



# Ecological Farming How to Guide

Growing Chemical Free Food

A Farmer and Consumer Guide for  
Rural and Urban Farming

**2020**



**GREENPEACE**



## **ACKNOWLEDGEMENTS**

This handbook was created by a great team of people working and volunteering in Greenpeace Africa on the Food for Life campaign. Without their contributions and ideas, this handbook would have not been possible. Special thanks to the farmers in Kitui, Machakos and Makueni counties whom I had the pleasure to interact with and learn from. They have influenced the creation of this handbook. They are my biggest inspiration and hope for sustainable and safe food systems. This handbook is therefore dedicated to the millions of farmers worldwide that are keen to grow food in a safe and sustainable manner.

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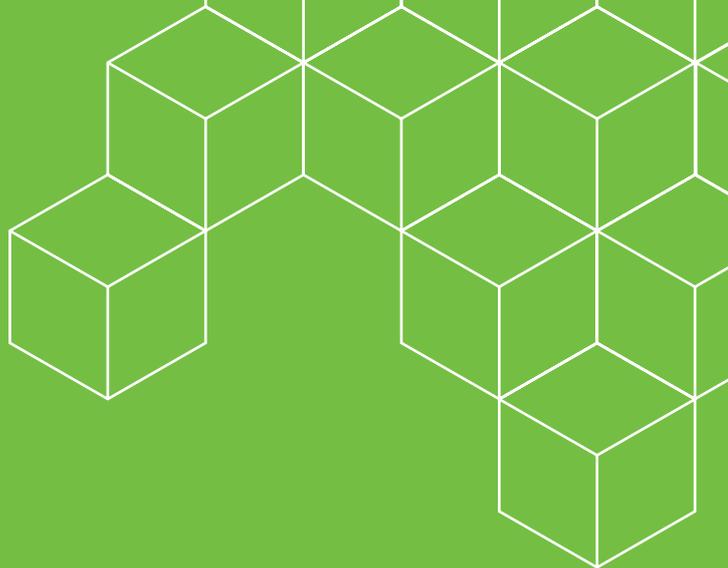
**Art Direction, Design and Infographics:** Centrepress Media Limited

**Cover photograph:** Paul Basweti

Published in February, 2020

by GreenpeaceAfrica  
House 6, Kanjata Road, Lavington  
Nairobi, Kenya  
[www.greenpeace.org](http://www.greenpeace.org)

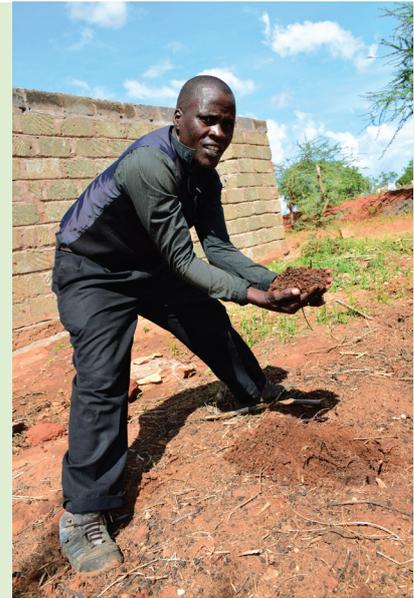
# Table of Contents



Safe Guarding our Food System Through Ecological Farming	3
Acronyms, Terms and Definitions	4
Introduction	6
About this How to Guide	6
Rationale	6
Purpose of this Handbook	6
HOW TO GUIDE 1: Ecological Farming - definition, principles and benefits	9
HOW TO GUIDE 2: Ensuring Healthy Soil for High Yields	11
HOW TO GUIDE 3: Managing Weeds, Pest, & Diseases	16
HOW TO GUIDE 4: Water conservation	23
HOW TO GUIDE 5: Seed sovereignty and saving	26
HOW TO GUIDE 6: Organic Certification	32
HOW TO GUIDE 7: Converting from Industrial Agriculture to Ecological farming	37
HOW TO GUIDE 8: Market development of organic products.	43

## Safe guarding our food system through ecological farming

This how to guide is designed for both farmers and consumers interested in growing healthy, safe and chemical free food. It is designed to help you understand what ecological agriculture is and it's role in food safety and environmental protection. It also gives you a step by step guide on how to transition from conventional agriculture, employ various ecological agriculture farming practices and how to obtain certification for your ecologically farmed produce.



## The ecological farming movement<sup>1</sup>

Significant progress has been made over the last few decades. Concepts such as the “organic movement”, the “locavore [locally produced food] movement”, and “food sovereignty” have developed to challenge the damaging mainstream industrial agriculture model. Now is the time to go further. A new movement is forming around agroecology- based ecological farming, and it is gaining significant international support and momentum.

Greenpeace sees itself as part of this **growing movement**.

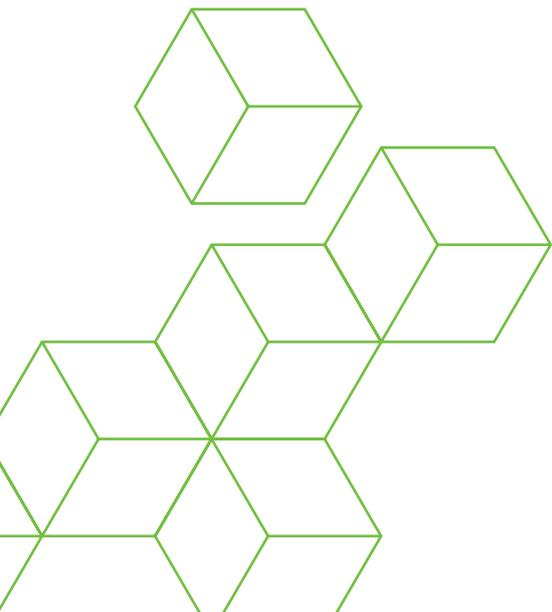
We are convinced that there is a solid shared vision for ecological farming within this wide spectrum of approaches and focusses. If we work together, we can create a food system that protects, sustains and restores the diversity of life on earth – at the same time respecting ecological limits.

It is a vision of sustainability, equity and food sovereignty in which safe and healthy food is grown to meet fundamental human needs, and where control over food and farming rests with local communities, rather than transnational corporations.

Together, we can return our food to what it was always meant to be: a source of life – for all people on the planet.

**Dr Reyes Tirado,**  
**Greenpeace Research Laboratories, University of Exeter**

<sup>1</sup> Greenpeace International, 2015. Ecological Farming – The Seven Principles of a food System that has people at its heart. Netherlands.



## Acronyms, Terms and Definitions

<b>AGROECOLOGY</b>	Agroecology refers to the scientific discipline of studying agriculture as ecosystems, looking at all interactions and functions (i.e. producing food but also cycling nutrients, building resilience, etc.).
<b>CIDP</b>	County Integrated Development
<b>ECOLOGICAL FARMING</b>	Ecological farming ensures healthy farming and healthy food for today and tomorrow, by protecting soil, water and climate. It promotes biodiversity, and does not contaminate the environment with chemical inputs or genetically engineered plant varieties. Ecological farming encompasses a wide range of crop and livestock management systems that seek to increase yields and incomes and maximise the sustainable use of local natural resources whilst minimising the need for external inputs.
<b>FOOD SOVEREIGNTY</b>	It is the right of people to healthy and culturally appropriate food produced through ecologically sound and sustainable methods and their right to define their own food and agriculture systems.
<b>FAO</b>	Food and Agriculture Organisation
<b>GPAF</b>	Greenpeace Africa
<b>GM</b>	Genetically modified
<b>UNEP</b>	United Nations Environmental Programme
<b>WFP</b>	World Food Programme
<b>WHO</b>	World Health Organisation

# Introduction

## About this How to Guide

This ecological farming guide is designed to provide budding and experienced farmers with information to develop, implement and evaluate their sustainable farming practices and initiatives. To upscale the practice of ecological farming – ensuring peoples’ right to safe and healthy food; grown in a manner that protects the environment through a model that fosters resilience and sustainable agriculture. This guide seeks to provide helpful how to guides for subsistence and commercial farming.



## Rationale

Our current food system primarily serves the needs, not of people or the planet, but of capital. Global markets – dominated by a small number of corporations – determine not only what kind of food is being produced, but also how it is being produced, and how it is being distributed. Major power imbalances mean that large investments in land, agriculture and food processing often marginalises or displaces small-scale farmers. Ecological Farming offers better solutions.

Furthermore, Farming is under stress: the climate crisis is worsening conditions in many parts of the planet, already. Over the coming decades, erratic weather events and unfamiliar climatic conditions are likely to become even more common. Uncertainties within the energy system and the commodity market contribute to the picture. It is against this backdrop that we must build a more resilient agricultural system. There is now a growing consensus for this need. Ecological Farming provides a large part of the answer.

Ecological farms that work with biodiversity and are knowledge-intensive rather than chemical input-intensive are the most resilient options under a drier and more erratic climate.

