

Organic Agriculture

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Part 1

1.1 Organic Agriculture

Organic agriculture seeks to produce healthy, good quality food in an ecologically responsible way. The organic management systems are designed to avoid the need for agrochemicals and to minimize damage to the environment and wildlife. Organic growers world over use sustainable management practices to maintain optimum natural fertility and biological activity in the soil, and to enhance the farm environment by encouraging farm wildlife. This helps to support plenty of natural predators, thereby preventing pests and diseases from reaching damaging levels. A healthy organic soil ensures sustained availability of nutrients through intricate biological processes, recycling of biomass keeps it rich in organic carbon and precious biological life and the combination of all such natural processes help produce crops that yield better in quantity and quality and is able to resist pests and diseases.

Organic agriculture is based on following fundamental rules:

- Nature knows best and has provided the model understood over centuries. One must learn and emulate from it
- Intimate understanding of nature's ways and integrating the same in farm operations is the key
- Nature has provided the ways to meet the demand and maintain balance among various component. It does not believe in mining of the soil and resources and do not degrade it.
- Organic agriculture regards soil as a living entity
- All life forms are integral part of the system and are significant contributors to its fertility.
- Management and preservation of all life forms in its full diversity is fundamental to success

Philosophy behind organic agriculture

Sir Albert Howard, father of modern organic agriculture in his famous book "An Agricultural Testament" summarized the philosophy of organic agriculture as:

"Mother earth never attempts to farm without livestock; she always raises mixed crops; great pains are taken to preserve the soil and to prevent erosion; the mixed vegetable and animal wastes are converted into humus; there is no waste; the processes of growth and processes of decay balance one another; ample provision is made to maintain large reserves of fertility; the greatest care is taken to store rainfall; both plants and animals are left to protect themselves against disease."

Since organic agriculture means placing farming on integral relationship, we must understand the relationship between the soil, water and plants, between soil-soil

microbes and waste products, between the vegetable kingdom and the animal kingdom of which the apex animal is the human being, between agriculture and forestry, between soil, water and atmosphere etc. It is the totality of these relationships that is the bedrock of organic farming.

1.2 Definitions

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Over last 50 years different organizations have suggested various definitions to modern organic farming. Some of the widely accepted definitions are listed below:

a. USDA Definition

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

b. FAO Definition

“Organic agriculture is a unique production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity, and this is accomplished by using on-farm agronomic, biological and mechanical methods in exclusion of all synthetic off-farm inputs”.

c. IFOAM Definition

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

d. Definition under National Programme for Organic Production (NPOP)

“Organic agriculture is a system of farm design and management to create an ecosystem, which can achieve sustainable productivity without the use of artificial external inputs such as chemicals, fertilizers and pesticides”.

e. Definition suggested by Task Force on Organic Agriculture (2014)

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1.3 Principle aims of organic agriculture

The principal aim of organic farming is to establish and maintain a harmonious and interdependent relationship between soil-plant, plant-animal and animal soil systems to create a sustainable agro- ecological system based on local resources. Organic farming uses environment friendly methods of crop and livestock production, without the use of synthetic fertilizers, growth hormones, growth enhancing antibiotics, synthetic pesticides or gene manipulation. As per IFOAM (2002) organic agriculture should be based on following aims:

- To produce high quality food in sufficient quantity
- To interact in a constructive and life-enhancing way with natural systems and cycles.
- To consider the wider social and ecological impact of organic production and processing systems.
- To encourage and enhance biological cycles within the farming system, involving microorganisms, soil flora and fauna, plants and animals.
- To develop a valuable and sustainable aquatic ecosystem
- To maintain and increase long-term fertility of soils.
- To maintain the genetic diversity of the production system and its surroundings, including the protection of plant and wild life habitats.
- To promote the healthy use and proper care of water resources and all life therein.
- To use, as far as possible, renewable resources in locally organized production systems.
- To create a harmonious balance between crop production and animal husbandry.
- To give all livestock conditions of life with due consideration for the basic aspects of their innate behavior.
- To minimize all forms of pollution.
- To process organic products using renewable resources.
- To produce fully biodegradable organic products.
- To produce textiles which are long lasting and of good quality.
- To allow everyone involved in organic production and processing a quality of life, which meets their basic needs and allows an adequate return and satisfaction from their work, including a safe working environment.
- To progress towards an entire production, processing and distribution chain which is both socially just and ecologically responsible.

