

2nd Edition

Organic Agriculture

Farmers Training Notes No. 1



Kenya Organic Agriculture Network

What is Organic Agriculture?

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 good quality life for all involved.

Organic Agriculture can also be defined as a farming system that works in harmony with nature rather than against it. This involves using techniques to achieve good crop yields without harming the natural environment or the people who live and work in it. Among the techniques that organic agriculture relies on include: crop rotation, green manure, compost and biological pest control to maintain soil productivity and control pests on a farm.

NB: Organic agriculture excludes or strictly limits the use of manufactured fertilizers, pesticides (which include herbicides, insecticides and fungicides), plant growth regulators such as hormones, livestock antibiotics, food additives, and Genetically Modified Organisms.

Evolution of present day conventional agriculture

The early man gathered fruits, seeds and roots in the forest and plains for food. He used crude tools for hunting and fishing for his meat. Later, he domesticated some of the animals that he hunted. He also started cultivating some of the grains, roots and fruits he previously gathered. He became a farmer as well as a pastoralist.

Over time, he devised better tools which enabled him to cultivate bigger portions of land. Farm families emerged, and ownership either by individuals or communities came into being.

Increase in population resulted in high food demand. To support the rising population on limited land sizes, commercial fertilizers and pesticides took over. Scientific agriculture had replaced age-old environmentally-friendly methods.

As nations interacted, trade in diverse agricultural products and inputs brought about commercial agriculture, the birth of an extensive agribusiness culture that has dealt our springs, rivers, lakes, forest and countryside such devastating environmental blows.

Simply put, the cardinal stages in the development of agriculture starting from the oldest to the most recent are as follows:

- Gathering/hunting/fishing
- Pastoral
- Plant culture stage (most people stopped roaming)
- Hoe ploughing stage
- Communal ownership
- Individual ownership
- Scientific agriculture (beginning of the green revolution stage). It increased **industrial** agriculture production with the objective of increasing yields through the development of high yielding crop varieties, irrigation, distribution of hybrid seeds, use of synthetic fertilizers, pesticides and herbicides which over time require more inputs, hence high cost of production and energy
- Commercial agriculture
- Agribusiness where organic agriculture is part of it

The development of Organic Agriculture

Among the people who contributed to the development of organic farming include the following:

- **Albert Thaer** (1752 - 1828): He worked on the development of optimum rotations for proper growth in Central Europe.
- **Justus von Liebig** (1803 - 1873): He stated that there was no fundamental difference between chemical processes taking place inside or outside an organism. He formulated the law of the minimum in plant nutrition. The law says that the needs of every living plant are found in the minimal salts present in the ash of such a plant. He identified a list of 16 essential minerals for plant growth.

From his work it was believed that:

- (a) Plants could be supplied with nutrients directly.
- (b) The soil was not necessary; nutrients need not be applied to the soil.

Agriculture was equated to industry. This created the big question: "Should a farmer feed the soil or the plants?" At the turn of the century, the industrial manufacture of ammonium and nitrate fertilizers became possible. Later insecticides, fungicides and herbicides were developed. This led to the reduction of labour requirements and encouraged the use of more crops and large farm units.

It soon became clear that the use of these inputs could endanger soil fertility and the health of the people. This provided the motivation to look for alternative farming methods such as organic farming.

In 1910, **F.H. King** wrote a book entitled "**Farmers of Forty Centuries** " which described the Chinese methods of organic farming that had persisted for 4,000 years. In some Chinese rural areas, composting had supported large populations on a sustainable basis in the absence of application of chemical fertilizers.

In the 1920s, **Rudolf Steiner** developed a concept of sustainable agriculture among a group of farmers and friends who had showed concern for the **declining health of the soil and diminishing quality of food crops**. In 1924, he gave six series of lectures, which led to the development of biodynamic agriculture. He stated that the forces of nature from the sun, stars and the moon influence the health of soils, plants and animals.

In the 1930s, when the extensive use of chemical fertilizers in the USA created catastrophic dust bowls, public interest was raised and people started looking for more sustainable land use systems.

In 1940, **Sir Albert Howard** conducted experiments on composting methods in India. He developed the **Indore composting method** based on old Indian farming habits. Howard pointed out that plant health depended on that of the soil. He said that the health of the crop had an effect on the consumer. He said, "The cycle of living substances within the soil plant-animal and human-soil system will function only when **organic fertilizers are used**." Howard's ideas were supported by research work done by **Lady Eve Balfour** who carried out practical organic farming for 30 years in England. In the USA, **J. I. Rodale** started publishing a magazine entitled "Organic gardening", based on his work on a small farm near Emmaus, Pennsylvania.



