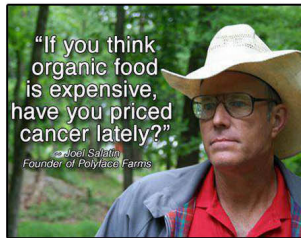


What is Organic Farming?



produced by
HDRA - the organic organisation

What is organic farming?

Organic farming works in harmony with nature rather than against it. This involves using techniques to achieve good crop yields without harming the natural environment or the people who live and work in it. The methods and materials that organic farmers use are summarised as follows:

To keep and build good soil structure and fertility:

- recycled and composted crop wastes and animal manures
- the right soil cultivation at the right time
- crop rotation
- green manures and legumes
- mulching on the soil surface

To control pests, diseases and weeds:

- careful planning and crop choice
- the use of resistant crops
- good cultivation practice
- crop rotation
- encouraging useful predators that eat pests
- increasing genetic diversity
- using natural pesticides

Organic farming also involves:

- careful use of water resources
- good animal husbandry

A modern approach to farming

Organic farming does not mean going 'back' to traditional methods. Many of the farming methods used in the past are still useful today. Organic farming takes the best of these and combines them with modern scientific knowledge.

Organic farmers do not leave their farms to be taken over by nature; they use all the knowledge, techniques and materials available to work with nature. In this way the farmer creates a healthy balance between nature and farming, where crops and animals can grow and thrive.

To be a successful organic farmer, the farmer must not see every insect as a pest, every plant out of place as a weed and the solution to every problem in an artificial chemical spray. The aim is not to eradicate all pests and weeds, but to keep them down to an acceptable level and make the most of the benefits that they may provide.

Combined techniques

On an organic farm, each technique would not normally be used on its own. The farmer would use a range of organic methods at the same time to allow them to work together for the maximum benefit. For example the use of green manures and careful cultivation, together provide better control of weeds than if the techniques were used on their own.



Why farm organically?

Organic farming provides long-term benefits to people and the environment.

Organic farming aims to:

- increase long-term soil fertility.
- control pests and diseases without harming the environment.
- ensure that water stays clean and safe.
- use resources which the farmer already has, so the farmer needs less money to buy farm inputs.
- produce nutritious food, feed for animals and high quality crops to sell at a good price.

Modern, intensive agriculture causes many problems, including the following:

- Artificial fertilisers and herbicides are easily washed from the soil and pollute rivers, lakes and water courses.
- The prolonged use of artificial fertilisers results in soils with a low organic matter content which is easily eroded by wind and rain.
- Dependency on fertilisers. Greater amounts are needed every year to produce the same yields of crops.
- Artificial pesticides can stay in the soil for a long time and enter the food chain where they build up in the bodies of animals and humans, causing health problems.
- Artificial chemicals destroy soil micro-organisms resulting in poor soil structure and aeration and decreasing nutrient availability.
- Pests and diseases become more difficult to control as they become resistant to artificial pesticides. The numbers of natural enemies decrease because of pesticide use and habitat loss.

Crop nutrition

To produce a healthy crop an organic farmer needs to manage the soil well. This involves considering soil life, soil nutrients and soil structure.

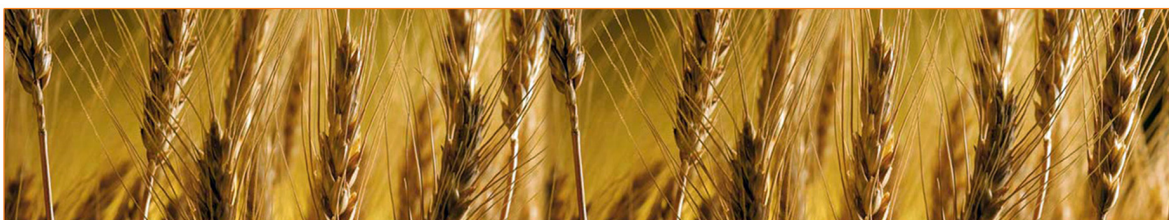
Artificial fertilisers provide only short term nutrient supply to crops. They encourage plants to grow quickly but with soft growth which is less able to withstand drought, pests and disease. Artificial fertilisers do not feed soil life and do not add organic matter to the soil. This means that they do not help to build good soil structure, improve the soils water holding capacity or drainage.

