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Technologies and practices for small agricultural producers

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Considerations for Conversion to Organic Agriculture

Summary

Conversion to organic agriculture describes the process of learning and implementation of changes on the farm towards a more sustainable and natural way of farming. The form the process takes depends on the local circumstances and the predisposition of the farmer or the community, and it varies from farm to farm. The more knowledge a farmer has about the concepts and practices of organic farming, the easier conversion process to organic farming will be. Even if organic farming does not depend on specific land conditions to start with, if soils are depleted for example, it may need greater efforts and require more patience to establish a sustainable production system and realize satisfying harvests. Here, you will find the factors to be considered during conversion to organic agriculture and some recommendations to succeed during the process.

Description

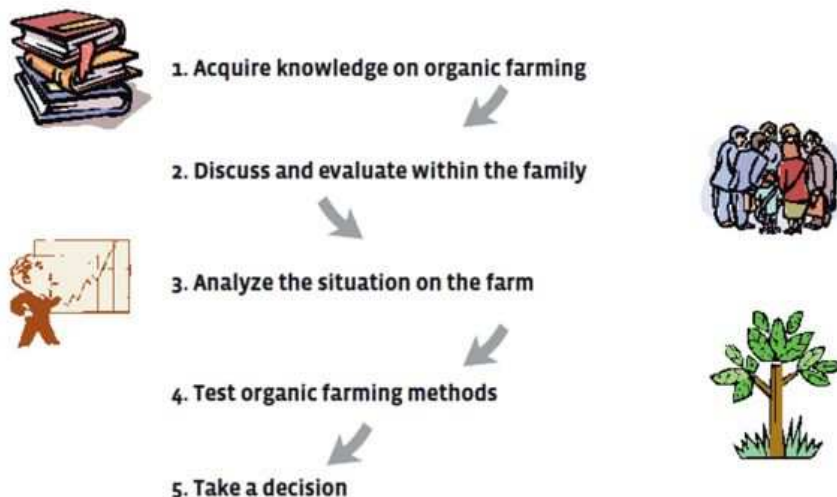
A. Analysis of the location

The conversion from a conventional to an organic system requires a transitory period, where the organic practices are applied progressively following an organized plan. During this period it is important to analyse carefully the actual situation of the farm and identify the actions to be taken (Florez, 2003).

The analysis of the farm must include:

1. Farm characteristics: size, plots and crops distribution, which kind of crops, trees, animals are integrated in the farm system.
2. Soil Analysis: an evaluation of the soil structure, nutrient levels, organic matter content, erosion level, and/or the soil have been contaminated.
3. Climate: rainfall distribution and quantity, temperatures, frost risks, humidity.
4. Organic matter sources and management (manures).
5. Presence of animal housing systems and/or machinery.
6. Limiting factors such as capital, labour, market access, among others.

This information will help you to have a clear picture of your farm and to take decisions.



Steps to get ready for the conversion to organic farming

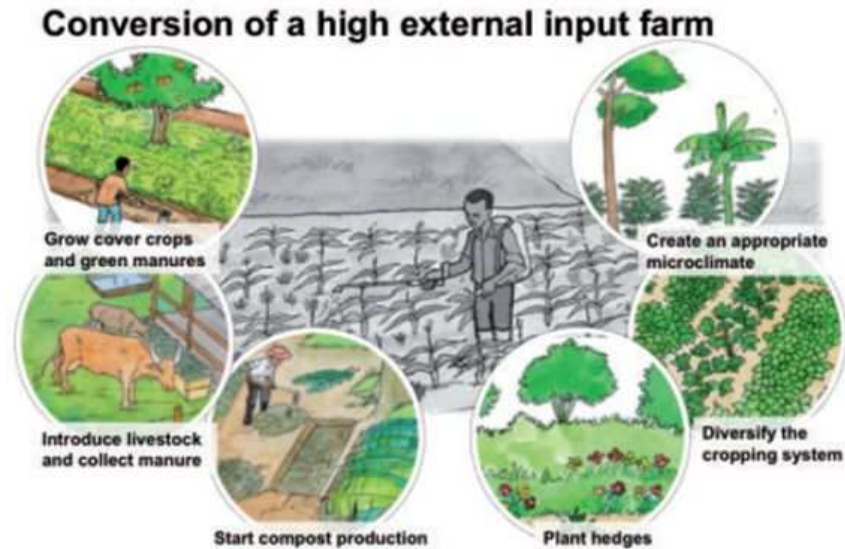
B. Farm-related challenges to conversion

