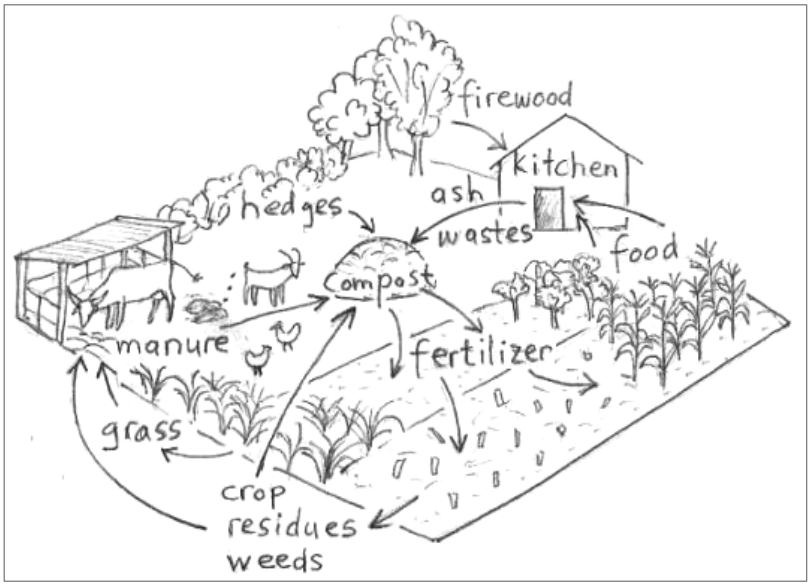
COMPOST, MANURES AND LIQUID MANURES

Compost

Organic farming is often associated directly with composting. A compost site is in fact a central place where all organic materials from the farm are collected, broken down, made available for plant nutrition and brought back into the nutrient cycle as fertilizer and soil amendment.

Compost is a long-term investment into the soil. It improves soil fertility by increasing soil organic matter and improving soil structure, and it provides plant nutrients which are released slowly and over a long period.



Decomposition, a natural process

All organisms, whether plant or animal, will decompose when they have finished their life cycle. This natural process is the domain of micro-organisms which are too small to be seen - and yet they are present in the environment, in the soil, in the water, and even in the air. Without them, life on earth would not be possible. Millions of them can be found in every handful of fertile soil. Composting is just a way of promoting, accelerating and optimizing this breaking-down process. The product of decomposition is humidified organic matter or pure humus. It gives the soil a dark colour and is not easily decomposed further.

Organic matter improves soil fertility

Using compost for fertilizing improves soil fertility in the long run. These are the properties and effects of soil organic matter:

- it contains and stores a wide range of nutrients and micro-elements important for plant growth.
- it retains and stores water, making it available to the plants over a longer period.
- it improves soil structure and resistance against rain and wind erosion.

Organic and inorganic fertilizers

In organic fertilizers like compost and manures, the main plant nutrients nitrogen (N), phosphorus (P) and potassium (K) and other nutrients are bound to the organic matter and are released to the plants slowly.

Inorganic fertilizers usually contain only nitrogen, phosphorus and potassium, but in high concentrations. They dissolve easily in water and are released quickly. However, adding synthetic fertilizers alone does not maintain soil fertility, and there is a danger of acidification. Organic matter is needed to retain nutrients and water. When inorganic fertilizers are being used, farmers need also to take care of the organic matter content of the soil.

Organic matter is especially important in vegetable production. Many vegetables do much better in soils rich in organic matter, for example nightshades, cabbages, cucurbits or yams. In such soils, plant tolerance for nematodes, which can be a problem for vegetables, is also improved.

The TOF-leaflet No 4 (Organic crop nutrition) gives more information on organic fertilizers and their use.

"Compost" means a composition, a mixture. Nearly all organic material can be used for composting.

From fields and garden	Crop residues, weeds, dead leaves, trimmings (any vegetative matter) Large amounts of diseased plant material should preferably be composted using the hot composting method ("the best way", see next pages).
From animal husbandry	Manure and urine, beddings, feed residues
From home	Kitchen wastes from food preparation, household water, wood fire ash, sweepings, shredded paper and cardboard
DO NOT USE:	Meat scraps (they attract rats and other pests, dogs, wild animals) Non-organic materials like plastic or metal

JUST DO IT!

Many ways to obtain good compost

Composting is practised in hundreds of varieties all around the world. All these different systems can be divided into two main categories:

- Continuously fed systems ("the easiest way"):

  All organic wastes are deposited on the heap continuously, as they are produced and obtained during the year. In these heaps, temperature does not rise up as much as in a heap which is set up at once, and the process of decomposition is therefore slower.

- Batch fed systems ("the best way"):

  The material is collected separately, then mixed and set up at once. This system leads to a hot composting process. Its advantages are reduced nutrient loss and destruction of diseases and weed seeds as a result of the high temperature. The compost is ready within a shorter time and a high quality product is obtained.

