# "ORGANIC FARMING- AN OVERVIEW"

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## ABSTRACT

*Organic farming is farming without addition of artificial chemicals. Artificial chemicals mean which are manufactured at industrial level such as Pesticides, Herbicides, Fungicides, and Urea etc. Basic idea of organic Farming is the minimum use of nonrenewable natural resources such as Fossil fuel used for manufacture of Fertilizers and Pesticides. It also helps in improvement of environmental infrastructure of the farm. There is lot of discussion between organic farming and Conventional farming. Conventional farmers believe that they will face more problems with weeds, insects and disease. But organic farmers know habit and lifecycle of pest and apply their knowledge to control the pest. In the present study, an attempt has been made that organic farmers know how rotation of crops controls disease cycle, increase soil manure .Cover crops protects young plants, reduce weeds. Traditional organic manures are Farm Yard Manure (FYM), crop residues, compost, sewage and sludge, Poultry manure, edible and non-edible oil cakes, meat meal. The study revealed that organic food taste better and is of superior quality. For keep in view of organic farming, the inputs used in are taken care of soil health, Plant health, animal health, pest harvest technology. The main aim of farmers are to develop economically and eco-friendly practices which reduce cost of cultivation, reduce soil and water pollution, increase in crop production without the use of artificial chemical. The study concluded that this practice not only prevents pollution but also maintaining nature over ecological balance. There are still challenges and constraints in organic farming on issues such as availability and cost issues of organic input, lack of support during conversation period. There is dire need to generate awareness among farmers to change their mindset. So, organic farming is eco-friendly, improve soil fertility, sustain high yield.*

*Keywords: Organic farming; Conventional farming; cover crops; economical aspect; pest management*.

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## INTRODUCTION

The Increasing consciousness about conservation of environment as well as health hazards associated with agrochemical and consumers' preference to safe and hazard-free food are the major factors that lead to the growing interest in alternate forms of agriculture in the world. Organic agriculture is one among the broad spectrum of production methods that are supportive of the environment. The demand for organic food is steadily increasing both in the developed and developing countries with an annual average growth rate of 20–25%. Organic agriculture, without doubt, is one of the fastest growing sectors of agricultural production. However, there are certain issues that should be clarified before we go for a large-scale conversion to organic agriculture. In India, vast stretches of arable land, which are mainly rain-fed and found in the Northeastern region where negligible amount of fertilizers and pesticides are being used and have low productivity, could be exploited as potential areas for organic agriculture. Considering the potential environmental benefits of organic production and its compatibility with integrated agricultural approaches to rural development, organic agriculture may be considered as a development vehicle for developing countries like India, in particular.

Green revolution technologies involving greater use of synthetic agrochemical such as fertilizers and pesticides with adoption of nutrient- responsive, high- yielding varieties of crops have boosted the production output per hectare in most of the cases. However, this increase in production has slowed down and in some cases there are indications of decline in growth of productivity and production. Priorities in agriculture research are gradually moving from a focus on individual crop performance to a total system productivity with due attention on product quality and environment safety. Environmental and health problems associated with agriculture have been increasingly well documented, but it is only recently that the scale of the costs have attracted the attention of planners and scientists towards the use of Organo compound in Farming This type of farming is known as Organic Farming or Organic Agriculture. **Organic agriculture is also termed as knowledge-based rather than input-based agriculture.**

In the words of Shri Bankim Chandra Chatterji,

Vande Mataram!

Sujalam, suphalam, malayaja shitalam,

Shasyashyamalam, Mataram!

When translated it means is as follows: -

I bow to thee, Mother,
richly-watered, richly-fruited,
cool with the winds of the south,
dark with the crops of the harvests,
The Mother

