated, humane, environmentally and economically sustainable production system, which maximize reliance on farm-derived renewable resources and the management of ecological and biological process and interactions, so as to provide acceptable levels of crops, livestock and human nutrition, protection from pest and disease, and an appropriate return to the human and other resources”.

1.3.1.4 According to National Organic Standard Board (USDA)³, “Organic farming is a system of ecological management of agricultural production, which supports and improves the biological diversity, biological cycles and biological activity of soils. It is based on minimal usage of artificial raw materials and agrochemical methods, which regenerate, support, and improve ecological harmony”.

From the above definitions the researcher has composed the simple definition of organic farming that, “Organic farming is a form of agriculture that relies on ecosystem management and attempts to reduce or eliminate external agriculture inputs, especially synthetic ones. It is a holistic production management system that promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity. It relies on agronomic, biological and mechanical methods, as opposed to using synthetic materials”.

1.4 A Brief History of Organic Farming

The organic movement began as a reaction of agriculture scientists and farmers against the industrialization of agriculture. Technological advances during world war spurred on post-war innovation in all aspects of agriculture, resulting in advance and a large scale irrigation, fertilization and the use of pesticides, ammonium nitrate, used in

³ United States Department of Agriculture.
munitions, become an abundantly cheap source of nitrogen DDT, insect among troops and pesticides etc. The term “Organic” was first used by J. I. Rodale in 1940 in a article. Therefore, he launched “Organic farming and Gardening” magazine. J. I. Rodale drew his concept of organic agriculture from a number of sources, including Lois Bromfield, Dr. William Albrecht, and the biodynamic movement. However, his ideas about farming come from the British agronomist Albert Howard. He preached that agriculture came from his observations and experiences in that part of the world. Sir Robert Howard often called “Father of Organic Agriculture”, studied traditional farming practices in Bengal, India. He came to regard such practices as superior to modern agricultural science and recorded them in his book, an agricultural treatment in 1940.

Clearly, Howard did not believe that reliance on chemical fertilization could address these concerns. He promoted a natural approach to building soil and fertility. In America, Rodale expanded on Howard’s ideas. In his book, he identified a number of other “good farming practices” like crop rotation and mulching- that gave further definition and clarification to what has become accepted organic practices and inputs. A truly significant event in the history of organic book place in 1962, with the publication of Rachel Caron’s silent spring. This is a strong and dramatic statement about the impact of pesticides on the environment. It was one of the key documents that gave birth to environmental consciousness in the 1960s and 1970s. While the silent spring and environmental movement were not about organic farming, they brought public consciousness on a vast scale. It is not uncommon, in fact, for some writers to suggest that organic agriculture began with Rachel Corson’s book. Though, this assertion is untrue, the book clearly played a major role in stimulating industry growth and altering public perceptions. From the Mid-1960s onward, organics was increasingly identified with pesticides issues.

In 1972, the International Federation of Organic Agriculture Movement (IFOAM), was founded in France. IFOAM was dedicated to the diffusion of information on the principles and practices of organic agriculture across national and linguistic boundaries. In the 1980s, various farming and consumer groups worldwide began pressuring for government regulation of organic production. This led to legislation and certification standards being enacted in the beginning of 1990s. Since, the early 1990s, the retail market for organic farming in developed economies has grown about 20 percent annually due to
increasing consumer demand. While, small independent consumers initially drove the race of organic farming. Meanwhile, as the volume and variety or “organic” products grew, production also increased on large-scale.

1.5 Principles of Organic Farming

The principles of organic farming reflect the potential contribution of organic farming system towards the world, and holds out a vision of how all agricultural system should function in the larger context. They serve to inspire the organic movement in its fully diversity. The four principles as delineated by IFOAM are;

- The principle of Health
- The principle of Ecology.
- The principle of Fairness
- The principle of Care.

Each principle is articulated through a statement followed by an explanation. These principles are to be used as a whole. They are composed as ethical principle to inspire action.

1.5.1 The Principle of Health

*Organic agriculture should sustain and enhance the health of soil, plant, animals, human and the planet as a whole.*

The principle points out that the health of individuals and communities cannot be separated from the healthy ecosystems. Healthy soil produces healthy crops that foster the health of animals and people. Health is the basis of the wholeness and integrity of living systems. It is not simply the absence of illness, but the maintenance of physical, mental, social and ecological well-being. Immunity, resilience and regeneration are key characteristics of health.

Organic agriculture enhances the health of ecosystem and organisms. In particular, it is intended to produce high quality nutritious food that helps to ensure preventive healthcare and well-being. In view of this it should avoid the use of the harmful fertilizers, pesticides, animal growth drugs and food additives that may have affected on health.
1.5.2 The Principle of Ecology

*Organic agriculture should be based on living ecological systems and cycles. It should also support and sustain the ecosystem and environment.*

This principle roots organic agriculture within living ecological systems. It states that production is to be based on ecological process and recycling. Nourishment and well-being are achieved through the ecology of the specific production environment. For example, in case of crops, it is the living soil, for animals, it is the farm ecosystem, for fish and marine organisms, the aquatic environment.

Organic farming, pastoral and wild harvest systems should fit in the cycles and ecological balances in nature. These cycles are universal, but their operation is site-specific. Organic management must be adapted to local conditions, ecology, culture and scale. Inputs should be reduced by reuse, recycling and efficient management of materials and energy to maintain and improve environmental quality and conserve resources.

Organic agriculture must achieve ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity. Those who produce, process, trade and consume organic products should protect and nourish the common environment, including landscapes, climate, habitat, biodiversity, air and water.