The soil is a living system. As well as the particles that make up the soil, it contains millions of different creatures. These creatures are very important for recycling nutrients.

Feeding the soil with manure or compost feeds the whole variety of life in the soil which then turns this material into food for plant growth. This also adds nutrients and organic matter to the soil. Green manures also provide nutrients and organic matter. These are plants with high nitrogen content that are sown as part of a rotation and are dug into the soil when young.

It is important to remember, however, that using too much animal manure or nutrient rich organic matter, or using it at the wrong time, could be as harmful as using man-made, artificial fertilisers.

The organic farmer must cultivate the soil at the right time and in the right ways to provide the best living conditions for the soil life and plant roots.



Choice of crops

Each crop and crop variety has its own specific needs. In some places it will grow well and others it will not. Crops are affected by;

- soil type
- rainfall
- altitude
- temperature
- the type and amount of nutrients required
- the amount of water needed

These factors affect how a crop grows and yields. If a crop is grown in a climate to which it is not suited, it is likely to produce low yields and be more susceptible to pest and diseases. This then creates the need to use agrochemicals to fertilise the crop and control pest and diseases.

The successful organic farmer learns to grow the crops and varieties which are suited to the local conditions. He should grow crops which are suited to his geography and climate. He should choose varieties which are suited to the local conditions such as local varieties.

Rotations

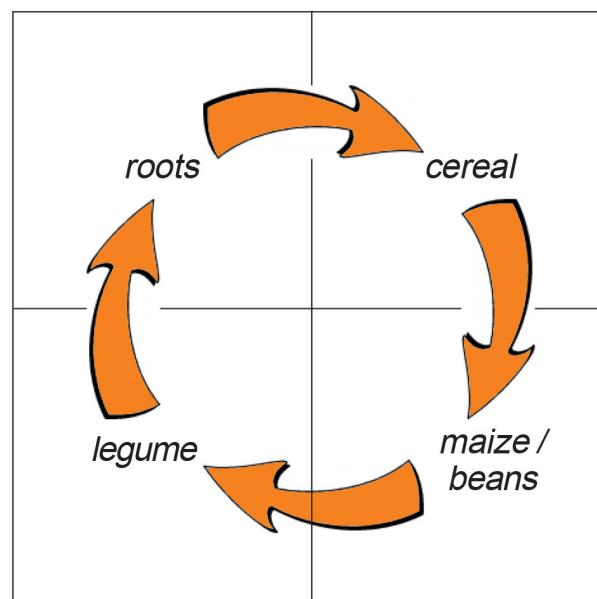
Growing the same crops in the same site year after year reduces soil fertility and can encourage a build up of pests, diseases and weeds in the soil. Crops should be moved to a different area of land each year, and not returned to the original site for several years. For vegetables a 3 to 4 year rotation is usually recommended as a minimum.

Crop rotation means having times where the fertility of the soil is being built up and times where crops are grown which remove nutrients.

Crop rotation also helps a variety of natural predators to survive on the farm by providing diverse habitats and sources of food for them.

A typical 4 year rotation would include a cycle with maize and beans, a root crop and cereals with either of the following;

1. Grass or bush fallow (a fallow period where no crops are grown).
2. A legume crop where a green manure, which is a plant grown mainly for the benefit of the soil, is grown (more information about green manures can be obtained from HDRA).