A key mandate of Greenpeace Africa – Chakula cha Afya Campaign is to support the upscaling of ecological farming and promote informed consumption capacity for the uptake or purchase of ecologically/organically grown produce by urban, peri-urban and rural consumers. It is for that purpose this how to guide has been developed.

## Purpose of this Handbook

The purpose of this Ecological Farming Handbook is to be a useful resource; through which, grassroots organisations, farmers, youth networks and consumers can practice ecological agriculture to strengthen and grow the Chakula cha Afya/ Healthy Food movement. The specific objectives include:

1. Building individual and community skills on ecological agriculture
2. Enabling stakeholders to develop and/ or implement:
  - *Effective ecological agricultural practises*
  - *Chakula cha Afya initiatives that enable small-scale farmer communities to develop and increase their yields*
  - *Different ways to measure progress*



## WHAT YOU SHOULD KNOW ABOUT THE FOOD FOR LIFE PROJECT

### *Chakula cha Afya/ Healthy Food Campaign*

In Sub-Saharan Africa, climate change is expected to affect food security, due to dependence on rain-fed agriculture coupled by high levels of poverty. Research estimates that by 2050, crop yields will decline by 14% (rice), 22% (wheat) and 5% (maize), pushing the vast number of already poor people, who depend on agriculture for their livelihoods, deeper into poverty and vulnerability. To counter the impending effects of climate change there is need to promote resilient livelihoods, which will be fostered by a multi-sectoral approach.

With relation to this project, it is important to note that agriculture is the backbone of the Kenyan economy. This sector is grappling with the effects of climate change; rising temperatures, unpredictable rainfall patterns, and significant environmental degradation. Land use in Kenya is underexploited in arid and semi-arid lands (ASALs) and small scale farmers only use 60% of their land for farming. These are two of the existing reasons informing Kenya's Agricultural sector Development Strategy (2010- 2020); which pushes for improved inputs such as hybrid seed, fertilisers, safe use of pesticides and machinery by small scale farmers. These inputs are expensive for local farmers and have damaging effects on the land. The solution is ecological farming. Allowing for climate resilience food production.

The best way to build climate resilient agricultural systems in Kenya is through sustainable agricultural practises compatible with ecological farming. Women have been flagged as strong contributors to this sector as seed trade actors (preserving ancestral seeds and biodiversity); this will be preserved and encouraged within the Food for Life project. On the contrary, the Kenya government is of the opinion that subsidising farm inputs such as fertilisers through the National Cereals and Produce Board (NCPB) to address food insecurity; the Food for life project's goal is to promote a different way. A lot more needs to happen at the policy and private sector level, to ensure long term sustainable change is adopted.

Through this project Greenpeace will demand that private companies, governments, donors and philanthropies shift their investments in agriculture and their policy support away from industrial agriculture and towards ecological farming. This means, for example, that governments stop allowing and subsidising the widespread use of potentially harmful chemicals on our farms.

## Campaign Objective

Our research so far has shown us that ecological agriculture is not intensively adopted as a farming practice in Kenya. The current administration is promoting industrial agriculture as a knee jerk solution to food security and climate change. So far Greenpeace Africa (GPAF) research demonstrates the sustainability and viability of ecological farming.

Most of the farmers the campaign has engaged with have been found to carry out ecological farming practices unknowingly. It is also apparent that these farmers largely understand that the climate is changing, but are not sure how to tackle it. This presents an opportunity to cement ecological agriculture as a sustainable method of farming. This will be done through alliance building leveraging the structure of farmer's networks to support up scaling of the practice and policy dialogues.

Therefore, by working amongst local communities and organisations in Machakos, Kitui, Makueni and Nairobi counties, the campaign will expose the negative impacts of an industrial agricultural model, whilst presenting ecological farming as a sustainable alternative solution.

## Theory of Change

The campaign effort is geared towards influencing a mindset shift among Farmers, Urban Consumers and Policy makers. Working with local communities and organizations to expose the negative impacts of industrial agriculture. For this reason, the campaign will challenge the broken food system and present ecological farming as a sustainable solution to this problem. In doing so, the campaign endeavors to place power back in the hands of farmers and consumers and foster climate change resilience.

To achieve this specific goal project work streams will be geared towards influencing a mindset shift among farmers through alliance building by way of capacity building (Ecological Farmers Workshop Training of Trainers) on ecological farming, Urban Consumers sensitization and engagement to ensure awareness and uptake of ecologically farmed produce, and Policymakers through lobbying for pro ecological agriculture policy and related County level budget allocation.



# HOW TO GUIDE 1

## Ecological Farming - definition, principles and benefits

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### Learning Objectives of this guide

- To provide the guiding principles to ecological farming
- To explain the benefits of ecological farming

### Learning outcomes

This how to guide on ecological farming will enable you to

- Understand what ecological farming is about
- Explain the value of ecological farming
- Understand the benefits of ecological farming

## What is Ecological farming?

Ecological farming ensures healthy farming and healthy food for today and tomorrow, by protecting soil, water and climate. It promotes biodiversity and does not contaminate the environment with chemical inputs or genetically engineered plant varieties. Ecological farming encompasses a wide range of crop and livestock management systems that seek to: (1) Increase yields and incomes (2) Maximize the sustainable use of local natural resources and (3) Minimize the need for external inputs.

## Why take up ecological farming?

Our problem today is not one of producing more food, but producing food where it is most needed and, in a way, that respects nature. The current industrial agriculture system fails to deliver this.

Meanwhile, the planet is suffering considerably. We are over-exploiting resources and reducing soil fertility, biodiversity, and water quality. Toxic substances are accumulating in our surroundings. Levels of waste are growing. And all this is occurring in the context of climate change and increased pressure on the Earth's diminishing resources.

Our current agricultural system depends on the use of vast amounts of chemicals, as well as fossil fuels.

It is controlled by a few large corporations, which congregate in a few parts of the world, mainly in rich, industrialized countries. It relies heavily on a few key crops, undermining the basis for the sustainable food and ecological systems upon which human life depends.

This agriculture system pollutes and toxifies water, soil, and air. It contributes massively to climate change and harms biodiversity and the wellbeing of farmers and consumers.

## Benefits of ecological farming

- It increases yields significantly, often comparable to or greater than chemical-intensive agriculture.
- It entails lower production costs for farmers as well as increased yields, and thus increased profits.
- Ecological farming improves soil and water management by having a minimum negative impact on the environment and avoiding contamination of soil and water resources.
- It can also enhance the resilience of vulnerable communities in the face of climate shocks. Practises such as crop rotation, inter-cropping and polyculture (multiple cropping) increase the availability of food throughout the year, increase diversity in food production and tend to use seeds and breeds with higher tolerance to climate extremes, pests and diseases.
- Farmers' and society's health can be improved by ecological farming because it often promotes a more diversified diet by producing many different food items, by using fewer pesticides, and by improving the availability of clean water.

[Click here to find out more about the principles of ecological Farming](#)



# HOW TO GUIDE 2

## Ensuring Healthy Soil for High Yields

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### Learning objectives of this guide

- To provide an understanding of the soil
- To explain the essential nutrients needed to keep soil fertile and plants healthy.
- To understand what soil degradation is
- To understand practices that reduce soil fertility.
- To provide information on the techniques employed in improving soil fertility

### Learning Outcomes

This how to guide on soil fertility and plant nutrition will enable you to

- Understand the process of naturally increasing soil fertility
- Understand the essential nutrients needed in keeping your soil fertile.
- Understand the negative practices that reduce soil fertility

# INTRODUCTION

## Soil and Fertility

- Soil by definition is a natural body consisting of layers (soil horizons) that are composed of weathered mineral materials, organic material, air and water.
- Soil fertility is the capacity of the soil to support the growth of plants on a sustained basis, yielding quantities of expected products that are close to the known potential.

### What you need to know about essential plant and soil nutrients

There are about seventeen elements have been found to be essential for plant growth. The types and quantities of nutrients must be correctly balanced and applied in order that the crop is vigorous and healthy. Different crops require different types and amounts of nutrients. Major or macro-elements are needed in large quantities, while trace or minor or micro-elements are required in small quantities. The elements must be present in forms usable by plants and in concentrations that are optimal for plant growth. However, some of the nutrients, when present in excess amounts are toxic to the plant, for example Manganese, Aluminum and Sulphur.

The elements as listed below, are categorized into macro- and micro- (trace) elements.

Macro-elements	Source
Carbon (C), Hydrogen (H <sub>2</sub> ), Oxygen (O)	Derived from air and water
Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca)	Derived from soil solids, and some from air
Magnesium (Mg), Sulphur (S) Micro Trace elements	Derived from soil solids
Iron (Fe), Molybdenum (Mo), Copper (Cu), Zinc (Zn), Manganese (Mn), Cobalt (Co), Boron (Bo), Chlorine (Cl)	Derived from soil solids

[Click here for more information on essential plant and soil nutrients](#)

### What you should know about Soil degradation?

It is a change in the soil health status resulting in a reduced capacity of the ecosystem to provide goods and services for its beneficiaries.

