LOW COST COMPOSTING TRAINING MANUAL

TECHNIQUES BASED ON THE UN-HABITAT / URBAN HARVEST-CIP COMMUNITY BASED WASTE MANAGEMENT INITIATIVES

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URBAN HARVEST

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U o N

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December 2005

Foreword

Here is a very useful book that tells you not only how to make compost but also why. It has emerged out of a lot of collaboration among several institutions that work with low-income urban and peri-urban farmers and composting groups during the last decade, since the mid nineties. Most of this work was done in Kenya, but it applies equally well to other tropical African countries.

It has been tested and used in draft form in courses for urban and peri-urban farmers by the Nairobi and Environs Food Security, Agriculture and Livestock Forum (NEFSALF) in 2005. This happened when farmers requested it, at a stakeholder forum on the research led by Mary Njenga of Urban Harvest, on groups using manure and compost in the city of Nairobi. This research was a brain-child of Urban Harvest, that brought together different institutions in the Consultative Group on International Agricultural Research (CGIAR), namely the International Livestock Research Institute (ILRI), the World Agroforestry Centre (ICRAF) and the International Potato Centre (CIP).

Other “big guns” in this enterprise are the United Nations Programme on Human Settlements (UN-HABITAT), which has been working on waste management with low income groups in the City of Nairobi and elsewhere for much longer than a decade. Harrison Kwach has been active in this institution.

The University of Nairobi’s Department of Soil Science

is another big player in this, and Professor Nancy Karanja who headed that Department for a while has also been working with the other institutions to further the cause of better soils and how to make them.

A book for urban farmers and groups who want to manage urban waste better in order to make a living is a good outcome from these big institutions. In my view it reflects the intention of these institutions to meet the Millennium Development Goals and Targets.

Hopefully, urban groups and communities will use it to increase their incomes by producing a useful, marketable product that also contributes to food security through better soils and higher outputs. Hunger and poverty may thereby be reduced. Improving the lives of slum dwellers can be reached partly in this way, but also because it will clean up the waste in their surroundings.

Diana Lee-Smith, PhD.
Regional Coordinator SSA, Urban Harvest, 2002 – 2005.

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1.0 INTRODUCTION

Organic waste constitutes the highest percentage of the waste flow in most developing countries. While most of the waste types (glass, plastics, scrap metals, etc) have ready markets for recycling and reuse, however very limited activities on recycling of the organic materials is practiced. This is hampered by:

- High perishability of this materials thus requiring proper handling.
- Lack of awareness on appropriate composting technologies
- High competition from more familiar synthetic fertilizers and ,
- Lack of supporting policies

2.0 WHAT IS COMPOSTING?

Composting is a controlled process that breaks down organic fractions of waste into stable substances whose chief use is soil conditioning. This process is as a result of the activities of micro-organisms that live in nature and are responsible for the natural maintenance and return of nutrients back to the soil which ensures sustainable soil productivity. Composting making is one of the most effective processes for recycling organic wastes intended for use in agriculture. It is a natural process that turns the waste material into a valuable natural fertilizer.

2.1 What is Required Before Starting Compost Making?

To establish a composting facility a number of items are required and a brief of some of them is given below:

- ***Composting site***

The most important requirement for composting is the space. A flat piece of land under shade is ideal for composting. The space should include a sorting place, proximity to a water source need to be taken into consideration when selecting this site.

- ***Personnel***

Composting is a labour intensive activity and labour requirement need to be planned for carefully taking into each step. Consultation with someone with good knowledge in composting maybe necessary.

- ***Implements***

Various types of equipment which include wheelbarrows, pangas, shovels, sieves and, packaging materials are required before this activity is started.

