A PRACTICAL GUIDE TO MAKING AND USING COMPOST

Based on a compost experiment at Imani Vocational Training Center

By Sylvie Chamberland and Michèle Provencher

A PRACTICAL GUIDE TO MAKING AND USING COMPOST

BASED ON A COMPOST EXPERIMENT AT IMANI VOCATIONAL TRAINING CENTER

Mtakuja village, Moshi area, Kilimanjaro district, Tanzania

By Sylvie Chamberland and Michèle Provencher

Students in Environmental Studies

Université de Sherbrooke

Québec, Canada

Translated by Teacher Robert Gayiya Akiki and Sister Gaudiosa Kessy

Printed by Ramco Tech, Moshi, Tanzania

December 2013

PREFACE

This guide is based on an experiment performed at Imani VTC, Mtakuja village, Kilimanjaro district, from September to December 2013. It includes both theoretical and practical knowledge. It is meant to help anyone who wants to improve soil fertility and increase food production at a low cost.

ACKNOWLEDGMENTS

The participation of the Sisters and the students of Imani was vital to this project. Peter Morrin, who is our supervisor, introduced the idea of making compost in the Kilimanjaro area and has supported us during our time at Imani.

Special thanks to Sister Gaudiosa Kessy and Teacher Robert Gayiya Rakiki for their precious contribution and the translation of this guide into Swahili.

We hope this can help families, communities, schools and villages to improve their quality of life and contribute to a sustainable society.

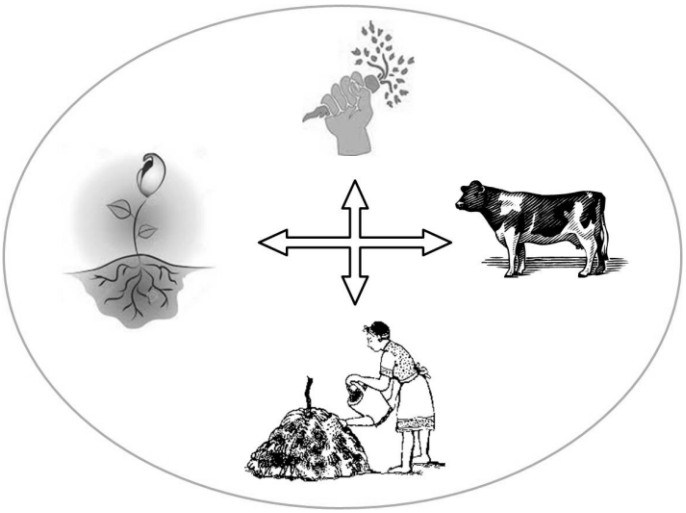
CONTENTS

WHAT IS COMPOST?

Compost is the result of the decomposition of a mixture of organic materials (animal wastes and plant matter) to produce a beneficial amendment for plants and soil.

WHY MAKE COMPOST?

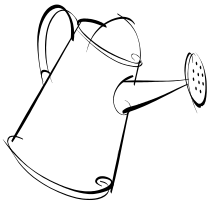
- Improves the soil structure by providing better drainage and aeration.
- Provides better drought tolerance by increasing the moisture retention of the soil.
- Provides nutrients for plants.
- Recycles waste materials and keeps the environment clean.

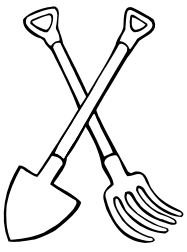


WHAT DO YOU NEED TO MAKE COMPOST?

TOOLS TO MAKE COMPOST

- Digging tools
- Chopping tools
- Watering can
- Wheel barrow, buckets
- Compost fork, hoe, shovel
- Cover material (plastic sheet, cement bags, etc.)
- Stick or pipe to allow for ventilation and to test heat
- Rubber boots and gloves for handling manure (optional)
- Compost thermometer (optional)