In the rapid pace of development we have inflicted serious damage to the natural resources and consequently we are now faced with questions as where is that Sujalam (clean water)? Where is that Suphalam (healthy crop)? And where is that malayaja shitalam (refreshing air)? These questions have given rise to a process of serious thinking to safeguard the environment and the quality of natural resources for sustainability. As a result more and more emphasis is being given towards returning to nature and adoption of organic agriculture. It has come out of the exploitative agriculture that has been followed by in all these years, resulting into damaging impacts on environment, human and animal health, and soil and water resources. It is well known now that increased use of chemical pesticides (rather abuse) and fertilizers have created chain of problems of soil, environment and water degradation. The intensive chemical agriculture that has been followed after green revolution successes is causing heavy pollution of our food, drinking water, air, the life expectancy has improved, but the quality of life has substantially deteriorated. The rural economy is in ruins because of over-dependence of outside inputs in agriculture such as seed, fertilisers, pesticides, growth-promoting chemicals etc. It is even said that the chemical agriculture has destroyed our ability to think about the right way to go forward. Fortunately, alternatives to chemical agriculture are available in organic, biodynamic and Eco-technological farming approaches.

## CONCEPT OF ORGANIC AGRICULTURE

Organic agriculture is one among the broad spectrum of production methods that are supportive of the environment. Organic production systems are based on specific standards precisely formulated for food production and aim at achieving agro ecosystems, which are socially and ecologically sustainable. It is based on minimizing the use of external inputs through use of on-farm resources efficiently compared to industrial agriculture. Thus the use of synthetic fertilizers and pesticides is avoided. ‘Organic’ in organic agriculture is a labeling term that denotes products that have been produced in accordance with certain standards during food production, handling, processing and marketing stages, and certified by a duly constituted certification body

or authority. The organic label is therefore a process claim rather than a product claim. It should not necessarily be interpreted to mean that the foods produced are healthier, safer or all natural. It simply means that the products follow the defined standard of production and handling, although surveys indicate that consumers consider the organic label as an indication of purity and careful handling. Organic standard will not exempt producers and processors from compliance with general regularity requirement such as food safety regulations, pesticide registrations, general food and nutrition labeling rules, etc.

## IMPACT OF ORGANIC AGRICULTURE

In intensive farming systems, organic agriculture decreases yield; the range depends on the intensity of external input used before conversion. In the green revolution areas (irrigated lands and well endowed water regions), conversion to organic agriculture usually leads to almost identical yields. In traditional rain fed agriculture (with low external inputs), organic agriculture has shown the potentials to increase yields. A number of studies have shown that under drought conditions, crops in organic agriculture systems produce significantly and sustainable higher yields than comparable conventional agricultural crops, often out-yielding conventional crops by 70–90 per cent. Others have shown that organic systems have less long-term yield variability

## ORGANIC VERSUS CONVENTIONAL AGRICULTURE

There is a lot of debate between the proponents of organic farming and a section of the community who questioned the scientific validity and feasibility of organic farming. The most often debated issues on organic agriculture fall under the following six categories:

(i) Can organic farming produce enough food for everybody?

(ii) Is it possible to meet the nutrient requirements of crops entirely from organic sources?

(iii) Are there any significant environmental benefits of organic farming?

(iv) Is the food produced by organic farming superior in quality?

(v) Is organic agriculture economically feasible?

(vi) Is it possible to manage pests and diseases in organic farming?

Most of the answer to above questions is in the favor of Organic agriculture.

Let us study few comparisons between organic farming and conventional farming in **Table 1**

Table 1: Table showing comparison between conventional and organic farming

| Conventional Farming | Organic Farming |
|---|---|
| Centralization | Decentralization |
| Dependence | Independence |
| Competition | Community |
| Dominationof Nature | Harmony of Nature |
| Specialization | Diversity |
| Exploitation | Restraint |

Source: www.localfoodworks.org

**Can organic farming produce enough food for Everybody?**

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

(i) In intensive farming systems, organic agriculture decreases yield; the range depends on the intensity of external input use before conversion

(ii) In the so-called green revolution areas (irrigated lands), conversion to organic agriculture usually leads to almost identical yields

(iii) In traditional rain-fed agriculture (with low external inputs), organic agriculture has shown the potential to increase yields

Studies conducted in Punjab clearly indicated that organic farming gave higher or equal yields of different cropping systems compared to chemical farming after an initial period of three years.

Organic agriculture is, therefore, often termed as knowledge-based rather than input-based agriculture. Furthermore, organic farms aim to optimize the crop productivity under a given set of farm conditions. This is in contrast to concept of yield maximization through the intensive use of agrochemical, irrigation water and other off-farm inputs. There are ample evidences to show

that agrochemical-based, high-input agriculture is not sustainable for long periods due to gradual decline in factor productivity, with adverse impact on soil health and quality.