2.2 Feasibility of theComposting Enterprise

To determine whether this activity would be a viable enterprise considers carrying out the following;

a) Market survey, perception and willingness to pay, social-economic data on demand and seasonality.

b) Waste or organic matter supply: Quality of the waste, distance to the site, any likely competition and cost/value.
c) Health and safety conditions
d) Source of initial capital and the size of the compost facility

3.0 STARTING UP COMPOSTING

Sustained supply of green (wet) and dry waste types is very important. These two waste types could be composed of the materials listed below:

i) Green (wet) wastes
- Food remains including egg shells, bones (without meat or fat)
- Fruit and vegetable peelings
- Freshly cut grass, tree leaves, weeds etc
- Tea leaves, coffee residues
- Stinging nettle, comfrey (if applicable)

These materials are considered as high quality because they contain high amounts of nitrogen.

ii) Dry wastes
- Dry grass, tree leaves
- Saw dust from timber workshops
- Straw, maize stalks etc

These are having high carbon contents and they regulate the rate of decomposition. Wood ash may be used if available to act as a source of major elements such as potassium calcium, magnesium etc.

Having at least one of the following materials in small quantities is also a pre-requisite: Coffee pulp, animal manure such as of chicken, goat, cow sheep, rabbit and also dried blood, bone and fishmeal. These materials are required as they act as a catalyst, which help speed up the process.

The following materials should NOT be used for composting

1. Charcoal ashes – high carbon dioxide content interferes with oxygen supply in the composting system thus slowing down the process.
2. Dog and Cat manure – contain harmful pathogens.
3. Any organic matter likely to be contaminated by pests or disease.
4. Eucalyptus and cassia tree leaves or any biomass suspected to contain substances toxic to microbes.
5. Meat and animal fat.

3.1 Handling/collecting Waste for Use in Compost Making

Most organic waste generated from household, markets and agro-industries (e.g. breweries) is usually mixed (i.e. biodegradable and non-biodegradable) and this makes their use for compost-making a bit difficult. The most economical way therefore is to collect waste from targeted sources where the material is sorted at source. To achieve this prior knowledge of the generators, collectors of the refuse are very useful. They may require some assistance or training from you to enable them render

good service in terms of the quality of the organics to be composted.

4.0 COMPOSTING METHODS

Different composting methods are available and the most commonly used are presented here below together with the requirements of each.

4.1 Windrow Method

This is one of the commonly practised systems for composting in the urban centres in Kenya because:

- It is cheap and easy to operate
- Uses local equipment and adjustable size
- Can be operated in the open in most climates
- Easily adjusted to cope with changing types of material quantities
- Suitable to small and large community schemes

The main drawback to windrow system is that control of the composting process is not as effective, which means that it takes longer to mature.

Windrow method of composting involves the following steps:

Steps 1: Preparing the land

In the windrow system, a pile of compost is made and then turned. The turned pile is placed in an adjacent

space, whilst a new pile is started in the original area. This is a continuous process: every time a pile is turned a free space is required. Prepare two sites, the first one for construction of the compost heap while the second one will be used for turning. The land will need to be cleared of all vegetation and the soil dug slightly to loosen it up so as to allow any excess water to drain away.

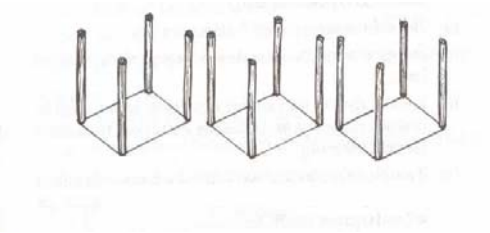

Figure.1: Site for preparation and turning compost heap

Step 2: Setting up the pile

Measure a space of land preferably 1.5m by 1.5m at one edge of the cleared and loosened land. Evenly spread a layer of larger dry wastes (small tree branches, straw, banana leaves etc.) up to a thickness of up to 15cm. Add a layer of smaller dry vegetation (chop/shred if necessary) on top of this, to make up the layer to about 30cm. Sprinkle water to moisten. The dry layer is important, as it will allow air to pass freely through the pile. The dry layer is then followed by a layer of 30cm of green wastes. If possible, the green waste layer should then be covered with 2.5cm of coffee pulp or animal manure or finished compost. Precaution must be taken when balancing these two important layers, as these are the layers that determine the decomposing rate of a

compost pile. Moisten the pile, and then repeat this process of layering until the pile is about 1.5m high. Remember to water each of the dry layers.