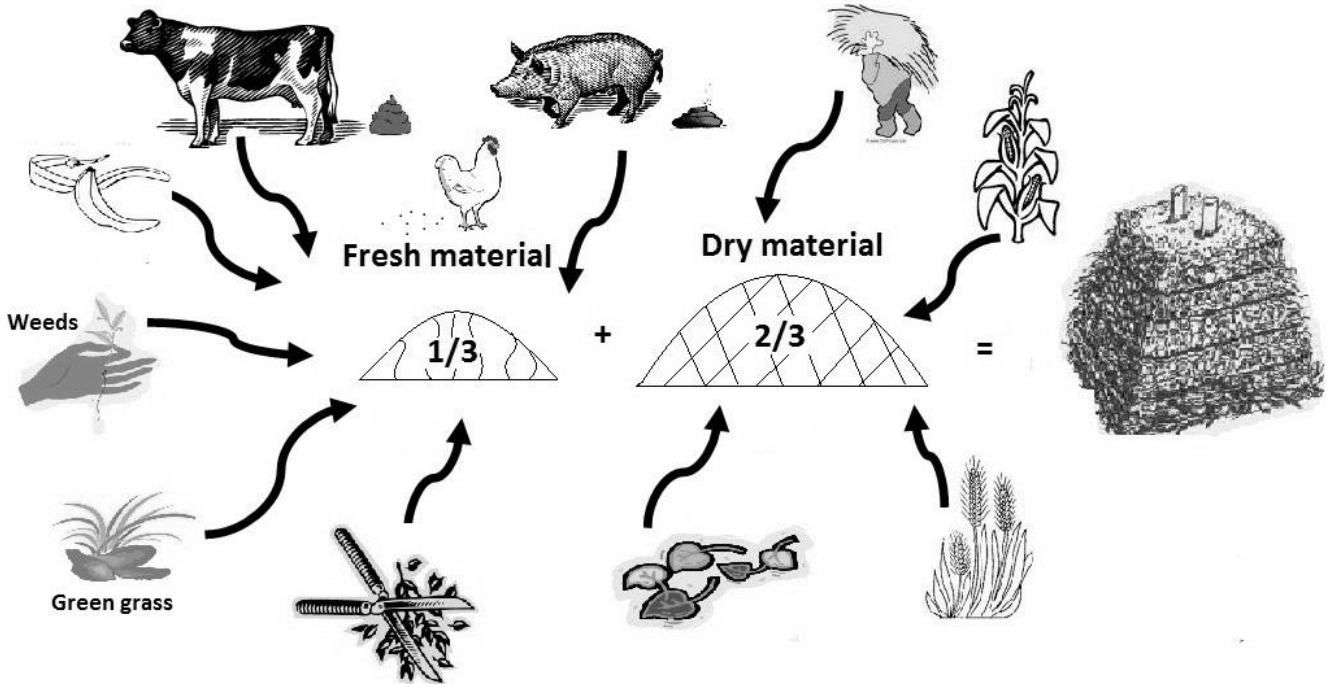


ORGANIC MATERIAL

The best proportion is 1/3 fresh material to 2/3 dry material.

Fresh	Dry
Manure, green grass and leaves, kitchen scraps	Leaves, straw, stalks, dry grasses

Other: Sufficient water. Ashes from plants, wood, hulls and/or bones (in very small proportion).



AVOID

Plants with diseases, dead animals, human feces, plastic, glass, metal and clothes, soap and detergents, oil, gasoline and batteries.

