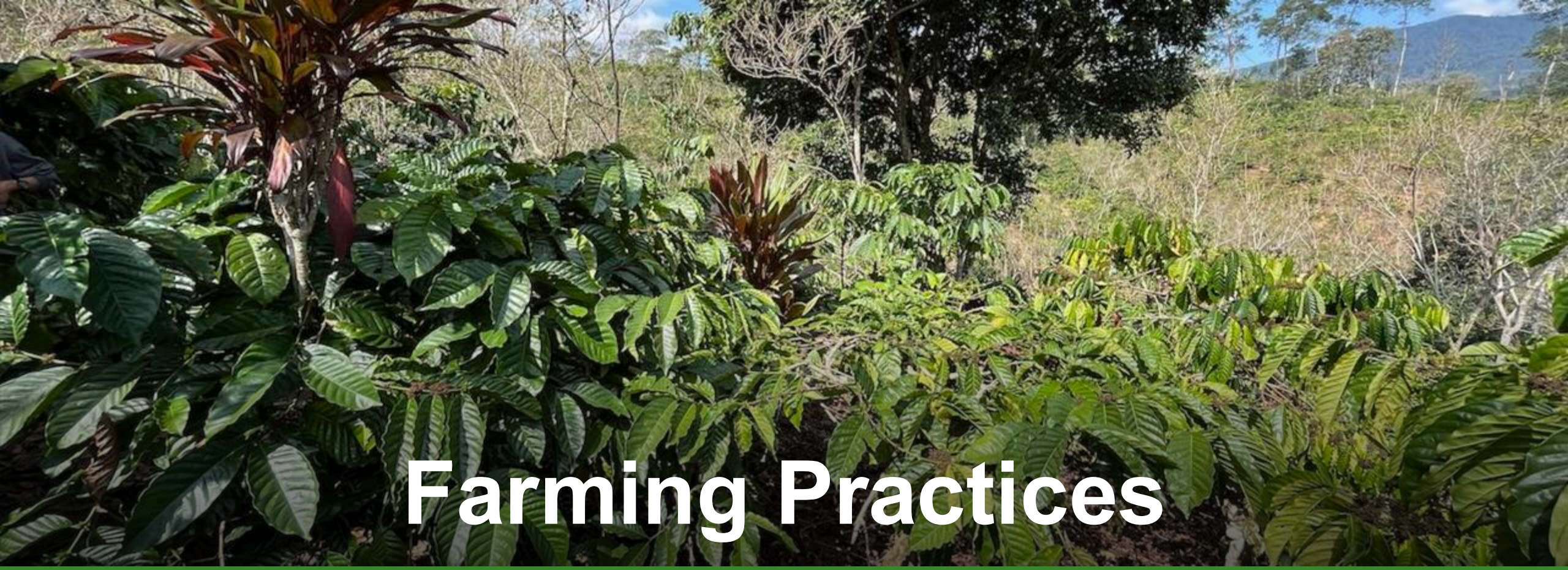
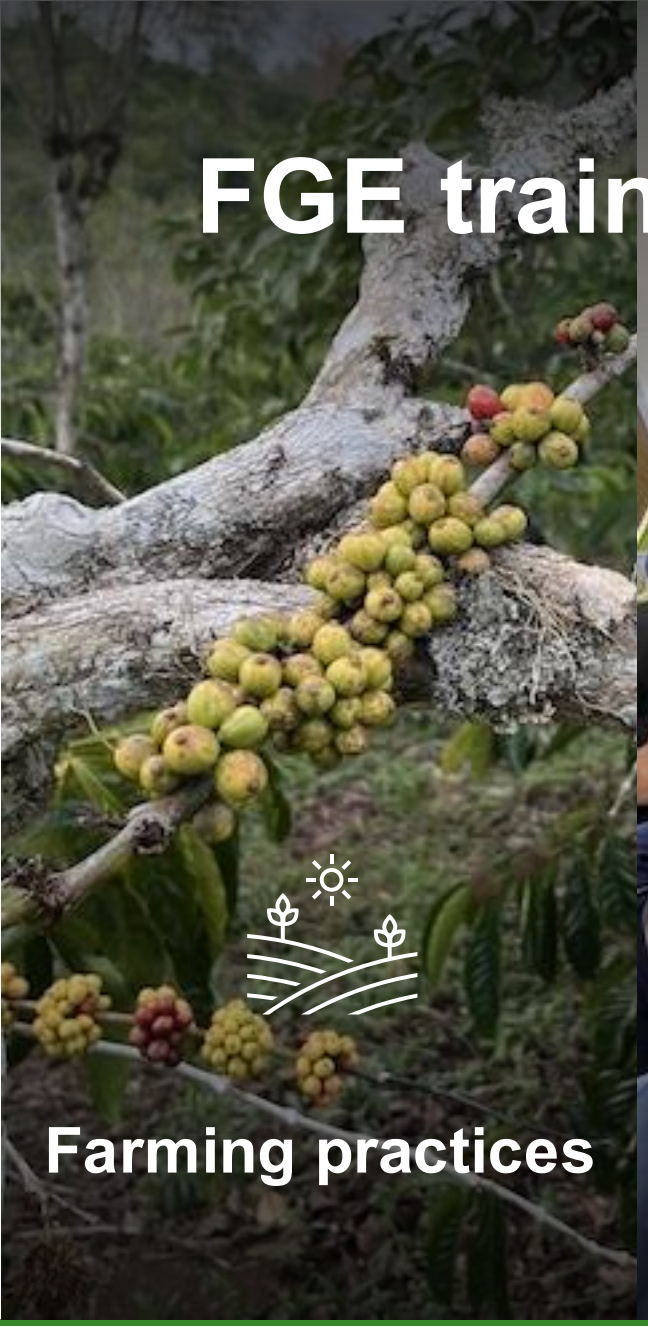