Once the pile has been built, insert a long sharpened stick diagonally right through to the centre of the pile and leave the process to start. The stick acts like a thermometer, and within the first 72 hours the pile should have moved through cryophilic (20^0C), mesophilic (20-45^0C) to thermophilic temperature (above 45^0C). This is indicated by steam seen flowing from the pile and hotness of the part of that stick that was driven into the pile on completion of layering (take the stick out of the pile every week, and feel it!). If the stick is hot, the process is going well. If the stick is not hot, the pile may need more or less water, and/or aeration. If the stick shows signs of a white substance on it, the pile will need more water added to it. To increase the amount of air, the pile should be turned more frequently.

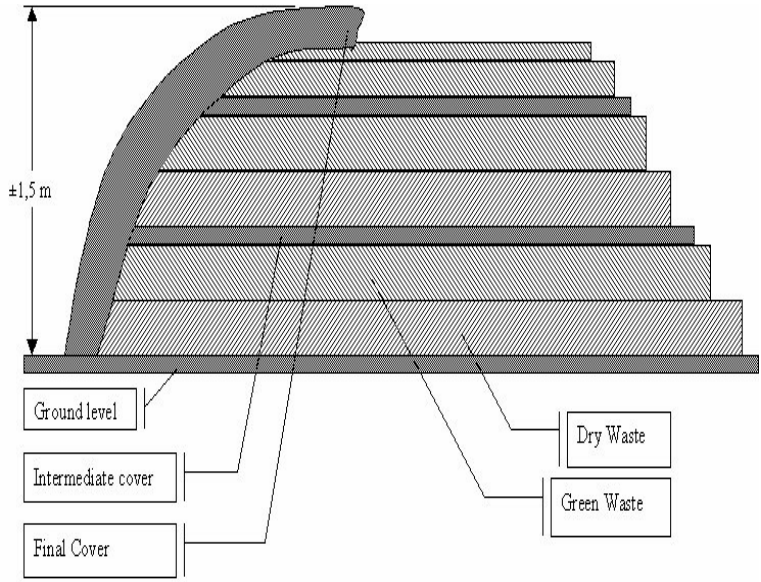

Figure. 2: Cross section of a windrow compost pile

Step3: Turning/ aeration

Within one week, the pile shall have reduced by almost a quarter. This will reduce the air spaces in the pile and most moisture will have escaped due to high temperatures. If the pile is not turned to improve these conditions the process would change into an anaerobic process, which is slow, time consuming, and unhygienic. Turning also promotes uniform decomposition of all the wastes. Well-balanced compost pile will always keep gaining higher temperatures, which is again detrimental to micro-organisms (60^0C and above) survival, thereby slowing down the composting process. The turning process is necessary on a weekly basis till between 6 – 8 weeks when the temperature of the pile becomes cool

which is an indication that the entire organic fraction has decomposed.

Figure. 3: Turning compost

Step 4: Processing mature compost

Controlled drying may be necessary before the compost is sieved, weighed and packed either for farm use or sale. The final product should be both easily handled and visually accepted (e.g. should not have contaminants such as pieces of glass etc.).Typical screening sizes and grading of compost;

Fine compost (first grade) which is less than 15 mm
Mulch standard compost (second grade) with particle size 15 to 40 mm

Return to the process materials that are greater than 40 mm

Figure .4: Composting yard

4.2 Aerated Static Pile

This method regulates heat and oxygen supply with an aim of producing safe compost within a shorter time period. Apart from waste materials and other conditions stated under windrow system, aerated static Pile method also require two hollow perforated wooden or pkamrylastic rods for aerating the pile (2” in diameter).