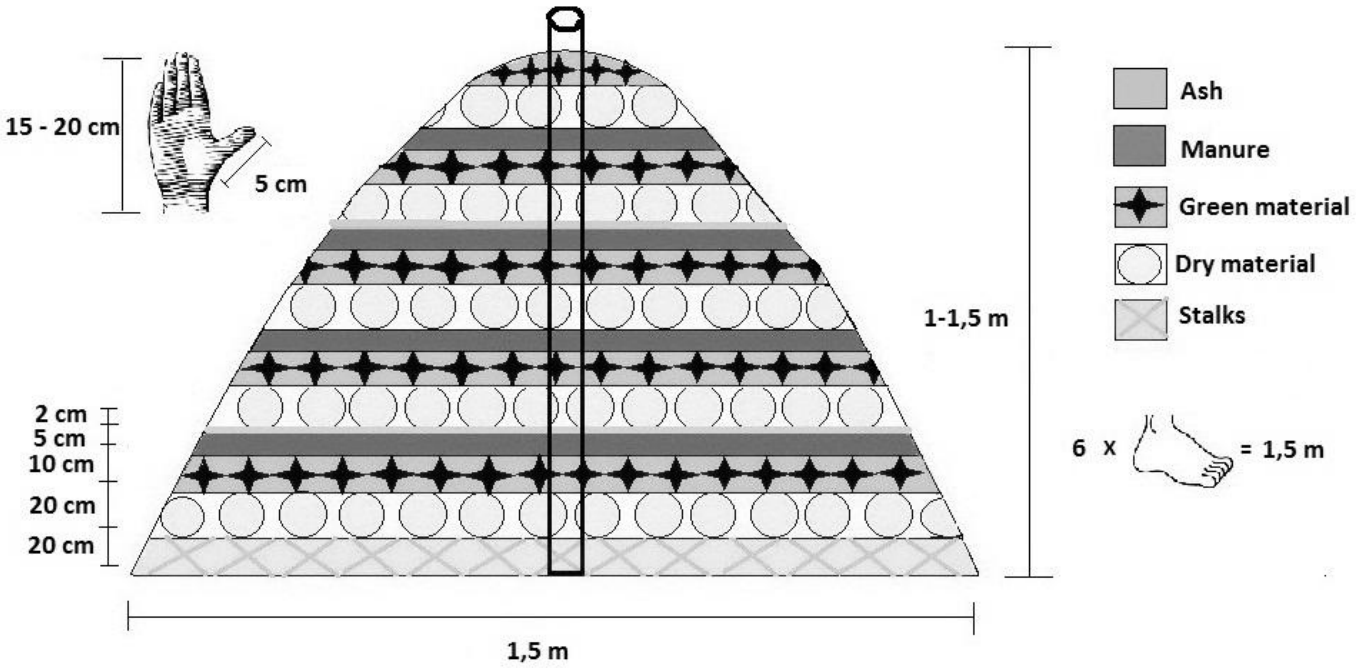
HOW TO MAKE COMPOST?

There are many ways to make compost. The two techniques presented here are the heap method and the pit method.

HEAP METHOD

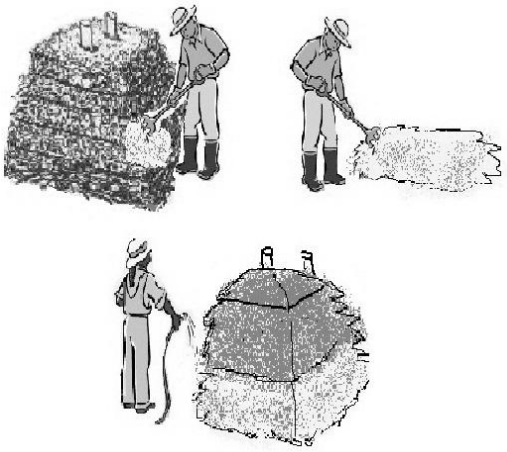
Building the compost pile

1) Choose a suitable area. This should be accessible to compost materials and protected from the sun and wind but should not be in a place where water will accumulate. Allow for storage of materials nearby if possible.
2) Mark the size of the compost area with sticks or rocks, allowing for two heaps, each measuring 1.5 m X 1.5 m minimum.
3) Bring all the materials to the compost site.
4) Chop stalks and other coarse materials into pieces smaller than 15 cm. Chop the other larger materials into small pieces (banana leaves, stalks, long grass...)
5) Start with a foundation layer of stalks at the bottom of the pile to a height of 10 cm. Sprinkle with water until moist but not wet.
6) Make the three basic layers as shown on the chart
    a. **Layer 1:** Put 15 to 20 cm of dry material and sprinkle with water until moist.
    b. **Layer 2:** Add 5 to 10 cm of green material (grass, leaves, kitchen scraps). DO NOT add water to this layer.
    c. **Layer 3:** Spread 5 cm of manure over the green material. You can also spread manure mixed with water. **If you do not have manure at all** you can make the compost with only the two first layers.
    d. **Additionally** spread a 2 cm layer of ash once in the whole pile.
7) Repeat the sequence of the layers 1-2-3 until you have a height of 1 – 1.5 m.
8) Put pipes or bamboo sticks in the compost pile to allow for ventilation.
9) Cover the compost. You can cover it with a plastic sheet, cement bags or other similar materials.



Turning the compost

Turn the compost by removing the outer material and transferring it to the second heap location. Add water if it is dry. Then continue until all the material from the first heap is transferred to the second heap. By using this technique the least decomposed material is moved to the inside of the heap and the decomposition becomes more uniform.



