Compost Making
Made Easy

produced by
ADDA - VNFU Organic Project
# Table of Contents

1. What is compost and how is it useful? .................................................... 1
2. Making compost ...................................................................................... 2
3. The composting process ......................................................................... 2
4. Organisms involved in the composting process ...................................... 3
5. Selecting the right materials .................................................................... 4
6. What to put in a compost heap................................................................. 5
7. Availability of materials ............................................................................ 5
8. Materials that should not be put in the compost heap ................................ 7
9. Where should a compost heap be placed? ............................................. 7
10. Considerations before building a compost heap...................................... 8
11. How to build the compost heap .............................................................. 8
12. Use of compost starters .......................................................................... 10
13. Elements of composting ......................................................................... 10
14. Managing a compost heap ..................................................................... 12
15. When is Compost Ready? ..................................................................... 14
16. How to Use Compost ............................................................................. 15

Annex 1 - Nutrient content of farm residues and animal manure ............. 18
Annex 2 - Compost requirements of some vegetable crops ..................... 19
Reference list ................................................................................................. 20
1. **What is compost and how is it useful?**

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. Many types of organic matter, such as leaves, straw, fruit and vegetable peelings, and manures can be used to make compost. The end product is very different from the original materials. It is dark brown, crumbly and has a pleasant smell. 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. It allows more air into the soil, improves drainage and reduces erosion.
- Compost helps to stop the soil from drying out in times of drought by holding more water.
- By improving soil structure, compost makes it easier for plants to take up the nutrients already in the soil. Compost may also improve soil quality by adding nutrients. This can help to produce better yields.
- Compost can reduce pest and disease problems in the soil and on the crop. The crop will be stronger and healthier and therefore resist pest and disease attack better.

Compost is a better way of feeding plants than using chemical fertilisers. Chemical fertilisers provide nutrients for plants but do not improve the structure or quality of the soil very much. They usually only improve yields in the season in which they are applied. Compost, on the other hand, is not washed away through the soil like chemical fertilisers, so the beneficial effects are longer lasting. Plants that are grown with chemical fertilisers are more attractive to pests and diseases because they have a more green, juicy growth. Plants grown with compost grow a bit slower but will get stronger and thus be able to better withstand pest and disease infestations. Moreover, compost contains a lot of beneficial microbes that can directly attack the pest or disease.
2. Making compost

Households and farms produce many materials, which can be used to make compost. Making compost makes use of materials that may otherwise be wasted. Some of these wastes could also be used for other purposes. For example rice straw may be needed for fire in the kitchen wastes or to feed livestock. A choice will need to be made as to whether to use such materials for the compost heap or not.

You may already be making compost. This booklet could help you to improve your methods. Organic matter is often piled up in the compound but left unmanaged. This will produce compost but the materials will take a long time to decompose and nutrients will be lost. If it is possible to invest some time and effort to manage the heap, the results will be very rewarding.

In a managed heap nutrient loss will be reduced, so more of the nutrients will be available to feed plants when the compost is used. This type of compost heap will also often heat up enough to kill weed seeds and plant diseases.

3. The composting process

There are two different processes when organic matter is decomposed. One is called aerobic decomposition (meaning: with oxygen), which involves microbes that use oxygen from the air or the water. In aerobic composting, a lot of heat is generated. Heap temperatures of 50 to 60 °C are normal but can reach over 70 °C. Compost made by aerobic fermentation is of good quality.

The other process is called anaerobic decomposition (meaning: without oxygen). Under anaerobic conditions the heat does not exceed 45 °C. Anaerobic microbes are not active in soil and water where free oxygen exists, but they are very active in an environment where there is a lack in free oxygen. They respire by taking up oxygen from oxidized matters. As in the aerobic process, anaerobic microbes use nitrogen, phosphorus, and other nutrients for their development. However, unlike aerobic decomposition, this reduces organic nitrogen to organic acids and ammonia. Carbon from organic compounds is released mainly as marsh (mostly methane gas or CH₄). A small portion of carbon may be respired as CO₂.