The procedure is as follows:

Step 1: Site preparation

The sites should be under shade preferably 1.5m x 2m. Loosen the soil to encourage free movement of micro-organisms.

Step 2: Setting up

Lay one perforated pipe along the centre lengthwise of site, spread dry organic material up to about 10 cm thickness then moisten DO NOT make it wet. Follow with 15 cm of green waste. Add 2 cm of wood ash if available, 2 cm of animal manure or Coffee pulp or finished compost and moisten. Repeat the whole process of layering until the pile is 1.5 m high. Be sure to keep moistening every section as indicated above. Push through at the centre the second rod to meet the one underneath. Cover the whole pile with either cotton or sisal rag or any dry plant residue e.g. grass, banana leaves etc to act as heat insulator leaving only the ends of both horizontal and vertical rods open. With well balanced dry versus green waste materials the pile should gain the thermophilic temperature with the first 72 hours.

Step 3: Turning

After two weeks of microbial activities the pile will now start going down. This will be as a result of low moisture content and compaction within the pile. To turn the pile, you will first remove the two rods. Place the horizontal rode along the length of the next space, unwrap the pile,

remove the outer layer and evenly spread (on the space to cover the rod) up to 15cm thickness remember to moisten with water any dry and or whitish “firefung fungus” stuff. Scoop and uniformly spread the whole pile while moistening as necessary till the pile is complete. Insert the vertical rode right through the centre and cover the pile with the rags like before. Within the next 72 hours the pile will regain the thermophilic range of temperature. Repeat this procedure after two weeks in the third space. If the composting process is properly monitored the compost should then be ready within six weeks.

Step 4: Processing mature compost
(As in windrow system)

Advantages of this method are:

1. All the waste materials are kept in one place, hence maintaining the hygienic standards of the surrounding.
2. It keeps the composting materials from excess water during rains.
3. Controls heat loss by insulating the pile thereby promoting evenly biodegradation.

4.3 Box Composting

Although it has a lot of similarity to windrow method, box composting is done in a container. All the ingredients, size of the pile, layering and turning frequency are handled similarly. However, box composting would be more ideal to specific environments that are prone to animal invasion, congestion or lack of

space and is feasible on roof tops within urban settlements.

Step1: Construction of the box

Using either wooden planks or wire mesh, construct a box preferably 1.5m x 1.5m x 1.2m dimensions (this can hold up to one tonne of raw waste, but would reduce by almost half at the end of composting phase). The box may be left open on both ends. Other containers such as plastic bins or wooden boxes could be used for this purpose. Corrosive containers such as oil/petroleum drums should be avoided.

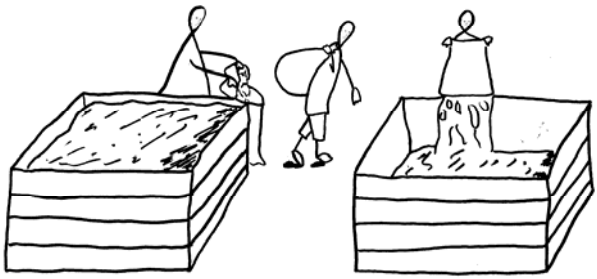

Figure 5: Composting boxes

Step 2: Setting the box Pile

Spread evenly a layer (2.5cm thickness) of either finished compost or forest top soil and moisten with water. Follow with 15cm dry waste, moistened with water, 15cm of green waste cover with any of the following; layer of animal manure, finished compost, coffee pulp, then moisten to end the first course of layering. Repeat this sequence till the box is full. As in the windrow method above, make sure the top of the box has a light 2.5cm cover of either finished compost/or animal manure to control moisture and oxygen loss.

Step 3: Turning

Like windrow composting the content should be turned after seven days. To achieve this make sure that you have an extra container of similar size or dismantle the box and reconstruct it on the space close to the pile (which should remain intact despite removal of the box) while maintaining same dimensions. There is a likelihood of losing some parts of the box, therefore be advised to have a budget for such an eventuality so as not to stall the process. In the new box, scoop in the whole pile while observing all the conditions and procedures as in windrow method above. This sequence should continue on weekly basis for the next six to eight weeks to produce ready compost.

