

## Operating & Maintaining a co-composting facility

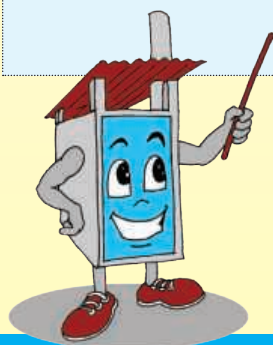


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<b>Brown waste</b>	Refers to biodegradable waste types which are high in carbon. Typical examples are wood chippings, saw dust, twigs and leaves.
<b>Compost</b>	Is a mixture of organic matter that has been digested by organisms, used to improve soil structure and provide nutrients
<b>Co-composting</b>	Refers to the process by which biodegradable waste is biologically decomposed together with UDDT matter under controlled conditions by microorganisms (mainly bacteria and fungi)
<b>Green waste</b>	Refers to biodegradable types which are high in nitrogen. (i.e. cow or chicken manure, vegetable waste, grass cuttings).
<b>Pathogen</b>	Refers to an organism capable of causing disease
<b>UDDT</b>	Refers to urine diverting dry toilet. It is an on-site toilet that operated without water and separates the urine from the faeces that can be used as fertiliser in crop production.
<b>UDDT matter</b>	Refers to the urine and/or faeces collected from the UDDT toilet
<b>Windrow</b>	Refers to a long low heap of biodegradable waste

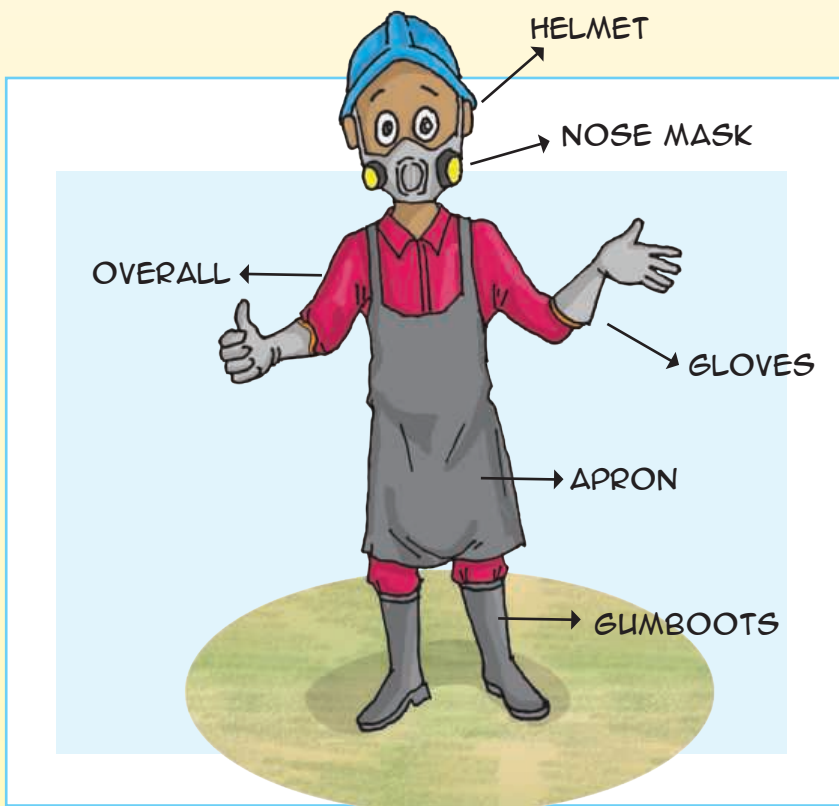
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## Operational Safety and health protection

- Sanitation team members must wear protective gear consisting of gloves, boots, helmet, nose mask, overall and apron at any stage when they are handling solid waste, UDDT matter or co-compost.
- The equipment must be regularly cleaned and replaced when necessary.
- Wash hands before leaving the co-composting area and/or before starting any other activities.