#### Causes of soil degradation

Depletion of nutrients and soil organic matter and erosion are the principal forms of soil degradation. Overgrazing and cultivation practices that are not adapted to local environments are the principal causes of soil degradation. Overgrazing is often the result of the loss of pastures to agriculture. Producing crops without compensating the nutrient losses by removing plants also leads to soil degradation.

The most prominent degradation feature worldwide is erosion by water. Various forms of chemical deterioration, such as soil fertility decline and soil pollution, and physical deterioration, such as compaction and water logging, account for smaller areas.



There are various types of soil degradation such as soil erosion, water erosion, wind erosion, soil pollution, acidification, loss of nutrients and compaction. All these types of degradation lead to the reduction of soil fertility and land productivity.

[Click here for key information on the types of soil degradation.](#)

## Techniques employed in improving soil fertility

### 1. Composting

It is the process of breaking down organic materials of plant and animal origin to produce humus. The requirements for composting are the presence of soil micro-organisms and organic material such as animal manure, crop remains, municipal garbage, kitchen waste, hedge trimmings and non-seeding weeds. Additional requirements include moisture to hasten decomposition, temperature control to optimize microorganism activity, and aeration to provide adequate oxygen for the decomposition process and labour.

[Learn how to prepare compost from crop remains and non-seeding weeds.](#)

### 2. How to prepare Boma compost from fresh livestock droppings

1. Dig a pit 0.5 m deep behind the boma, putting the excavated soil beside the pit. The pit should be 1.5 m wide and any length, depending on the amount of material available. Loosen the soil at the bottom of the pit and place a layer of dry crop residues like maize stover or grass at the bottom.
2. Then place a layer of about 10 cm of fresh manure and bedding obtained from the boma.
3. Cover this with a thin layer of topsoil (1ñ2 cm).

4. Now add a 10-cm layer of manure and again cover with a thin layer of topsoil. Repeat the process until the compost heap is 1.5 m high.

[Learn the complete step by step guide to making boma compost from fresh livestock droppings.](#)

### 3. Liquid manure

Liquid manures are useful for top-dressing. It can be made from plants or animal droppings. Extra nitrogen for top-dressing can be made locally from a specially prepared liquid fertilizer termed plant tea. This can be made from plants such as Tithonian diversifolia (Mexican sunflower)

[Learn how to make plant-tea solution and liquid manure from animal droppings.](#)

### 4. Mulching

Mulching is the covering of the soil with crop residues, dry grass and leaves. Once rotten and decomposed, mulch forms humus and adds to the organic matter in the soil. Mulching is important for the prevention of soil erosion, addition of organic matter to the soil, regulating the soil temperature, increasing soil micro-organism and biological activity, weed suppression, increasing water retention, and decreasing evaporation from the soil surface. It is important to ensure that sufficient mulch is maintained as soil cover to reduce evaporation of soil moisture and to discourage the growth of weeds.

[Learn how to mulch your land](#)

### 5. Green manures

Green manures are plants that are deliberately grown for the purpose of incorporation into the soil to improve soil fertility and organic matter content. Legumes are the most commonly grown green manures, but other plants that are not legumes, such as Tithonian, may also be used. Most green manure crops also play a role in covering the ground and protecting it from solar radiation and soil erosion. Crops which serve these functions are often referred to as green manure cover crops.

Benefits of using green manures include:

- *Nitrogen supplied by legumes*
- *Improved soil tilth and water infiltration*
- *Reduction in diseases and nematodes*
- *Weed control*
- *May trap nitrates and prevent leaching • Control of erosion*
- *Source of feed for livestock*
- *An ideal green manure crop is one that meets most of the following criteria:*
- *It is fast growing (accumulates much biomass within a short period)*
- *It fixes nitrogen from the air*
- *It is deep rooting and thus improves soil structure and recycling of nutrients*
- *It covers the soil quickly, thus controlling erosion and suppressing weeds*

[Click here for more information on green manure](#)

### 6. Use of organic fertilisers

Organic fertilisers are materials derived from plant and animal parts/droppings or residues which are applied to fertilize the soil. These include Farmyard manure, weed residue, tree pruning, compost, green manure and crop residue, amongst others.

Also grazing livestock play an important role in nutrient flow to cropland. Plants contain

three substances that define their quality as organic fertilizer: Nitrogen, Phenols and Lignin.

[Click here for more information on organic fertilizers](#)

## 7. Intercropping

Intercropping involves growing two or more crops in the same field at the same time, with at least one of the crops providing quick ground cover. Intercropping can help improve soil fertility when legumes are used. Intercropping also allows for intensive land use where landholdings are small.

[Click here to learn more on how to intercrop on your farm](#)

## 8. Crop rotations

It is the growing of different crops in a predetermined cycle on the same piece of land. During their growth, different crops need different minerals, have different root depths and attract different diseases and pests. The crops used usually include row crops, small grains, legumes and grasses. Legumes enhance plant nutrient levels, while grasses improve soil structure. Rotation of crops prevents pest build up and ensures balanced crop nutrient uptake according to the different plant's nutritive requirements and rooting depths.

[Click here to learn more on carrying out crop rotation on your farm](#)



### References

- <http://www.fao.org/soils-portal/about/all-definitions/en/>
- Gachene, C.K.K. and Kimaru, G. (2003). Soil Fertility and Land Productivity - A guide for extension workers in the eastern Africa region. Technical Handbook No.30. Regional Land Management Unit (RELMA) / Swedish International Development Cooperation Agency (Sida).
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# HOW TO GUIDE 3

## Managing Weeds, Pest, & Diseases

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### Learning objectives of this guide

- To differentiate between harmful pests and beneficial organisms on the farm.
- To understand the common pests and diseases in Kenya.
- To understand the different ways of controlling pests and diseases naturally.
- To explain the process of monitoring pest, and diseases

### Learning Outcomes

This how to guide on pests, diseases and weed management will enable you to

- Understand the kind of pest that cause damage to the crops
- Understand the kind of diseases that cause damage to the crops
- Understand the various environmentally friendly ways to manage pests, weeds and diseases
- Understand the process of monitoring pest and diseases.



## Every Farm has Harmful and Beneficial Organisms

Some of these organisms are beneficial to the soil such as the earthworm and harmful to the plants such as aphids.

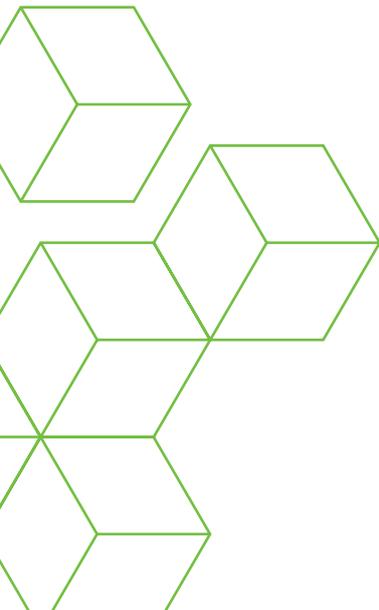
### A. Beneficial organisms

These include the productive bugs that feed on harmful pests while at the same time helping in the relevant processes of crop growth for instance bees which help in the pollination process.

### Ways of Attracting Beneficial Organisms

For these organisms to survive and thrive they need a supportive environment that can be brought about by the following practices:

- Avoiding the use of chemical based pesticides towards pest control because it end up killing all the organisms in the farm
- Planting of pollen and nectar producing plants in the farm to attract bees
- Planting perennials or permanent plants around your farm to attract praying mantis.



## B. Harmful Pests

### Types of Pests and Diseases

#### Trans-boundary Pests and Diseases

These can easily spread to several countries and reach epidemic proportions, causing huge losses to crop; outbreaks and upsurges which eventually threatens livelihoods of vulnerable farmers and the food and nutrition security of millions at the same time.

#### How do transboundary pests spread?

- Trade or other human-migrated movement
- Environmental forces like weather and windborne
- Insects among other vector-borne pathogens

[Click here to learn more on transboundary pests and diseases. \(External Link\)](#)

#### Storage Pests

These range from rodents, beetles, moths and fungi. They are further categorized into primary and secondary pests.

**Primary Pests:** these have the ability to feed on whole and healthy grains. They include grain borers, weevils and Angoumois grain moths.

**Secondary Pests:** these are only limited to broken, moist and soft grains; which are the remnant of the grain damaged by primary pests. They include; flour beetles.

#### Common pests and diseases in Kenya

##### African Armyworm

This is a migratory moth whose larvae (caterpillars) are crucial pests of pasture and cereal crops. Outbreaks follow the onset of wet seasons which come with new growth on dry grassland and planting of cereal crops.

**Host plants:** barley, pearl millet, African millet, maize, oat, rice, sorghum, sugarcane, teff, wheat, and pasture grasses.

[Read more on the African armyworm](#)

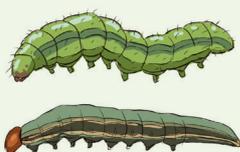


## How To Control The African Armyworm Using Neem

Neem seeds and leaf extracts are used to kill armyworms although in practicable small holdings.