For faster compost turn your pile as follows:

1. Four days after starting your compost pile, turn it for the first time.
2. Then turn it every second day until your compost is ready. It should take at least three weeks to obtain **young** compost. If you want **mature** compost, you have to let it decompose longer than three weeks.
3. When the compost is ready you can apply it to the garden and start a new heap.

N.B. The frequency of turning influences the rate of decomposition. If you prefer to put less effort in the turning and you do not need compost quickly, you can turn the pile less frequently. For example, you can turn the compost pile every three weeks for three months until the compost is ready.

Storage

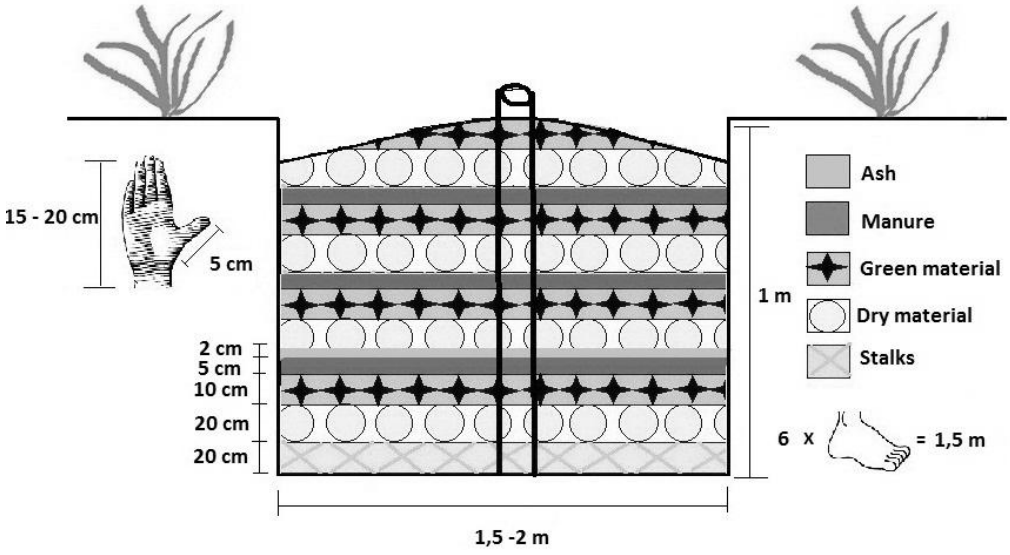
When the compost is ready it should be applied to the garden as soon as possible so it does not lose its nutrients.

- If it cannot be applied immediately store it in a pit, in a heap or in sacks somewhere near the garden until you need it.
- Cover and keep under the shade of a tree or in a shed.

PIT METHOD

Building the compost pile

1) Choose a suitable area. This should be accessible to compost materials and protected from the sun and wind but should not be in a place where water will accumulate. Allow for storage of materials nearby if possible.
2) Mark the size of the compost area with sticks or rocks. Dig three side-by-side holes at least 1.5 m X 1. 5m x 1.0 m deep.
3) Bring the materials to the compost site.
4) Chop the stalks and other coarse materials into pieces smaller than 15 cm. Chop the other larger materials into small pieces (banana leaves, stalks, long grass...)
5) Make a slurry by mixing manure with water and then spread it on the walls and the bottom of the pit.
6) Start with a foundation layer of stalks in the bottom of the pit to a height of 10 cm. Sprinkle with water until moist, but not wet.
7) Make the three basic layers as shown above.
    a. **Layer 1:** Put 15 to 20 cm of dry material and sprinkle with water until moist.
    b. **Layer 2:** Add 5 to 10 cm of green material (grass, leaves, kitchen scraps). DO NOT add water on this layer.
    c. **Layer 3:** Spread 5 cm of manure over green material. You can also spread manure mixed with water. **If you do not have manure at all,** you can make the compost with only the two first layers.
    d. **Additionally** spread a 2 cm layer of ash once in the whole pile.
8) Repeat the sequence of the layers 1-2-3 until you have a height of 1 – 1.5 m approximately
9) Put pipes or bamboo sticks in the compost pile to allow for ventilation.
10) Cover the compost. You can cover it with a plastic sheet, cement bags or other similar materials. The pit should always be covered to keep the moisture inside and to prevent soaking during the rainy season.