Farming Practices

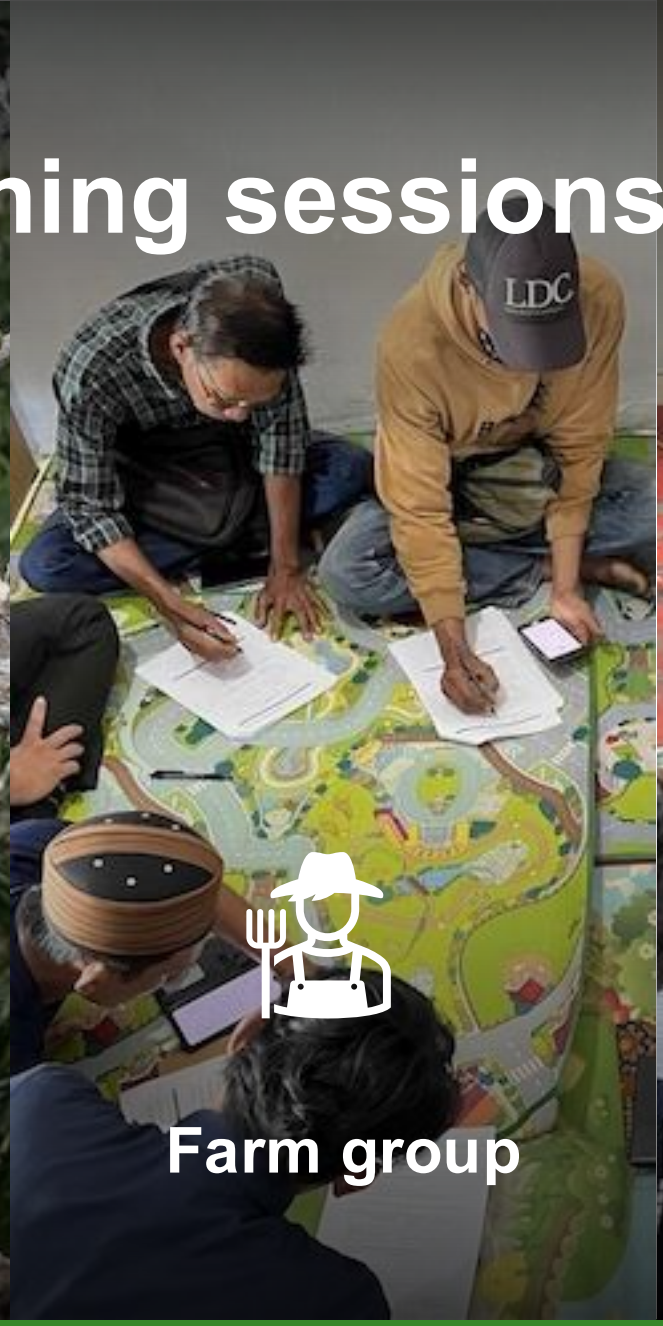
Composting of biomass in coffee plantations