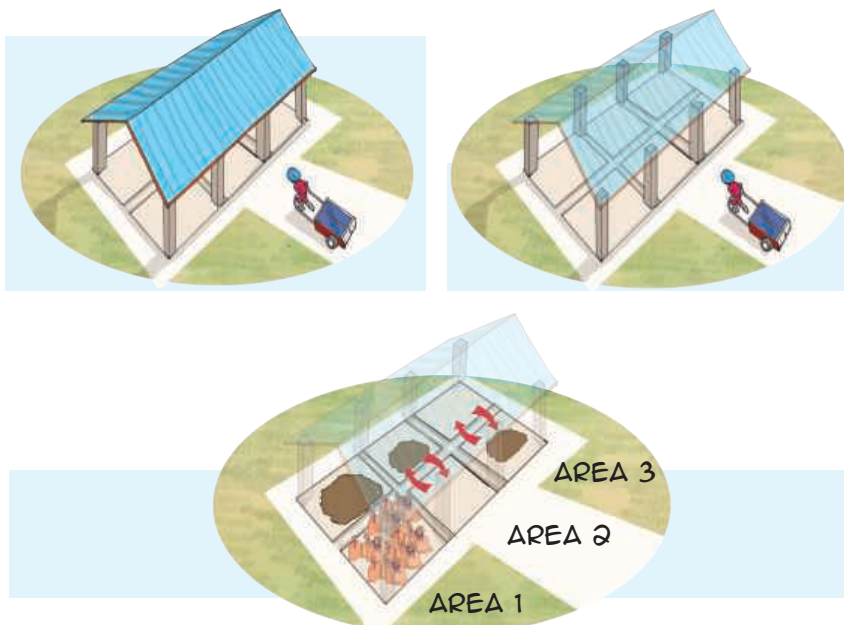
## Co-composting shed

The platform of the composting shed is divided in three areas consisting of two chambers separated by a drainage channel.

**Area 1** is dedicated to the offload and storage of the raw material (waste and UDDT matter) and the storage of finished product (mature compost and bags).

**Area 2 and 3** are dedicated to co-composting process. A maximum of two windrows can be operated at the same time. Each windrow is shifted (by turning) from one chamber to the other.

### CO-COMPOSTING SHED



## Suitable material for composting

### Incoming Domestic Waste

#### Biodegradable materials

##### Garden Waste

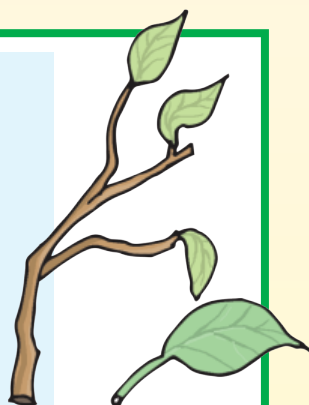
- Leaves and grass
- Twigs

##### Food waste

- Vegetables and fruits waste
- Leftover bread

##### Others

- Scrap paper/cardboard
- Straw
- Meat (with limitations)



## Non suitable material for composting

### Incoming Domestic Waste

#### Hardouts Materials

- Cleaning products
- Automotive products
- Pesticides, chemicals and inflammable products
- Used razor blades
- Syringes
- Broken glass
- Screws and nails
- Expired medicines
- Batteries
- Treated timber



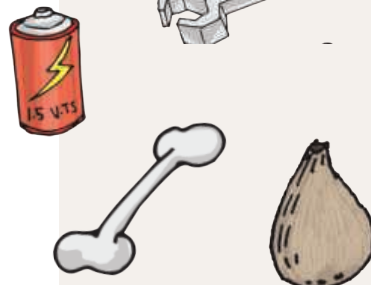
#### Residues

- Soiled polythene
- Hard leaves
- Tree branches
- Coconut shells
- Bones
- Painted wood
- Boards



#### Recyclables

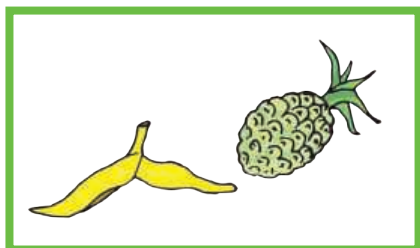
- Metal
- Aluminium
- Clipboard
- Paper
- Plastic scraps
- Glass



## Co-composting composition

Compost process: Micro-organisms biologically degrade the organic waste. Carbon (C) and Nitrogen (N) are feedstock for micro-organisms and can be found in the waste material.