[Learn how to prepare the neem solution to control the fall army worm](#)

### 1. African Bollworm



This damage a wide variety of food, fiber, oilseed, fodder and horticultural crops. It is characterized with an ability to feed on many plant species.

**Host plants:** French beans, dry beans, peas, legumes, maize, sorghum, sunflower, tobacco and tomato.

[Click here to read more on the African Bollworm](#)

### 2. Leaf Mining Flies

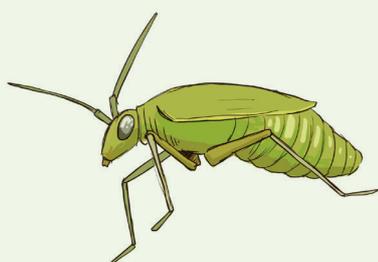


These pose a serious threat to vegetables and ornamental plants. They are grouped into, serpentine leaf miner, vegetable leaf miner, cabbage leaf miner and the pea leaf miner.

**Host plants:** Amaranth, Beans, Cabbage/Kale, Brassicas, Okra, Onion, Passion fruit, Peas, Peppers, Tomato

[Click here to read more on leaf mining flies](#)

### 3. Aphids

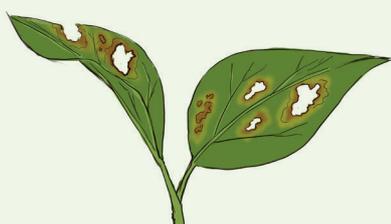


These pests are known to cause damage all across the African continent. The major species include banana aphid, black bean aphid, cabbage aphid, false cabbage aphid, citrus aphid, green peach aphid, cotton aphid, mango aphid, pea aphid, sorghum aphid and the maize aphid among many more.

**Host plants:** African Nightshade, Amaranth, Bananas, Beans, Cabbage/Kale, Brassicas, Citrus plants, Cocoa, Cotton, Cowpea, Cucumber, Eggplant, Green gram, Groundnut, Maize, Mango, Okra, Papaya, Passion fruit, Peas, Peppers, Pigeon pea, Potato, Pumpkin, Sesame, Soybean, Sorghum, Spider plant, Spinach, Sweet potato, Tea, Tomato, Watermelon, Wheat, Zucchini/ Courgette

[Click here to read more on Aphids](#)

### 4. Anthracnose



It is a disease of the foliage, stems, or fruits that typically appear as dark-coloured spots or sunken lesions with a slightly raised rim. Some cause twig or branch dieback.

**Host Plants:** Avocados, Bananas, Beans, Cashew, Cassava, Citrus plants, Cotton, Cowpea, Cucumber, Eggplant, Green gram, Mango, Onion, Peas, Peppers, Pumpkin, Sorghum, Soybean, Spinach, Sugarcane, Tomato, Watermelon, Wheat, Yam, Zucchini/ Courgette

[Click here to read more on anthracnose](#)

## Monitoring of pests and diseases

It is essential for farmers to monitor pests and diseases on their farms to minimise the impacts of these pests by arresting them early.

This can be done through:

- Regular scouting of the crops in the early morning and late evenings when the pests are perceived to be feeding.
- Farmers should look out for eggs and small caterpillars for the sake of early detection.

### Want to know more common pests and diseases in Kenya?

[For more information on pests and diseases in Kenya click here \(External Link\)](#)

## THE NATURAL APPROACH TO PEST AND DISEASE CONTROL

### 1. Hot water treatment

It involves the use of hot water to treat certain pests and diseases

This is mainly used against the following diseases, bacterial blight, bacterial spot, black scurf, common blight and black leg. It is also used to control the following pests Fruit flies (on mango fruits) / Banana weevil/ Mealybugs (cassava and pineapple) / Nematodes (banana suckers and pineapples)



[Click here for procedures on using hot water treatment to control pests](#)

### 2. Plant Extracts

These involves the use of various plant extracts such as Neem, Garlic and Pyrethrum obtained directly from their respective plants to control pests and diseases.

#### a. Garlic extract:

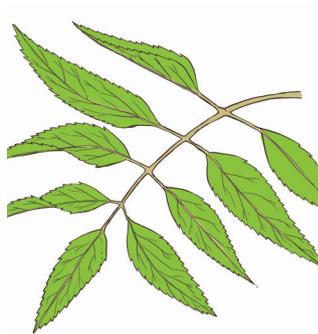
Garlic has an antifeedant, bacterial, fungicidal, insecticidal nematocidal and repellent properties. It can be used on the following pests and diseases; African bollworm, downy mildew, fruit rots, rusts, blights, African armyworm, onion thrips, root knot nematodes, anthracnose, rice bugs.

Garlic has a non-selective broad-spectrum effect that can kill beneficial organisms too, one has to be extremely cautious when using it in pest control. For instance, it is not advisable for use in Aphid control since it kills the natural enemies of aphids.



[Click here for more information on the standard procedures for its preparation](#)

**b. Neem extract**

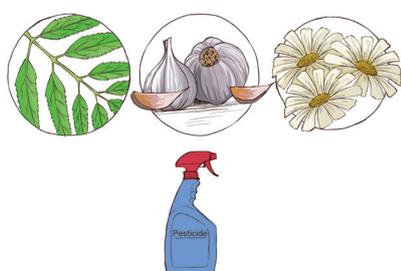


Neem extract doubles up as an insecticide, fungicide, nematocide, acaricide and as a molluscicide. It can be used against the following pests: African armyworm, African bollworm, Aphids, Banana weevil, Cabbage looper, Cabbage moth, Cabbage webworm, Coconut mite, Cutworms, Diamondback moth, Giant looper

Unlike garlic extract, the neem does not harm the beneficial organisms, hence highly recommended for effective pest control.

[Click here for the standard procedure on the preparation of the various concentrates of neem extract](#)

**1. Bio fumigation**

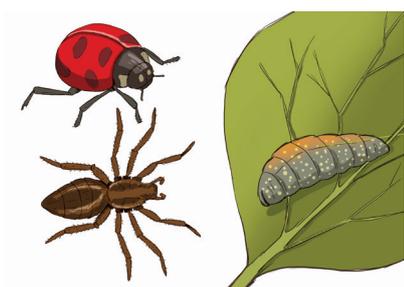


This method makes use of fresh plant mass and manure which is introduced into the soil to release chemical substances which are able to combat soil borne pests and diseases and produce a heating effect that enhances biological activities in the soil. This method of pest control can be used against Root-knot nematodes and bacterial wilt.

The beneficial plants that provide the right concentrate include; cabbage, cauliflower and radish.

[Click here to learn more on how to carry out bio-fumigation](#)

**2. Use of Natural Enemies**



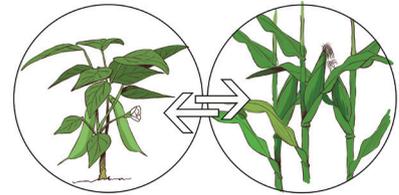
Various beneficial organisms can help the farmer to keep pests and diseases, hence minimizing the economic damage. predator organisms are known to keep the population of their prey in check. The predators and parasitoids are some of the groups of the beneficial organisms. farmers are advised to keep the balance in their favour by observing the populations of beneficial organisms like ladybirds, spiders and hoverfly larvae which feed on plant eating pests like aphids and caterpillars.

- [Click here for more on the beneficial organisms](#) .
- [Click here to learning more about natural pest control methods](#)

### 3. Cultural Methods of Pest Control

This approach recognizes pests not as enemies but as indicators of problems in the design and management of systems. Potential pests are hence prevented from becoming problems by means of the integration of cultural and biological controls.

It makes the environment less attractive to pests and less favorable for their survival, dispersal, growth and reproduction. It requires accurate knowledge of crop and pest biology.



### 4. Crop rotation

Each kind of plant attracts its own particular pests and diseases, and therefore crop rotation allows for the break on particular persistent pests with a change of crop. It is therefore important for farmers to evaluate the possible rotations in the agro-ecological zone to maximize on the yields and pest control. This practice help reduce pest risks associated with monoculture through interrupting the pest attack chain between subsequent crops.

[Click here for key information on crop rotation](#)

### 5. Intercropping and Push pull

It is a multiple cropping practice involving growing two or more crops in proximity. Intercropping of compatible plants also encourages biodiversity, by providing a habitat for a variety of beneficial insects and soil organisms that would not be present in a single crop environment. This biodiversity can in turn help to limit outbreaks of crop pests by increasing the diversity or abundance of natural enemies, such as spiders or parasitic wasps.

- **Push-Pull** is a simple cropping strategy, whereby farmers use Napier grass or Bracharia grass and desmodium legume (silverleaf or greenleaf desmodium) as intercrops in maize.

Desmodium is planted in between the rows of maize. It produces a smell or odour that stem borer moths do not like. The smell ‘pushes’ away the stem borer moths from the maize crop. On the other hand, Napier grass (*Pennisetum purpureum*)/ Bracharia grass (*Brachiaria cv Mulato* ) is planted around the maize crop as a trap plant.