1.5.3 The Principle of Fairness

*Organic agriculture should be built 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 their relations to other living beings. This principle emphasizes that those involved in organic agriculture should maintain human relationships in a manner that ensures fairness at all levels and to all party farmers, workers, processors, distributors, traders and consumers. It should provide, everyone involved with a good quality of life, and contribute to food sovereignty and a sufficient supply of good quality food and other products.

This principle insists that animals should be provided with the conditions and opportunities of life that accord with their physiology, natural behaviour and well-being. Natural and environmental resources that are used for production and consumption should
be managed in such a way that is socially and ecologically just and should be held in trust for future generations. Fairness require system of production, distribution and trade that are open and equitable and account for real environmental and social costs.

1.5.4 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 environmental.*

Organic agriculture is a living and dynamic system that responds to internal and external demands and conditions. Partitions of organic agriculture can enhance efficiency and increase productivity, but this should not be at the risk by jeopardizing health and well-being. Consequently, new technologies need to be assessed and existing methods reviewed. A good understanding of ecosystem and agriculture is a must for exploiting it.

This principle also states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture. Science is necessary to ensure that organic agriculture is healthy, safe and ecologically sound. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge that are tested by time, offer valid solutions. It should prevent significant risks by adopting appropriate technologies and rejections unpredictable ones, such as genetic engineering. Decisions should be transparent and precautionary and reflect the values and need of all, who could be affected.

1.6 Characteristics of Organic Farming

In case of organic farming there are several compelling characteristics of certified organic farming. They are as follows

1.6.1 Biodiversity

Diverse ecosystems in nature have a higher degree of stability than those with only a few species. This is true for agro ecosystem also. Farms with a diverse mix of crops have better chance of supporting beneficial organisms that assist in general management. Diversity above ground also suggests diversity in the soil, providing better nutrient cycling, disease suppression, tilth, and nitrogen fixation. Good organic farmers maintain the biodiversity of nature through practices like intercropping, companion planting,
establishment of beneficial habitats and crop rotation. The effort to increase biodiversity works hand-in-hand with enterprise diversity, which is often an objective on organic farms.

1.6.2 Diversification and Integration of Enterprises

The drive to build biodiversity in organic systems encourages diversity among enterprises, but not as isolated entities. Good organic operations integrate their various enterprises, specially crops and animals. A typical organic farmer integrates all the farm operations in such a way that he ties the needs of crops and livestock together in a practical and elegant way. The forage and grain needs of ruminant livestock are made from a diverse mixture of fodder crops. Forge legumes in rotation fix a sustainable supply of nitrogen in the soil that feeds subsequent non-legume crops in rotation. Manure from the livestock enterprises is converted through biogas plants and vermi composting as a nutrient resource and is recycled back to the crop fields. Farms, which have the additional advantage of greater economic sustainability, as their risks are spread over livestock, crop enterprises and value addition of products.

1.6.3 Sustainability

Organic farms perform well on many of the measurable indicators associated with sustainability, such as energy consumption and environmental protection. However, sustainability is ideal and the best and it can be said that many of the organic farms are ideal than most alternatives and they are certainly closer than comparable chemical farming operations.

Farmers use organic factors as inputs in organic farms instead of chemical input that can lead in higher soil fertility from barren land, less soil degradation and water pollution. All organic inputs are related to sustainability. In addition to the greater economic sustainability afforded by enterprise, diversification, organic farmers are often able to reap market premiums for certified production.

1.6.4 Natural Plant Nutrition

Human and animals, by contrast, can obtain energy, foods, proteins, and vitamins only by consuming plants or animals products. Both plants and animals also require minerals. Humans and animals extract minerals, along with sugars and protein from the food they eat. Plant, too, obtain minerals and the wide range of vitamins, antibiotics and
other useful compounds—through digestion. However, plant digestive systems are not internal as the external digestive processes of the soil system, within reach of their roots a zone called the rhizosphere.

The organic philosophy of crop nutrition begins with proper care and nourishment of the organisms responsible for the soil digestive process. Organic farmers believe this is best accomplished by avoiding toxic chemicals and practices—like excessive tillage—that are harmful to soil organisms, as well as by the addition of organic matter and natural rock minerals. Conventional systems, in contrast, try to circumvent the soils digestive process and provide needed minerals to the plant directly in a soluble form.

1.6.5 Natural Pest Management

In the organic farms, the pest-weather weeds, insects or disease are not simply sources. They are indicators of how far the production system has strayed from the natural ecosystem it should imitate. Certain weeds, for example, tend to predominate when soils are too acidic or too alkaline; some become a problem when soil structure is poor and conditions become anaerobic; others may be stimulated by excessive fertilizer.

Organic proponents also believe that insect pests get attracted, to inferior or weak plants—they result in poor crop nutrition. Their logic continues by asserting that pests are naturally repelled by vigorous and well nourished plants. This belief is often challenged and significant research remains to be done. In nature, massive pest outbreaks are relatively rare and short-live because of the presence of natural predators, parasites, and disease causing agents that quickly knock the pest numbers back to a moderate level. In farming systems that inadvertently destroy or otherwise fail to support the natural control complex, pest problems are routine and deteriorate with time. Most of the organic growers consider pesticides to be a cause of agro ecosystem imbalances and allow natural pesticides as little as possible.

1.6.6 Integrity

Integrity refers to the systems in place and actions undertaken to assure that consumers of the organic products should get what they pay for. Consumers have right to expect that the organic food they buy should not only be raised by organic methods, but be protected from contamination and from non-organic products also.
While the responsibility for much of this rests with others in the organic marketing chain, many certified organic growers need to incorporate additional practices that work to assure the integrity of their products. Proper record keeping is very important in this regard, though growers are often reluctant to spend much time on it. Among the most important production practices in the field are buffer strips, which reduce chemical drift from neighbouring fields and roadsides, while also servicing water and soil conservation objectives.