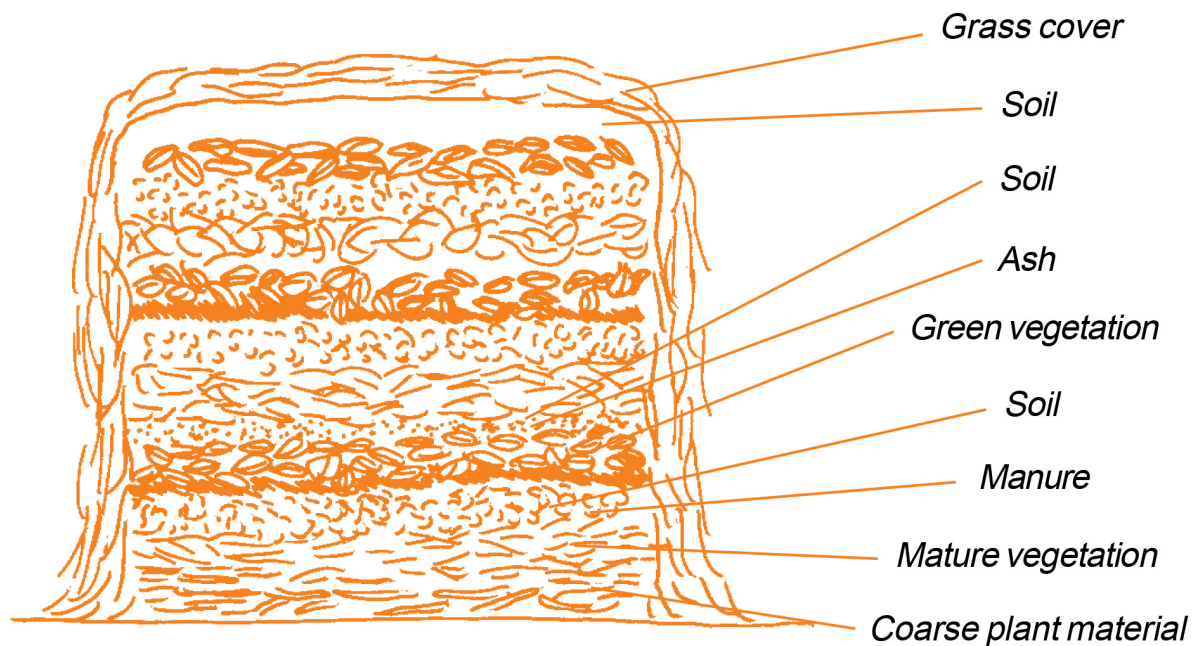


A simple rotation that includes a legume

Composting

Compost is organic matter (plant and animal residues) which has been rotted down by the action of bacteria and other organisms, over a period of time. Materials such as leaves, fruit skins and animal manures can be used to make compost. Compost is cheap, easy to make and is a very effective material that can be added to the soil, to improve soil and crop quality.

- Compost improves the structure of the soil. This allows more air into the soil, improves drainage and reduces erosion.
- Compost improves soil fertility by adding nutrients and by making it easier for plants to take up the nutrients already in the soil. This produces better yields.
- Compost improves the soil's ability to hold water. This stops the soil from drying out in times of drought.
- Compost can reduce pests and diseases in the soil and on the crop.