Step 4: Processing mature compost

Ready compost is sieved and weighed in bags ready for storage, farm use or sale to the farming communities as in windrow.

4.4 Pit Composting

As demonstrated by the law of nature, in a forest environment for example, dead organisms keep piling one on top of the other, and over a period of time those underneath decompose and turn into humus. In this method, organic wastes are piled into a pit daily and as time goes on those underneath decompose into compost. The method is suitable for use in institutions like hospitals, boarding schools, children's homes, etc, where daily production of organic waste is high. The process uses the following procedures.

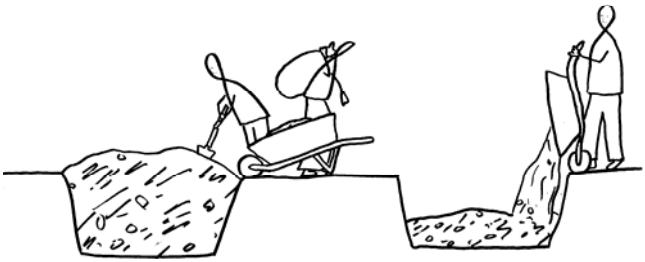

Figure 6: Composting pit

Step 1 Land preparation

Identify a space of land in preferably under shade and dig a pit of 2.5m x 2.5m x 1m dimension.

Step 2: Layering the waste

All the organic waste should be evenly spread out in the pit. At the end of each day cover your waste with a thin layer of soil and remember to moisten with water where necessary. This process should be continued on daily basis till the pit is full. The full pit should be covered with soil and be left to decompose. The decomposition period will vary between 6 to 10 months as it is an anaerobic process. Ready compost could be removed for use in the garden, however if the pit was of the size of a garden bed it could be planted with crops directly. To ensure health and safely the materials being decomposed in the pit need to be carefully sorted to exclude inorganic.

4.5 Vermi-composting

This is the combination of biological processes, designs and techniques used systematically and intensively to culture large quantities of certain species of earthworms and at the same time to speed up stabilization of organic wastes materials. The waste are eaten, ground and digested by the earthworms with the help of aerobic and some anaerobic micro flora. They are thereby naturally converted into finer, humified microbially active faecal material (castings), where important plant nutrients are held in a form much more soluble and available to plants than those in the parent compound.

Generally, earthworm culture can perform at the same time three major and useful functions:

- reduce the pollution potential of organic waste;
- make good use of organic residues by their bioconversion into casts (a plant medium); and
- produce more earthworms; this can either be useful to extend the vermi-composting areas, or as a high quality protein meal, suitable for inclusion in various domestic animal rations.

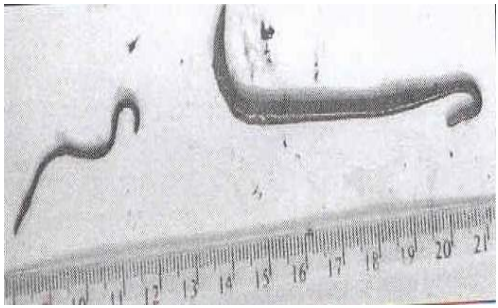

Fig 7: *Earthworm species that are well-suited for vermi-composting of agricultural wastes: Kenyan pigmented worm (left) and tiger worm (right)*
(Savala *et al.*, 2003*)*

What is Vermi-compost?

A humic substance produced through an accelerated composting process that, when applied to the soil , results in improved chemical, physical and biological properties and better conditions for plant growth.