1.7 Objectives of Organic Farming

The following list of objectives is taken from the Draft of IFOAM Basic Standards. All the objectives are important, which are stated below.

1.7.1 To produce sufficient quantities of high quality food, fibre and other products.
1.7.2 To work compatibly with natural cycle and living systems.
1.7.3 To maintain and increase long-term fertility and sustainability of soils.
1.7.4 To maintain, promote and increase agro-biological diversity through sustainable production systems and protection of their ecological context.
1.7.5 To maintain and promote genetic diversity by increasing the number of crops and plant varieties and animals in the farming system.
1.7.6 To promote the responsible use and conservation of water and water resources.
1.7.7 To use, as far as possible, renewable resources in production and processing systems.
1.7.8 To foster local and regional production and supply chain.
1.7.9 To minimize all forms of pollutions.
1.7.10 To utilize bio-degradable and recycled packaging materials.
1.7.11 To allow and provide everyone quality of life that satisfies their basic needs and furnishes an adequate return, within a safe, secure and healthy working environment.

1.8 Difference Between Organic and Natural Farming

Most people mix up organic farming with natural farming, because neither of them are using chemical fertilizers. However, Mr. Fakuda believed that organic farming is one of the modern farming techniques, because these techniques are used by humans exclusively
for the benefit of humans. The farming method itself is same the farmer still has to till the
land and use organic fertilizers.

Natural farming is different. Here, the means of production is the power of nature;
one almost feels that natural farming means production by nature for the benefit of nature.
It involves neither tilling nor the use of fertilizer. It does not need watering or weeding. In
natural farming, one has the sensation of slipping. Unobtrusively into a long skipping rope
without getting stuck, the equivalent of humans sliding into the circle of nature.

1.9 Difference Between Organic and Chemical Farming

Organic farming is reaction against the large scale, chemical- based farming
practices, that has become dominant in food production over the last few decades. The
difference between chemical and organic farming accounts for most of the controversy and
claims surrounding method and organic food. The comparisons between both farmings are
stated in following manner;

1.9.1 Size

The size of organic farms is relatively on small scale and operations are independent
e.g. the family farming etc. Whereas, the size of chemical farms are on large scale and it is
economically tied to major food corporations.

1.9.2 Method

In organic farming, farmers don’t use purchased chemical fertilizer and other inputs
e.g. pesticides, insecticides etc. They use organic inputs like green manure, vermi compost,
bio fertilizer etc. on the other hand in chemical farming farmers use (purchased) chemicals
e.g. fertilization, use of pesticides etc. Furthermore, in it intensive chemical programmes
and reliance on mechanized production by special equipment and facilities etc., is used.

1.9.3 Technology

In organic farming, the technology is nature based, environment friendly and
sustainable. Whereas, the technology in chemical farming is synthetic, harmful to
environment and nutrient depleting.
1.9.4 **Products**

Product of organic farming are good in taste, flavor and nutrition is maintained and are free from chemicals. Contrary to this, the products of chemical farming are tasteless, less nutritious, and contain toxic residues of chemicals.

1.9.5 **Market**

The market of organic farming is local, direct to consumer, on farm stands and farmers market them through special wholesalers and retailers. On the other hand, the market of chemical farming is wholesale with product distribution across large areas and is sold through in high volume.

1.9.6 **Government Support**

Government has been giving less or limited support to organic farm practices i.e. subsidy and loan etc. On the other hand, government is giving sufficient support to chemical farming practices i.e. subsidy, R&D, extension etc.

1.9.7 **Price and Quality**

The benefit of price premium is being enjoyed by farmers in organic farming, due to more quality and tasty products. Whereas, farmers have to accept downward prices due to less quality and tasteless products of chemical farming.

1.9.8 **Type of Intensive Technology**

Organic farming is knowledge increasing technology. Whereas, chemical farming is capital intensive technology.

1.9.9 **Cost of Production**

Cost of production of organic farming is minimum, because farmers use organic inputs i.e. biofertilisers, bio-insecticides, local seeds and less use of capital intensive technologies. Whereas, cost of production of chemical farming is relatively high, because, the farmers use synthetic purchased inputs in heavy quantity i.e. chemical fertilizers, pesticides, insecticides, processed seeds etc., and capital intensive technology is used in chemical farming.
1.9.10 Time Required

Farmers in organic farming, require long period to get optimum production. It requires long period to show good results. Therefore, it has a longer learning curve. In chemical farming farmers require very short period to get optimum production. It requires very short period to show optimum/goods results. Therefore, it has a short learning curve.

The contrast is as much economic as it is between methods of production. Most of the organic farms have typically small business units, often based in local economics, and chemical farming have big business or often called agribusiness or corporate farming, that is closely integrated with all aspects of the global food production chain. However, the situation is changing rapidly as consumer demand encourages large-scale organic production.

1.10 Need of Organic Farming in India

India needs to adopt organic farming on a large scale, because the chemical method of farming has caused damage to the ecology. This method of farming adopted by India and other countries is inherently self-distractive and unsustainable. The theme of consumer welfare has become central in the developed countries of the world. The Indian agriculture has switched over to the conventional system of production on the advent of “Green Revolution” during 1960 to 1970s.

Science and technology have helped India to increase agricultural production from natural resources like land, but this achievement had been at the cost of nature and environment, which supports the human life itself. We in India have to be concerned much more than any other nation of the world as agriculture is the source of livelihood of two-third of the people of India. Now the most fundamental research like the land, water and air supporting the human life have degraded to such an extent that they now constitute a threat to the livelihood of millions of people in the country. Economical and environmental effects have been highly published all over the world. India has equally contributed in the degradation of ecology. However, there is need to take remedial measures.