Depending on the farm situation, different challenges are to be expected during conversion:

a) Farms with high external input use

The majority of intensively managed farms in Africa, Latin America and Asia that strongly rely on external inputs are larger farms. Such farms mostly grow a few annual or perennial cash crops relying heavily on the use of fertilizers for plant nutrition and pesticides and

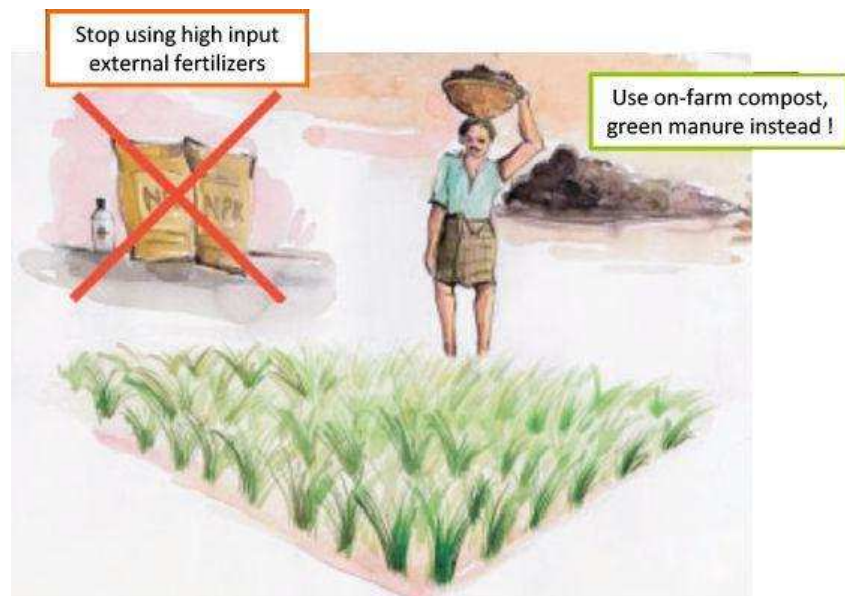
herbicides for pest, disease and weed control. On such farms crops are often grown without a planned rotation and farm animals are not integrated into the nutrient cycle. Diversification is usually low on these farms. Trees and bushes are mostly removed to facilitate extensive mechanization, and crops are mostly grown alone.



Conversion of a high external input farm

Potential challenges in conversion of such farms:

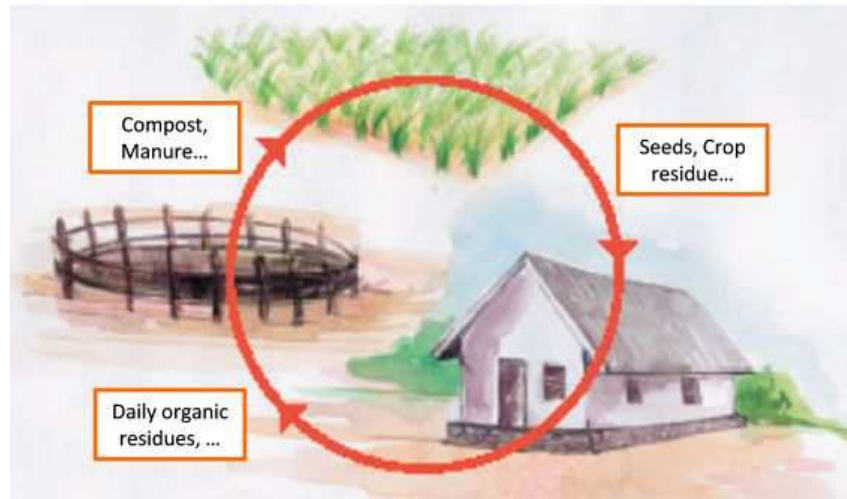
- Establishing a diverse and balanced farming system with a natural ability to regulate itself usually takes several years.
- Major efforts may be necessary to restore natural soil fertility by providing a considerable amount of organic matter to the soil.
- Abandoning high input external fertilizers results in yield depression in the first years of conversion, before soil fertility is re-established and yields rise again.
- New approaches and practices usually involve a lot of learning and intensive observation of crop development, and dynamics of pests, diseases and natural enemies.