1.4 Principles of organic agriculture

International Federation for Agriculture Movements (IFOAM) has codified the principles of organic agriculture during 2005. These principles are now the roots from which organic agriculture is growing and developing. These principles while emphasizing on core issues of health, ecology, fairness and care also elaborate the

contribution that organic agriculture can make to the world, and a vision to improve entire agriculture in a global context.

IFOAM's four principles of organic agriculture

- i. The principle of health
- ii. The principle of ecology
- iii. The principle of fairness
- iv. The principle of care

i. Principle of Health

Organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible. Health is the wholeness and integrity of living systems ensuring maintenance of physical, mental, social and ecological wellbeing. Immunity, resilience and regeneration are key characteristics of health. The role of organic agriculture, whether in farming, processing, distribution, or consumption, is to sustain and enhance the health of ecosystems and organisms from the smallest microorganism in the soil to human beings. In particular, organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well being and to achieve this it prohibits the use of chemical fertilizers, pesticides, hormones, synthetic drugs and antibiotics and chemical food additives directly or indirectly in the entire food production chain.

ii. Principle of Ecology

Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. It states that production is to be based on ecological processes, and recycling. Nourishment and well being is achieved through the ecology of the specific production environment. For example, in the case of crops this is the living soil; for animals it is the farm ecosystem; for fish and marine organisms, the aquatic environment. Organic farming, pastoral and wild harvest systems should fit the cycles and ecological balances in nature. These cycles are universal but their operation is site-specific. Organic management must be adapted to local conditions, ecology, culture and scale. To maintain and improve environmental quality and conserve resources, input use policy must rely on reuse, recycling and efficient management of materials and energy. Organic Agriculture should attain ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity. Those who produce, process, trade, or consume organic products should protect and benefit the common environment including landscapes, climate, habitats, biodiversity, air and water.

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iii. Principle of Fairness

Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities. Equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings, is the foundation for ensuring fairness.

This principle emphasizes that those involved in Organic Agriculture should conduct human relationships in a manner that ensures fairness at all levels and to all parties - farmers, workers, processors, distributors, traders and consumers. Organic Agriculture should provide everyone involved with a good quality of life, and contribute to food sovereignty and reduction of poverty. It aims to produce a sufficient supply of good quality food and other products.

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

iv. Principle of Care

Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment. Organic Agriculture is a living and dynamic system that responds to internal and external demands and conditions. Practitioners of organic agriculture can enhance efficiency and increase productivity, but this should not be at the cost of health and well-being of any living form including human. Consequently, new technologies need to be assessed and existing methods reviewed. Given the incomplete understanding of ecosystems and agriculture, care must be taken.

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

1.5 Integrating principles in farming/ processing operations

a. Implementing Principle of Health

- i. Management of soil health and fertility through diversified cropping systems, crop rotations, multi/ intercropping, conservation and enhancement of nutrient cycles and resource recycling.
- ii. Making soils chemical residue free through adoption of conversion period
- iii. Management of livestock in a way where they can express natural behavior.
- iv. Ensuring health care system through preventive measures and immunity in animals.
- v. Complete prohibition on use of synthetic inputs such as chemical fertilizers, pesticides, hormones and growth stimulants in plants, synthetic feed and feed supplements for animals and avoiding to the extent possible use of hormones, synthetic feed supplements, synthetic drugs and antibiotics.
- vi. Absolute no to genetically modified organisms, their products and derivatives
- vii. Prohibition on the use of ionizing radiations (such as gamma rays, X-rays etc)
- viii. Minimizing use of synthetic food additives, preservatives and nutritional supplements in food processing