Organic agriculture is a situation with other remedial measures on the above discussed problems. It is relatively better to withstand water loss and nutrition degradation. Its potential to counter soil degradation is high and several experiments have revealed that it may help to combat diversification. The national productivity of many of the cereal crop
millet, oilseeds, pulses and horticulture crop etc., continues to be one of the lowest in the world in spite of the Green Revolution. Recently, the prices of agricultural commodities are hiking due to scarcity of it and high population pressure. There is a need to achieve second green revolution, but this should be with organic farming with minimal use of synthetic inputs. The application of agriculture farming can led in increasing the agricultural productivity, which leads to increase in agriculture production, which can lead in food security in India. Thus, the sustainability of Indian agriculture can be achieved by organic farming, which can affect on the resources, biodiversity and environment.

1.11 Benefits of Organic Farming

The benefits of organic farming are classified in economic, ecological and social categories, which are stated as follows

1.11.1 Economic Benefits

1.11.1.1 More Productivity and Income

Organic farming reduces the use of external inputs and increases output of organic products with greater potential to benefit the health of farmers and consumers. Organic farming produces less output, is a myth and not reality. Uncountable organic practices and studies have shown that organic farming increases the productivity of land, which leads in increases in output. Field trials of organic farming reveal that during the conversion period the yield of organic products was low. However, after third year, the yield of organic agriculture started rising.

Furthermore, the income of organic farmers is high due to more productivity and price premium of organic products. This higher income gives the appreciation to the farmers to cultivate farm through organic method.

1.11.1.2 Low Cost of Production

Organic farmers typically spend a lot time and efforts to improve their land. The cost of production of organic farming is minimum, because organic farmers avoid the use of purchased external synthetic inputs, i.e. pesticides, fertilizers, insecticides etc., which are expensive as compared to biological inputs. Organic farmers use only farm input e.g. Bio-fertilizers, bio-pesticides, bio-insecticides and local seeds etc., which require minimum
expenditure. Furthermore, organic farmers use labour intensive techniques for production practices, which require minimum expenditure than capital intensive techniques.

1.11.1.3 More Quality and Taste

Organic food, fruits and vegetables contain higher vitamins and minerals than inorganic product. Because organic farmers use organic inputs such as organic wastes, animal manure, compost, bio-pesticides, bio-insecticides etc., which leads to greater variety of living organisms and trace mineral in soil, consequently organic products have better taste and better quality. According to a study, conducted in USA on nutritional values of organic and inorganic food, the organic food, in general, had more than 20 percent less of bad elements and about 100 percent more of the good elements.

1.11.1.4 Price Premium

The benefit of price premium is enjoyed by farmers in organic farming, due to more demand, more quality and tasty products, more consumers are giving preference to purchase of organic products, which leads to increased demand for its overall in the world and especially in Europe, which leads to increase the scope for exports by developing countries. The standard of living of the organic farmers is being increasing by higher prices, which gives appreciation to farmers to produce organic products.

1.11.1.5 More Scope for Export

Organically grown crops are believed to provide healthier and nutritionally superior food for human. That is why an increasing consumer demand for organic products is more in developed countries, consumers are willing to pay more for organic products. This leads increase in more scope for export of organic products by developing countries like India.

1.11.2 Ecological Benefits

1.11.2.1 Improvement in Soil Quality

Soil quality is the foundation on which organic farming is based. Efforts are directed to build and maintain the soil fertility through farming practices. Multi cropping, crop rotations, organic manures and pesticides and minimum tillage are the methods employed for the purpose. Natural plant nutrients from green manures, farm yard manures, compost and plant residues build organic contents in the soil. It is reported that soil under organic farming conditions had lower bulk density, higher water holding capacity, higher
microbial biomass carbon and nitrogen and higher soil respiration activities as compared to the chemical farms. This indicates that sufficiently higher amount of nutrients are made available to the crops due to enhanced microbial activity under organic farming.

1.11.2.2 Higher Biodiversity, More Diverse Landscape

Organic farming promotes biodiversity and a great variety of animals and plant interaction on earth. Organic farms grow several crops including, trees, either as mixed cropping or in rotation. Animals are an integrated part of the system. The diversity not only allows optimum use of the resources but also serves as an economic security in case of pests or diverse attack or low market prices for certain crops. Animals are also part of the system. If one organism drops out, it is immediately replaced by another one which fills the gap. Thus, space light, water and nutrients are used to their optimum level. The result is a very stable system.

1.11.2.3 More Recyclable Nutrients

Organic nutrient management is based on bio-degradable material i.e. Plants and animal residues which can be composed. Nutrient cycles are closed with the help of composition, mulching, green manuring, crop rotation etc. Farm animals can play an important role in the nutrient cycle their dung is of high value and its use allows to recycle nutrients provided with the fodder. If carefully managed, losses of nutrients due to leaching, soil erosion and gasification can be reduced to the minimum. This reduces the dependency on external inputs and helps to save costs. However, nutrients exported from the farm with sold products need to be replaced in some way.

1.11.2.4 Bio-Control without Economical Damage

Pests and diseases do occur in natural ecosystems, but they rarely cause a big damage. Due to the diversity, it is difficult for them to spread. Plants usually can recover from an infection on their own and many pests are controlled by other organisms such as insects or birds. Organic farmers try to keep pests and diseases at a level, which does not cause economical damage. The main focus is on supporting the health and resistance of the crop. Beneficial insects are promoted by offering them a habitat and food. If pets reach critical levels, natural enemies and herbal preparations are used.
1.11.2.5 No Pollution

In organic farming, we can find there is no pollution i.e. water, soil and air pollution. Because organic farmers use green manure, bio-pesticides, bio-insecticides, and employ the practices such as mulching, composting, multi-cropping, crop rotation etc. It also uses less manorial inputs and complete. They avoid the synthetic fertilizers, which otherwise pollute the soil, water and air. Further, organic farming releases much less carbon dioxide than other farming systems.