Minimizing external input

However, the conversion process can be achieved, if the following practices are implemented:

- **Diversify the farming system:** Select appropriate annual crops for the area and rotate them in a planned sequence. Include legume crops such as beans or leguminous feed crops in the rotation to provide nitrogen to the subsequent crops. Plant hedges and flower strips to encourage natural enemies and to control pests.
- **Start recycling valuable farm by-products.** Establish on-farm compost production based on harvest residues and manure, if available, and mix the compost with the topsoil. This will bring stable organic matter into the soil and improve its structure and its capacity to feed the plants and store water. Green manures can provide plenty of plant material to feed soil organisms and build up soil fertility.
- **Introduce farm animals into the system.** Farm animals provide valuable manure and diversify farm income through additional animal products.
- **Grow cover crops.** Cover crops or lay out mulches in perennial crops provide protection to the soil.

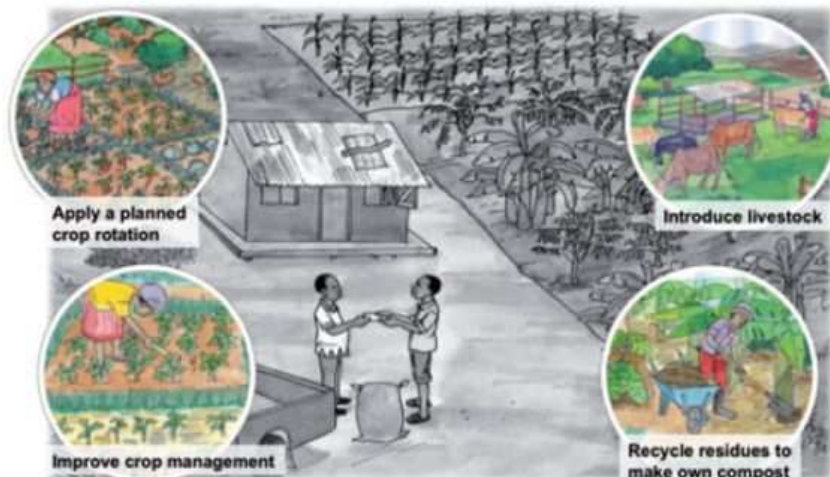


Recycling valuable farm by-products

b) Farm with low external input use

Farmers working with little external inputs based on traditional practices may grow many different crops in a densely mixed system on the same piece of land changing crops randomly. A few livestock such as chickens, pigs, cattle and/or goats may be kept, which scatter the manure in their feeding places, hence providing very little manure for the gardens. The trees may be extensively cut for firewood and charcoal burning. Bush and trash burning may be a common practise especially during land preparation. Harvests are probably low and increasingly becoming difficult due to unreliable and insufficient rains. The harvests may just be sufficient for feeding the family and little may be left to sell for income.