Farmer Group Educator (FGE) training sessions

FGE training sessions

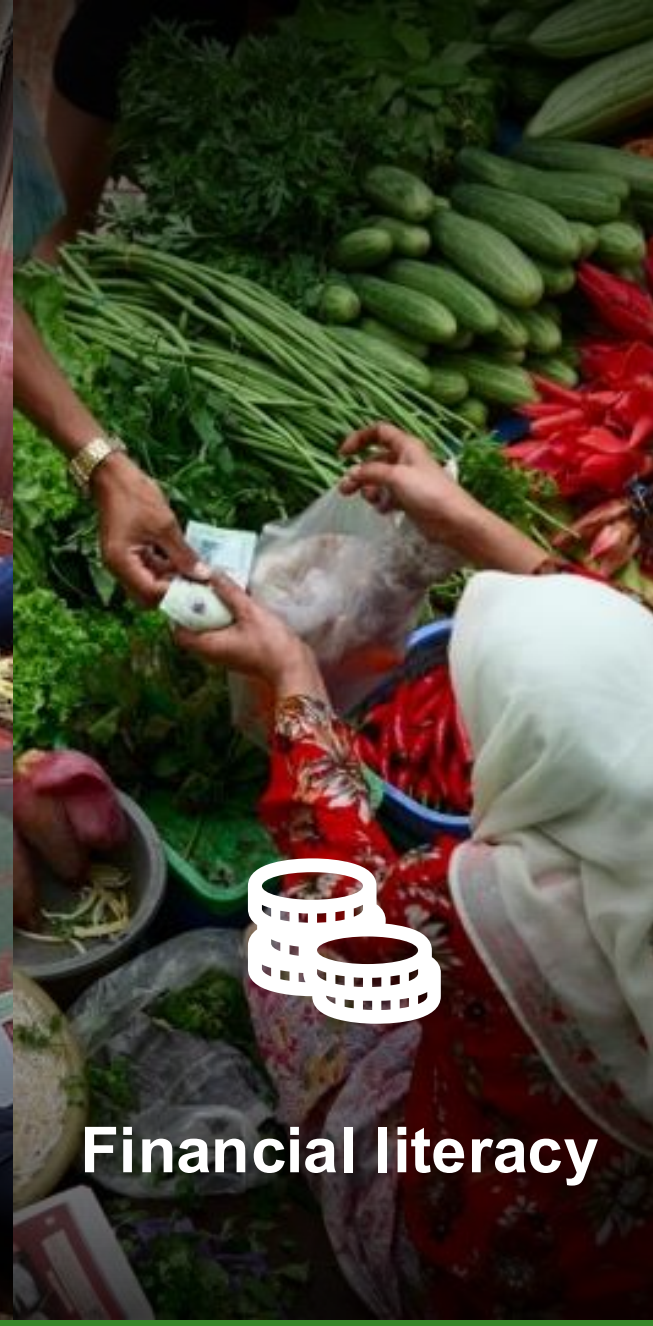


Farming practices



Farm group

Gender & ESS



Financial literacy

Content

- What is composting
- Advantages of composting
- Composting vs natural disposal of organic wastes
- Methods of composting
- Material required for composting
- Selection of site for aerobic composting
- Size of compost heap
- Preparation / pre-treatment of raw material
- Construction of heap
- Turning the heap
- Time for turning
- Maturation of compost
- How to know when the compost is ready
- Application of compost

What is composting?

- Composting is an effective means of recycling the all available on farm wastes (biomass) for obtaining high value organic compost
- Composting is a process wherein larger particles are broken down into smaller ones by the action of microorganisms. The end product, which is friable, is called compost
- During the composting process the microorganisms use carbon for energy and nitrogen for protein synthesis. The population of beneficial microorganisms increases which help in improving nutrient uptake by plants

Advantages of composting

- Improves soil texture and structure
- Minimizes soil erosion by binding soil particles
- Increases water holding capacity of soils
- Provides ideal environment for growth of beneficial microorganisms in the soil
- Increases the use efficiency of applied nutrients and reduces reliance on chemical fertilizers
- Composting helps in reducing greenhouse gases (GHGs) emissions

Composting vs natural disposal of organic wastes

No composting

- Releases methane, a GHG contributing to climate change
- Significant loss of nutrients through leaching
- Can lead to contamination of ground water and air pollution
- It will take longtime for breakdown of organic matter
- Loss of beneficial microorganisms

Composting

- No/ insignificant GHGs
- Retention of all nutrients
- No contamination of ground water and air pollution
- Composting is complete within 8-12 weeks
- Rich in beneficial microorganisms