There are many organic farming Tact:

(i) Green Manure crops are ploughed to increase organic matter

(ii)Rotation of crops helps to break the disease cycle. Rotation with legume also increases soil fertility.

(iii)Cover crops also reduce weeds and protect young plants.

(iv)Trees also act as windbreakers add shelter for farmers which help in pest management

## NUTRIENT MANAGEMENT IN ORGANIC FARMING

Organic farming is often understood as a form of agriculture with use of only organic inputs for the supply of nutrients and management of pests and diseases. In fact, it is a specialized form of diversified agriculture, wherein problems of farming are managed using local resources alone. The term organic does not explicitly mean the type of inputs used; rather it refers to the concept of farm as an organism. Often, organic agriculture has been criticized on the grounds that with organic inputs alone, farm productivity and profitability might not be improved because the availability of organic sources is highly restricted. True, organic resources availability is limited; but under conditions of soil constraints and climate beggaries, organic inputs use has proved more profitable compared to agrochemical.

Organic farming systems rely on the management of soil organic matter to enhance the chemical, biological and physical properties of the soil. One of the basic principles of soil fertility management in organic systems is that plant nutrition depends on 'biologically-derived nutrients' instead of using readily soluble forms of nutrients; less available forms of nutrients such as those in bulky organic materials are used. This requires release of nutrients to the plant via the activity of soil microbes and soil animals. Improved soil biological activity is also known to play a key role in suppressing weeds, pests and diseases.

Some Potential Sources of Nutrients:

a) Animal dung, crop residues, green manure, biofertilizers and bio-solids from agro-industries and food processing wastes are some of the potential sources of nutrients of organic farming. While animal dung has competitive uses as fuel, it is extensively used in the form of farmyard manure.

b) Development of several compost production technologies like vermicomposting, phosphocomposting,N-enriched phosphocomposting, etc. improves the quality of composts through enrichment with nutrient-bearing minerals and other additives. These manures have the capacity to fulfill nutrient demand of crops adequately and promote the activity of beneficial macro- and micro-flora in the soil.

c) Crop rotations and varieties are selected to suit local conditions having the potential to sufficiently balance the nitrogen demand of crops. Requirements for phosphorus, sulphur and micronutrients are met with local, preferably renewable resources.

d) Use of liquid manures prepared through fermentation of green leafy materials, cattle urine and other locally available resources are common

Nitrogen availability from organic resources often limits to realize full yield potential of cereals under organic production system. Under restricted water availability or rainfed conditions, the differences in crop yields between organic and conventional production narrow down to between 10-15%. FYM(Farm yard manure) used in these experiments usually contains N, 0.5-0.8%, P, 0.2-0.4% and K, 0.8-1.0% with no mention of quality of organic matter/manure or alternative methods of efficient use. This nutrient rich manure helps to raise crop productivity. The differences in quality of manures used are probably the reason for wide difference reported in crop yields under organic and conventional system of crop production. There is however a need to scientifically evaluate the nutrient supplies methods in organic *Vs* conventional systems. Their efficient use is an area of future research investigation.

## ENVIRONMENTAL BENEFITS OF ORGANIC AGRICULTURE

The impact of organic agriculture on natural resources favors interactions within the agro-ecosystem that is vital for both agricultural production and nature conservation. Ecological services derived include soil forming and conditioning, soil stabilization, waste recycling, carbon sequestration, nutrient cycling, pollination and habitats. The environmental costs of conventional agriculture are substantial, and the evidence for significant environmental amelioration via conversion to organic agriculture is overwhelming A review of over 300 published reports showed that out of 18 environmental impact indicators (floral diversity, faunal diversity, habitat diversity, landscape, soil organic matter, soil biological activity, soil structure, soil erosion, nitrate leaching, pesticide residues, $CO_2$, $N_2O$, $CH_4$, $NH_3$, nutrient use, water use and energy use), organic farming systems performed significantly better in particular condition and

performed worse in none. There are also high preconsumer human health costs to conventional agriculture, particularly in the use of pesticides. It is estimated that 25 million agricultural workers in developing countries are poisoned each year by pesticides.