Background information on Organic Agriculture

1920-1940 As more and more people realized the dangers of commercial agriculture, individual efforts led to the formation of institutions or movements aimed at conserving the environment. Rudolf Steiner came up with Bio-dynamic agriculture, Muler Rusch introduced organic or biological agriculture, Rodale started the Rodale Institute to promote organic farming through research, training and extension. Sir Albert and Lady Eve founded the Soil Association.

1962 **Rachael Carson** wrote a book entitled "**The Silent Spring.**" She reasoned that the real effects of pesticides, fungicides and herbicides on the environment were becoming visible through the disappearance of birds, insects and other forms of life. She said that the pesticide chemicals, which did not differentiate between beneficial insects and pests, had killed them.

1972 The **Club of Rome** wrote a report entitled "**The Limits of Growth**". Concern grew over the renewable and non-renewable resources. At that point in time, economists got involved in the endeavor and the **International Federation of Organic Agriculture Movements (IFOAM)** was formed for the promotion of the development and spread of organic agriculture. IFOAM is particularly known for the development of worldwide organic agriculture standard for production, processing and marketing of crops and animal products.

1975 The **United Nations** created the **United Nations Environment Program (UNEP)** to look into pollution issues throughout the world.

1977 UNEP Commissioned the Prime Minister of Norway to develop a policy for environmental protection in the world. The commission produced the famous "**Our Common Future**" book which says that this generation should utilize natural resources in such a way as to allow future ones to use them also.

1987 Policy planners and politicians became involved in environmental issues.

1992 The concern of the politicians clearly emerged during the **Earth Summit in Rio de Jenairo, Brazil**. The meeting was held to draw an international action plan. It was hoped that politicians would give the various movements the needed support towards the conservation of the environment.

1980s Organic Agriculture was introduced in East Africa and steadily promoted by **Non Governmental Organizations (NGOs)** where the emphasis was production for home consumption.

2004 East African countries, Kenya, Uganda, Tanzania and Rwanda had established organic agriculture networks specifically emphasizing on areas of production, training, certification and marketing of organic products. Together they have since developed the East African Organic Standard and a common organic **(Kilimo Hai)** mark to label organic certified product for the local and regional markets. In Kenya, the **Kenya Organic Agriculture Network (KOAN)** is the national coordinating body for organic agriculture activities.

Why Organic Farming?

Casual and mechanistic thinking have led to economic and technical developments, which in turn have resulted in an increasing industrialization of agricultural production and the belief that agricultural problems can be solved by the appropriate use of machines and chemicals. Chemical fertilizers, pesticides, growth regulators, concentrated feed and other additives are supposed to keep plants and animals healthy but they often fail to do so. The high yields they produce initially are usually accompanied by adverse side effects sooner or later. The negative side effects include reduced soil fertility, ground water pollution, the destruction of natural habitats, the reduction of the number of plant and animal species, steadily increasing energy requirements and climate change.

Population growth and the consequent high demand for food in the developing countries have led to the need to increase the yields from farmlands and livestock by using and sometimes over-using agrochemicals. It has been estimated that many people suffer from pesticide poisoning and a large number die every year as result of the toxic effects of chemicals. Organic farming provides practical and meaningful ways of reducing the pollution of air, water and soil, which affect the environment and ultimately human welfare. It helps to maintain the balance in the basic constituents of healthy farming viz. air, water, soil, microorganisms

Characteristics of Organic Agriculture

The main characteristics of Organic Agriculture are:

- Protection of long term soil fertility by maintaining high organic matter levels, fostering soil biological activity and making careful mechanical intervention.
- Indirect provision of crop nutrients through use of insoluble nutrients which are made available to plants through the action of soil micro-organisms.
- Establishment of nitrogen self-sufficiency through use of legumes, biological nitrogen fixation and effective recycling of organic material such as crop residues and animal manure
- Weed, pest and disease control through use of crop rotation, natural predators, diversification, organic manure and other natural interventions
- Rearing of livestock by considering their natural behavior needs and welfare issues with respect to nutrition, housing, health and breeding, among others
- Paying attention to the impact of the farming system on the wider environmental issues and the conservation of wildlife species and natural habitats