Methods of composting

- **Aerobic method** – is simple and efficient, ideally suited for composting of easily breakable organic material like coffee fruit skin, cherry husk, weed biomass, prunings etc
- **Anaerobic method** – suitable for difficult to breakdown organic material like coir pith, arecanut shells, cocoa pod shells etc

Aerobic method is most suitable for composting of on-farm organic biomass available in coffee plantations

Materials required for composting

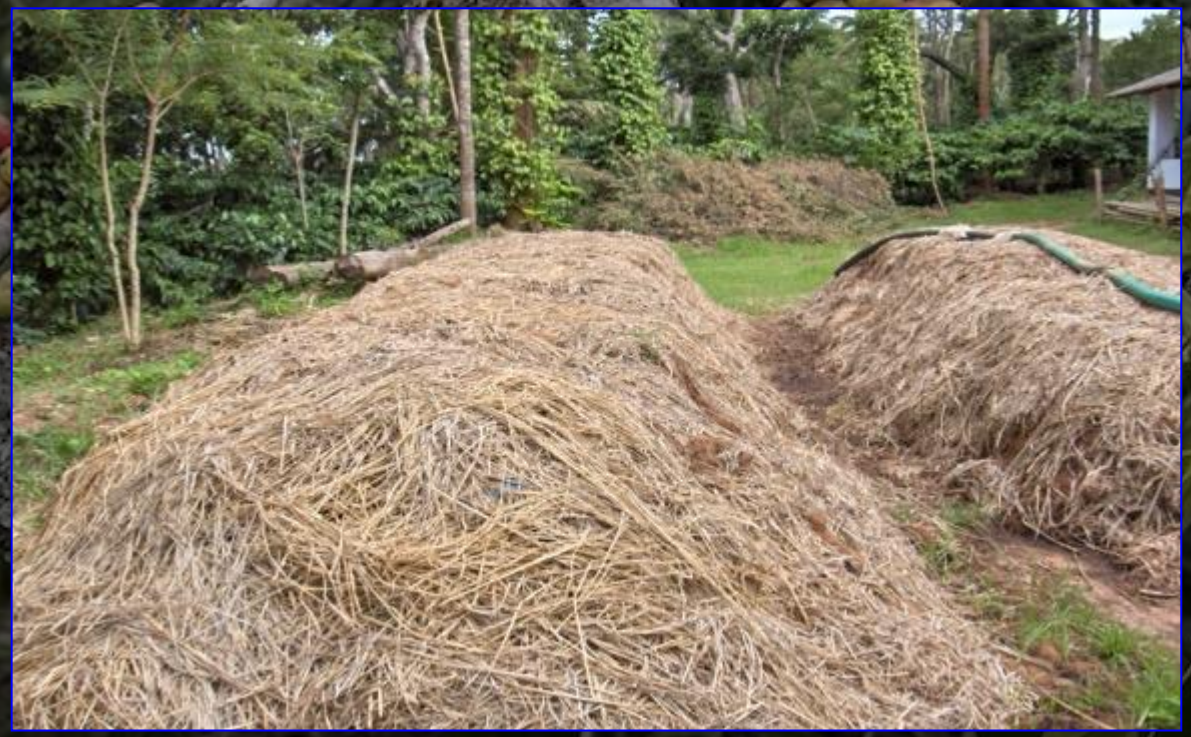
- **Farm wastes:** Rich in carbon
  - Agri wastes like cherry husk, coffee pulp and other crop residues like straw etc.
  - Animal wastes like dung and urine, goat droppings, piggery and poultry wastes
- **Green material:** Rich in Nitrogen
  - Green plant material like leaves, weed biomass, prunings etc.
- **Compost enhancers:** Rich in decomposing bacteria
  - Cattle dung slurry, biogas slurry, microbial decomposers etc.
- **Compost enrichers:** Rich in nutrients and nutrient mobilizers
  - Rock phosphate, Biofertilizers etc.