**HIGH QUALITY AND IMPROVED NUTRITION OF ORGANICALLY PRODUCED FOOD**

There is a growing demand for organic foods driven primarily by the consumer's perceptions of the quality and safety of these foods and to the positive environmental impact of organic agriculture practices. Organic food products have a better life and taste. A study revealed that organic food items were more nutritious than produced conventionally. These foods have more vitamins, minerals and less of nitrates as compared to conventional chemical food. The difference in nutritious status between organic and chemically conventional products are summarized in **Table 2.** It has been demonstrated that organically produced foods have lower levels of pesticides and medicinal and hormonal residues and in many cases lower nitrate contents. Nitrates are significant contaminants of foods, generally associated with intensive use of nitrogen fertilizers.

Table 2: Table showing difference in Nutritious value between organic and conventional food

| Products | Nutrient in organic food per 100 gram | Nutrient value in chemically produced food per 100 gram |
|---|---|---|
| 1. Apples(vitamin C) | 21.6 gm | 19.3 gm |
| 2.Tomatoes | | |
| vitamin C | 21.8 gm | 18.0 gm |
| vitamin A | 4.7 gm | 3.5 gm |
| 3.Potatoes | | |
| Zinc(Zn) | 310 µg | 260 µg |
| Potassium(K) | 329 mg | 370 mg |

Source: Analytical survey of Nutritional value (2008)

Studies that compared nitrate contents of organic and conventional products found significantly higher nitrates in conventional products. Quality after storage has been reported to be better in organic produce relative to chemical based produce after comparative tests.

Organic farming systems can deliver agronomic and environmental benefits both through structural changes and tactical management of farming systems. The benefits of organic farming are relevant both to developed nations (environmental protection, biodiversity enhancement, reduced energy use and $CO_2$ emission) and to developing countries like India (sustainable resource use, increased crop yields without over-reliance on costly external inputs, environment and biodiversity protection, etc.

Crop management practices such as crop rotations, green manuring, crops residue recycling, water management, efficient plant types etc., are adopted through a combination of structural and tactical management options to ensure farm produce of sufficient quantity and quality for livestock and human consumption. Normally, a crop rotation involving a leguminous crop is preferred over others. Organic farmer preferably grow locally adopted varieties having some quality traits for the premium markets.

There is a growing demand for organic foods driven primarily by the consumer's perceptions of the quality and safety of these foods and to the positive environmental impact of organic agriculture practices. The 'organic' label is not a health claim, it is a process claim. It has been demonstrated that organically produced foods have lower levels of pesticides and veterinary drug residues and in many cases lower nitrate contents. No clear trends have, however, been established in terms of organoleptic quality differences between organically and conventionally grown foods. There have been many claims that eating organic foods increases exposure to microbiological contaminants. But studies investigating these claims have no evidence to support them. Organic foods must meet the same quality and safety standards applied to conventional foods. These include the CODEX General Principles of Food Hygiene and Food Safety Programmes based on the Hazard Analysis and Critical Control Point.

## ECONOMICS OF ORGANIC FARMING

The replacement of external inputs by farm-derived resources normally leads to a reduction in variable input costs under organic management. Expenditure on fertilizers and sprays is substantially lower than in conventional systems in almost all the cases. In a few cases, higher input costs due to the purchase of compost and other organic manure have been reported. Studies

have shown that the common organic agricultural combination of lower input costs and favorable price premiums can offset reduced yields and make organic farms equally and often more profitable than conventional farms. The economics of organic cotton cultivation over a period of six years indicated that there is a reduction in cost of cultivation and increased gross and net returns compared to conventional cotton cultivation in India.

## PEST AND DISEASE MANAGEMENT IN ORGANIC FARMING

Pest control in organic farming begins by making sensible choices, such as growing crops that are naturally resistant to diseases and pests, or choosing sowing times that prevent pest and disease outbreaks. Careful management in both time and space of planting not only prevents pests, but also increases population of natural predators that can contribute to the control of insects, diseases and weeds. Other methods generally employed for the management of pests and diseases are:

a) Improving soil health to resist soil pathogens and promote plant growth.

b) Rotating crops;

c) Encouraging natural biological agents for control of diseases, insects and weeds.

d) Using physical barriers for protection from insects, birds and animals.

e) Modifying habitat to encourage pollinators and natural enemies of pests.

f) Using semi-chemicals such as pheromone attractants and trap pests.