Component of the system

To perform successfully and produce an efficient and valuable plant growth medium, four principal components are needed for vermi-composting:

- Proper substrate e.g. animal manures, vegetable, organic urban and industrial residues.
- Correct environmental conditions-temperatures =30°C, Oxygen supply and no pesticides
- Appropriate earthworms with suitable populations
- Designs and operations to be implemented such as heaps, pits , boxes , bins or containers stacked in racks)

Vermi-composting process

Different systems can be used to prepare vermi-compost just as described above in conventional compost making. Steps to be followed in bed/windrow systems are described here below:

Steps 1: Bed construction

Prepare a bed with a concrete, wood or plastic sheet bottom and construct walls 20 to 30 cm in height using wood, logs, stones or any appropriate material especially if recoverable from the waste. Place a wooden board across the bottom and line with chicken wire for better handling and aeration.

Step 2: Add coarse material

The layering procedure is similar to the windrow composting .Place a 10 to 15 cm layer of coarse organic materials such as banana trash, maize Stover, coffee husks and other crop/plant residues on top of the chicken wire. The materials must not contain chicken manure as the uric acid is harmful to the worms. Composted poultry manure is however suitable as feed.

Step 3: Add fine material and water

Place a 5 to 10 cm layer of manure on top of the coarse material. Cattle, pig, sheep and goat manure is suitable. Green manure, such as tree leaves or grass cuttings may be used as well. Mix some of the fine materials such as grass cuttings, bean threshing, maize or wheat bran and brewery waste are preferable. If the fine material is in short supply, then apply it to specific areas where the earth worms are placed in the compost pile. Moisten the organic materials prior to the introduction of the worms. Sufficient water should be applied so that pockets of dried material remain. Wet materials such as banana trash and fresh manure need little watering while dried materials may require as much as 30 liters per m^3 of bed.

Step 4: Releasing worms in the compost/pile

Release the earthworms into the moist bed. Avoid handling them individually , rather place small handfuls of compost rich in earthworms (clusters) in to “wells” or “holes” spaced about 0.5 m apart.

Step 5: Covering the bed/pile

Cover the bed with plant materials or dark polythene sheet. Inspect the bed regularly during composting for moisture and plant residue/leaves used to cover the bed since the earthworms do consistently eat the older organic materials. Earthworms do not like direct light, control this by keeping the beds covered. Ants will usually leave the bed if the underlying chicken wire is violently and repeatedly shaken.

Step 6: Feed the bed

Organic materials may be applied to the bed regularly as additional layers or in discrete locations. A common practice is to periodically apply additional organic wastes by burying them in different positions within the bed. Vermi-compost is ready after approximately 3 to 6 months. Additional feeding prolongs the vermi-composting process but yields larger amounts of vermi-compost. Withhold feed about three weeks before the vermi-compost is collected to obtain a finer and more homogeneous and finished product.

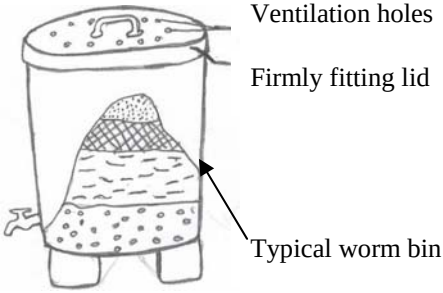

Figure 8: (a) *Vermi-composting bin*
(b) Earthworms and the castings

Step 7: Recover worms and vermi-compost.

When the vermi-compost is ready, worms are harvested and compost processed. Place a fine feed material on the bed prior to vermi-compost harvesting to facilitate the collection of worms from subsequent "batches". Wheat bran, brewers' waste or fresh cattle manure are particularly good feeds that lure earthworms. Collected worms may also be fed to fish and poultry. Spread vermi-compost in the sun to collect other pockets of worms by hand as the vermi-compost dries.

Once worms are collected, the vermi-composting cycle may be repeated. The finished vermi-compost is uniform, dark and fine textured. It is best used as the main ingredient in a seedling or potting medium after passing it through 5 or 10 mm mesh.