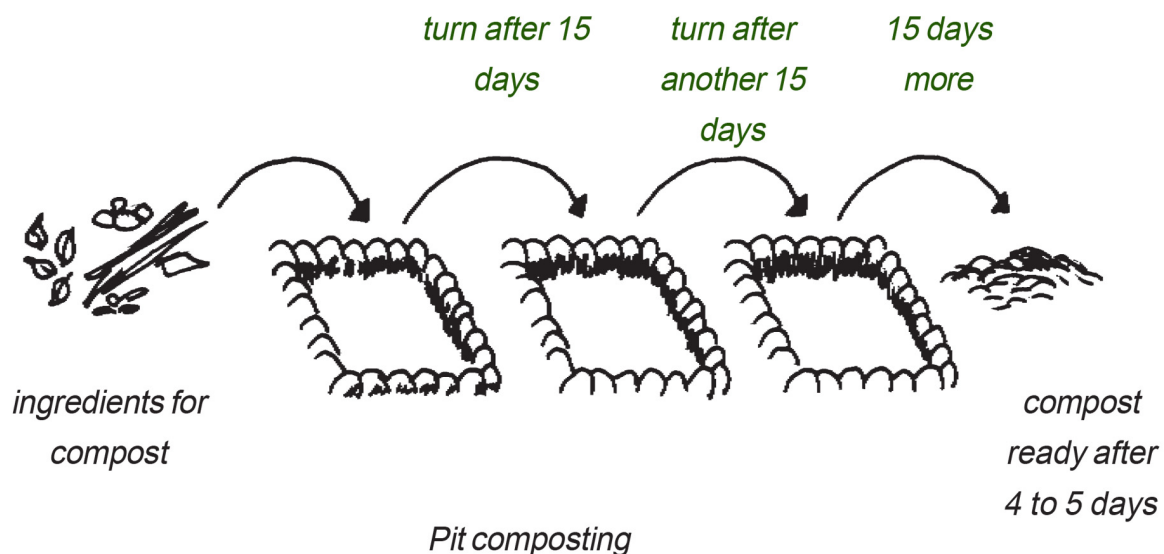


The layers of a compost heap

Compost has many advantages over chemical fertilisers. These provide nutrients for plants but do not improve soil structure. They usually only improve yields in the season in which they are applied. Because compost feeds soil life and improves soil structure, the beneficial effects are long lasting.

There are many ways to make compost depending on available materials and climate, for example:

- Indore method
- Bangalore method
- Heating process/Block method
- Chinese high temperature stack
- Pit composting
- Trench composting
- Basket composting
- Boma composting



Mulching

Mulching means covering the ground with a layer of loose material such as compost, manure, straw, dry grass, leaves or crop residues. Green vegetation is not normally used as it can take a long time to decompose and can attract pests and fungal diseases.

Mulches have several effects on the soil which help to improve plant growth:

- Decreasing water loss due to evaporation
- Reducing weed growth by reducing the amount of light reaching the soil
- Preventing soil erosion
- Increasing the number of micro-organisms in the top soil
- Adding nutrients to the soil and improving soil structure
- Adding organic matter to the soil

Alternative mulching materials include black plastic sheeting or cardboard. However these materials do not add nutrients to the soil or improve its structure.



How to use mulches

- Always apply mulches to a warm, wet soil. Mulch applied to a dry soil will keep the soil dry.
- Care should be taken as to the thickness of the mulch applied. Too much mulch will prevent air flow and encourage pests.
- To allow the germination of planted seeds through the mulch, a layer of less than 10cm should be used.
- To clear an area of land of persistent weeds a layer of 10cm or more can be used.



Mulching with large leaves

Green manures

Green manures, often known as cover crops, are plants which are grown to improve the structure, organic matter content and nutrient content of the soil. They are a cheap alternative to artificial fertilisers and can be used to complement animal manures.

Growing a green manure is not the same as simply growing a legume crop, such as beans, in a rotation. Green manures are usually dug into the soil when the plants are still young, before they produce any crop and often before they flower. They are grown for their green leafy material which is high in nutrients and provides soil cover. They can be grown together with crops or alone.

Green manures:

- Increase and recycle plant nutrients and organic matter
- Improve soil fertility
- Improve soil structure
- Improve the ability of the soil to hold water
- Control soil erosion
- Prevent weed growth
- Stop nutrients being washed out of the soil, for example, when the ground is not used between main crops.



Centro (*Centrosema pubescens*),
a useful green manure

Weed control

In organic farming systems, the aim is not necessarily the elimination of weeds but their control. Weed control means reducing the effects of weeds on crop growth and yield.