Selection of site for aerobic composting

- The site should be in close proximity to a place where maximum biomass is generated
- Slightly elevated land with good drainage
- Tree cover is desirable

Size of compost heap

- **Width**: 1.0-1.5 meters
- **Height**: 1.0 meter
- **Length**: Any convenient length depending upon availability of raw materials



Preparation / Pre-treatment of raw material

Wet/ Moist material

Coffee Fruit skin,
Fruit & Vegetable wastes

Allow them to slightly wither
To remove excess moisture

Rough /coarse material

Stalks of maize, paddy, maize cobs etc

Chopping into small pieces
or
Use them as bedding in animal sheds

Dry material

Cherry husk, Cocoa Shells

Wetting for few days

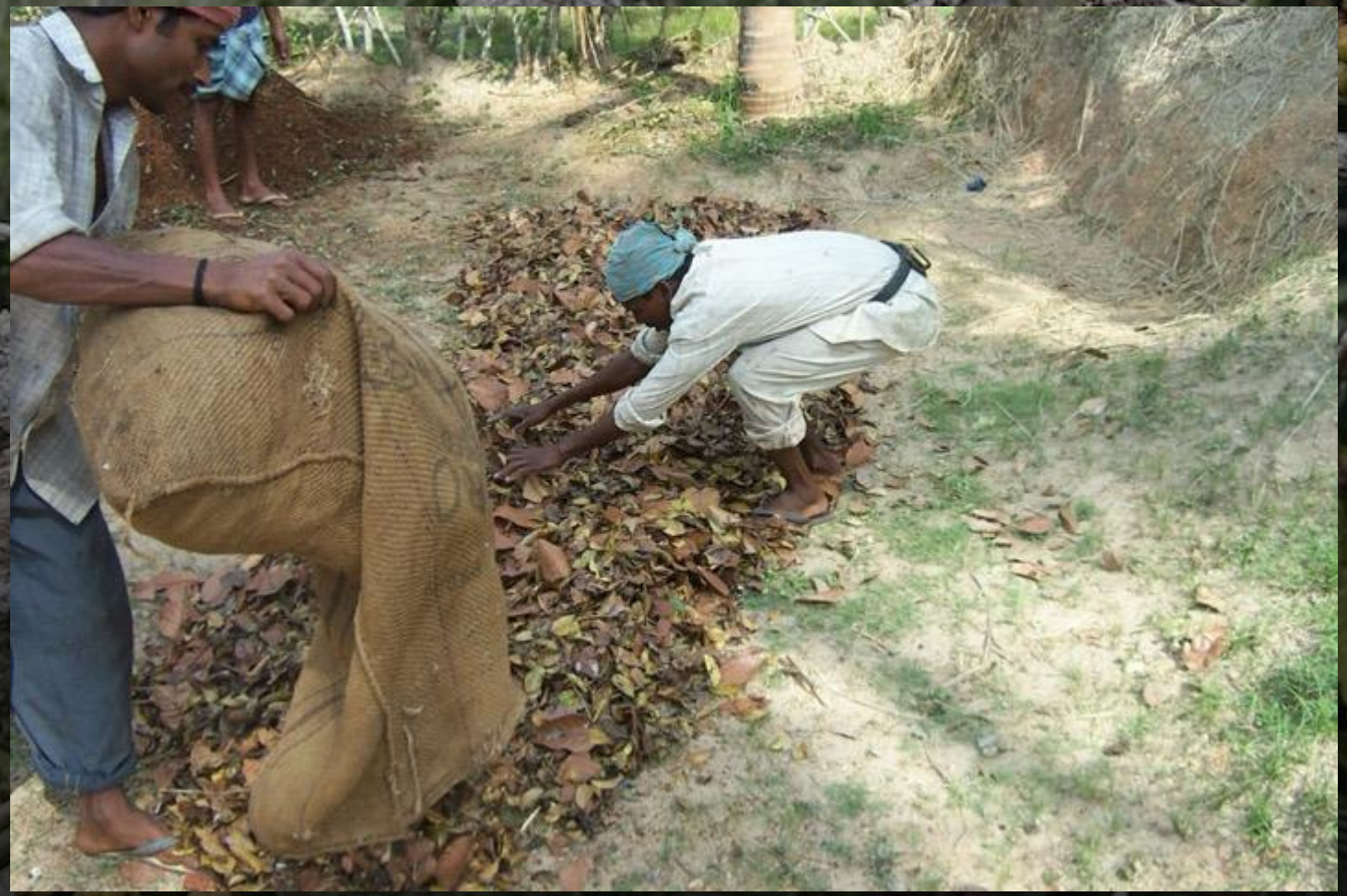
Construction of heap

- The compost heap construction is made by spreading the raw material layer by layer
- **Base layer**: lay a lattice of old branches or fibrous material like coconut shells etc. covered with dry leaves at the bottom for providing aeration and preventing water logging
- **Step 1**: Spread green material like fresh leaves, weed biomass etc.
- **Step 2**: Spread farm wastes like cherry husk, coffee pulp, crop residues etc.
- **Step 3**: Spread farm cattle shed wastes like dung, goat / sheep dropping etc.