10 REASONS TO GO ORGANIC

1. Organic production does not contain poisonous chemical residues. The average conventionally grown food products contain substantial levels of chemical residues that are harmful to one's health even after they are harvested. Most of the synthetic chemicals used on the farm find their way into rivers, streams, and underground water reservoirs where majority of the people get their water.
2. Fresh organic produce contains on average 50% more vitamins, minerals, enzymes and other micro-nutrients than intensively farmed produce. Several studies have shown increased fertility for animals and people who eat organic produce.
3. Intensive chemical farming can seriously damage the health of farm workers. There are much higher instances of cancer, respiratory problems and other major diseases among farm workers from non organic farms. This is particularly true in conventional flower farms and vegetable growing areas, where chemicals are extensively used.
4. Going organic is the only practical way to avoid eating Genetically Modified (GM) food. By buying organic food, you are registering your mistrust of GMOs and doing your part to protest against their introduction.
5. Organic food simply tastes better than conventional food. Organic fruits and vegetables are full of juice and flavor, and one can choose from many different varieties.
6. Organic farms support and nurture our beautiful and diverse wildlife. Over the last thirty years, the infamous Green Revolution has led to dramatic erosion of the soil, a fall of up to 70% of bird populations in some areas, the destruction of ancient landscape, and the near extinction of some of the most beautiful species of butterflies, other insects and wild mammals.
7. Organic food is not necessarily more expensive than conventionally farmed foods at least in Kenya, only that in most shops it is not differentiated. Millions of shillings are spent every year cleaning up the mess caused by use of agro-chemicals on the natural water supply systems and in treating diseases that they cause.
8. For the last three decades, the Green Revolution has failed to ensure food security and year after year, millions face hunger, yet organic agriculture holds the key to food security. Go organic and support increased stable production and increased incomes for our small scale farmers.

9. If you like the idea of your children and grandchildren being able to visit your rural home and play in the farm, without fear, just like we did when we were young, go organic for the sake of our future.
10. There are more gains to the society in general: a better environment and recirculation of nutrients, biological diversity, food quality and safety as well as reduced use of non renewable energy. If you love your neighbor, go organic.

PRINCIPLES OF ORGANIC FARMING (As summarized by IFOAM)

These Principles are the roots from which organic agriculture grows and develops. They express the contribution that organic agriculture can make to the world, and a vision to improve all agriculture in a global context.

1. The Principle of Health

- Organic agriculture is geared towards achieving health in plants, animals, human beings and the whole planet.
- Holistic approach to health is considered where health in individuals is embedded in healthy ecosystems
- In humans health is considered in terms of social, mental, physical and ecological wellbeing exhibited in immunity, resilience and regeneration

2. The Principle of Ecology

- Organic agriculture is based on living ecological systems and cycles
- These systems are ;the living soil, farm ecosystem, and aquatic ecosystem
- Inputs should be reduced by reuse, recycling, and efficient management
- Wild harvests should fit the cycles and ecological balances in nature
- Ecological balance should be attained through the design of farming systems, establishment of habitats and maintenance of genetic and agriculture diversity

3. The Principle of Fairness

- Relationships build should ensure fairness with regard to the common environment and life opportunities.
- Fairness is cultivated through equity, respect, justice and stewardship of shared world, both among people and in relations to other living things.

- The relationships cultivated should ensure fairness at all levels and to all parties: farmers, workers, processors, distributors, traders and consumers
- Animals should be provided with the conditions and opportunities of life that accord with their physiology, natural behavior and wellbeing.
- 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

4. The Principle of Care

- Management of organic agriculture is in a precautionary and responsible manner to protect the wellbeing of the current and future generations
- Whereas organic agriculture may focus on increasing productivity, this should not jeopardize health and wellbeing
- New technologies need to be assessed and existing ones reviewed to establish their risk factor
- Practical experience, accumulated wisdom and traditions and indigenous knowledge which are tested by time are encouraged and promoted

General facts in Organic Agriculture.

Organic agriculture is cheap and sustainable. Farmers can produce without causing health or environmental damage. Careful organic agriculture systems have shown that farmers can achieve the following principles:

- Work with natural systems and produce food of high nutritional quality in sufficient quantities
- Successfully enhance and utilize biological cycles within a farming system involving micro-organisms, soil flora and fauna, plants and animals for sustainable productivity
- Maintain and increase long term use of the soil
- Fully utilize renewable resources in locally organized agricultural systems
- Provide livestock with conditions that will facilitate their best performance without subjecting them to stress and vices that would naturally not be there
- Avoid all forms of pollution that emanate from conventional agriculture, and which have lately caused environmental hazards



- Maintain the genetic diversity within their agricultural environment, and which will impact positively on plant and wildlife habitats
- Compost - Add natural soil nutrients among other uses
- Bio-gas slurry – It is rich in nitrogen
- Bio-fertilizers – They add nutrients not readily available in compost, slurry or green manures
- Animal manure – Is a major component in composting and source of soil nutrients

Cyclic flow of nutrients

This is encouraged through:

- Cover cropping – Cover crops prevent soil erosion and soil nutrient loss
- Nitrogen fixation by especially the Rhizobium bacteria in legumes
- Deep rooting plants – They bring up nutrients from lower horizons and access them to shallow-rooted crops through leaf fall
- Using livestock manure and urine as a source of nitrogen
- Composting as a means of increasing natural soil fertility
- Using external inputs of organic origin
- Use of renewable energy

Advantages associated with Organic Agriculture

- Sustainability - The soil's capacity to nurture and sustain plant life is enhanced
- Efficient use of soil nutrients
- Self-reliance in crop production inputs like compost
- Use of pest management systems that are safe to human beings and the environment
- Elimination of pesticide related health problems
- Improved family nutrition
- Full utilization of available farming space
- Conservation of plant genetic resources and water
- Risk free, economically sound income generation

Transition from Conventional to Organic Agriculture

According to different Organic Standards, land is supposed to be managed for three years (36 months) prior to the harvest of the first organic crop. This period is known as the **transition period**.