### HIGH N CONTENT

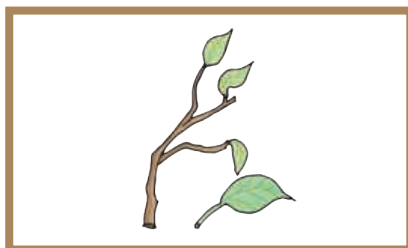


**Green (wet) material** : household waste



**UDDT matter**: dry faeces collected from SafiSan toilet

### HIGH C CONTENT



**Brown (dry) material** : garden waste



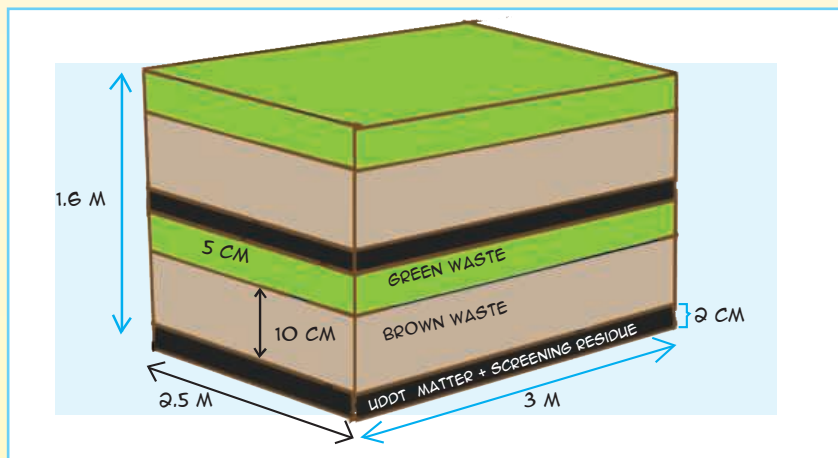
**Screening residues**: remaining coarse compost collected from the screening of the mature compost

## Co-composting composition

### *Suggested combination*

Composting windrow has a width of 2.5m, a length of 3m and a maximum height of 1.6m. It is composed of consecutive layers of:

1. UDDT matter and screening residues (2cm)
2. Brown Waste (10cm)
3. Green Waste (5cm)



The ideal combination of material must be determined by trials. The ratio between C and N needs to be adjusted if the composting process is not satisfying.

- Add more brown material and screening residues (high C) if the mix is too wet
- Add more green material and UDDT matter (high N) if the mix is too dry

## Windrow turning

The composting process starts from the windrow making to the compost screening and lasts around 3 months.

Ensuring sufficient supply of air is necessary to favour the growth of micro-organisms and prevent odours. Therefore windrows must be turned regularly during the overall composting process.

The number of turnings depends on the nature of waste and the external conditions (temperature, humidity, etc.). It will be determined by trials. A total of 3 to 6 turnings within 3 months are recommended.



## Windrow turning

*Suggested schedule:*

*Windrow making*



*1st turning*



Day 5

*2nd turning*



Day 15

*3rd turning*



Day 30

*4th turning*



Day 50

*Screening*



Day 90

## Moisture control

Maintain the moisture content at a level of 40 to 60%.

**Quick test for moisture measurement:**

**Take a handful of compost and squeeze it hard**



*If no drops emerge the compost is too dry and the composting process slows down. Add water*

*If water runs profusely the compost is too wet and will start producing unpleasant odours. Add brown waste or screening residues.*



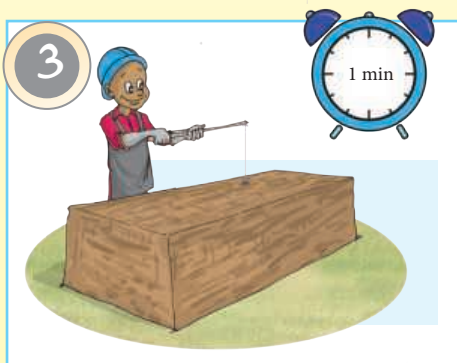
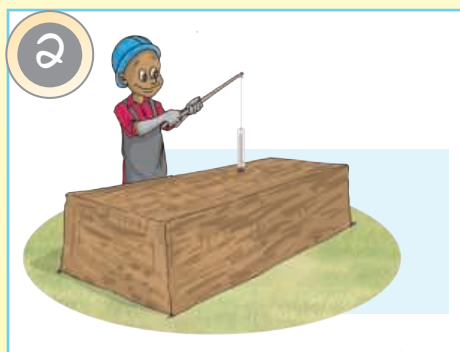
*If only a few drops of water appears, the moisture is optimal.*