Conversion of a low external input farm



Conversion of a low external input farm

Traditional farmers fulfil some principles of organic farming already by relying on farm-own resources, growing different crops simultaneously and raising livestock. However, there are still practices, which clearly distinguish such farms from organic farms. The following challenges need to be addressed for conversion:

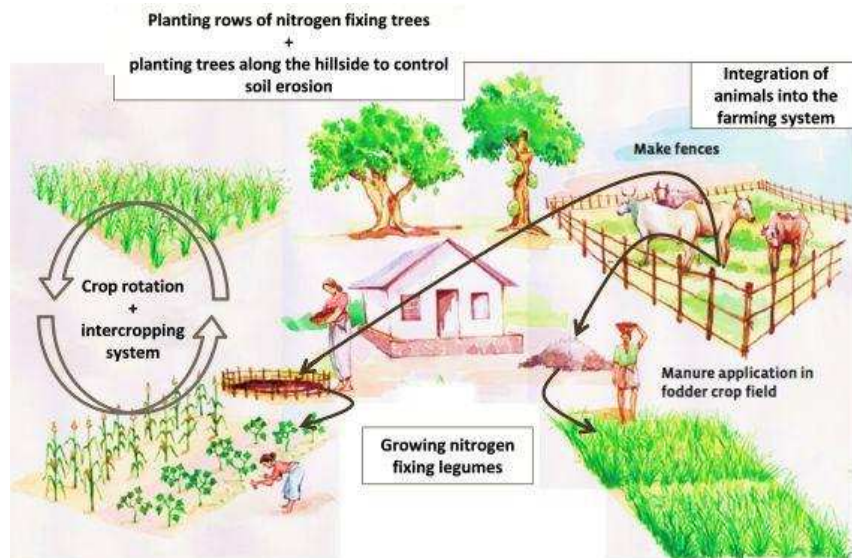
- Avoid burning of crop residues after harvest as this is, in most cases, not a viable solution, since it destroys valuable organic material and damages soil organisms.
- Establish a well organised diversification systems including a 'planned' crop rotation and intercropping systems.
- Accumulate knowledge and practice regarding efficient use of farm own resources, especially for compost production to manage and improve soil fertility.
- Avoid indiscriminate tree cutting for firewood and charcoal burning.
- Establish a system to collect the animal manure for composting.
- Apply measures to prevent loss of soil through erosion and protect it from drying out.
- Pay special attention to satisfy feed and health requirements of the farm animals.
- Avoid infection of seeds with diseases, gain knowledge on disease cycles and preventive measures.
- Avoid harvest and storage losses.

Some practices for conversion in this systems are:

- Implement planned crop rotation and intercropping systems. A combination of annual and perennial crops including leguminous green manure cover crops is needed. Combined with properly selected or improved crop varieties with good resistance to plant pests and diseases, will facilitate the crop and soil management.
- Proper integration of animals into the farming system, as well as planting rows of nitrogen fixing trees between annual crops will

improve the growing conditions for the crops and encourage better growth, while providing additional feed for the ruminant animals. Better housing is also needed to facilitate collection of animal manure for field use.

- Improving the fertility of the soils, for example, through the application of high quality compost. Compost is a highly valuable fertilizer in organic farming. Instead of burning the crop residues after harvest, collect them for compost production, or work them into the soil. The animal manures and plant materials should be regularly collected for compost making.
- Growing nitrogen fixing legumes between annual crops is another possibility to feed the soil and the crops.
- Additional measures to control soil erosion such as digging trenches and planting trees along the hillside, and covering the soil with living or dead plant material should be implemented.