[Click here for more information on intercropping and Push-pull](#)



## WEED MANAGEMENT

A weed is a plant that grows where it is not wanted. Weeds are known to reduce yields by competing with the plants for sunlight, moisture and soil nutrients hence need to control them through ecological practices:

Weed management should focus on the control of weed species to avoid both competition on crops and preventing further build of weed seed bank in the soil to eventually reduce it.

Control mechanisms include,

- Digging and pulling the weeds
- Shallow cultivation
- Slashing of the weeds
- Planting of ground cover crops like legumes to crowd out the weeds
- Burning of the weeds

[Click here to learn more on the harmful and beneficial weeds](#)

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# HOW TO GUIDE 4

## Water conservation

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### Learning objectives of this guide

- To understand how to increase the amount of water stored in the soil

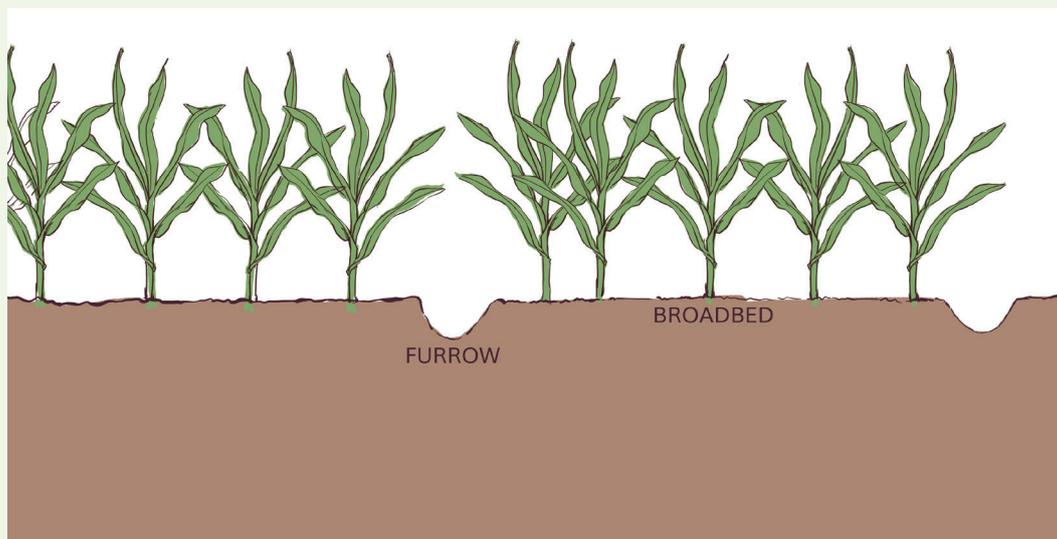
### Learning outcomes

- This how to guide on water conservation will enable you to understand how to conserve the limited water received on the farm
- This how to guide deals with methods to increase the amount of water stored in the soil profile by trapping or holding rain where it falls, or where there is some small movement as surface run-off.



The techniques described in this section all involve some re-shaping of the soil surface, and so require substantial inputs of energy. In many cases it is not practical to use only hand labour, and animal-drawn implements are necessary, or tractors. Some of the methods show promise of increased crop yields so a major feature of experimental trials is the search for cheap, simple, low energy methods and machines.

## Broad Bed and Furrow System (BBF)



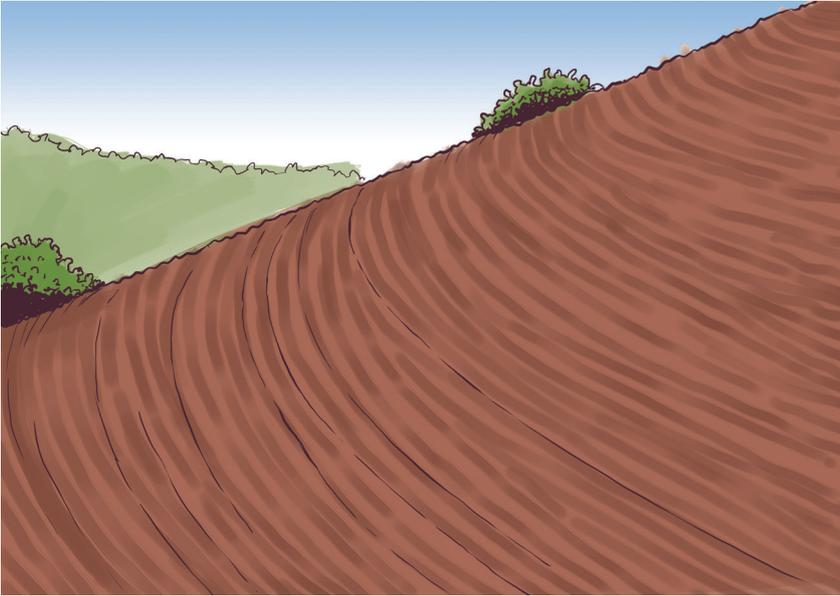
In a broad bed-and-furrow system, runoff water is diverted into field furrows (30 cm wide and 30 cm deep). The field furrows are blocked at the lower end. When one furrow is full, the water backs up into the head furrow and flows into the next field furrow. Between the field furrows are broad beds about 170 cm wide, where crops are grown.

- BBF is majorly used to control erosion and to conserve soil moisture in the soil during rainy days.
- This system is particularly suitable for the vertisols. (heavy black clay soils sometimes called cotton soils).
- The technique works best on deep black soils in areas with dependable rainfall averaging 750 mm or more.

[Click here to learn more on broad bed and furrow system](#)

[Click here for additional information on broad bed and furrow system](#)

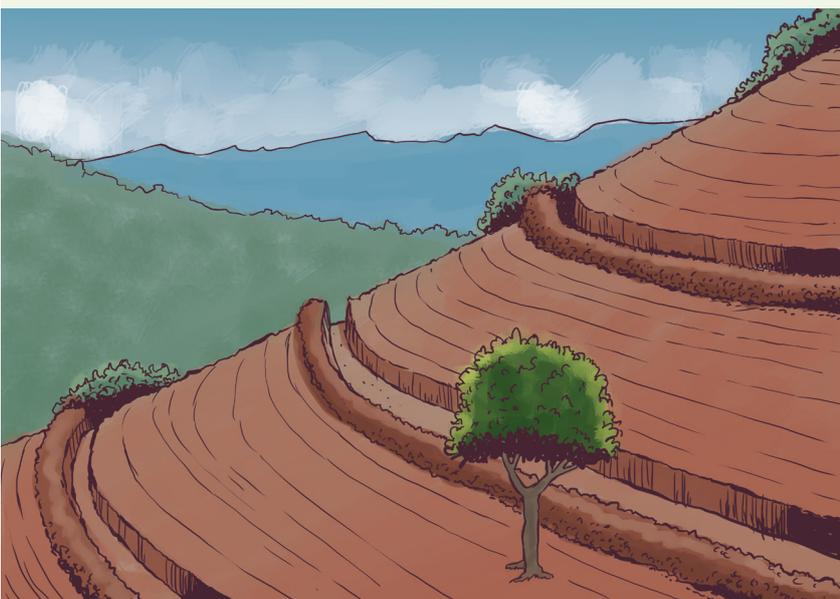
## Contour furrows (also known as contour bunds and desert strip farming)



These are key in controlling runoff velocity and intercepting the runoff flowing down the slope by an embankment. The embankment may be closed, or open, surplus arrangements are provided whenever necessary.

[Click here to learn the specifications of creating contour bunds](#)

## Contour Trenches



These are 2 by 1 by 1 m<sup>3</sup> and 5 to 10 feet vertical distance. trenches that are excavated in contours and excavated soil is used to form bunds in the down line. They are suitable where the slope of land is greater than 33.33%, which helps to reduce the velocity of water as well as soil erosion.

[Click here to learn how to make contour trenches](#)



## Zai pits

These are pits that are 20-30 cm in width, 10-20 cm deep and spaced 60-80 cm apart [dimensions of the pits can vary] dug during the dry season and filled with mulch such as crop residue or manures. These act as micro-water catchments, holding about four times the amount of water that normally runs off the land. Farmers create in the hardpan soil using hand tools or plows and animals.

[Click here for key information on zai pits](#)

### References

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# HOW TO GUIDE 5

## Seed sovereignty and saving

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### Learning objectives of this guide

- To describe what a seed is.
- To explain the different types of seeds
- To explain how to harvest seeds from mature crops
- To explain what seed sovereignty
- To describe the process of saving seed
- To explain the importance of seed sovereignty in relation to food security

### Learning outcomes

This how to guide on seed saving and storage will enable you to

- Understand the process of seed saving
- Understand seed sovereignty and its importance



## Introduction

Seeds are the first link in the food chain and the repository of life's future evolution. As such, it is our inherent duty and responsibility to protect them and to pass them on to future generations. The growing of seed and the free exchange of seeds among farmers has been the basis to maintaining biodiversity and our food security.