Organic farming avoids the use of herbicides which, like pesticides, leave harmful residues in the environment. Beneficial plant life such as host plants for useful insects may also be destroyed by herbicides.

On an organic farm, weeds are controlled using a number of methods:

- Crop rotation
- Hoeing
- Mulches, which cover the soil and stop weed seeds from germinating
- Hand-weeding or the use of mechanical weeders
- Planting crops close together within each bed, to prevent space for weeds to emerge
- Green manures or cover crops to outcompete weeds
- Soil cultivation carried out at repeated intervals and at the appropriate time, when the soil is moist. Care should be taken that cultivation does not cause soil erosion.
- Animals as weeders to graze on weeds

Weeds do have some useful purposes. They can provide protection from erosion, food for animals and beneficial insects and food for human use.

Natural pest and disease control

Pests and diseases are part of nature. In the ideal system there is a natural balance between predators and pests. If the system is imbalanced then one population can become dominant because it is not being preyed upon by another. The aim of natural control is to restore a natural balance between pest and predator and to keep pests and diseases down to an acceptable level. The aim is not to eradicate them altogether.

Chemical control

Pesticides do not solve the pest problem. In the past 50 years, insecticide use has increased tenfold, while crop losses from pest damage have doubled. Here are three important reasons why natural control is preferable to pesticide use.

Safety for people

Artificial pesticides can quickly find their way into food chains and water courses. This can create health hazards for humans.

Human health can also be harmed by people eating foods (especially fruit and vegetables) which still contain residues of pesticides that were sprayed on the crop.

There is also much concern for those people using chemical pesticides. The products may be misused because the instructions are not written in the language spoken by the person using them. This has led to many accidents such as reports of people suffering from severe skin rashes and headaches as a result of using chemical pesticides. There are an estimated one million cases of poisoning by pesticides each year around the world. Up to 20,000 of these result in death. Most of the deaths occur in tropical countries where chemical pesticides which are banned in Europe or the USA are still available.

Cost

Using natural pest and disease control is often cheaper than applying chemical pesticides because natural methods do not involve buying materials from the outside. Products and materials which are already in the home and around the farm are most often used.

Safety for the environment

There are a number of harmful effects that chemical pesticides can have on the environment:

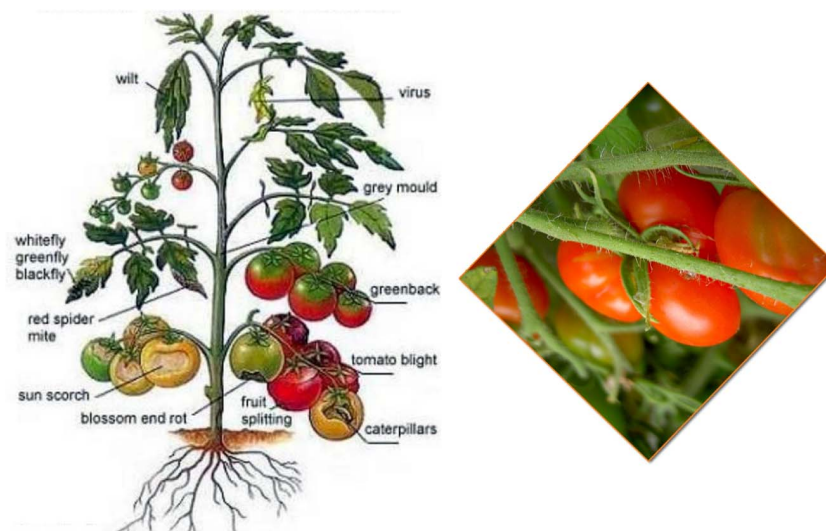
- Chemical pesticides can kill useful insects which eat pests. Just one spray can upset the balance between pests and the useful predators which eat them.
- Artificial chemicals can stay in the environment and in the bodies of animals causing problems for many years.
- Insect pests can very quickly, over a few breeding cycles, become resistant to artificial products and are no longer controlled. This means that increased amounts or stronger chemicals are then needed creating further economic, health and environmental problems.