4.6 Hints on How to Prepare Liquid Fertilizer

Various types of green (fresh) organic materials are found around and the majority of them could be used to prepare liquid fertilizer. These materials may be found as markets and household wastes, on agro-industrial and horticultural wastes. In the gardens, crop residues, some of the weeds and live hedges could also be exploited for this purpose. Steps to be followed so as to obtain a concentrated extract that is high in plant nutrients as well as other special elements are described below:

1. Place fresh, chopped organic materials into a container that can be tightly closed and has an opening bored near the base. The size of the

container will be determined by the quantities of the compost being prepared or the amount of organic material available or the space where the process is to be carried out.

2. Put the composting container on a stand to raise it from the ground, so that a jar or bottle can be placed underneath the hole or tap. There are many types of containers that could be used, the majority of which are easily recoverable from the waste e.g. a plastic jar with a screw-top lid.
3. When the composting container is completely full of the chopped organic materials, place heavy weights such as stone or logs to press the material tightly in the container.
4. Cover the container tightly either with its lid or using polythene sheeting, then place it in a safe place with minimal disturbance.
5. After about two to three weeks, the organic materials will decay and begin to "run" as a liquid
6. A black liquid will start to ooze from the leaves and drip through the hole into the jar underneath.
7. Leave to drip until all the juice is collected at the bottom. To obtain the liquid, tilt the barrel forward to collect the last of the black liquid into the collection container and when finished screw the lid on to the jar and store in a safe cool place for use as a plant foliar feed.

   NOTE- the solution obtained contains high levels of plant nutrients especially nitrogen and as such if applied directly on the crop it may burn the leaves. As a rule of thumb 1:10 dilution is

recommended but test to meet the specific crop requirement.

8. Put the sludge from the bottom of the composting container on the compost heap, or use it for mulching around your vegetable garden.

Fig 9: (a) Biomass for extraction of liquid fertilizer
(b) Simple extraction set up with liquid fertilizer in bottles

5.0 MINIMIZING HEALTH RISKS ASSOCIATED WITH COMPOST MAKING AND USE

1. Use of protective clothing especially when picking and sorting wastes and sieving the compost. Some of these include; gumboots, gloves and scarves/masks. Their use would protect the body from coming into contact with hazardous chemicals or heavy loads of pathogens as well as reducing accidents such as cuts and inhaling contaminated gases.
2. Source sorting to remove non-biodegradable and hazardous waste.
3. Control of odours and flies through covering compost pile with a layer dry organic material that allows air into the heap.

4. Adhering to prescribed composting conditions so as to ensure that air and moisture are present in sufficient quantities so that the process takes the shortest time possible and does not emit undesirable smells.

6.0 WHY COMPOST?

6.1 Function of Compost in Soil

Compost adds balanced nutrients to soil in an easily assimilated form, and helps improving soil structure by lightening heavy clays and improving water retention properties in porous sands. This allows air and micro organism to pass more freely and lets roots grow easily into soil. Compost also absorbs large amounts of water from the air: twice as much as garden soil; nearly four times as much as clay; and eight times more than sand. The water is held in reserve so that plants can use it during dry seasons. Compost contain the nutrients nitrogen, phosphorus and potassium that are found in chemical fertilizer and even trace elements (such as zinc, iron and magnesium) that are not, and which are useful to the roots of growing plants.

6.2 Use of Compost in Gardens and Farms

Compost is excellent for growing quickly maturing crops like vegetables and flowers, and when combined with intensive gardening, can increase production by as much as 3 to 5 times. Rates of application depend on the quality of your soil and the size of the garden.

Compost can and should be regularly dug into the soil in the gardens, pots, vegetable beds, etc, to add nutrients and keep plants growing healthily. It may be sieved a through 0.5 cm sieve to be used for planting seeds in boxes.

You can as well top dress your garden with a 2.5-5cm of compost and cultivate it into the upper layer of the soil. Do this regularly after planting and you will notice the improvements within a few seasons.