Today, the threat is greater. We are witnessing a seed emergency at a global level. The disappearance of our biodiversity and of our seed sovereignty is creating a major crisis for agriculture and food security around the world.

The current industrial food system based on monocultures, widespread use of agrochemicals, commercial/ patented seeds and genetically modified seeds is a major contributor of the disappearance of 75% of plant genetic diversity in the last century. Of the original 10,000 species, barely more than 150 species are now under cultivation and the great majority of mankind is now living off no more than 12 plant species.

[Click here to read more on seeds](#)



### What is a seed?

A seed is a mature ovule consisting of an embryonic plant together with a store of food, all surrounded by a protective coat. A seed may be any plant used for the purpose of further propagation or multiplication.

## What are the various types of seeds?

Seed is produced mostly by transfer of pollen (male parts) to female parts of the flower and is called - Pollination. It is carried out by wind, insect, birds, or other natural agents.

**Open-pollinated Varieties (OPV) seed** is one in which pollination is carried out from either the same (parent) plant.

### Self-pollinated Crops seed

Those plants that pollinate themselves by accepting pollen from within their own flower before it opens. The seed saved from both an open and self-pollinated variety can be used for planting in a few subsequent years on.

### Hybrid seeds

Hybrid seeds are produced through a controlled cross pollination of one specific variety of a class of plant with the pollen of another genetically different variety of that class.

### Genetically Modified Organisms (GM or GMO) seeds

Genetic modification is the transfer of specific genes into the plant in a laboratory. The genes introduced in the plants include the capability and characteristics of the species of plants, bacteria or animals that have been transferred from external sources.

## What is seed sovereignty?

It is the farmer's rights to save, breed and exchange seeds, to have access to diverse open source seeds which can be saved –and which are not patented, genetically modified, owned or controlled by emerging seed giants.

### Importance of seed sovereignty

1. It is the basis to maintaining biodiversity as well as food security.
2. High-quality open source seeds can be easily produced and at a low cost, thus, reducing the costs of purchasing seeds.
3. Allows farmers produce their own seeds (seed self-reliance)
4. It allows for the free exchange of and sell of seeds among farmers.
5. Enables farmers to select seeds suited to their environment. If one wants fruits that are big and are not attacked by pests in the garden, they can choose seeds of the plants that are grown in their garden with these specific traits.
6. It enables the preservation of valuable traditional or indigenous seed varieties of vegetables for future generations.

**Seed saving** refers to the practice of saving various types of reproductive material and seeds from plants such as flowers, herbs, grains, vegetables, and tubers for future use. Seed saving was the traditional way that gardens and farms were maintained centuries ago. While commercial farmers rarely practice seed saving nowadays, it is still a common practice among home gardeners, especially for economic reasons.

In order to cultivate certain types of crops, farmers need to have access to these seeds. This makes seeds the most valuable input for farming. They are not only needed for farming,



but also serve as food, for example wheat, maize and rice and can be sold to generate income and contribute to improving people's livelihoods. Acquiring seeds through the formal seed sector may be too costly for farmers, there may not be varieties available that are adapted to specific local conditions, or the supply of seeds may be erratic, meaning seeds are not available at specific times.

Farmers that save seeds, can access them to grow crops during the next planting season or use them as an emergency seed supply when their crops are damaged and destroyed, for example, due to flooding. In this way, farmers do not need to buy seeds from external buyers, and it helps them to diversify by cultivating several crop varieties that are highly adapted to the environmental conditions of their region, which builds up their resilience.

### **Seed harvesting, threshing, cleaning, drying and storage**

Proper post-harvest processing is critical to maximize yield, longevity, vigor, and overall quality of the seed crop. At maturity, seed must be harvested, threshed, cleaned and fully dried before storage. Each of these steps require proper timing, skills and in some cases, equipment. Investing in the long growing season of a seed crop only to lose it with improper harvest and post-harvest handling, is an incredibly frustrating experience.

### **Seed processing**

#### **A. Threshing**

Is the process of removing seeds from the plant and breaking up remaining plant materials (e.g. stems and leaves) into what is called chaff. The dry seed heads attached to the plants are rubbed or crushed to release the seed and break down the plant material. This step facilitates the subsequent separation of the seeds from the plant materials in the seed cleaning process. Threshing may be done by hand or

machine, depending on the scale and type of seed to be processed.

- B. **Cleaning:** All foreign material should be removed by sieving, winnowing and other methods.
- C. **Drying:** Seed received from the farmer's field is dried to the required moisture content
- D. **Seed Treatment:** Seed must be treated to protect it during the storage process and also in the initial stages after planting. Bagging or packaging- the seed should be packaged in bags and labelled, with the necessary information.

### **Seed packaging, bulking and storage**

Seed is a living matter and if not handled and stored properly it can die. Reasons for seed deterioration.

- High temperature in the seed store
- High humidity in the storage area.
- Handling & storage of seed
- High moisture content of the seed itself.
- Storage in improper packaging that cannot
- Prevent moisture from entering the package.
- Storage of uncleaned and untreated seed.
- Presence of pests and diseases.
- Extreme temperature (too hot or too cold) can lead to serious seed damage.
- High humidity in the store can lead to serious seed damage through mold formation.
- High humidity also encourages the growth of insects and pests in the store.

### **Measures to avoid seed deterioration during packaging and storage.**

- Seed bags should not be thrown carelessly.
- Seed bags should be stored in dry, well ventilated stores.
- Always use slatted wooden pallets or PVC sheets spread on floor.
- Recommended moisture content for seed storage is 12%.
- Avoid storage of seeds together with chemicals, especially those that emit vapors.
- Avoid the sale of seed from open bags or containers.
- Avoid light exposure to sunlight as this will shorten the life of seeds. Use dark-colour jars or non-transparent containers to protect seed from sunlight. If using clear jars, place them in paper bags to shield out sunlight.
- Newly harvested seeds should not be immediately stored in a plastic bag because the moisture content of the seed is still high and will lead to deterioration.

## E. Storage

Indigenous knowledge is eco friendly and safe both to man and his environment. It is estimated to 60-70% of food grain produced in Kenya is stored at home level in indigenous structures ranging from Granaries, gunny bags and modern bins. Proper storage of seed is necessary to protect from spoilage, increasing storage quality, germination and viability of the seeds. Traditional technical skills teach us how to best utilization of natural sources for protects storage life of seed. The purpose of seed storage is to maintain the seed in good physical and physiological condition from the time they are harvested until the time they are planted.

### General; principles in seed storage

- Seed storage conditions should be dry and cool
- Effective storage pest control
- Proper sanitation in seed stores
- Before seed storage, they should be dried to safe moisture limits, appropriate for storage systems
- Store high quality seed and well cleaned, treated as well as of high germination vigour and good pre-storage period.
- Seed longevity is improved by storing seeds in low temperature and low moisture content.

### Seed Storage types of Sealed containers

- Aluminum or plastic cans
- Aluminum pouches
- Plastic bottles
- Waxed boxes
- Laminated paper bags

**Open storage:** This does not have temperature or relative humidity control. **This** needs basic protection for water, contaminating agents and rodents.

**Conditioned storage:** This is more commercial, with conditioned temperature and humidity control. Used for high value seeds.

[You can get indigenous seeds from Seed savers network](#) Contact +254 712 451 777

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# HOW TO GUIDE 6

## Organic Certification

### Learning objectives of this guide

- To define organic certification
- To explain the process of organic certification
- To describe the standards of organic certification and identify various certification bodies in Kenya.
- To foster implementation of organic certification in Kenya.

### Learning Outcomes

This how to guide on Organic Certification will enable you to

- Understand the process of certification among smallholder farmers in Kenya
- Understand the standards and requirements to be met for certification
- Understand the benefits and challenges of organic certification in Kenya
- Understand how organic certification can be implemented in Kenya



## Organic certification

Organic certification is a procedure by which an independent party gives a written assurance that production and processing methods employed conform to organic standards. It is a “process certification” as opposed to “product certification”, that is, it looks at the entire production process and not just the end product. Organic certification for domestic markets offers a ‘quality assurance’ that gives the consumer the security of knowing that food has been produced according to strict organic production standards. There are several international certification bodies that are involved in Kenya, namely: Soil Association (UK), Ceres (USA), EcoCert, (France), IMO (Germany), Kilimo Hai Organic Certification Mark (KOAN) and Bio Suisse (Switzerland). The East African region organic markets conform to the standards of East Africa Organic Standard. For the national market, producers and processors of organic products use certification bodies namely EnCert and Kenya Organic Agricultural Network (KOAN).

EnCert was established in 2005. It uses locally trained inspectors as opposed to external certifiers, thereby minimizing costs of certification in Kenya. KOAN provides Certification support including precertification advisory, development and Implementation of Internal Control Systems (ICS) and participatory guarantee system (PGS) for organic, fair trade and Good Agricultural Practices. It also coordinates organic certification and inspection process and standards acceptable at both national and international levels. Other certification bodies for local production include Kenya Bureau Standards Guidelines for organic production and Processing and Labelling of Agricultural Product.