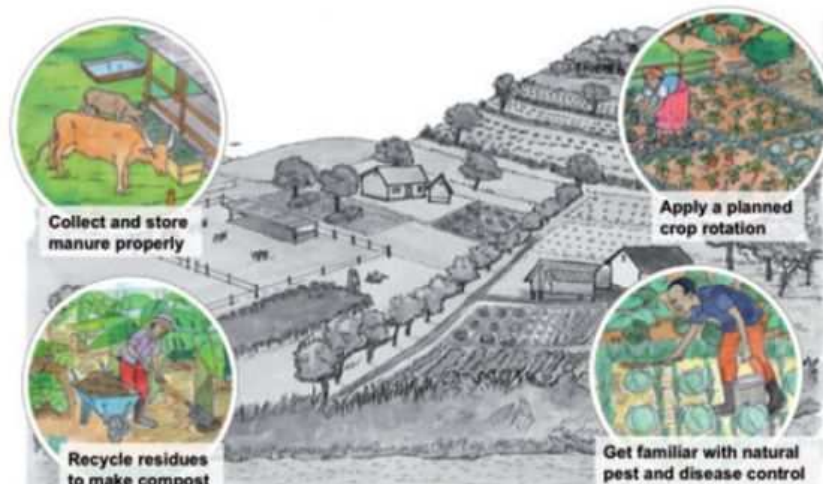


Some organic farming methods to test in your own farm

c) Mixed Farm

On mixed farms, crops and farm animals may be integrated, whereby the animal manure is collected and used in the gardens after having kept it for a few weeks to rot. Some soil conservation measures may be implemented, such as mulching in perennial crops and trenches to reduce erosion. Occasionally herbicides, pesticides and treated seeds may be used to control weeds in fruit and vegetable production. Farmers of such mixed farms are obviously familiar with some of the organic farming practices. Such farmers will find it easy to learn new methods from other farmers or from a trainer and to implement organic practices throughout the farm.

Conversion of a mixed farm



Conversion of a mixed farm

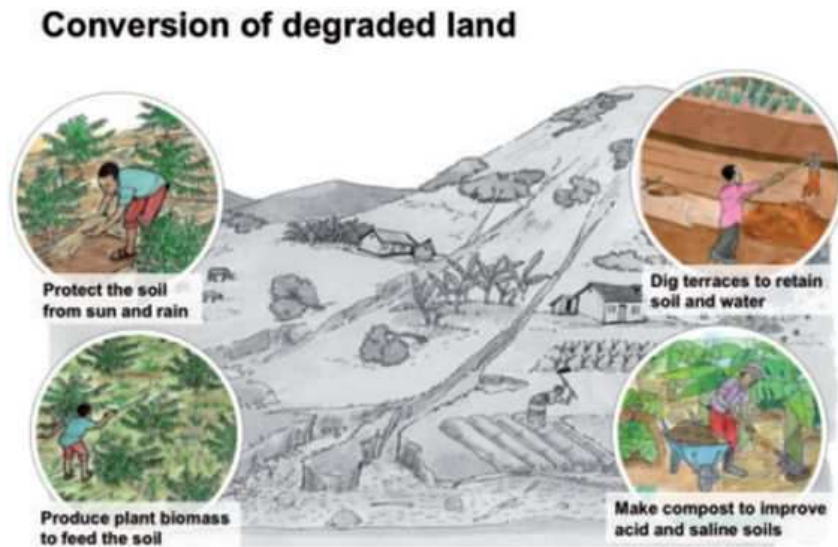
Recommendations for organic conversion:

- Implement organic practices to manage the soil and to control weeds instead of using herbicides. For example, in fruit orchards grow a leguminous cover crop to cover the soil. Or in vegetables and arable crops implement a planned crop rotation that includes weed suppressing green manure or feed crops.
- Further improve recycling of farm own nutrients from animals and crop residues to make best uses of them, for example by mixing them with crop residues for making compost. Improve storage of animal manures to avoid nutrient losses.
- Use seeds without pesticide-treatments, if available. Make sure to use healthy seeds only and get familiar with non-chemical ways of treating seeds.
- Get familiar with approaches and methods of natural pest and disease control.

- Learn about beneficial insects and observe population dynamics of pests through regular monitoring during crop growth.
- Further diversify the farming system to increase productivity of the land and provide habitats for beneficial insects and spiders.

d) Degraded Land

Land may be degraded due to shifting cultivation, overgrazing, over-cultivation or deforestation, salinity after years of intensive irrigation with ground water, or water logging and flooding. Such land may take more effort and patience to establish good growing conditions. At the same time, organic practices are an excellent approach to recover such soils. It may require specific practices to stop soil degradation and to re-establish soil fertility. Such practices include digging of terraces or sowing an intensive fallow with a leguminous green manure crop that grows well on poor soils.



Conversion of degraded land

Many experiences show that organic farming is a promising approach to improve degraded land and bring it back into production. In most cases, the increase of organic matter plays a key role to improve the quality of degraded soils.