b. Implementing Principle of Ecology

- i. Addressing biodiversity and habitat management needs for various ecological needs and conservation of different life forms through planting of diversified trees, hedge rows, buffer crops and diversified cropping systems
- ii. Ensure genetic and agricultural diversity through mix cropping and multi-variety cropping cultivation
- iii. Minimum reliance on external inputs and practices that are not environment friendly and put extra financial burden on grower
- iv. Maximum reliance on on-farm resource recycling
- v. Adoption of non-polluting practices (avoiding contamination)
- vi. Conservation of natural resources such as water through rain water harvesting

c. Implementing Principle of fairness

- i. Allow all living forms to thrive and adopt management practices for pest control using ecological and preventive approaches
- ii. Fairness at all levels including farmers, farm workers, processors, traders and consumers
- iii. Animals are provided with the conditions and opportunities of life suiting to their physiological and ethological needs
- iv. Conservation and maintenance of natural resources (preventing soil erosion, rain water conservation etc)

- v. Entire production system considers real environmental and social costs and prevents damage and losses

d. Implementing Principle of care

- i. Selection of technologies to ensure safe, healthy and ecologically sound production system
- ii. Combination of traditional wisdom, indigenous practices and modern science is the best way to develop practices which respect for all its participating components such as soil, water, air, plants and animals.
- iii. Prohibiting technologies with environmental risks such as GMOs and ionizing radiations
- iv. Maintain very high level of integrity and trust for consumers through certification process

1.6 National Standards for Organic Crop Production

National Programme on Organic Production (NPOP) and PGS-India organic guarantee system have prescribed Standards for Organic Production. These standards are comparable to widely adopted international standards of IFOAM, USDA and European Union.

- a. **Maintenance of documentation** – Organic certification system requires documentation of entire production process starting with advance crop plan to documentation of practices, inputs use, nutrient and pest management, harvest, storage, handling and processing etc
- b. **Crop production plan** – Annual crop production plan is required to be submitted to the certification body which may include the crops to be taken, area, seeds, types and quantity of inputs proposed to be used, description of monitoring processes, contamination control and post harvest handling.
- c. **Conversion** – When a conventional or non-organic farm is converted to organic, it has to pass through a transition period known as conversion period, which may span over a period of 24 to 36 months depending upon the crop and past usage of inputs.
- d. **Landscape** - Entire farm design has to ensure that it contribute beneficially to entire ecosystem through biodiversity, landscape management and resource conservation.
- e. **Choice of crops and varieties** – Varieties used shall be adapted to the local climatic conditions. All seeds and planting material shall be of organic in origin. In cases of non-availability conventional seeds without any chemical treatment

can be used. Use of Genetically modified seeds; transgenic plants or plant material is prohibited.

- f. **Diversity in production system** – Maintenance of diversity keeping in view of local requirements and pressure of pests and diseases while maintaining soil fertility, organic matter, microbial activity and general soil health through diversified plantations, multi-cropping, crop rotations etc
- g. **Nutrient management** – Fertilization management largely relies on use of biodegradable material of plant/ animal origin from organic farms, minimize nutrient losses, and prevent accumulation of heavy metals and pollutants. Prohibition on use of all synthetic fertilizers directly or indirectly. Natural mineral fertilizers can be used as supplementary sources on establishment of need.
- h. **Pest, disease and weed management** – Weeds, pests and diseases are controlled through preventive cultural techniques, which includes: habitat management, balanced nutrient management, diversity, rotations, green manures, use of resistant varieties etc. Pests can also be managed by using natural enemies of pests, mechanical, biological, botanical and organically acceptable chemicals. Use of synthetic pesticides in any form is prohibited. Use of genetically modified organisms and their products is also prohibited.
- i. **Contamination control** – Preventive measures shall be taken to prevent contamination through water and air drift including management of buffer zones and adopting measures to prevent contamination in field, storages and transit.
- j. **Soil and water conservation** – Soil and water resources to be handled in a sustainable manner. Prevent soil erosion, salination and excessive and improper use of water. Clearing of land through burning is prohibited.
- k. **Collection of non-cultivated material of plant origin/ forest produce** – Collection of non-cultivated material from forests under organic certification is allowed from areas where no prohibited substances have been used. Collection is to be carried out in sustainable manner from the identified area as per the forest management rules.