Not more than three basic rules to know!

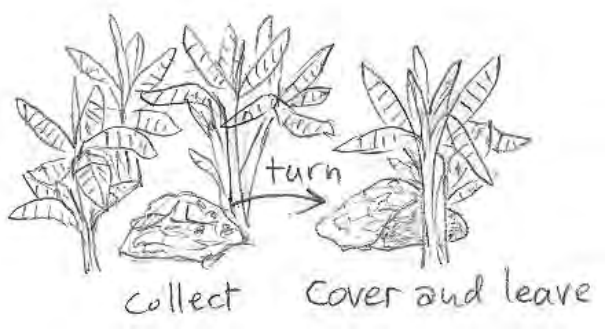
If you just stick to these rules, you will obtain compost fertilizer of adequate quality.

A place in the shade. This is necessary to prevent the material from drying up in the sun. Choose a place under some trees or high bushes, between banana plants or under some kind of roof.

Keep the material moist. Any method will do:
- during dry spells, sprinkle household water
- keep the compost covered with banana leaves or with a plastic sheet
- in dry climates, you should use pits of 1 to 2 feet depth to conserve humidity better
- or you can cover the maturing heap with a 15 cm thick layer of mud

Protect compost from heavy rain to prevent fouling processes and nitrogen and potassium being washed out. Any method will do. If you have a place under a roof, this is ideal, but a plastic sheet will also do and have the same effect.

The easiest way to prepare compost



The easiest way to produce compost is collecting the material continuously. Just throw any organic material you have onto one heap.

Turn, mix and shift the heap only once, then leave it there until you need it for fertilizing. A good time to turn the heap is around two or three months before the beginning of the next rainy season. Then the compost will be ready when you need it for planting.

After you turned the heap, cover it and leave it to mature. From now on, new organic material is collected on a new heap. You can use the spot or pit from which you removed the first heap when you turned it.

If you have a lot of material, turn and move the heap when it is around one meter high. Then start a new heap. If this one also reaches one meter, turn the material onto the first heap, cover it all up and start collecting again. In this way, you will always have compost ready for use.

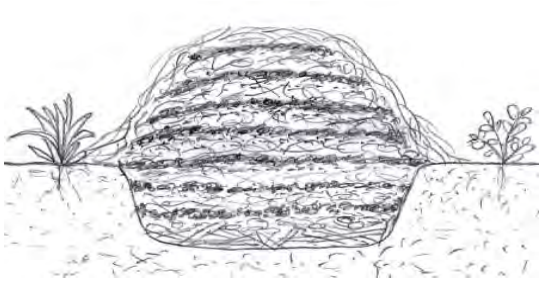
Composting near animal housings

If you keep animals (cows, goats, sheep, rabbits, chicken) in enclosures where droppings are concentrated, the heaps, pits or trenches should be right beneath them. Collect also all other organic wastes there.

It is advisable to add new bedding (maize stalks, weeds, leaves etc.) for the animals once a week to soak up all the urine and manure. The shed should have a roof so urine and manure do not get washed away by rain. Feed residues, beddings, droppings and urine are all added to the heap regularly.

You can use the "easy way"-system. Collect all organic material in one pit or heap until it reaches one meter, then mix and turn it to another pit beneath the first one. In any case, turn the heap two or three months before planting and let it rest to mature, while you start to fill the first pit again.

The best way to prepare compost



1. Collecting the material

To enjoy all advantages of this method, collect material like kitchen wastes and animal manure regularly. It is good to keep them dry, cool and covered, for example with banana leaves or a grass thatch to prevent water and nutrient loss before the heap is constructed.

Soil, crop residues and green vegetative matter may be collected on the day of building the heap.

The ideal material mix

Decomposition of dry crop residues and woody parts is faster when enough easily decomposable material like fresh green plant material or fresh animal dung is mixed into the compost.

An ideal mixture would be:

- one third fine nitrogen-rich material, such as fresh green vegetation, fresh leaves, weeds, household wastes and animal manure. Micro-organisms need this nitrogen to multiply and break down the other material.
- one third medium to fine material with lower nitrogen content (fine dry crop residues, dry leaves, straw etc.).
- one third bulky material like chopped branches, tree bark, coarse crop residues. This material guarantees that there is enough air inside the heap.

2. Setting up the heap

- Prepare the composting material well: chop coarse woody material to encourage its decomposition.
- If the composting material is dry, soak it before mixing it.
- Put a layer of bulky twigs and branches at the bottom to allow good drainage of excess water.
- Pile up coarse dry material and fresh green material in alternating layers.
- Manure or some compost applied to each layer enhances the composting process.
- If you have dug a new pit, add some soil in layers.
- Wood ash to increase potassium content can be sprinkled in thin layers.
- When you have finished the heap, cover it with 10 cm straw or grass to protect it from drying out.