Soil-borne root diseases are generally less severe on organic farms than conventional farms, while there were no consistent differences in foliar diseases between the systems. The successful control of root diseases in organic systems is likely to be related to the use of long and diverse crop rotations, crop mixtures and regular application of organic amendments. Organic farming has been considered as an agricultural production system that abides or excludes the use of synthetic fertilizers, pesticides, growth regulators and feed additives. This system mostly depends on locally available plant/animal resources, crop rotations, crop residues, animal manures, legumes, green manures, organic waste and biological control of pest and disease management for qualitative and quantitative crop production.

## CROPS CURRENTLY CULTIVATED UNDER ORGANIC FARMING

The following crops are currently cultivated under organic farming methods in our Country.

**Cereals:** wheat, paddy, jowar, bajra, maize

**Pulses:** Pigeonpea, chickpea, greengram, blackgram, *chana,*

**Oilseeds:** groundnut, Castor, mustard, sesame

**Commodities:** Cotton, sugarcane, particularly for Sugarcandy (*gur*)

**Spices:** Ginger, Turmeric, Chillies, cumin

**Plantation Crops:** Tea, Coffee, Cardamom

**Fruits:** banana, sapota, custard apple and papaya

**Vegetables:** Tomato, brinjal, cucurbits, cole crops, leafy vegetables

## TECHNIQUES, PRACTICES AND SPECIALIZED FORMS OF ORGANIC FARMING

Some of the techniques and practices integral to organic farming are:-

- Biodynamics
- Biological / natural pest and weed control
- Composting
- Cover cropping
- Crop rotation
- Diversity on the farm
- Effective Microorganism (EM)
- Green manuring and green leaf manuring
- Homa farming
- Indigenous seeds
- Intercropping
- Integration of systems
- Living fences
- Microbial biofertilisers
- Mulching
- Multicropping
- Multipurpose trees
- Permaculture
- Polyculture
- Reduced tillage

- Soil and water conservation
- Specialised organic farming techniques
- Vermicomposting

## TASK FORCE ON ORGANIC FARMING

The Task Force on Organic Farming had made several recommendations, few are very important, as:

i) Economic value of chemical fertilizers and organic manures may be equated in terms of their over all effect on soil productivity, crop production and then Government may provide the support accordingly.

ii) The technology packages on organic farming as developed by farmers, NGOs and others may be evaluated and the successful technology may be expanded in larger areas.

iii) Bullock drawn implements should be encouraged.

iv) Bankable model schemes on organic farming may be prepared and circulated among the States for its adoption and popularization.

v) Each of the agricultural universities in the country may start a course at the Post-Graduation level on organic farming.

vi) Each KVK (Krishi Vigyan Kendra) may set up a vermi compost unit and a biological control unit for demonstration and dissemination of the techniques. These centres may also provide worms to the farmers after their training.

vii) Each KVK may lay out one demonstration on organic farming by taking major crops of that area as test crops.

viii) Farmers training about cost-benefit relationship in organic farming and about export of organic produce may be organized through some designated institutions Specialised in this area. The Government may support such institutions, which may include NGOs.

ix) The organic markets for supply and purchase of inputs and outputs for organic farming may be developed.

x) In the areas of high production, the shifting to organic farming system may result into loss of produce in the initial years. For such switch over, farmers may need to be compensated for initial 2-3 years.

xi) All the Central Government farms may set up vermi compost units, develop, and demonstrate the system of re-cycling of crop residues. This may be demonstrated by reduced consumption of chemical fertilizers on the Government farms.

xii) All the State Government may be advised to consider to device the system as introduced by Government of Madhya Pradesh about the experimentation and demonstrations on Government farms on 50:50 area basis on organic on organic farming and other forms of farming.

xiii) The biodynamic means of preparing nutrients may be standardized and the technology may be popularised.

xiv) The crop residues should not be permitted to be burnt. Suitable legislation may be thought of, if required.

xv) Adequate information may be made available to the farmers about the cropwise residues arising and equivalent nutrient value per unit area through such crop residues.

xvi) The ventures of vermi compost, compost, press mud and other forms of generation of organic nutrients for crop production may be exempted from levy of all kinds of taxes, excise and income tax etc.

xvii) Each Sate may set up a State level cell or create a suitable unit at the Headquarter of Directorate of Agriculture to oversee the promotion of organic farming in the State.