1.11.2.6 Poison Free Products

Organic farming avails poison free products to both the consumer and farmers. Both get healthy food, fruits and vegetable with better palatability and taste and nutritive values without poison. Because, organic farmers use animal manure organic/vermi compost, bio-pesticides, bio-insecticides, local seeds etc., and they employ the practices, i.e. mulching, composting, multi-cropping, crop rotations etc. These organic products with less poison lead to widen the scope for exports in European countries than Gulf countries. Organic on farm inputs contain different trace of minerals than the synthetic off farm purchased inputs, which leads to less proportion of poison in organic product.

1.11.3 Social Benefits

1.11.3.1 Employment Generation

According to many studies, organic farming requires more labor input than the conventional farming system. Thus, India which has a problem of labor unemployment and under employment will find organic farming an attraction. We examine whether conservation of more land to organic status could provide area. Moreover, the problem of seasonal unemployment will also get mitigated because of the diversification of the crops with their different planting and harvesting schedules resulting in the requirement of a relatively higher labor input.

1.11.3.2 Reducing the Competitiveness and Disparities

Organic farming avoids the use of external synthetic inputs, which could reduce dependency on external inputs and costly capital intensive technologies, thus reducing the competitiveness and disparity among the farmers in a community. Wherever, land has become unproductive, it has lead to income disparity. In many countries, farmers have adopted organic farming to free themselves from need by buying expensive inputs.
1.11.3.3. Food Security

The productivity of organic land is higher than conventional farming system, which leads to increase the total supply of food, which helps to achieve the food security, at family level and national level. In actual condition, India failed to achieve the food security even after the achievement of “Green Revolution”. The “Second Green Revolution” with organic farming will lead to food security in India. Sufficient quantity and nutrients will be provided by organic food and fruits.

1.11.3.4 Beneficial to Marginal Farmers

Organic farming uses the labour intensive knowledge techniques and avoids the use of capital intensive techniques. That the former practices can be adopted in small farms and benefited to marginal farmers, which can increase the income level of them, which can further increase in the standard of living of small or marginal farmers.

1.12 Myth and Reality about Organic Farming

This topic exposes the misleading and erroneous statements made against organic food and provides the facts that prove them wrong. In particular the researcher examines six myths.

1.12.1 Myth: Organic foods are not healthier than non-organic foods.

Reality: Wrong organically produced Food contains fewer contaminants (pesticides, antibiotics and nitrates). Some scientific studies have shown that these are more nutrients in organic food products.

1.12.2 Myth: Organic farming increases the risk of food poisoning.

Reality: False Organic farming can actually reduce the risk of food poisoning.

1.12.3 Myth: Organic farming uses pesticides that damage the environment.

Reality: False Organic farming systems rely upon prevention rather than cure, minimizing the need for pesticides being used.

1.12.4 Myth: Consumers are paying too much for organic food products.

Reality: Not so Crop rotations, organic animal feed and welfare standards, the use of good husbandry instead of agri-chemicals, and the preservation of natural habitats etc., all result in organic food costing more. Non-organic food appears to be cheaper but in fact consumers pay for in three times over; 1) first over the counter 2) second via
agricultural subsidies and 3) third to remedy the environmental pollution caused by intensive farming practices.

1.12.5 Myth:  Organic food cannot feed a hungry world.

   **Reality:**  False  Intensive farming destroys the fertility of the land and is unsustainable. Organic methods help labour-rich but cash-poor communities to produce food sustainably.

1.12.6 Myth:  Organic farming is unkind to animal.

   **Reality:**  Far from it animal welfare and the freedom to behave naturally is central to organic livestock standards.

The myths are generated by organizations with particular interests to defend and they are presented as press releases and prepared articles for publication in media. This topic concludes by looking a little more closely at the origins of the myths, and the people who peddle them.

1.13 Organic Farming and Sustainability of Agriculture

There is no real dispute that sustainable agriculture and organic farming are closely related terms. There is however disagreement on the exact nature of this relationship. Some of the research that has been carried out regarding the historical relationship between agricultural systems and the sustainability of the societies they support. The point is that a farming system need not be modern, mechanized and using synthetic chemicals to be profoundly unsustainable. In response, it might be argued that inputs and tillage methods are only one part of the picture, and that organic production goes beyond these narrow production issues Limpkin and Measures (1995, p.3) write that “the term sustainable” is used in its widest sense, to economic pass not just conservation of non-renewable resources but also issues of environmental, economic and social sustainability.

An obvious example of the need to have clear-cut standards is the prohibition of synthetic chemicals, which is one of the defining properties of organic farming systems. One the basic characteristic of organic system is “the avoidance of fertilizers in the form of soluble mineral salts” and “the prohibition of agro-chemical pesticides”. There are problems with this grouping together of synthetic chemical inputs. Putting mineral fertilizers in the same category as synthetic pesticides may be as much a result of an antipathy towards science and the industrialization of agriculture, as it is of scientific
categorization. For example, fertilizers supply the same nutrients as organic manure, but in a more soluble form, whereas many pesticides are biocides, which have no natural equivalents. Regarding both type of chemical inputs as equally unsuitable farming.

Work on impact assessment raises the issues of which are the key aspects of a system’s performance that should be measured, that is, what the key aspects of agricultural sustainability are and what the associated indicators that should be monitorised. Solze et al. (2000) adapt the OECD set of environmental indicators, during only those indicators, which directly affect the system of organic farming. The difficulty in assessing the sustainability of agricultural systems is the fact that both the units of measurement and the appropriate scales for measurement differ both within and across the commonly identified economic, biophysical and social dimensions of sustainability.