In case of a **bare and eroded soil** on sloping land, organic farming calls for digging of terraces (e.g. fanya juu terraces, see the figure below). Fanya juu ('throw it upwards' in Kiswahili) terraces are made by digging trenches along the contours and throwing the soil uphill to form embankments (bunds), which are stabilized with fodder grass like Napier (*Pennisetum purpureum*) and multipurpose agroforestry trees. The space between the embankments is cultivated with crops and over time, the fanya juu develop into bench terraces. They are useful in semi-arid areas to harvest and conserve water. Additionally, green manures and compost can be used to further build the soil to support good crop growth and yields.

HOW A FARM IS CONSERVED USING FANYA-JUU TERRACES	
<ol style="list-style-type: none"> 1. The farm is surveyed by a technician to see if a cutoff drain is required above the fields. 2. A cutoff drain is laid out along the contour. All the runoff from outside the farm is held and infiltrates. 3. The soil dug out from the cutoff drain is heaped downslope. 4. Contours are then surveyed with a line level. 5. Soil is loosened with hoes or mattocks along the line of the contour and then thrown upslope to make the bund. A small step is left between the trench and the bund so that soil is not washed straight back in when it rains. 6. Grass is planted on top of the bund to stabilize it. "Bane grass" is one of the best varieties for Kenya. Bananas or other trees may be planted in the trench. 7. Ploughing, weeding and natural soil movement cause the land between the terrace banks to level off into benches after a few years. 	
<p>Transversal view of Fanya-Juu terrace (details)</p>	<p>Transversal view of Fanya-Juu terraces through years</p>
<p>CUTOFF DRAIN Dimensions: Ditch: 1,25 m wide at top and 1m wide at bottom Depth: approx. 1m Gradient: usually sited on contour, but sometimes sited on a slight gradient when it is joined to a natural waterway</p> <p>Where fanya-juu terraces can be used</p> <ul style="list-style-type: none"> • in marginal/wetter zones (700 mm rainfall and above) • soils should be deep • suitable for slopes from less than 5% to 50% 	<p>FANYA-JUU TERRACE dimensions: Spacing of terrace banks: usually between 5 and 20 m apart, (depends on the slope of the land - the steeper the land, the closer the terrace banks) Trench: 60 cm wide and 60 cm deep Bund: 50 cm high and 150 cm wide at base Step: 20 cm between trench and bund Gradient: sited on contour (in dry areas) Labour: 150-350 person-days/hectare (for cutoff and terraces)</p>

Fanya-Juu Terraces techniques of Kenya

Saline soils contain large amounts of water soluble salts that inhibit seed germination and plant growth. These salts may have been accumulated through excessive use of irrigation water, especially in arid and semi-arid climates. These salts can be reduced slowly by ensuring proper irrigation and building up the structure of the soil with compost to allow natural drainage of the excess salts. In a first period salt tolerant crops may be grown.

Acid soils can be reclaimed by adding lime and well-made compost.

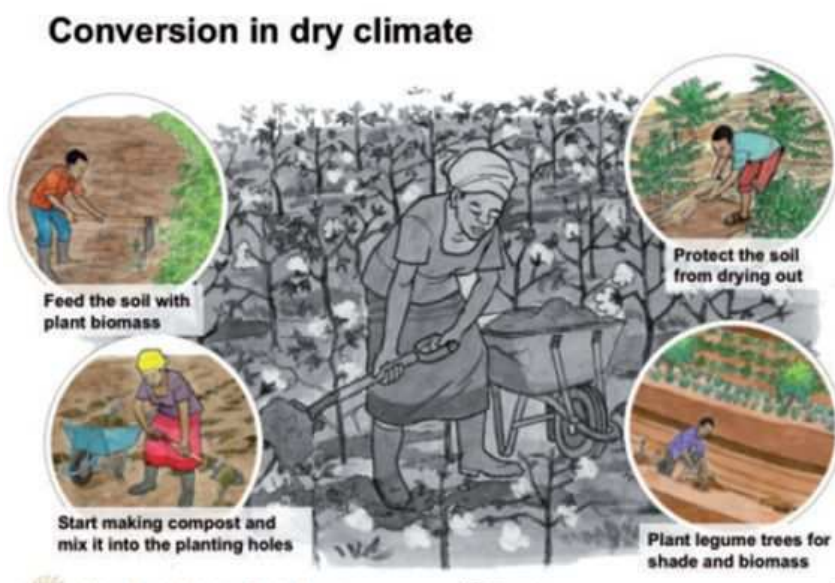
Flooded soils can be improved by creating drainage channels to drain off the excess water.