6.3 Planting Trees

To plant tree seedlings, compost should be mixed evenly at the bottom of the hole where the roots will sit and water well. Trees planted in this hole will continuously send their roots down towards the nutrients making them grow firmly and be resilient to wind and storms. Compost can also be added around tree seedlings holes as top dressing, and with the rains the nutrients will sink down to the roots. The compost will keep enough moisture for a longer period, helping the tree to resist drought, pests and diseases.

6.4 Using compost on Larger Areas of Land

For planting crops like maize on a large scale, a hand full of compost can be placed in the hole together with the seeds at the time of sowing. However, since soil quality and texture vary from place to place, you could also carry out tests on application rates to find out what quantity is best for your type of soil.

7.0 COMPOST QUALITY

A potential client such as a farmer or landscaper will certainly ask about quality, handling and rates of application for specific crops or plants. One of the best ways of validating the quality of the compost is by directly applying it on your own vegetable/flower gardens or to plants grown in pots. This is a very practical way to determine the compost performance and in some cases one may manage to identify types of plants and rate to be applied, thus enhancing the ability to meet customers' needs. It is however recommended that laboratory analysis is done on selected batches of the compost from time to time to ensure that a high quality product is maintained. During such tests, checks on other contaminants such as heavy metals and pathogen loads should be carried out.

Table 1. What should be considered in compost quality?

Parameters	
Plant nutrients	
pH (in H_20)	>7.0
Nitrogen (g/kg)	17
Phosphorous (g/kg)	16
Potassium (g/ kg)	21
Heavy Metals	
Arsenic (mg/kg)	10
Copper (mg/kg)	80
Cadmium (mg/kg)	3
Lead (mg/kg)	150
Zinc (mg/kg))	300
Mercury (mg/kg)	1

World Bank standards (1997)
Remarks: Recommended standards for composts

8.0 MARKETING COMPOST

If you are an existing enterprise, how do you sell your products currently? Do you have a list of your current customers? Do you have a way of keeping in touch with them in case they want more compost? If you are a new

enterprise, have you identified who you think could be your potential customers? You would find this information by visiting some of the shops, which supply seeds and farm inputs, asking what kind of fertilizers they sell, and who they sell to. Initially your main markets will be small-scale farmers and households, which have gardens within the neighbourhood.

(a) Exploring Markets

To do this calls for the following considerations;

- Investing in awareness/promotion of the product.
- Maintaining a high quality product (compost) with unique quality and packaging.

Options for promoting compost product include:

1. Visiting agro-retailer shops to make them aware of the compost and also of the prevailing customers needs.

2. Visiting seed, tree and flower nurseries to convince them to sell your compost to their customers.

3. Placing posters in environmental institutions or public places for well wishers who may want to support your product.

4. Participating in environmental days organized by the environmental institutions in order to exhibit and promote your product.

5. Visit associations of farmers, gardeners, small farmers, etc. asking them aware of your product, and ask if you could be included in their newsletters.

6. Volunteer to appear on radio shows and TV programmes to market your product.

Figure 10: Compost marketing

(b) At What Price Do You Sell Compost?

This is a very important question. At what price are people currently selling compost, and how long has it been at this price? How have you arrived at this price and why? Have you done any research to see what price fertilizers and even compost sell at elsewhere? Have you incorporated items such as transportation costs and costs of packaging into your costing? At what price should you sell to other similar enterprises?

You must be able to include costs in your pricing, such as the cost of transportation and packaging. Also, you should have a pricing structure. You may have a certain price that you will sell compost to other members of the composting enterprises, if they require your surplus. You may have another price for people who are willing to sell

your compost for you in their shops or nurseries. You may even have third price for directly selling compost to a client. If you do not price your product carefully, you may find that you are not making any profit – it is that important! This is how you can go about determining the price of your product in a simple way.

1. Conduct market surveys to establish average prices of fertilizers and compost already existing
2. Estimate your annual running costs
3. Determine how much compost you can produce per year
4. Divide (2) by (3) to get an indication of the true cost per kg of compost
5. Try to have competitive prices that would compare with (1) but would cover your costs, and generate an income for you.

9.0 REFERENCES

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