Organic farming clearly performed better than conventional farming in respect to floral and faunal diversity. However, direct measures for wildlife and biotype conservation depend on the individual activities of the farmers. In terms of soil it is concluded that organic farming tends to conserve soil fertility and system stability better than conventional farming systems. No difference between the farming systems were identified as far as soil structure is concerned. Regarding water quality, it is concluded that organic farming result in lower nitrate leaching rates than integrated or conventional agriculture. Regarding the impacts on nutrient balances, nutrient balances on organic farms are often close to zero and that energy efficiency is found to be higher in organic farming than conventional farming is most cases. (Stolze Et al. 2000)

1.14 Challenges of Organic Farming

1.14.1 Lack of demand will not be a problem, but rather it will be the supply situation. The share of organic products is low. There are still major obstacles to develop the market, which need to be removed.

1.14.2 A price premium is needed to reward the work of farmers in respect of their contribution to nature conservation and human well being. The price premiums are also an inducement for new farmers to convert into organic agriculture.

1.14.3 To strengthen the consumer’s confidence and to build local markets, definition and specific rules of organic agriculture should be developed and controlled by the private sector.
1.14.4 To increase and enhance government policy initiatives and assistance, especially for and during the conversion process.

1.14.5 To introduce organic extension services and training for farmers, such as organic farmers field schools.

1.14.6 To build up adequate infrastructure for transport, storage and processing and market facilities.

1.14.7 To create a guarantee system of the domestic market.

1.14.8 To increase consumer awareness about the safe and environment friendly production of food.

1.14.9 To add organic information to the existing oversees reports on markets.

1.14.10 To spur production and supply of organic seeds, organic manure, organic bio-fertilizers and bio-pesticides.

1.14.11 To provide funds for proper scientific studies on income generation, household income and food security, yields and soil improvement from organic agriculture.

1.15 Organic Agriculture and Food Security

Modern organic agriculture contributes positively to food security by- ideally-improving small holder farmer’s conditions on all four dimensions. In low input area in Africa and Asia, agro-ecological techniques such as use of compost and other methods of soil improvements and density of crops and crop mixtures, which increase the yields and the stability and overall resistance improves the stability of food access for the smallholder farmers in times of changing climate including erratic rainfall patterns. Supachai Panitchpakdi, Secretary General of UNCTAD stated that organic agriculture can be more conductive to food security than most conventional systems and that it is more likely to be sustainable in the long term. (UNEP-UNCTAD, 2008). Evidence from projects and modeling shows that promoting organic agriculture does not increase the food security problems, but it is part to solution-especially, because it leads to improvement in productivity of local food system and access to food. But realizing this potential on a large scale is presently hampering major challenges that include lack of significant research and technical support.
Even though there is evidence that organic agriculture can improve food security for small holders, the degree of success may vary between the different types of organic projects. Tow ends of continuum of organic farming schemes may influence the different dimensions of food security. If a project focuses solely on developing an organic cash crop, the smallholder farmers may become vulnerable to fluctuating market conditions. In projects focusing on informal (non-certified) organic production, there are often positive developments in terms of natural and social capital, but not necessarily higher income from the marketing products.

In organic agriculture the sustainable alternative is present on a large scale and in the developed world, we need to continuously improve the output per unit of land, while at the same time contributing to social and environmental goods. The output from organic farms will be multifunctional and it is not the goal to mimic conventional agriculture’s focus on maximizing yields in non-cropping systems. Organic output is a combination of multiple crops and maintenance of eco functions in soil, water and bio-diversity, but we need to take this to the next level in order to be bio-friendly and climate protective. Thus, organic agriculture can contribute significantly to improve food security among small holder farmers in developing countries and a large scale conversion has the potential to reduce the future dependence of food imports in sub Saharan Africa. However, such a positive scenario depends on well-designed training and extension focusing on building human, natural and financial capital. There is also huge need for more research and innovation to improve local farming systems and adoption of agro ecological principles.

1.16 Research Methodology

1.16.1 Title of the Study

The present study is entitled as “Economic and Environmental Significance of Organic Farming in Kolhapur and Sangli Districts”, the study covers two important aspects of organic farming in Kolhapur and Sangli districts.

1.16.1.1 Economic Aspect

Economic aspect includes per acre cost of production, per acre income, investment, per acre net gain, per acre productivity, finance of organic farming, which is examined in comparison with inorganic farming in Kolhapur and Sangli district.
1.16.1.2 Environmental Aspect

In includes salinity of land, water pollution, air pollution, side effects of chemical fertilizers and pesticides on agricultural production farmers, labours, which are examined in comparison with inorganic farming in Kolhapur and Sangli district.

1.16.2 Significance of the Study

Agriculture is the art of cultivating the soil, growing and harvesting crops and raising the live stocks. It is the soul of Indian economy and to raise its economic condition for supply of food, supply of raw materials for industries, it is a crucial foundation. Before 1960s, there was scarcity of food supply, because of low yield. The high yielding varieties of seeds, intensive agriculture techniques, and use of synthetic inputs broke the unprecedented records of yields of crops under the coverage of “Green Revolution” in 1970s. It has created self reliance in food grains and has raised the economic conditions of Indian economy. But these impacts were not long term and not sustainable. They have come with many adverse impacts on environment, on productivity, on biodiversity, on human and animal health, on quality of food, on resources etc.

But as a solution on above adverse impacts of chemical farming, organic farming is against the use of chemical farming system. There are ‘n’ number of benefits of organic farming, which can overcome the problems of chemical farming. This is the basic reason behind the publicity and adoption of organic farming and its production at higher level is developed in other countries, especially in European countries. The area of organic farming is reported to 41000 ha. in India, which is very less in proportion as compared to other countries like Australia. The basic reason behind the less proportion of organic farming in India is the lack of awareness among the farmers about organic farming and lack of awareness among the consumer about the organic products.