In the process of anaerobic fermentation, organic acids such as marsh gas, lactic acid and butyric acid are produced. These are harmful to crops because they weaken and hinder roots growth. There are some beneficial bacteria among the anaerobic bacteria, but generally, most of them are harmful for agricultural crops.
When materials are composted anaerobically, the odour nuisance may also be quite severe, because some of the compounds produced (ammonia and hydrogen sulphide) have a very characteristic bad smell.

Pathogens could cause problems in anaerobic composting because there is not enough heat to destroy them. However, aerobic composting does create high enough temperatures.

The final product of composting is humus. Ranging in colour from brown to black, it consists primarily of carbon but also contains nitrogen and smaller amounts of phosphorus and sulphur. Humus has a great effect upon the physical properties of soils with regard to improved soil structure, water intake and reservoir capacity, ability to resist erosion, and the ability to hold nutrients in a form readily accessible to plants. There are two types of humus formed by compost in the soil, neutral and acidic. The humus formed through aerobic composting is neutral and is very effective in building up the fertility of the soil. However, the humus formed through anaerobic decomposition is acidic in nature and this will increase the acidity of the soil.

4. Organisms involved in the composting process

In the initial stages of "aerobic" composting, mostly bacteria do the work. But in later stages larger organisms, such as fungi, sowbugs, pillbugs, centipedes, millipedes, spiders, earthworms, will assist the pile decomposition.

Most of the organisms involved in the composting process are so small that you cannot see them. In order to survive they need water, air and organic material, which is their food. The organisms feed on the organic matter and produce carbon dioxide, water and heat.

There are three important phases during the decomposition of a compost heap; the hot phase, the cooling down phase and the maturation phase.

During the hot phase the highest temperatures are reached at the centre of the heap. This has a hygienic effect, killing diseases, if present, in the organic materials and sometimes weed seeds also.
Next, the heap goes through a cooling down phase and the fungi become important. They break down the tough fibrous material such as crop stems.

During the final, maturation phase larger organisms such as termites and worms also have an important role in breaking down and mixing material.

In a hot climate the organisms are more active and the organic materials are broken down more quickly than in a cold climate. The types of organic matter used and the acidity of the soil will also affect the rate of decomposition.

5. Selecting the right materials

Nearly all organic materials can be used to make compost but different items will take varying amounts of time to decompose and form different end products.

It is essential for a good result to include a mixture of old and tough materials ("brown materials") with young and juicy materials ("green materials"). This is because different types of organic matter contain different proportions of Carbon (C) and Nitrogen (N). Carbon and nitrogen are both necessary for microbial growth. Organic carbon (which makes up about 50% of the mass of microbial cells) provides both an energy source and a basic cellular building block. Nitrogen is a crucial component of the proteins, amino acids and enzymes necessary for cell growth and function.

When selecting the materials for making compost it is important to consider the balance between the total amount of carbon and the total amount of nitrogen in the materials. This balance is called the C/N ratio.

The ideal C/N ratio for composting is generally considered to be around 30:1, or 30 parts carbon for each part nitrogen by weight. Why 30:1? At lower ratios, nitrogen will be supplied in excess and will be lost as ammonia gas, causing undesirable odours. Higher ratios mean that there is not sufficient nitrogen for optimal growth of the microbial populations, so the compost will remain relatively cool and degradation will proceed at a slow rate.

In general, materials that are green and moist tend to be high in nitrogen, and those that are brown and dry are high in carbon. The table in Annex 1 gives an overview of the C/N ratio and N, P, K contents of some commonly used composting materials.

Since drying and weighing the materials that you put in your pile is not practical, you can use the simple rule that compost needs to be about half
"browns" and half "greens" by volume. You can adjust this ratio depending on the quantity and quality of the materials you have at hand. Composting soon becomes a matter of instinct, like the cook who bakes without a recipe. If the pile doesn't heat up, you know there's not enough "greens" in the mix, while an ammonia smell means it needs more "browns. 

6. What to put in a compost heap

Most of the materials that can be used to make compost will come from your own farm. If you do not have enough, you can collect materials from others in the village as long as these materials were not treated with pesticides or herbicides.