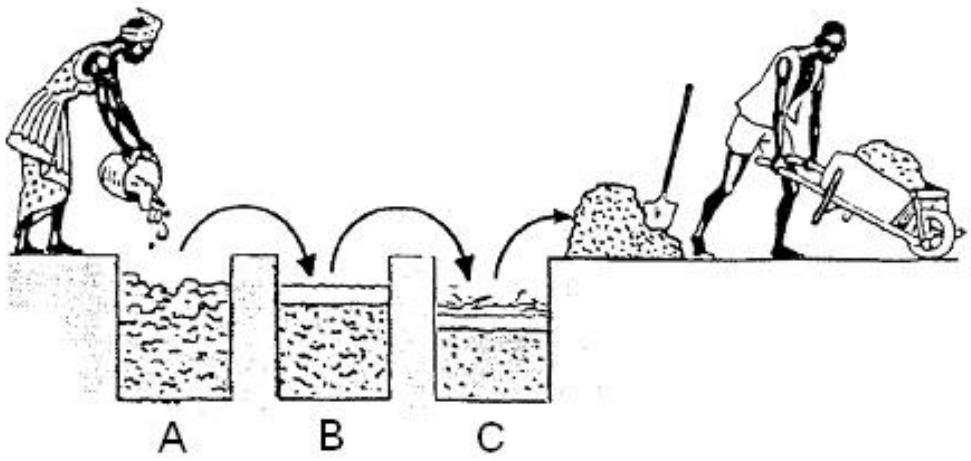


Turning the compost

When you turn the compost from one pit to another **first spread a slurry,** as mentioned above, into the second pit and **add 15 cm of stalks** to the bottom. Then bring the materials from the top of the first pit to the bottom of the second. If the material is dry sprinkle water on the layers until they are moist.

The turning then follows this sequence:

1. After one month transfer the material in pit A to pit B. Then start a new pile by refilling pit A with new materials as described above.
2. A month later turn the compost from pit B into pit C, and from pit A into pit B. Start a new pile by again refilling pit A.
3. After three months total, the compost in pit C should be ready to use in the garden or elsewhere. Continue the process as described above if more compost is required.



Source: Agromisa Foundation, 2005

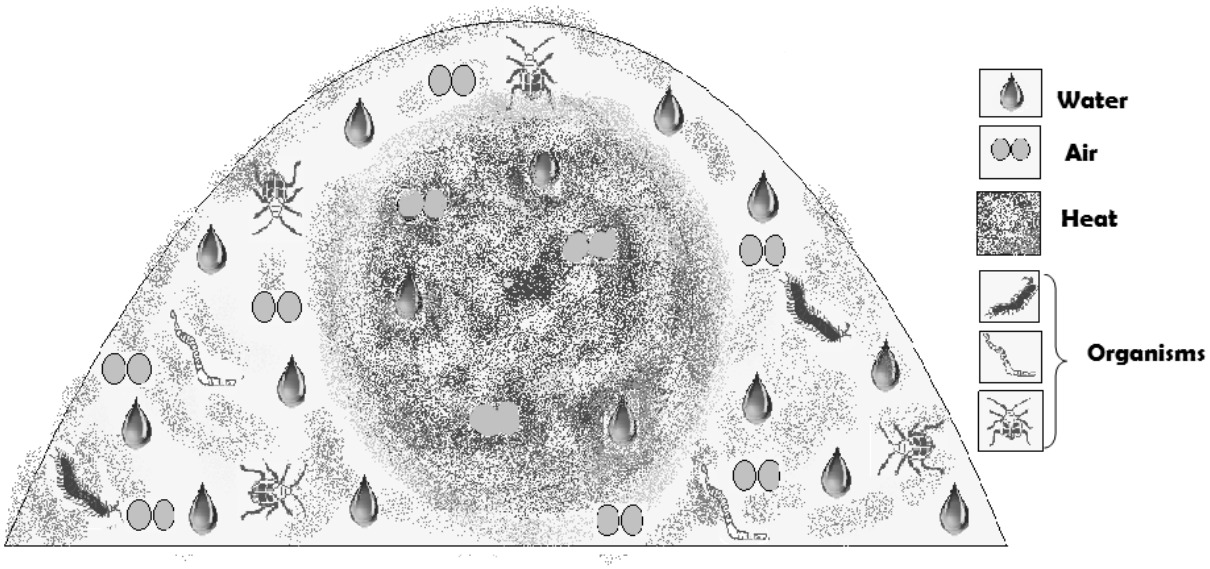
Storage

When the compost is ready, it should be applied to the garden as soon as possible so it does not lose its nutrients.