Natural control

There are many ways in which the organic farmer can control pests and diseases.

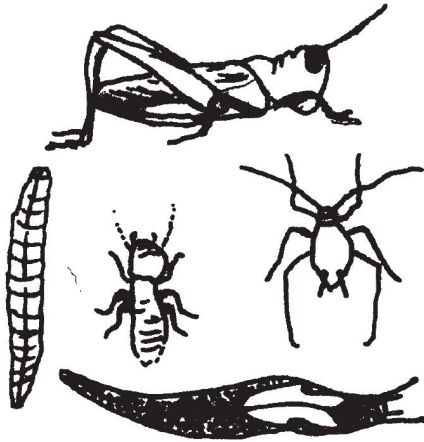
- Growing healthy crops that suffer less damage from pests and diseases.
- Choosing crops with a natural resistance to specific pests and diseases. Local varieties are better at resisting local pest and diseases than introduced varieties.
- Timely planting of crops to avoid the period when a pest does most damage.
- Companion planting with other crops that pests will avoid, such as onion or garlic.



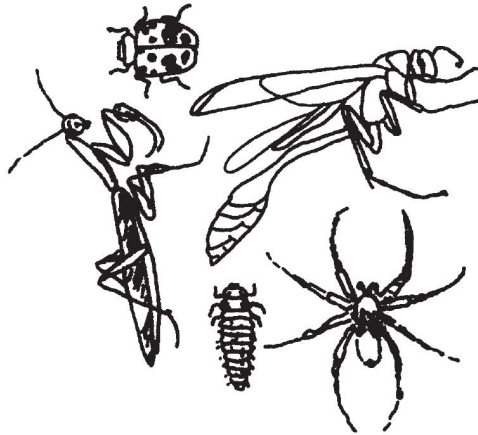
Companion planting

- Trapping or picking pests from the crop.
- Identifying pest and diseases correctly. This will prevent the farmer from wasting time or accidentally eliminating beneficial insects. It is therefore useful to know life cycles, breeding habits, preferred host plants and predators of pests.

- Using crop rotations to help break pest cycles and prevent a carry over of pests to the next season.
- Providing natural habitats to encourage natural predators that control pests. To do this, the farmer should learn to recognise insects and other animals that eat and control pests.



Grasshoppers, slugs, termites, aphids and types of caterpillars are pests



Ladybirds, spiders, ground beetles, parasitic wasps and praying mantis are predators

Through careful planning and using all the other techniques available it should be possible to avoid the need for any crop spraying. If pests are still a problem natural products can be used to manage pests, including sprays made from chillies, onions, garlic or neem. Further information can be obtained from HDRA.

Even with these natural pesticides, their use should be limited as much as possible and only the safest ones used. It is wise to check with national and international organic standards to see which ones are allowed or recommended.

Genetic diversity

Within a single crop there can be many differences between plants. They may vary in height or ability to resist diseases, for example. These differences are genetic.

Traditional crops grown by farmers contain greater genetic diversity than modern bred crops. Traditional varieties have been selected over many centuries to meet the requirements of farmers. Although many are being replaced by modern varieties, seeds are often still saved locally.

Crops which have been bred by modern breeding methods tend to be very similar and if one plant is prone to disease, all the other plants are as well. Although some modern varieties may be very resistant to specific pests and diseases they are often less suited to local conditions than traditional varieties. It can therefore be dangerous to rely too much on any one of them.

In organic systems, some variation or 'genetic diversity' between the plants within a crop is beneficial. Growing a number of different crops rather than relying on one is also very important. This helps to protect against pests and diseases and acts as insurance against crop failure in unusual weather such as drought or flood. It is important to remember this when choosing which crops to grow.