## Temperature control

### Step by step on how to measure temperature

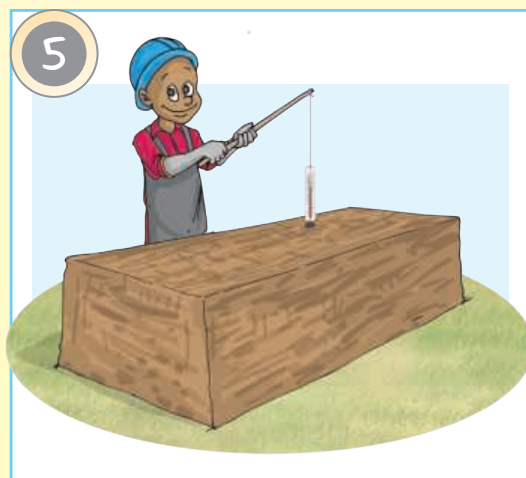
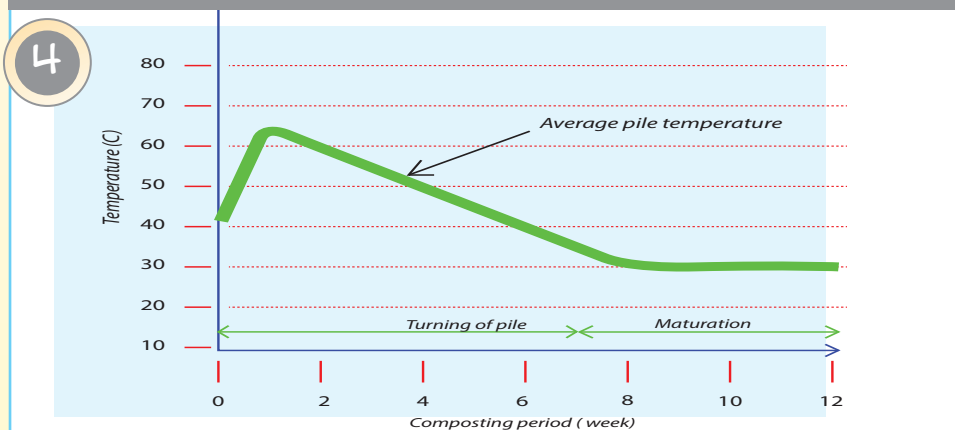
Push a hole with a stick and use an alcohol thermometer attached to a string. Leave the thermometer in the hole for 1 minute before recording the temperature.



## Temperature control

The windrow must not exceed 70°C because it prevents microbiological activity. It should stay at around 65°C for at least 3 days to favour rapid composting and ensure destruction of weed seeds, insect larvae and pathogens. After the first week, the temperature gradually decreases until 45-50°. Once the compost is mature it should reach ambient temperature.

Temperature control



## Maturing

After the last turning (around 50 days), the compost has a soil like color and the temperature has fallen below 50°C. Fungi (white stains) and small insects appear and break down complex organic material



Additional 3 weeks (minimum) are necessary to ensure that the compost is mature. During this phase, the compost needs less oxygen and less water.



## Screening / Storage & Bagging




The raw compost is thrown onto the sieve and rubbed through the mesh (5 to 10 mm mesh size). The screening residue is used for the composition of a new windrow and the fine compost is stored in bulk or bags (5, 10 or 40kg) ready for sale.




## Trouble shooting

### Composting parameters



**Too high temperature  $> 70^{\circ}$  :** turn the windrow more often



**Too low temperature  $< 30^{\circ}$  :** add water and/or green waste



**Odour development:** turn the pile, mix in with coarse material (wood chips), avoid composting meat and fish leftovers

## Trouble shooting

### Climatic influences and vectors



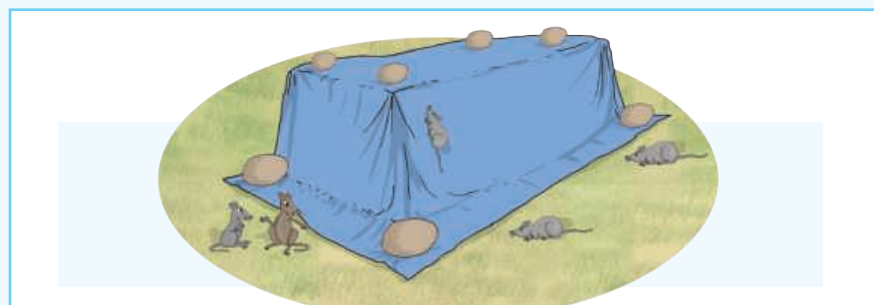
**Humid climate or heavy rainfall season:** cover the windrow with tarpaulin and turn it more often



**Arid climate or extended dry season:** Cover the windrow with tarpaulin and water it more often

## Trouble shooting

### Climatic influences and vectors



**Excessive flies, insects and rodents:** cover with tarpaulin (or coarse compost), use fresh organic waste (not more than 2 days)

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MANUEL DES ACTIVITIES DU SITE DE CO-COMPOSTAGE-

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**USER'S GUIDE**

*Operating and Maintaining a co-composting facility*