Organic Standards require that land and soil must be managed for a number of years, using only accepted inputs and practices before being certified organic. (Livestock transition procedures are different from crops and hence are covered separately in the Standards).

To transition from conventional to organic management, one needs to change farming practices and then wait for up to three years for certification to commence. During this period the producer sells his/her products as **organic on conversion**. The conversion process, however, should be done with some careful forethought, information gathering and planning. In the initial transition process, the following five steps of self evaluation are important:

1. Visualize – Envision the ways in which the farming business will grow and assess the changes required, including a clear idea and ideal future.

2. Evaluate – Take inventory of all your current resources, practices and what needs to be modified to meet the organic standards.

3. Educate – Begin by learning the basics about organic practices and guidelines, and compile a list of contacts and resources (other farmers, extension agents, organizations, and books) that can continue to provide help to you as you progress towards your goals.

4. Plan – Organize a “road map” of practical steps that you plan to follow to achieve your goals and vision. Be certain to commit this plan to paper so it is clear for you, and be prepared for some of the steps to change as your work progresses.

5. Act – Take your first practical step, as outlined on your road map, and then continue along your planned path with patience and deliberation.

To transition towards organic practices takes time, remember therefore that there is no need to rush into anything. Changes can be made much more easily if you give yourself the time you need to become comfortable with the new focus.

Start to certify your farm in small sections, rather than trying to certify the whole farm at once, especially if you don't have enough resources to do so. Certifying a few specific fields is acceptable provided there is no parallel production (i.e. the same type of crops are grown in the organic and non organic section).

To transition successfully, focus on the following action steps:

1. Attend organic producers meetings, trainings and market place in order to make contacts with other organic farmers, to gather information on the certification process, the certification organizations and cost of certification within your locality, among others.

2. Select the certification organization(s) with whom you want to certify your farm, either using local or international standards depending on your end market. It is important to take this step early and carefully, because these organizations will be your connection to the Organic Standards, and their seals (mark) that will be used in the market.
3. Follow the Organic Standards closely when developing the transition strategy and organic system management plan. In the plan, it is good to bear in mind that one will:
 - Permit and encourage on-site farm inspections
 - Submit all application fees to the certifying organization(s)
 - Prepare a written description of intended organic practices and procedures
 - Prepare a list of all substances and inputs to be used in the practices



- Assess and prepare a written description of the physical barriers or buffer areas to protect the integrity of the organic fields from the conventional farms in the neighbourhood
- Develop a comprehensive record keeping system if one is not in place

Summary

The motivations for the transition to organic are varied. Requirements are set according to Organic Standards. The path to organic will be determined by the unique attributes of individuals' farms and by the products to be grown and marketed. There will be challenges to meet the new opportunities, but willingness to learn, to adapt, to network, and to persevere will be valuable assets on the road to success.

Some of the material in this book was adapted from the books:

1. **Sustainable Agriculture** - by ILRI
2. **Natural Pests And Disease Control** - By Henry Elwell and Anita Maas
3. **Organic Farming Filed Note book** - by John Njoroge
4. **Soil Fertility Management** - by John Njoroge
5. **IFOAM Training manual**

BOOKLETS IN THIS SERIES:

1. **Organic Agriculture** (Kilimo Hai)
2. **The Living Soil** (Undongo ulio hai)
3. **Soil Fertility** (Rutuba kwenye Udongo)
4. **Composting** (Mboji)
5. **Green Manure** (Mbolea ya Majani)
6. **Soil and Water Conservation In Organic Agriculture**
- Uhifadhi wa Maji na Udongo katika Kilimo Hai
7. **Soil Tillage** (Kutayarisha Undongo)
8. **Crop Rotation** and its role in Soil Fertility
(Mzunguko wa mimea na umuhimu wake katika kuhifadhi rutuba kwenye udongo)
9. **Cropping Systems** (Mbinu za Upanzi)
10. **Crop Pest Protection** (Kukinga Mimea)

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Kenya Organic Agriculture Network (KOAN) is the National Coordinating Body for organic agriculture activities in Kenya.

KOAN's mandate is to coordinate, facilitate and provide leadership and professional advisory services to all members and stakeholders in the areas of production, technical training, marketing, certification, lobbying and advocacy.

It seeks to promote the organic agriculture movement in Kenya, to evolve and become a highly beneficial and integral industry with direct impacts on the environment , poverty reduction, employment and wealth creation

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