C. Climate related challenges to conversion

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 favourable temperatures. At the same time, the improvements that follow implementation of organic practices will be more obvious under arid conditions than under ideal humid conditions. For example, compost application into topsoil or into planting holes will increase the soils water retention capacity and the crop's tolerance to water scarcity.

In very **warm and dry climate**, losses of water through transpiration from plants and evaporation from soils are high. These losses may be further encouraged by strong winds, enhancing soil erosion. The soils' organic matter content is generally low, as biomass production is low, implying that the availability of nutrients to the plants is highly reduced.

Under such conditions, the key to increasing crop productivity lies in protecting the soil from strong sun and wind and increasing the supply of organic matter and water to the soil. Soil organic matter can either be increased through compost or through cultivation of green manure crops. In the case of compost production the challenge is to increase production of plant biomass, which is needed for compost production.



Conversion in dry climate

In **warm and humid climate**, high aboveground biomass production and rapid decomposition of soil organic matter imply that the nutrients are easily made available to the plants. But it also involves a high risk that the nutrients are easily washed out and lost. Under such conditions a balance between production and decomposition of organic matter is important to avoid depletion of soil.

Combining different practices to protect the soil and feed it with organic matter proves to be the most effective approach to choose. These practices include creating a diverse and multi-layer cropping system ideally including trees, growing nitrogen-fixing cover crops in orchards and applying compost to enrich the soil with organic matter and in this way increase its capacity to retain water and nutrients.

This is part of a training guide on Organic Agriculture. Further reading is available on the following topics:

1. [Introduction to Organic Agriculture](#)
2. [Considerations for Conversion to Organic Agriculture](#)
3. [Step by Step Conversion to Organic Agriculture](#)
4. [Mulching in Organic Agriculture](#)
5. [Water Management in Organic Agriculture](#)
6. [Crop Planning and Management in Organic Agriculture](#)
7. [Nutrient Management in Organic Agriculture](#)
8. [Pest and Disease Management in Organic Agriculture](#)
9. [Weed Management in Organic Agriculture](#)
10. [Soil Cultivation and Tillage in Organic Agriculture](#)
11. [Plant Propagation in Organic Agriculture](#)
12. [Animal Husbandry in Organic Agriculture](#)

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This techniques has been compiled by Ilka Gomez.

Further reading

IFOAM. 2003. Training Manual for Organic Agriculture in the Tropics. Edited by Frank Eyhorn, Marlene Heeb, Gilles Weidmann, p 214, 219-224, <http://www.ifoam.bio/>

FIBL (2011): African Organic Agriculture Training Manual – Conversion. Version 1.0 June 2011. Edited by Gilles Weidmann and Lukas Kilcher, Research Institute of Organic Agriculture FIBL, Frick

Agricultura Ecológica, Manual y Guía Didáctica. Javier Flórez Serrano, IRMA S.L. (Instituto de Restauración y Medio Ambiente, León-España)

Looking after our land: Soil and Water Conservation in Dryland Africa. Will Critchley, Published by Oxfam on behalf of the Arid Lands Information Network and the International Institute for Environment and Development, 1991, Part 3, Kenya, <http://www.fao>

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As the only global organic umbrella organization, we are committed to advocating Organic Agriculture as a viable solution for many of the world's pressing problems. With around 815 affiliates in over 120 countries, we campaign for the greater uptake of Organic Agriculture by proving its effectiveness in nourishing the world, preserving biodiversity, and fighting climate change. We also offer training courses, provide services to standard owners, certifiers, operators, and realize organic programs.

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