If different compost ingredients are not available, a local processing plant might have useful by-products such as coconut husks, groundnut shells or coffee berry residues. It may also be possible to obtain suitable material from the roadside. Table 1 on the following page gives an indication of the type of items, which can be put on a compost heap.

7. Availability of materials

Some of the materials mentioned in the table, such as soil or crop residues, may be collected on the day of building the heap. Some ingredients, such as kitchen wastes, are collected on a regular basis. These materials should be gathered and stored. They should be kept dry and cool and covered so that too much air does not reach it. Banana leaves or grass thatch provide a good cover. This treatment should prevent water loss before the heap is constructed. Manure can also be collected over time, for example you could construct a holding area for manure next to the pigsty. Make sure, however, that the urine can flow out so that the manure is not too wet during storage. If you collect the urine separately, it is very easy to use it to moisten the heap.

---

**Is compost safe to handle?**

Yes, if the usual garden hygiene rules are followed. Cover any cuts or wounds you may have and wash your hands before eating or drinking.

The decomposing compost heap can generate heat up to 60 - 70 °C. Therefore; take care not to burn your hands or feet while turning the compost heap or checking its temperature.
Table 1 - Examples of material that can be used to make compost:

<table>
<thead>
<tr>
<th>Material</th>
<th>Preparation</th>
<th>Notes</th>
<th>Precautions</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOME</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit and vegetable peelings</td>
<td>None</td>
<td>Decomposes quickly</td>
<td></td>
</tr>
<tr>
<td>Wood fire ash</td>
<td>None</td>
<td>High in potassium and lime</td>
<td>Use in very small quantities</td>
</tr>
<tr>
<td>Paper and cardboard</td>
<td>Tear up or shred</td>
<td>Decomposes slowly Mix with wet/moist ingredients</td>
<td></td>
</tr>
<tr>
<td>House/compound sweepings</td>
<td>None</td>
<td>Variable quantity and quality</td>
<td></td>
</tr>
<tr>
<td>GARDEN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop residues (the remainder of a crop after it has been harvested)</td>
<td>Chop up tough material If dry, moisten well before use</td>
<td>If the material is tough, it will decompose slowly</td>
<td>Do not use if recently sprayed with pesticide or herbicide</td>
</tr>
<tr>
<td>Dead leaves</td>
<td>If dry, moisten before use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crops grown specifically for the compost heap</td>
<td>Chop up if large</td>
<td>Legumes commonly recommended</td>
<td></td>
</tr>
<tr>
<td>Weeds</td>
<td>Chop up if large</td>
<td></td>
<td>Avoid roots of perennial weeds and mature seeds of annuals.</td>
</tr>
<tr>
<td>OTHER SOURCES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manure</td>
<td>None</td>
<td>Excellent source of nutrients and microorganisms.</td>
<td>Don't use night soil!</td>
</tr>
<tr>
<td>Urine (animal and human)</td>
<td>May be collected in the bedding of animals</td>
<td>Sprinkle on heap. Will greatly accelerate decomposition.</td>
<td>Use in small quantities</td>
</tr>
<tr>
<td>Soil</td>
<td>Use soil from the top 10 cm of cropped land</td>
<td>Not essential but a sprinkling may reduce nitrogen loss from hot heaps. Good source of micro-organisms. May be used to cover a heap but only in a thin layer (2-3 cm).</td>
<td>If soil layer to cover heap is too thick, air cannot enter the heap and composting processes will become anearobic</td>
</tr>
</tbody>
</table>
8. Materials that should not be put in the compost heap

- Material such as plants which have been recently sprayed with pesticides or herbicides
- Meat scraps, as these may attract rats and other pests
- Large amounts of plant material that is diseased
- Material with hard prickles or thorns (If these materials are chopped up, they can be composted but using them could be inconvenient)
- Persistent perennial weeds. These should be killed by laying out in the sun to dry, or even burning, to avoid them spreading. The dried material or ash could then be added to the heap.
- Non-organic materials such as metal, glass or plastic

Some farmers add chemical fertilisers to the compost heap to add additional nutrients or speed up the composting process. However, chemical fertilisers are not allowed in organic agriculture and thus cannot be used in compost for organic farming. Besides, when you select your composting materials well and prepare the heap carefully, your compost will have all the necessary nutrients.