(Detailed training manual on NPOP Certification system available at) To see please [CLICK here](#)

1.7 PGS-India Standards for Organic Crop Production

1. Scope

Crop production standards prescribed here refer to cultivation of any agricultural and non-agricultural crops/ plants for the production of food and fibre and their derivatives or by-products and collection of non-timber wild harvest produce from natural forests.

2. Habitat Management and General Requirements

- a. Maintain sufficient diversity on farm through maintenance of diversity plantations, biological nitrogen fixation bushes and trees on farm boundary or as hedge rows. Integration of randomly located multipurpose trees on farm bunds and in utility spaces help in creation of habitat for maintenance and survival of different beneficial life forms.
- b. Integration of agro-forestry, if feasible should be considered
- c. Adequate measures should be adopted to conserve and harvest rain water
- d. Preferably the entire land holding with livestock should be converted to organic according to these standards.
- e. If it is not possible to convert the entire farm (split production) then the measures must be in place to ensure that organic and non-organic parts are clearly and continuously separate.
- f. Simultaneous production of same crop (parallel production) in organic and non-organic needs to be avoided.

3. Diversity Management

- a. Organic farming systems should avoid monocropping and ensure continuously changing farm diversity. Diversity is also a key to maintain soil fertility and to effectively manage the pressure from insects, diseases and weeds. Diversity should also help in maintaining or increasing soil organic matter, soil fertility, microbial activity and general soil health.
- b. Diversity can be achieved by adopting mixed cropping, intercropping and crop rotations. Cover crops, trap crops and multi-layered farming practices are also effective tools for diversity management. Soil fertility can be maintained by integration of legumes or deep rooted plants in cropping systems, frequent use of green manures, planned rotations and fertilization with organic inputs.

4. Integration of livestock

As organic farming systems largely depend upon farming system approach, therefore it is important to integrate livestock along with crop production. This will not only help in overall farm diversity but will also ensure continuous availability of dung and urine for manuring and soil fertility management.

5. Soil and Water Conservation

- a. Soil and water resources to be managed in sustainable manner and measures to be taken to prevent erosion and salination of soil, excessive and improper use of water and the pollution of ground and surface water.
- b. Clearing or destruction of forest is prohibited, burning of straw or biomass shall be restricted to minimum
- c. Measures to be in place to prevent land degradation and pollution of ground and surface water.

6. Contamination Control

- a. Adequate measures to be taken to prevent contamination through water, air drift, mixing or comingling through:
- b. Raised bunds and escape channels to prevent rain water runoff from non-organic fields
- c. Buffer zones between organic and non-organic farms
- d. Separate storage in time and space both for inputs and farm produce
- e. Cleaning of machines and tools while using in organic farm
- f. Any other measure suggested by the group/ certification programme

7. Conversion requirements

- a. For a farm and its crop production products to be certified organic, it is mandatory that the farm and entire farming operations of organic production unit has under gone a period of conversion, complying with all the standard requirements for following period:
 - i. 36 months for perennial plants
 - ii. 24 months for plants/ crops other than perennials
- b. In cases where de-facto requirements under these standards have been met for several years and the same can be verified from available documents, conversion period can be reduced to 12 months at the discretion of Regional Council.
- c. In default organic areas where there is no history of prohibited substances use and administration has imposed the ban on use of such substances and adequate measures are in place to prevent entry of such prohibited substances, the requirement of conversion period can be dispensed with. But such exception can be granted only by the PGS-NEC on recommendations of PGS Secretariat after physical verification and endorsement by verification committee constituted for the purpose.