An organic farmer should try to:

- grow a mixture of crops in the same field (mixed cropping, intercropping, strip cropping)
- grow different varieties of the same crop
- use as many local crop varieties as possible
- save the seed of local and improved crop varieties rather than relying on buying seed from outside the farm every year. Exchange of seed with other farmers can also help to increase diversity, and ensure the survival of the many traditional crop varieties which are being lost as they are replaced by a few modern varieties.



Strip cropping onions and tomatoes to prevent pest and disease attack

Careful use of water

In arid lands the careful use of water is as much a part of organic growing as is any other technique.

As with other resources, organic farmers should try to use water which is available locally, avoiding using water faster than it is replaced naturally.

There are many ways to use water carefully, including:

- The use of terracing, rain water basins or catchments and careful irrigation
- The addition of organic matter to the soil to improve its ability to hold water
- The use of mulches to hold water in the soil by stopping the soil surface from drying out or becoming too hot

Animal husbandry

In an organic system, the welfare of the animals is considered very important.

- Animals should not be kept in confined spaces where they cannot carry out their natural behaviour such as standing and moving around in an inadequate amount of space. However, care should be taken that animals do not damage crops.
- Food for animals should be grown organically.
- Breeds should be chosen to suit local needs and local conditions and resources

These factors help to ensure that livestock are more healthy, better able to resist diseases and to provide good yields for the farmer.

International standards

The International Federation of Organic Agriculture Movements (IFOAM) has produced a set of international organic standards, laid down by people from many countries. These give guidelines about what organic farming is and how it should be practised on the farm.

International standards are also used to help countries set their own standards, which take into account different farming systems. Many countries have an organic standards authority which lays down national standards and awards a symbol to farms which have followed the standards. This symbol then allows farmers to market certified organic produce. This is important, as it ensures that people know that the food which they buy is organic.

The main principles of organic farming were laid down by IFOAM in 1992.

- To produce food of high nutritional quality in sufficient quantity.
- To interact in a constructive and life enhancing way with all natural systems and cycles.
- To encourage and enhance biological cycles within the farming system, involving micro-organisms, soil flora and fauna, plants and animals.
- To maintain and increase long term fertility of soils.
- To use, as far as possible, renewable resources in locally organised agricultural systems.
- To work, as far as possible, within a closed system with regard to organic matter and nutrient elements. This aims to reduce external inputs.
- To work, as far as possible, with materials and substances which can be re-used or recycled, either on the farm or elsewhere.

- To give all livestock living conditions which will allow them to perform the basic aspects of their innate behaviour.
- To minimise all forms of pollution that may result from agricultural practices.
- To maintain the genetic diversity of the agricultural system and its surroundings, including the protection of plant and wildlife habitats.
- To allow agricultural producers a living according to the UN human rights; to cover their basic needs and obtain an adequate return and satisfaction from their work, including a safe working environment.
- To consider the wider social and ecological impact of the farming system.

Organic food is becoming popular in Europe and America. However for food to be sold as organic it must bear a symbol that proves that it is truly organic. This is obtained through a certification organisation. This is quite a complex procedure and is potentially expensive if there are not certification organisations in your country.

Please contact HDRA for further information about how to become a certified organic producer.

Further information on organic farming can be obtained from HDRA. Other publications include booklets covering composting, green manures, weed control and the neem tree, as well as single information sheets about crop pests and diseases and their control, natural pesticides and green manures. Please write to:

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The aims of HDRA - the organic organisation are to carry out scientific research into, collate and disseminate information about, and promote interest in organic gardening, farming and food in the UK and overseas. For more than a decade, HDRA's international programme has been involved in the support and extension of sustainable farming practices; supporting research on aspects of tropical organic agriculture, providing advice and literature on appropriate organic techniques and providing tree seeds and technical information to organisations involved in tree planting and research.

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Further reading

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