9. Where should a compost heap be placed?

There are three factors to consider when deciding where to put a heap:

Transport
A compost heap should be placed in an area to where it is easy to carry the materials collected. Distance and access to the fields or garden where the compost will be applied are also important considerations.

Water
A compost heap should be placed in a shady, sheltered area to avoid too much evaporation. If you want to provide more shelter you could construct a bamboo roof over the heap, although this is not essential if labour is limited.

Water usually needs to be added to the heap so ideally a source of water should be nearby. If you do not have a well close by you should keep a container, such as a jerry can filled with water, near to the heap.

Pests and vermin
Pests and vermin such as rats, snakes, termites, flies and mosquitoes, may be attracted to a compost heap if they are already present in the area, so a heap should not be placed too close to the home.
10. Considerations before building a compost heap

Size
A good size for a heap is about 2 metres wide by 1.5 metres high. If it is much larger, air circulation will be poor. The heap should not be smaller than 1 by 1 metre. The heap length can vary based on the amount of compost required.

Water
If water is scarce, it may seem preferable to use available water directly for irrigation rather than for producing compost. However, compost added to the soil can improve its water holding capacity and, in the long term, will reduce the amount of the water required to irrigate the crops.

If water is scarce, you may want to consider building the heap in a pit. This method is preferred in dry areas because the heap needs less water. Trenches are dug and are filled in the same way as a compost heap. However, heavy rainfall or a high water table could make the pit too wet. This will then cause the composting process to turn anaerobic.

Labour
Building a heap should be timed to fit with periods of little labour. Some procedures, such as regular turning, are more labour intensive than others.

11. How to build the compost heap

Step 1. Prepare compost area
Select a site that does not flood. Choose a shaded and well-drained area. For drainage, bare soil is better than a hard surface such as concrete.

Step 2. Gather Materials
Gather all materials together at the compost area. The exact amount of each material used varies on what is available. The basic mixture should include:

- Green plant material of all kinds (around 50 %);
- Straw or similar carbon-rich material (20 - 30 %) (some rice husks can also be mixed in but the amount used should not be too much);
- Animal manure (best mixed as liquid) (20 - 30 %).

The green material will provide carbon and nitrogen, the straw mostly carbon, while the animal manure provides nitrogen and food for bacteria.

Mixing certain types of materials or changing the proportions can make a difference in the rate of decomposition. Achieving the best mix is more an art gained through experience than an exact science.
**Step 3. Piling the materials**

1. Make a heap in a series of layers - each layer is about 15 - 25 cm thick.
2. The first layer should be with coarse and woody materials such as thin sticks or twigs. This will ensure good air circulation and drainage.
3. Add a layer of more difficult to compost materials, such as rice straw, rice husks or leaves and stems of maize.
4. Add the animal manure (wet) to cover the plant material.
5. Add the green material that is easily composted, such as fresh grass, leaves, vegetables and fruit residues.
6. Ash and urine can then be lightly sprinkled onto these layers, to accelerate the process of decomposition.
7. Repeat all these layers except the first layer of coarse material, until the heap reaches a height of 1 to 1.5 m. The last layer is again green material.

Each layer should be laid down by starting at the edge of the pile so that the heap does not collapse. Care should be take to avoid pressing the materials too much or walking on the heap while building it. If the materials are too much compacted, this will reduce the airflow in the heap and cause the composting process to develop slowly or not at all. Air vents, made out of bamboo canes with holes cut in them and placed both vertically and horizontally throughout the heap, will improve the air circulation.

**Step 4. Water compost heap**

Water the whole pile well until all is sufficiently moist. (See section 12 on how to check moisture.)

**Step 5. Cover compost heap**

The heap should be covered to protect it against evaporation and heavy rain, as this will wash away the nutrients. Use bags, grass or banana leaves for this.