- If it cannot be applied immediately store it in a pit, in a heap or in sacks somewhere near the garden until you need it.
- Cover and keep under the shade of a tree or in a shed.

HOW COMPOST WORKS?

Decomposition occurs when microorganisms transform the fresh and dry materials into compost. To work efficiently they need water and air. The process creates heat which is very important because it allows all the raw material to break down.

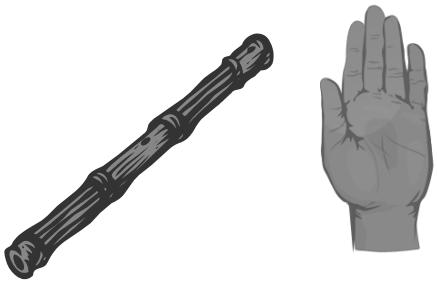


HOW DO YOU KNOW IF DECOMPOSITION IS GOING WELL?

Heat, moisture and the smell of the compost should be checked every second day in the first week after making a new pile. After turning, it should be tested every week until the compost is ready.

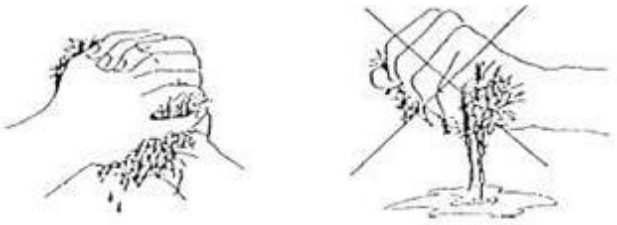
TEST FOR HEAT

Stick test: Remove the bamboo stick or pipe from the pile and touch it. If the stick is cool the material is not decomposing. If it is hot but still possible to hold, the temperature is good and the material is decomposing. If the stick is too hot to hold it means the compost is too hot for beneficial organisms to survive.



TEST FOR MOISTURE

Hand test: Take a sample of compost and squeeze it strongly with your two hands. If your hands do not get wet the compost is too dry. If your hands get wet or a few drops fall when you squeeze the sample the compost is moist enough. If a lot of water is pressed out it is too wet.



Source: Agromisa Foundation, 2005

TEST FOR SMELL

If the compost smells rotten it is an indication that something is going wrong.

HOW TO CORRECT THE PROBLEMS?

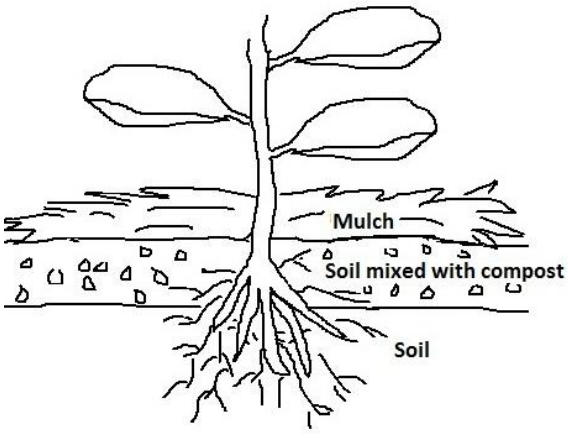
Problem	Solutions
Cool and/or dry	Turn the pile and sprinkle water, or manure mixed with water, between each layer of material. Then cover the compost pile after replacing the stick.
Too hot and dry	Open up the pile by turning the layers to the side and sprinkle them with water before reassembling the pile. Put more sticks for ventilation. Let the compost sit uncovered for a week or until you test it again.
Wet and smells rotten	Add dry material (like sawdust) and mix it with the wet material in the pile. Put more sticks for ventilation. Let the compost sit uncovered for a week or until you test it again.

HOW TO USE COMPOST IN THE GARDEN?

The more compost you add to your garden the more you will increase the soil fertility and the plant's productivity. Here are four techniques for using compost most efficiently.