8. Seeds and planting material

- a. All seeds and planting material shall be certified organic. When certified organic seed and planting materials are not available (Local group need to ensure non-

availability), chemically untreated conventional seed and planting material can be used.

- b. Use of Genetically modified seed/ planting material/ transgenic plants, microorganisms (GMO) or their products, directly or indirectly are strictly prohibited

9. Soil fertility and nutrient management

- a. Green manuring, legume cover crop/ intercropping, multi cropping, effective crop rotations and recycling of organic farm generated plant biomass through composting or mulching should form the basis of nutrient management
- b. Sufficient quantities of biodegradable material of plant or animal origin should be used
- c. Biodegradable material of plant/animal origin must be composted through aerobic composting method where pile temperature has been maintained between 131^o and 170^o F for minimum 5 days.
- d. Raw dung-urine products should be used only after controlled fermentation
- e. Mined mineral fertilizers in their natural composition can be used. In case of micronutrient deficiency, micronutrients can be used mixed with compost.
- f. Off-farm/ purchased inputs should be evaluated before use by the group to ensure that no prohibited substances have been used in their making and method of production is physical, mechanical or biological.
- g. Off-farm/industry produced inputs approved by NPOP accredited certification body as approved input for use in organic farming can be used without further approval of the group.
- h. Microbial preparations such as biofertilizers, biodynamic preparations, EM solutions etc can be used.
- i. Use of mineral nitrogen and all synthetic fertilizers, chemical hormones, synthetic growth promoters, directly or indirectly are prohibited.
- j. Use of sewage, sludge, human excreta or their products are prohibited

10. Insect pest, disease and weed management

- a. Insect pest and disease management should rely primarily on best management practices such as balanced soil fertility management, use of crops and varieties resistant to pests and adapted to local situations, diversity management, effective crop rotations, multi-cropping/ intercropping, green manures, manipulation of planting and sowing time and habitat manipulation through diversified plots, hedge rows, insectary plants, trap crops etc.
- b. Pest problems may also be controlled through physical, mechanical and biological approaches such as (but not limited to):
 - i. Removal of infested plants/ parts,
 - ii. Collection and destruction of egg masses
 - iii. Use of light traps, yellow and blue sticky traps, pheromone traps
 - iv. Mechanical such as tilling, scuffling, hoeing

- v. Biological such release of pest predators, parasites, pathogens, installation of bird perches,
- c. In cases where cultural and preventive approaches are not sufficient and there is imminent threat to the crop then plant protection products derived from plant or animal origin and prepared by using physical, mechanical or biological methods can be used. Products approved for use in organic farming by certification bodies accredited under National Programme for Organic Production (NPOP) can also be used.
- d. Natural mined products and biological products such as microbial biopesticides can be used
- e. On-farm produced plant extracts, oils or fermented products can be used provided no synthetic ingredients is used in such preparations,
- f. Weed management can be done through mulching with biodegradable material, mowing, livestock grazing, hand or mechanical weeding, flame, heat or electrical means or by using plastic or other synthetic mulches, provided that such mulches are removed from the field after harvest.
- g. Use of synthetic herbicides, fungicides, insecticides and other chemical preparations including synthetic plant growth regulators and synthetic dyes are strictly prohibited. Use of genetically engineered organisms or products are also prohibited.

11. Collection of non-cultivated products of plant origin from wild habitats and forests

- a. The collection of wild plants and parts thereof and products including Tusser cocoon, Honey, Lac, Medicinal Plants and Herbs, Roots and tuber, grown naturally, and in forest shall be certified as organic provided:
 - i. It is derived from a designated area for collection, clearly depicted in the map and is permitted by the forest department or state department, which is subject to inspection,
 - ii. The collection areas have not received any treatment with products other than those authorized for use in organic production,
 - iii. The collection area shall be at appropriate distance from conventional farming and sources of pollution and contamination,
 - iv. The products are derived from a stable and sustainable environment and total collection shall not exceed the sustainable yield of the ecosystem or threaten the existence of plant and species.

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