---

**The layers of a compost heap**

Grass cover
Green materials
Manure
Straw, husks, etc.
Green materials
Manure
Straw, husks, etc.
Green materials
Manure
Straw, husks, etc.
Coarse plant material
12. Use of compost starters

Some companies sell compost starters or compost activators, which they claim are needed to start the decomposition process (the heating) in the compost pile or to speed up the process. Such starters are often composed of high-nitrogen fertilizers, EM supplements or other preparations of micro-organisms. High-nitrogen fertilizers are not allowed to be used on organic crops so they can also not be used in compost for organic crops. The benefits of adding more bacteria from a package have yet to be proven. All the bacteria and other micro-organisms you need are already present in the air and on the soil under the compost pile and, especially, in the materials that you add to the pile. So, why wasting money on buying these micro-organisms from a company if you can get them from free from nature?

If you still want to give your compost pile a "boost", the best source of micro-organisms is finished compost. When fresh planting material (green leaves, grasses) is added, there will be enough nitrogen for the micro-organisms to start decomposing the compost quickly. Fresh manure is another good source of nitrogen and micro-organisms. In the Philippines, farmers use left-over rice that they leave to ferment for a few days. When the rice has become liquid (and is full of the micro-organisms that cause the fermentation) it is added to the compost heap.

13. Elements of composting

Aeration

Aeration means adding oxygen to your compost system. Microbes need oxygen to break down organic materials efficiently. Because they reproduce so quickly under ideal conditions, microbes may deplete the available oxygen through their activity. Therefore, it is important to aerate your compost. The carbon dioxide produced by the activity of the organisms also needs to be blown out by a flow of air.

You can aerate your compost by turning it. This directly incorporates oxygen into the pile. Other advantages of turning are:

1. **Turning helps destroy undesirables** such as weed seeds, insects and disease-causing organisms by exposing them to the lethal temperatures at the centre of the pile.
2. **Turning reduces odour problems.** Bad odour is an indication that there is an imbalance in your compost system. Turn the pile at the first sign of offensive odour or ammonia smells.
3. **Turning breaks up clumps and layers.** Clumping can cause pockets in your compost pile where oxygen cannot penetrate. These spots can go
"anaerobic" which means that microbes that don't need oxygen are doing the work of composting. Anaerobic microbes produce smelly gasses as a by-product of decomposition. Turning breaks up clumps and matted layers in the compost and allows oxygen to penetrate. Therefore, to create a better end product, break up all the clumps of material when turning the compost.

You can aerate by adding bulky items. Bulky items provide air channels so that oxygen can flow into and through the compost. Bulky items also keep the pile from settling and compacting, which could restrict oxygen flow. Bulky items include large leaves, chipped twigs, and straw.

**Moisture**

Microbes need moisture to thrive. At the ideal moisture level, 40-60%, a handful of compost will feel wet but water cannot be squeezed out of it. Some people compare this to the feeling of a damp sponge.

Compost should be kept moist, but not soggy. The activity of the organisms in the compost heap will slow down if the heap is too dry. But if the materials are too wet, they will compact and restrict the airflow through the pile. This leads to anaerobic (no oxygen) conditions, which slow down the degradation process and causes foul odours. When preparing your composting materials, make sure they are not too wet. Remember that it is easier to add water to the heap then to get water out!

It may be necessary to add water to the composting system to keep it moist. Add water when building and turning the compost pile. Judging the right amount of water requires a little experience.

**Pile temperature**

Compost pile temperature is a function of the biological activity within the composting system, and, to some extent, its exposure to the sun. When microbes flourish, they will raise the pile temperature through their metabolism, reproduction, and conversion of composting materials to energy.

The main reason to be concerned about pile temperature is that maintaining a minimum pile temperature of 55 °C for 3 days is desirable to destroy weed seeds or plant pathogens. To establish this highly efficient biological system requires the proper food balance (a mixture of nitrogen and carbon rich materials), sufficient pile size (approximately one cubic metre), oxygen and adequate moisture content (moist but not soggy).
If the heap gets too hot (over 65 °C), microbes operating at lower temperatures will be killed, causing decomposition to slow down. You could reduce the temperature by turning the heap. But don't worry, when the heap cools down the organisms will return!