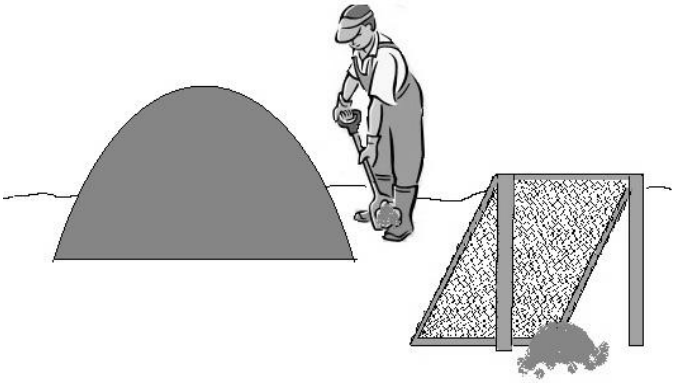
MULCHING PLANTS

- Spread 5 cm of **young** compost around the plants and mix it into the topsoil.
- Add a thick layer (5-10 cm) of grass, leaves, straw or stalks on top to keep in the moisture. This layer is called mulch.
- Examine the soil under the mulch often to see when you need to add water.



PLANTING SEEDS OR SEEDLINGS

- Make sure you use **mature** compost. Before applying it **screen the compost** to remove the bigger pieces that are not entirely decomposed.



- Spread at least 5 cm of compost where you want to plant your seeds or seedlings and then mix it immediately with the first 10 cm of soil. It should be done early in the morning or late in the afternoon so the compost is not exposed to bright sun.
- Plant your seeds or seedlings where compost has been applied and mulch with any organic material to prevent the loss of nutrients and moisture.

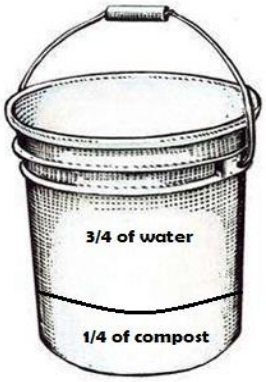
PLANTING AND FERTILISING FRUIT TREES

Source: Agromisa Foundation, 2005

- When you plant a tree mix 1 part compost with 2 parts soil and put it in the bottom of your hole. After planting the tree make a shallow depression around the stem and spread **mulch** on top. Water well.
- To fertilise trees that are already growing, make a ring about 1 meter in diameter around the trunk and spread 10 cm of compost mixed with the soil over this area. Cover with a thick layer of organic materials or small stones as a mulch.

COMPOST TEA

You can water young plants, transplanted seedlings, or trees with compost tea which will provide instant nutrients.



- Fill ¼ of a bucket with compost and fill the rest with water.
- Stir it often for two or three days.
- Dilute the solution with double the amount of water and pour 1 litre around plants or trees you want to fertilise. Be careful not to wet the leaves of the plants.
- Repeat this process every two weeks as needed.

BIBLIOGRAPHY

DEBORAH L. MARTIN AND GRACE GERSHUNY, 1992. *The Rodale Book of composting - Easy methods for every gardener.* USA: Rodale Press.

FAO, 1987. *Soil management: Compost production and use in tropical and sub-tropical environments.* Rome: FAO.

GEOFF LAWTON, 2010. *Permaculture Soils.* Ecofilms.

JUSTINE ANSCHUTZ, ANTOINETTE KOME, MARC NEDEROF, ROB DE NEEF, TON VAN DE VEN, 2003. *Water harvesting and soil moisture retention.* 2ND edn. Netherlands: Agromisa Foundation.

MADELEINE INCKEL, PETER DE SMET, TIM TERSMETTE, TOM VELDKAMP, 2005. *The preparation and use of compost.* 3RD edn. Netherlands: Agromisa Foundation.

R.V. MISRAM AND R.N.ROY., *On-farm composting methods.* Rome: FAO.

ROMEELA MOHEE, 2007. *Waste management opportunities for rural communities.* Rome: FAO.

SUE EDWARDS AND HAILU ARAYA., 2011. How to make and use compost. *Climate change and food systems resilience in sub-saharan Africa.* Italy: Institute for Sustainable Development (ISD), pp. 385-436.

***For further details on the project, see the forthcoming full report.**