African countries lack sufficient established and widespread organic markets for organic produce and the majority of certified organic production is for export.

## IMPORTANCE OF CERTIFICATION

- To protect scrupulous producers and processors
- To build trust and avoid consumer confusion
- To facilitate trade via conformity assessment
- It is a legal requirement for exporters of organic products. Exporters of organic products should be certified and conform to organic standards.
- Ensures that the end products can be traced back to the farmers/ producer along the distribution chain in a food system.

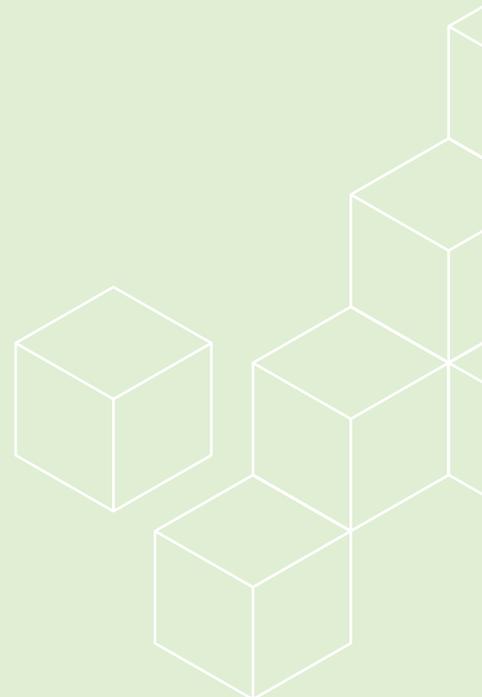
### Organic standards

Organic standards are set of requirements that describe what practices can be considered organic. The aim of the standards is to protect consumers and producers against misinterpretation and fraud in the food market. Certified organic products and producers are labelled with the certification body mark thus providing authentication and price justification of the products.

Additionally, organic standards ensure that all stages of a food system-production, processing, storage, transport and marketing- are subjected to inspection and conform to the set organic standards.

### Organic standards are based on:

- **The principle of Health-** organic agriculture aims at enhancing the health of the ecosystem holistically, including the health of soils, plants, animals and humans.
- **The principle of Ecology-** states that organic farming should be based on ecological processes and should fit the cycles and ecological balances in nature.
- **The principle of Fairness-** it should build on relationships that ensure fairness with regard to the common environment and life opportunities. Organic agriculture should be conducted in a manner that is fair to all those involved-farmers, workers, producers, processors, distributors, consumers and policy makers. It should provide everyone involved with a good quality of life thus contributing to food sovereignty and reduction of poverty.
- **The Principle of care-** states that organic agriculture is a living dynamic system that responds to internal and external demands as it aims at increasing productivity. However, production process should be sustainable enough so as not to compromise the ability of future generations to meet their own needs with the available resources.



# Certification process



## Application

The process starts by sending in application forms as described by the accredited body, together with the application fee. Once the documents are screened and verified, the producer fills an inspection form and an inspector is appointed for the inspection process.

## Inspection

This is an important and compulsory process before the awarding of an organic certificate. The inspector visits the production unit, taking into account the following aspects (but not limited to);

- **The surrounding of the farm.** This is inspected to ensure that the surrounding environment is free from contaminants.
- **The quality of soil and water-**should be not contaminated by heavy metals or harmful chemicals. The source of water should be fresh and reliable.
- **The awareness of organic standards and laws by the owner, manager and workers of the unit-** the labor force in the production unit should be savvy with organic requirements to maintain standards. Employees and workers should also be guaranteed human rights and fair working conditions according to the national and international conventions and laws.
- **The quality of seeds and seed treatment used-**should be organic and free from harmful chemicals.
- **Pest management-** Should apply biological and cultural means to prevent unacceptable losses from pests, diseases and weeds.
- **Fertilisers and pesticides used-** Chilean nitrate and all synthetic fertilisers, including urea, are prohibited. Soil and plant inputs should be from organic production, naturally derived substances or use of low solubility mineral fertilisers. An organic farmer should only use fertilisers and supplementary nutrients as supplements and not to replace methods of nutrient recycling. Production in a farm must be planned to minimize the need of brought-in nutrients.
- **Environmental management and conservation-** the owner must abide by legal and statutory requirements in respect of any aspect of the wider environment at all times.
- **Storage facility** – Storage facilities are inspected to ensure that food products are not contaminated and are free from harmful preservatives. Harvesting equipment should be clean and free from non-organic substances and contaminants.
- **Packaging, labelling and transportation** used is inspected to ensure that packaging material is well sealed to avoid contamination.
- **Genetic engineering-** organic products must be free of contamination by GMO products or their derivatives throughout the product system- production, processing, storage, transport and consumption.

[Click here for key information on inspection](#)

## Certification

After the inspection, a report is made and signed by the inspector and the owner of the unit to show its accuracy and sent to the certification body for review and certification. Follow-through inspections are done throughout the year to ensure organic standards are maintained. Inspections include surveillance office and operator visits. For export producers and processors, an international number and later an organic farming certificate is issued, which should be renewed annually.

For certification, a compliance form is drafted, based on the findings of the inspection report. The compliance form lists all the areas that do not conform to the organic standards and the owner is asked to state how they will correct them. If the information provided is deemed satisfactory, the certification body approves the compliance forms and issues a certificate of registration and schedule listings all the fields and enterprises that are licensed.

### Certification of small-scale individual and group farmers

Small-scale farmers can form local groups or Group Certification Schemes to reduce certification costs, making certification process more affordable, and encourage more farmers to have their products certified. The producers link together and be certified under one license- in the name of the group. To qualify for certification, the group has to be organized in such a way that there is adequate coordination and control mechanisms to ensure dissemination of information and procedure to all members. For individual applicants, application and licensing fees are based on the total acreage to be converted to organic farming while for groups, the fees are based on the number of the group members. Inspection fees, both for individual and groups, varies from operation, depending on the number of days taken (including travelling time). Applicants and licenses may provide suitable transport for the inspector, where other modes of transport are charged at a cost.

### Challenges to Organic certification

- Lack of certification for organic farming standards of some of the farmers involved in organic production
- Lack of enforcement of organic farming standards by the Ministry of Agriculture or other bodies.
- Lack of inspection of produce quality.
- Expensive certification cost (Ksh. 300,000 per visit per year)
- Limited awareness of group certification among small & medium farmers
- Small and medium-sized organic producers are not able to access international markets
- Inadequate understanding of how organic certification works: Organic certification is a 'production process certification' as opposed to a 'product certification'. Therefore, organic certification is a process and not an instant action
- Inadequate technical capacity to develop certifiable production operations • Increasing number of new regulations.

#### References

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# HOW TO GUIDE 7

## Converting from Industrial Agriculture to Ecological farming

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### Learning objectives of this guide

- To define industrial and ecological agriculture.
- To describe the step by step process of shifting from industrial agriculture to ecological farming
- To explain the challenges likely to be experienced during transition to ecological farming works and how to overcome them.

### Learning Outcomes

This how to guide on conversion from industrial agriculture to ecological farming will enable you to

- Understand the difference between industrial and ecological farming.
- Understand the process of shifting from industrial to ecological farming.



**By definition Industrial agriculture** is a modern form of capital-intensive farming in which the machinery and purchased are substituted for the labor of human beings and animals. It involves invention of new agricultural machines, adopting new farming methods, creation of new markets for consumption, ensuring patent protection to genetic information and using genetic technology. It's also known as industrial farming.

## Harmful effects of industrial agriculture

**Ecological Farming** it is a type of farming that combines modern science and innovation with respect for nature and biodiversity. It ensures healthy farming and healthy food. It protects the soil, the water and the climate. It does not contaminate the environment with chemical inputs or use genetically engineered crops.

## The step-by-step approach conversion from industrial agriculture to ecological agriculture.

For a farmer to fully convert from industrial to organic agriculture, it takes a minimum period of 3 years.

Year one starts when a farmer manages his farm in accordance with the organic regulations. This starts when a farmer abolishes the use of synthetic pesticides, fertilisers

and GMO or treated seeds. Stepwise reduction of agrochemicals cannot be considered part of the conversion period. An important step of the conversion period is the recognition of the farm as organic by a certification body.

In the third year or third harvest the conversion period is accomplished, and products certified as organic but even if the formal conversion period is accomplished, the adaptation of the farm is not finished. It usually takes several years to establish a well-balanced farm ecosystem and restore natural soil fertility. According to the basic regulations of IFOAM, the International Federation of Organic Agriculture Movements, the entire farm must be managed organically.

The procedure of conversion of a farm commonly consists of three steps.

1. Collection of information on appropriate organic farming practices.
2. Suitable organic practices should be tried out on selected plots or fields to get familiar with.
3. Organic procedures implemented in the entire farm.