**Particle Size**
Smaller materials have more surface area available for microbes to attack. Therefore, reducing the particle size of raw materials will increase the speed of the composting process. Size reduction also reduces the volume of the compost pile, thereby saving space. It is a good idea to cut small branches and twigs to a size of 5 - 6 cm before composting. Particle size can be too small. For example, sawdust can decrease aeration, reduce the rate of composting and perhaps cause anaerobic conditions leading to odour problems.

**14. Managing a compost heap**
To ensure successful compost production it is important that the heap is well managed after it is built. It requires water, turning, heat and a maturation phase.

**Water**
In dry conditions, the heap will need to be watered twice a week. A way of testing the moisture is by placing a small bundle of straw in the middle of the compost heap. When removed, after five minutes, it should feel damp. If it does not, water needs to be added to the heap.

There are a number of ways to reduce evaporation from the heap and therefore the amount of water that needs to be added to it:

- Cover the heap with banana leaves or grass cuttings
- Cover the heap with a layer of mud
- Do not turn the heap

If the heap becomes too wet it should be opened up and mixed with dry organic matter or allowed to dry in the sun before rebuilding.

**Turning**
Within three weeks of building the heap, its size will have decreased considerably. Turning the heap will replace the oxygen supply and will ensure that the material on the outside decomposes as well. To turn a heap, take it apart, mix the ingredients and rebuild it. The material on the outside of the heap is put in the middle of the heap. If the heap is dry, add water, and if it is wet, add dry matter. The first turning should be done after 2 or 3 weeks and the next after another 3 weeks.
The temperature and moisture of the heap should be tested a few days after each turning. A third turning may be necessary before all the material, other than twigs and thick stems, has decomposed.

Compost can be made without turning, but material left at the edge of the heap may not compost properly. Weed seeds and any diseased plant material present in this may not be killed. These materials should be separated from the finished compost and used in the next compost heap. Although turning is not essential it is recommended to produce better compost.

Taking the thatch off the outside of the heap before turning the heap

Heat
To test the heat of the heap put a large pointed stick into the heap, as shown, about 10 days after it has been built. The stick should feel slightly too hot to touch when removed after a few days. If it does not this may be because decomposition has not started. In this case, more air or water may be needed, or the heap may just need to be left for a while longer. If the heap is very hot, decomposition is happening but the excessive heat may kill the microbes. In this case, the supply of air will need to be reduced and more water added to cool it down. You should test the temperature of the heap from time to time using the stick method.

Placing a stick in the heap to test the temperature
15. When is Compost Ready?

Compost is ready to use after 1 to 12 months, depending on the size of the materials placed in the compost system, the degree of management, and the intended use. Compost that will be used as a top dressing or mulch can be applied after the least amount of time. Compost that will be used for growing plants in the field must be composted more thoroughly.

Signs that your compost is ready to use (finished compost):
- The pile has shrunk significantly, up to one-half its original volume;
- The original organic materials that you put in are no longer recognizable for what they were;
- If you are using a hot composting method, the pile will be no longer generating a significant amount of heat.
- The compost has a dark crumbly appearance and has an earthy odour.

Curing compost
If your compost is not ready for its intended use, it should be "cured" for a period of time. Curing is the process of allowing compost that has completed the hot phase of composting to finish the composting process. Even at this stage the heap should be kept covered to protect it from the rain and sun. Make sure the compost is moist (but not wet!) and aerated during the curing period, which can be as short as one month or as long as a year or more. However, if the compost is stored for too long before use it will lose some nutrients and may also become a breeding place for unwanted insects.

Final touches
Your composting system may not break down all the larger materials, such as corn cobs or wood chips, in the first batch of compost that you make. When you sieve your compost, any material larger than grid of your sieve can be removed (see picture). These materials are called "overs" which can go back into the compost system the next time that you build a pile. The overs provide bulk for aeration and microbes attached to these pieces will help jumpstart the new composting process.
Compost maturity tests
Most farmers don't do any testing of their compost. After a while, you'll get a "sense" of the look, feel, and smell of finished compost. For uses other than top-dressing or mulch, immature (unfinished) compost may stunt or kill plants. Therefore, a farmer should determine compost maturity before incorporating compost into the soil.