In summary, Environmental factors internal to firm can be classified as Strength(S) or Weakness (W) and those external to firm can be classified as opportunities (O) or Threats (T).Such an analysis of strategic environment called SWOT analysis. It provides information that is helpful in matching firm's resources and capabilities to the competitive environment.

Summary of SWOT analysis of Organic Farming

| Strength | Weakness |
|---|---|
| ▪Safety food<br>▪Comparative advantage in organic food<br>▪production<br>▪Improved Soil Health<br>▪Premium Price<br>▪High Water use efficiency<br>▪Preserve Traditional varieties | ▪Productivity gap<br>▪Lack of Established markets<br>▪Low R & D investment<br>▪Lack of organic market buyer<br>▪Lack of Strategy<br>▪Adulteration and poor quality of organic inputs |
| Opportunities | Threats |
| ▪Big and growing market potential<br>▪Growing Purchasing power of consumers<br>▪Control nitrate losses and CO2 emission<br>▪Earn High export earning | ▪High cost of organic food<br>▪Complex Certification process<br>▪Lack of infrastructure<br>▪Lack of awareness<br>▪Most of fields are contagious and problem of contamination |

## CONCLUSION

Potential alternatives to chemical pesticides, fertilizers and other inputs are available in nature and these are not in conflict with nature. Such biological and natural inputs include extracts of plant origin bio-fertilizers, bio-herbicides, organic manure. In addition, the adoption of different cultural practices can not only lead to enhanced productivity and control of not only weeds and pests but also obviate the use of weedicides and pesticides. With Organic farming we can have Recycling of organic waste, Increases water retention power of the soil thus saves irrigation cost, It reduces the cost of cultivation by 20% and increases the production by 25%, Improves the taste, shape, size and nutritional quality of fruits, vegetables and grains, Thermal insulation,

Ensures biodiversity within a farm. To have maximum use of resources we must use Organic compound in farming.

The following conclusions can be drawn on important issues regarding Organic farming:

(1) Large-scale conversion to organic agriculture would result in food shortage with the present state of knowledge and technology, as the yield reductions of organic systems relative to conventional agriculture average 10– 15%, especially in intensive farming systems. However, in traditional rain-fed agriculture, organic farming has the potential to increase the yield, since 70% of total cultivable land falls in this category. Mere 5–10% increase in farm production would definitely help achieve the targeted growth rate of 4–5% in agricultural production.

(2) Organic manure is an alternative renewable source of nutrient supply. A large gap exists between the available potential and utilization of organic wastes. However, it is not possible to meet the nutrient requirements of crops entirely from organic sources, if 100% cultivable land is converted to organic farming.

(3) Organic farming systems can deliver agronomic and environmental benefits both through structural changes and tactical management of farming systems. The benefits of organic farming are relevant both to developed nations (environmental protection, biodiversity enhancement, reduced energy use and $CO_2$ emission) and to developing countries like India (sustainable resource use, increased crop yields without over-reliance on costly external inputs, environment and biodiversity protection, etc.).

(4) Organic foods are proved superior in terms of health and safety, but there is no scientific evidence to prove their superiority in terms of taste and nutrition, as most of the studies are often inconclusive.

(5) Combination of lower input costs and favorable price premiums can offset reduced yields and make organic farms equally and often more profitable than conventional farms. However, studies that did not include organic price premiums have given mixed results on profitability. Thus it is the premium price on the organic food, which decides the economic feasibility of organic farming, at least at the current rate of development in Organic agriculture

(6) In organic farming systems, pest and disease management strategies are largely preventive rather than reactive. In general, pest and disease incidence is less severe in organic farms compared to conventional farms.

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