### **Step 1: Getting good information and familiarization with organic practices.**

To successfully transit to organic farming, farmers need considerable knowledge on the functioning and management of natural processes. Farmers interested in adopting organic farming practices are recommended to get in contact with farmers who already practice organic farming within their localities to learn from them how to make compost, plant or manure tea. Learning from experienced farmers allows to get first-hand experience under local conditions, and thus to learn about the advantages and potential challenges related to implementing organic methods.

Farmers who are interested in converting their farms to organic agriculture, need to know:

1. How to improve soil fertility.
2. How to keep crops healthy.
3. How to best increase diversity in the farm.
4. How to keep livestock healthy.
5. How to give value to organic products and how to successfully sell them.

### **Step 2: Trying out organic practices on selected small plots.**

Farmers are recommended to implement organic practices on selected plots or selected animals only minimize risks of crop failure and losses of animals and avoid frustrating overload.

Some of low risk practices to be tried are:

1. **Mulching** - Covering the soil with dead plant material is an easy way to control weeds and protect the soil in annual crops.
2. **Intercropping** - Growing two annual crops together, commonly a leguminous crop like beans or a green manure crop in alternating rows with maize or another cereal crop or vegetable to diversify production and maximize benefits from given land.
3. **Composting** - Application of compost to the fields can have a major impact on crop growth and yields.
4. **Sustainable pest management** - Introduction of sustainable pest management requires good knowledge on the pathogen cycle and its interaction with the crop,

on influencing factors and potential natural enemies. Instead of using synthetic pesticides, farmers should try out recommended bio-control agents or natural remedies.

- 5. Appropriate seeds and planting material** - This practice may require use of healthy seeds, planting materials and some information on selection of seeds and planting materials including availability of improved varieties and seed treatments.
- 6. Animal feeds growing** - To improve the availability of livestock feed, farmers may grow grasses and leguminous fodder crops around, between other crops or in rotation.
- 7. Construction of Terraces, Zai pits and soil bunds** - Construction of terraces and soil bunds (Fanya Juu and Fanya chini) along the curves of hills is a key measure for soil conservation. This practice builds the foundation of further improvement to soil fertility on slopes. It is of high relevance but requires much labour and some specific knowledge for appropriate implementation.

### Step 3: Full conversion to organic farming

Finally, once sufficient experience with different practices has been gained, implementation of organic practices throughout the entire farm should be done, at this point a farmer can claim to be an organic farmer.

Consistent application of organic practices will lead to improving soil fertility, enhance self-regulation of pests and diseases, optimizing the balance between feed production and livestock.

Farming organically also means continuously learning from personal observation, from outside experiences, sharing experiences with other organic farmers and implementing new information on your farm, making it increasingly more sustainable.

[To read more on the conversion process please click here \(External Link\)](#)

### Criteria for crop selection during conversion:

Organic farmers should grow enough food for the family and for the market to get money for other family needs. The farmers should also grow crops that contribute to the improvement of soil fertility. Farmers who keep livestock need to grow pasture grass and legumes. The types of crop selected should be:

- 1. Crops with low risk of failure.**  
Cereals and legumes such as maize, sorghum, millet, beans and peas are especially suitable for conversion, since they cost little to produce, generally have moderate nutrient demands and are robust against pests and diseases. In addition, many of the traditional crops can be stored and sold in domestic markets. High-value short term crops, such as most vegetables, are more delicate to grow and highly susceptible to pest and disease attack. Therefore, they should not be grown on a larger scale, unless the farmer can endure some losses in harvest.
- 2. Crops that can be sold at the farm gate:**  
Crops that can directly have available market at the farm and roadside market or can be transported to nearby markets in urban centers. Choosing the right crop to sell on the market may require some market information. Decision making for

crops for local or export markets requires detailed information from traders or exporters on the crops, requested varieties, quantities, qualities and season.

[To read more on the types of crops to plant during conversion, please click here. \(External Link\)](#)

## CHALLENGES DURING CONVERSION

### Climate-related challenges.

Converting a farm to organic farming in an area with very little rainfall and high temperatures or strong winds will be more challenging than converting a farm located in an area with well distributed rainfall and favorable temperatures.

### Social and cultural challenges

Social and cultural aspects are relevant in conversion to organic farming. Farming is highly regarded as a social activity, whereby decisions regarding what, how and where to grow is taken by either the whole family or the community. So changes in farming, such as the introduction of organic farming practices, needs to be discussed with the family and the community. Key aspects to consider include the ideas of family members about conversion to organic farming, their aims and expectations. A farming family or community needs to sit together to agree on what they wish to achieve through conversion to organic farming. Points to take into consideration include income, availability of food for own consumption, the amount of firewood produced on the farm and the workload.

## 3. Economic challenges

Conversion to organic agriculture also requires time and investment in building knowledge and in setting up a marketing infrastructure. The decision to farm organically is in most cases a commitment for the future of farming: When a farmer decides to convert to organic farming, they aim to improve their income and livelihood. In a first period of the conversion process, however, some investments may be required such as purchasing of appropriate equipment for soil cultivation, for weed control or for compost production.

[Click here to learn more of the challenges arising from conversion to ecological farming.](#)

## How to avoid water contamination after conversion

- Organic farmers are required to protect the organic fields from being contaminated by conventional farming activities such as spray with synthetic pesticides from neighboring farms.
- **Planting of natural hedges on the boundary to neighboring fields** can avoid the risk of pesticide spray drift through wind or run-off water.
- **Organic farmers should divert the water away** or talk to the farmers upstream about how to work together to minimize the risk of contamination through runoff water.

## GMO CONTAMINATION RISK

**Use either personally selected seeds or get organic or untreated seeds** that were not genetically modified from neighboring farmers and are certain do not use GMO seeds and

are not surrounded by GM crops of conventional farmers (distance of at least 1 km). If you use seeds from a trader, make sure that he is registered and can confirm where the seed is derived from. Check that he is not involved in GM production and multiplication. Ask your trader for a certificate confirming GM free seeds and inquire about the trader's involvement in the GM-seed market.

1. **Check for the breeding habits of the specific crops you are interested in.** Most crossbreeding species such as maize can disperse by wind or bees to distances of up to 1 to 3 km.
2. **Create protective safety (buffer) zones** around your fields to reduce the risk of GMO pollen dispersal, if GM crops are cultivated in this region. Isolation distances between GM crops and organic fields should be established, about 2-3 times larger than those required for seed production for a given species.
3. **Avoid any physical GM contamination** by using sowing and harvesting machines, transporters, processing and storage facilities not used for GM crops. Do not store organic products next to GM products.
  - [Click here to read more on the ways of reducing contamination.](#)
  - [Interested on being trained on ecological agriculture click here Manor House](#)

#### References

1. <http://www.fao.org/3/ca4046en/ca4046en.pdf>
2. African Organic Agriculture Training Manual: A Resource Manual for Trainers by FIBL
3. Training manual for Organic Agriculture by FAO and TECA
4. <http://www.fao.org/teca/new-search-result/technology-detail/en/?uid=8364>
5. <https://www.greenpeace.org/international/publication/7009/ecological-farming-the-seven-principles-of-a-food-system-that-has-people-at-its-heart/>
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# HOW TO GUIDE 8

## Market development of organic products

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### Learning objectives of this guide

- To describe the process of developing organic markets
- To identify organic Markets available for farmers and consumers in Kenya.

### Learning Outcomes

This how to guide on marketing of ecologically farmed produce will enable you to

- Understand the process of developing a market for organic products

Marketing of organic products starts with labelling of certified organic products. Certified organic products are those which have been produced, stored, processed and handled in accordance with precise standards and certified as organic by a certification body.

## Market development for organic products

There are many steps involved in developing organic markets. They include:

1. **Building consumer awareness** of the benefits of Organic Agriculture
2. Developing mechanisms (e.g. labels) **enabling consumers to easily identify organic**
3. **Building consumer trust** in the organic label and the guarantee system associated with it
4. Conducting market surveillance and **fighting against fraud**.

[Click here for more information on market development for organic products](#)

## Where farmers can sell their products and places one can find organic food

- **Organic markets:** Kids Ventures Garden Estate, Organic Farmers Market next to Hillcrest and Karengata Farmers' Market both in Karen, US Embassy Organic Farmers Market, Community Sustainable Agriculture and Healthy Environment Programme (C-Shep) farmers market in Ongata Rongai.
- **Supermarkets:** Carrefour, Chandarana Foodplus and Tuskys have organic food sections. Groceries such as Kalimoni Greens in Karen, Zucchini at ABC Place, The Corner Shop at Diamond Plaza in Parklands and also sell organic products.
- **Organic food delivery services:** Sylvia Basket, Greenspoon, Kalimoni Greens and Mlango Farm do the deliveries to one's doorstep. For hotels, Bridges Organic Restaurant in the Central Business District serves over 80 percent organic food.

[To sell and buy organic produce click here](#)

### References

1. <https://www.ifoam.bio/en/market-development>
2. <https://www.koan.co.ke/where-to-get-your-organic-fix/>



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