A simple testing method is to put your compost in a couple of pots and plant some radish seeds (or seeds of any other plant that germinates and matures quickly) in the compost. If 3/4 or more of the seeds sprout and grow into radishes, then your compost is ready to use.

16. How to Use Compost
The main use of compost is to increase and maintain crop yields by improving the ability of the soil to hold water and nutrients and keeping the soil healthy. It can also be used to prevent soil erosion by incorporating it into the soil.

There are many ways to use compost. Some of the most common uses of compost include:
- Soil amendment
- Mulch
- Compost tea

Compost as soil amendment
Use compost as a soil amendment to increase the organic matter in the soil. Organic matter is critical for plant development and growth. Tropical and subtropical soils are notorious for their lack of this material. Whereas temperate soils may have up to 50% organic matter, sub-tropical soils typically have 1% or less. Compost can help raise organic matter in soils.

Because tropical and subtropical soils never freeze, microbial activity continues year-round. As a result, organic material is used up quickly. Because of biological soil activity and year-round warm weather, farmers are advised to apply compost regularly during the year to increase soil organic matter content.

For best results, use only finished compost as a soil amendment. Compost used as a soil amendment should be applied and incorporated into the soil before planting the crops. Apply 3 - 5 cm of compost to the soil surface and work it in to the soil to a depth of about 8 - 10 cm. It should not be dug in any deeper as crop roots will not be able to take up the nutrients released by the compost. An effective way of using limited supplies of compost is to place small
amounts of compost directly into the planting holes. In dry areas these holes can be extended into pits or furrows, which can be used for trapping water.

Using unfinished compost as a soil amendment may stress plants, causing them to yellow or stall their growth. This is because the decomposition process is continuing near the plant roots and the microbes in the compost are competing with the plants for nitrogen.

As an alternative, use compost as a mulch, and you don’t have to worry about whether the compost is "finished" or not. This is because any additional decomposition is occurring above the root zone. The plants still benefit from the compost.

Annex 2 gives the compost requirements of some vegetable crops. Please note that these figures are indications only and applications will depend on soil type, years of organic management and quality of compost. It is good to make some field tests with different rates of compost to define the appropriate rate for a specific location or for a new crop.

**Compost as mulch**

The forest floor is a natural composting system in which leaves are mulch on the soil surface, and then gradually decompose, recycling nutrients and conditioning the soil. Likewise, garden debris such as leaves, grass clippings, or shredded branches can be used as mulch and allowed to compost on the soil surface. Over time, the mulch will compost in place.

Finished or unfinished compost can be applied as a mulch 8 - 10 cm thick on the soil surface. Do not incorporate into the soil. Keep compost mulch 5 - 8 cm away from plant stems. Nutrients will filter into the soil, without robbing nitrogen from the root zone. Compost mulch has similar benefits as regular mulch:

- Soil moisture retention
- Insulating soil from extreme temperatures
- Breaks downs to provide nutrients and organic matter for soil structure.

When using compost as a mulch it should be covered with a thin layer of straw. This will avoid loss of nutrients due to direct exposure to sunlight and heat.

One disadvantage to using compost as mulch is that it will not act as a barrier to weed growth. In fact, it may promote weed growth if not covered with a regular mulch material. Compost or mulch should be reapplied regularly to replenish the decomposing layer.
Spreading compost around the base of plants to suppress weed growth and improve soil structure

Compost Tea
Compost tea is a method of using your compost nutrients and beneficial microbes for foliar applications (spraying on plant leaves) of compost. Compost tea extracts nutrients and microbes from the compost and allows you to apply these beneficial components to plants. Therefore, compost tea acts as a weak liquid fertilizer, low in nitrogen but high in micronutrients and as a natural suppresser of diseases.

To make compost tea, follow this procedure:
- Step 1: Fill a woven bag (e.g., burlap) with finished compost.
- Step 2: Place the bag in a barrel or bucket of water.
- Step 3: Let sit an hour, and then remove the bag.
- Step 4: Use the resulting liquid, "compost tea" to spray plants. (But only use the tea when it does not have a bad smell!)
- Step 5: Empty the contents of the bag into the garden and use as compost mulch or soil amendment.