The Central Government of India and the State Governments are implementing various schemes and polices of organic agriculture to expand it in Indian agriculture. The efforts of government have succeed to certain extent, but is being lacking in creating the awareness among the farmers at sufficient level and at regional level about organic agriculture. There are various studies about organic agriculture successively completed in foreign countries and also in India, considering the fact that there is lack of national, regional and local empirical study of organic farming.
To create awareness, popularity and expansion of organic agriculture, the local and regional studies can play an important role. The present study is important considering the above purposes and attempts to examine the development, cost of production, investment, income, potentials and future along with the problems of organic agriculture in study area.

1.16.3 Objectives of the Study

The study put forths following objectives.

1.16.3.1 To study method and management of organic farming.
1.16.3.2 To study Socio-Economic conditions of farmers of organic farming.
1.16.3.3 To examine economic and environmental benefits of organic farming.
1.16.3.4 To study the problems faced in adoption of organic farming.
1.16.3.5 To suggest remedial measures for extension of organic farming.

1.16.4 Hypothesis of the Study

The following hypotheses are considered in the study.

1.16.4.1 The productivity of organic farming is more than inorganic farming.
1.16.4.2 Cost of production of organic farming is less than inorganic farming.
1.16.4.3 The socio-economic condition of farmers of organic farming is improved due to organic farming.
1.16.4.4 Organic farming is environment friendly method.

1.16.5 Period of the Study

As pointed out earlier, the present study aims to examine the Economic and Environmental aspects of organic farming in the study area. In this direction, the period of one year, from 2009 to 2010 was selected for analysis. The comparative study between organic farming and inorganic farming of sugarcane and grapes in Kolhapur and Sangli District was done by considering the above period of the study.

1.16.6 Area of the Study

The practice of organic agriculture is mostly undertaken by farmers at Kolhapur and Sangli districts in Maharashtra as compared to other districts from the same state. Therefore, the researcher has selected Kolhapur and Sangli districts for the study of organic farming.
1.16.7 Scope of the Study

The Kolhapur and Sangli districts are leading districts in Maharashtra; the farmers have accepted organic farming in more number due to awareness of environment and qualitative products. The researcher has examined the economic and environmental aspect of organic farming as compared to inorganic farming in the study area. The study also discusses about the methods and management of organic farming. The development and existing status of organic countries is also examined by the researcher. Further, the study critically examines cropping pattern in study area. The study also examined about the socio-economic conditions of organic farmers. Furthermore, the researcher examined economic and environmental benefits of organic farming as compared to inorganic farming. Finally, the researcher has attempts to state the problems or limitations of organic farming and has given suggestions for expansion of organic farming in study area as well as in Maharashtra and India.

1.16.8 Methods of Data Collection

Following points are the main components of data collection.

1.16.8.1 Data Sources

To collect the data for the study of organic farming in study area, the researcher has used the following sources of data.

1.16.8.1.1 Primary Data

The researcher has collected the primary data through separate questionnaire. The researcher has discussed with farmers both methods of farming in the study area about socio-economic conditions, environmental aspect, productivity of land, cost of production, income from farming, and finance for the farming. Furthermore, the researcher has also discussed with farmers about the problems being faced by them and suggestions to overcome the problems of organic farming. The researcher has also discussed with Regional Agriculture Officer, Kolhapur, District Agriculture Officer, Kolhapur, District Agriculture Officer, Sangli, Taluka Agricultural officers of all talukas from Kolhapur and Sangli district about the development, potential actual farming government’s economic support and comparison between both methods of farming etc. The primary note and the observations at the time of collecting the information from the respondent are used to complete the primary data.
1.16.8.1.2 Secondary Data

The secondary data is used by the researcher from the sources i.e. Census of Kolhapur District, Census of Sangli District, Gazette of Maharashtra, Gazette of India, Article published in newspapers, from Journals, from Internet, reference books, research dissertations, study reports completed by working group of experts/ NGO’s, Governments etc. The secondary data is also collected from the Government Agriculture offices, i.e. i) Regional Agriculture Office, Kolhapur, ii) District Statistical Office, Kolhapur, iii) District Statistical Office, Sangli, iv) District Agriculture Office, Kolhapur and Sangli, v) Tahasil Agriculture Offices, Kolhapur and Sangli districts.

1.16.9 Tools of Data Collection

The researcher has used the questionnaire and interview method for the primary data collection from the farmers, who cultivate their land through organic and inorganic method of farming in the study area. Further, the researcher has also used the observation method to collect the data. For that purpose, the researcher has prepared two types of questionnaires for both type of farmers of both type of farming, i.e. organic and inorganic farming.

1.16.9.1 Sampling Design

The present study is completed by researcher by examining the Economic and Environmental aspect of organic farming and inorganic farming system in study area. Purposive Sampling Method is used for selection of samples out of total population. Presently, 2766.40 and 639.30 hectar land has been cultivated by farmers through organic farming in Kolhapur and Sangli districts respectively. The total numbers of farmers of organic farming were 6029 from 409 villages in Kolhapur district and were 1705 from 145 villages in Sangli district. Out of total number of farmer, 3 percent of population sample is selected i.e. 180 and 52 farmers from Kolhapur and Sangli district respectively. In all 232 organic farmers were surveyed from study area. The researcher also has selected 25 and 25 inorganic farmers from Sangli and Kolhapur district for comparison as a controlled group. The information of population samples in the study area is simply stated in following table.
### Table No.1.1 Sampling Design