3. Turning and covering the heap

After two to three weeks, the hot phase is over and the heap will have decreased to about half its original size. This is the right time to turn it.

You may turn it a second time about two months later. Turning the compost helps to accelerate the decomposition process, but it is not essential if the heap has been set up properly and kept moist.

The compost is ready about 2 to 4 months after the heap has been set up.

What's wrong with my compost?

If the compost material gets dusty white, this is a sign that fungi are developing too much. The material is too dry and too loose. In this case, you have to add water and mix in nitrogen rich material (fresh green material, urine, fresh cow dung) and keep the heap moist.

If the material gets blackish-greenish and has a foul smell, this is a sign that the material is too wet and that air and structure are missing. Loosen the heap or best set it up again, mix coarse woody dry material into it and protect it from rain.

Application of compost

Compost can be used as soon as the original composting material has changed into an unrecognizable crumbly, dark mass with a pleasant smell. Twigs and thick stems do not decompose completely and can still be seen. When this stage is reached, depends on the used materials, the outside temperature and moisture content of the heap. It can take one month only to three or four months after turning the heap.

Immature compost should be spread out as mulch, whereas ripe compost can be worked into the soil superficially.

It is best to use compost near to or directly in the root zone of plants. Mix a few handfuls into the planting hole before or at planting.

If you prepare a seedbed or beds for transplanting, use about two large hoefuls per square metre, or enough to cover the ground with a layer of 1 cm thickness.

Compost is a scarce and valuable soil amendment. Usually it is just not possible to produce sufficient amounts for fertilising all fields. It should therefore be applied where it is most beneficial:

- in nurseries for seedlings
- in seedbeds
- into planting holes or pits

For the nutrient contents of composts, please refer to the TOF-leaflet No 4 (Organic crop nutrition).

Livestock manures

Animal manure is a valuable fertilizer for all farming operations and has been used for centuries to improve soil fertility and crop production. It is one of the best nitrogen (N) sources in organic farming, and it also provides phosphorus (P) and potassium (K). Because some risks are involved with fresh manure application, it is better to compost animal manures before using them on the fields. Composting livestock manure is an excellent manure management technique for small farm owners.

Benefits of composted animal manure

- composted manure has a much higher nutrient content than dried manure because losses are smaller
- composting eliminates pathogens and viable weed seeds
- it reduces the possibility of parasite re-infestation of your animals, because the heat generated in the composting process kills parasite eggs
- composted manure will contribute more to the organic matter content of the soil than fresh manure
- it is virtually odourless, is more pleasant to apply and has a finer texture than fresh manure
- it accelerates decomposition in a compost heap

For nutrient contents of various manures please refer to the TOF-leaflet No 4 (Organic crop nutrition).

Be careful with fresh livestock manure

Fresh manure is high in soluble forms of N (nitrogen). But due to the high concentration of ammonium, it can cause "burning" of crops.

Fresh manure may also contain various pathogens like *E coli.* Therefore, precautions have to be taken when applying fresh manure to crops for human consumption.

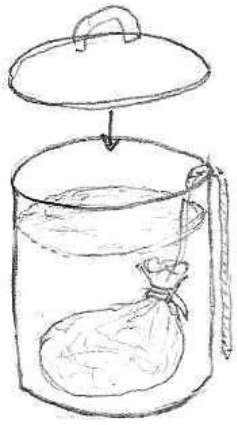
- Fresh manure should be used only in moderate amounts.
- To avoid nutrient losses of this scarce fertilizer, apply it when the soil is moist, and work it in superficially.
- Between application of fresh manure and harvest for human consumption there must be at least four months.

Liquid manures

Liquid manures, or manure teas and plant teas, provide quick nutrients during the growing season. They are cheap and effective nitrogen rich organic fertilizers which are often used for vegetables as a top-dressing or as foliar feeds. They can be prepared from animal manure or from green plants.

Animal manure tea

- Fill a 50 kg gunny bag or another porous sack with any fresh animal manure, tie securely and place into a drum filled 3 quarters full with water.
- Put a cover or a plastic bag on top to reduce nitrogen loss.
- Stir by lifting the bag up and down every three days.
- After 2 to 3 weeks, the nutrients will have dissolved into the water. The smell will not be too pleasant, but the fertilizer will be very effective!



Green plant manure tea

All strongly growing green plants can be used, including weeds and grasses. Use soft young shoots and leaves or plant parts which are still growing.

Especially good are soft plants such as Tithonia or comfrey.

Stuff a gunny bag tightly with chopped green material and follow the same steps as for animal manure tea.

Application

- Dilute the solution to a lighter brown colour.
- Use two or three times per week to water the crops.
- Be careful not to spill livestock manure over the plant leaves or any parts which will be eaten.
- Teas made from plant materials can be used as foliar feeds. They should not be too strong. Dilute the solution until it has a light brown colour.

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