*: Using unfinished compost is not recommended due to possible pathogens and compounds which could damage plants. Only finished compost should be used.
## Annex 1

**Nutrient content of farm residues and animal manure**

*Average elemental NPK composition of some crop residues, green and animal manure as compost materials*

<table>
<thead>
<tr>
<th>Material</th>
<th>% OVEN DRY BASIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C/N</td>
</tr>
<tr>
<td>Rice straw</td>
<td>105</td>
</tr>
<tr>
<td>Wheat straw</td>
<td>105</td>
</tr>
<tr>
<td>Corn stover</td>
<td>55</td>
</tr>
<tr>
<td>Soybean stover</td>
<td>32</td>
</tr>
<tr>
<td>Cotton stalk &amp; leaf</td>
<td>-</td>
</tr>
<tr>
<td>Peanut straw</td>
<td>19</td>
</tr>
<tr>
<td>Peanut hull</td>
<td>-</td>
</tr>
<tr>
<td>Cowpea stem</td>
<td>-</td>
</tr>
<tr>
<td>Sugarcane trash</td>
<td>116</td>
</tr>
<tr>
<td>Cabbage</td>
<td>12</td>
</tr>
<tr>
<td>Tobacco</td>
<td>13</td>
</tr>
<tr>
<td><strong>Green Manure</strong></td>
<td></td>
</tr>
<tr>
<td><em>Sesbania aculeata</em></td>
<td>-</td>
</tr>
<tr>
<td><em>Sesbania speciosa</em></td>
<td>18</td>
</tr>
<tr>
<td><em>Vigna sinensis</em> (Cowpea)</td>
<td>-</td>
</tr>
<tr>
<td><em>Melilotus indica</em></td>
<td>-</td>
</tr>
<tr>
<td><em>Pisum sativum</em> (pea)</td>
<td>-</td>
</tr>
<tr>
<td><em>Acacia ferruginea</em> leaf</td>
<td>-</td>
</tr>
<tr>
<td><em>Acacia arabica</em> leaf</td>
<td>-</td>
</tr>
<tr>
<td><em>Desmodium trifolium</em></td>
<td>-</td>
</tr>
<tr>
<td><em>Calopogonium mucunoides</em></td>
<td>-</td>
</tr>
<tr>
<td>Water hyacinth</td>
<td>18</td>
</tr>
<tr>
<td>Azolla</td>
<td>-</td>
</tr>
<tr>
<td>Algae</td>
<td>-</td>
</tr>
<tr>
<td><strong>Animal Manure</strong></td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td>19</td>
</tr>
<tr>
<td>Sheep</td>
<td>29</td>
</tr>
<tr>
<td>Horse</td>
<td>24</td>
</tr>
<tr>
<td>Pig</td>
<td>13</td>
</tr>
<tr>
<td>Chicken</td>
<td>-</td>
</tr>
<tr>
<td>Duck</td>
<td>-</td>
</tr>
<tr>
<td>Human</td>
<td>8</td>
</tr>
</tbody>
</table>
## Annex 2

### Compost requirements of some vegetable crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Amount (kg/sao)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese cabbage</td>
<td>400</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>600</td>
</tr>
<tr>
<td>Broccoli</td>
<td>450</td>
</tr>
<tr>
<td>Eggplant</td>
<td>800</td>
</tr>
<tr>
<td>Chili</td>
<td>1250</td>
</tr>
<tr>
<td>Cucumber</td>
<td>600</td>
</tr>
<tr>
<td>French bean</td>
<td>450</td>
</tr>
<tr>
<td>Long bean</td>
<td>700</td>
</tr>
<tr>
<td>Tomato</td>
<td>400</td>
</tr>
</tbody>
</table>
Reference list

Useful publications about composting include the following:


The Preparation and Use of Compost; Agrodok 8 (1990) - Inckel, M. et al. AGROMISA, PMB 41, 6700 AA, Wageningen, The Netherlands


Field Notes on Organic Farming (1992) - Njoroge, J. Kenya Institute of Organic Farming, PO Box 34972 Nairobi, Kenya


10 Steps in Compost Production - PhilRice Farming Tips/Technoguides