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Districts</th>
<th>Total Farmers (Organic)</th>
<th>Selected Farmers (Organic)</th>
<th>Percentage</th>
<th>Selected Farmers (Inorganic)</th>
<th>Selected Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kolhapur</td>
<td>6029</td>
<td>180</td>
<td>03</td>
<td>25</td>
<td>Sugarcane</td>
</tr>
<tr>
<td>2.</td>
<td>Sangli</td>
<td>1705</td>
<td>52</td>
<td>03</td>
<td>25</td>
<td>Grapes</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7734</td>
<td>232</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sample Farmers of Organic Farming (52) Experimental**

**Sample Farmers of Inorganic Farming (25) Controlled Group**

**Grand Total 282 Farmers (232 Organic + 50 Inorganic)**
1.16.9.2 Selection of Crops

The crops cultivated under organic farming are mainly sugarcane, grapes, wheat, rice, fruits, vegetables, flowers, cotton, maize etc., in study area. Out of all these crops, majority of farmers are applying organic farming method for sugarcane and grapes. Therefore, these two crops are selected for the study, in study area. At the same time, such crops are surveyed as per the size of land, i.e. marginal, small, medium and large. In this respect, the formula used by Government of India and NABARD is used.

1.16.9.3 Statistical Packages for Data Analysis

To analyze and interpret the data in effective manner it is impossible without the use of modern statistical packages. Therefore, Microsoft office Excel 2007 and Statistical Package for Social Science (18.0th Version) are used to process and interpret the data effectively.

1.16.9.4 Statistical Techniques for Data Analysis

The collected data is tabulated in order to satisfy the objectives of the study. The fact is that only tabular analysis is not sufficient to interpret the data effectively. Therefore, considering the objectives of the study, some appropriate statistical techniques are also used for the data analysis and interpret.

Dispersion Analysis is used for measuring the fluctuations in various factors. Standard Deviation shows an absolute variability and Co-efficient of Variance shows relative variability used for the analysis Co-efficient of Range is formulated as,

\[ RR = \frac{X_{\text{max}} - X_{\text{min}}}{X_{\text{max}} + X_{\text{min}}} \]

Standard Deviation is formulated as,

\[ \Sigma = \sqrt{\frac{\sum X^2}{N} - \left( \frac{\sum X}{N} \right)^2} \]

Co-efficient of Variation abbreviated as C.V.
Where,

\[
C. \text{ V.} = \frac{\sigma}{X^-} \times 100
\]

\(\sigma\) = Standard Deviation

\(X^-\) = Mean

Pearson’s Co-efficient of Skewness calculated as,

\[
PSC = \frac{X - M_0}{\sigma}
\]

Co-efficient of Correlation analysis is used for studying the relationship of the variable and explained how strong or weak relationship between these variables (price, income, cost of production, investment, output etc.) exists. Karl Pearson’s formula is used for measuring the co-efficient of correlation (r) between two variables as,

\[
r = \frac{N \times \Sigma XY - (\Sigma X \times \Sigma Y)}{\sqrt{N \times \Sigma X^2 - (\Sigma X)^2} \times \sqrt{N \times \Sigma Y^2 - (\Sigma Y)^2}}
\]

Regression analysis studies relationship between independent and dependant variable. In this study, linear regression (between X and Y) relationship was calculated as,

**Regression equation Y on X,**

\[
Y = a + bx
\]

\[
byx = \frac{\Sigma (X - Y \times Y - Y)}{\Sigma (X - X)^2}
\]

\[
a = \frac{\Sigma Y}{N} - byx \times \frac{\Sigma X}{N}
\]

Where,

Y= dependant variable
a = intercept.
b = slope of the line.
X = independent variable
Y= arithmetic mean of Y series.
\[ X = \text{arithmetic mean of } X \text{ series.} \]

**Regression equation** \(X\) on \(Y\),

\[ x = a_1 + b_1 y \]

\(b_1\) calculated as

\[ b_{yx} = \frac{\sum (X - \bar{X} \cdot Y - Y)}{\sum (Y - Y)^2} \]

\(a_1\) calculated as,

\[ a_1 = \frac{\sum Y}{N} \cdot b_{xy} \cdot \frac{\sum Y}{N} \]

Where,

- \(X = \) dependant variable
- \(a_1 = \) intercept.
- \(b_1 = \) slope of the line.
- \(Y = \) independent variable
- \(Y = \) arithmetic mean of \(Y\) series.
- \(X = \) arithmetic mean of \(X\) series.

Moreover, some cartographic devices are used for data analysis of arrivals and value transaction by bar graph, line graph, pie-chart are also used for showing share of factors/components in total.

**1.16.10 Chapter Scheme**

The present study is presented in the following chapters.

Chapter No. 1  Introduction and Research Methodology

Chapter No. 2  Review of Literature

Chapter No. 3  Development of Organic Farming in India and Other Countries

Chapter No. 4  Profile of the Study Area

Chapter No. 5  Socio- Economic Conditions of Sample Farmers in Kolhapur and Sangli Districts

Chapter No. 6  Economic and Environmental Significance of Organic Farming in Sample Districts in Respect to Selected Crops

Chapter No. 7  Problems, Conclusions and Suggestions
1.17 Conclusion

The area of organic farming is less in India. But it has a large potential to cultivate the land through organic farming. Because, India has large geographical and arable area, with a wide variety of Agro-Chemical Zones. Organic agriculture provides enhanced health of soil, animals and human beings. India has large potential to increase the proportion of organic agriculture through specific efforts. However, there are limitations and challenges, but the efforts of government, NGOs, Co-operatives, organic agriculture will grow steadily in the coming years. Furthermore, there is need to undertake the research like present study, which can help to solve the actual problems faced by farmers while cultivating organic farming through the suggestions.

References


8. CruceFix David, (July 1998), Organic Agriculture and Sustainable Rural Livelihoods in Developing Countries, Published by Natural Resources and Ethical Trade Programme, 1st Edition.