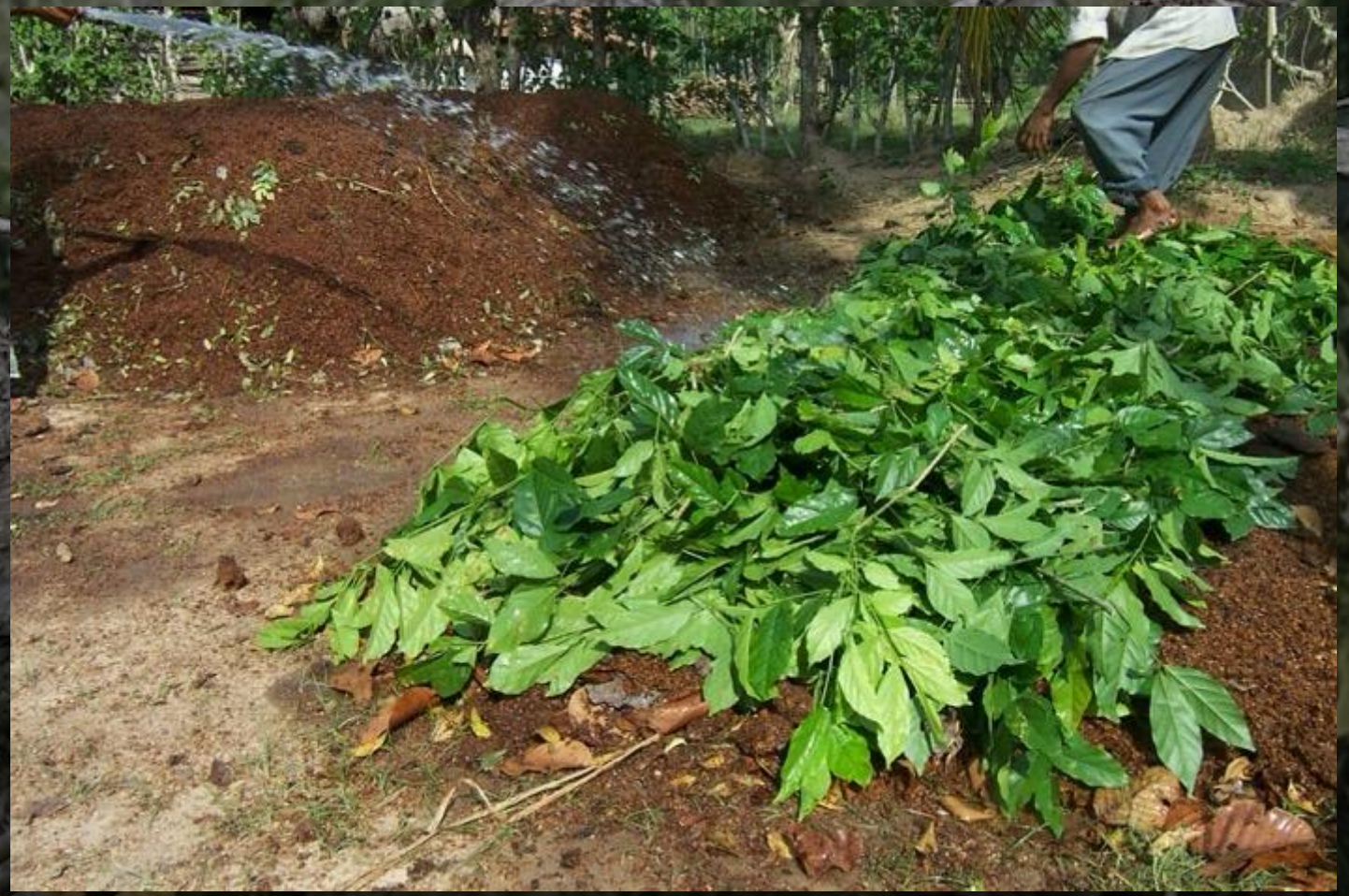
Construction of heap

- The thickness of each layer should be around 10-15 cm
- Sprinkle cattle dung slurry or biogas slurry between each layer to hasten the composting
- Repeat the steps 1 to 3, till the heap reaches 1.0 – 1.5 meters height
- When heap is finished – cover with a thin layer of soil and straw

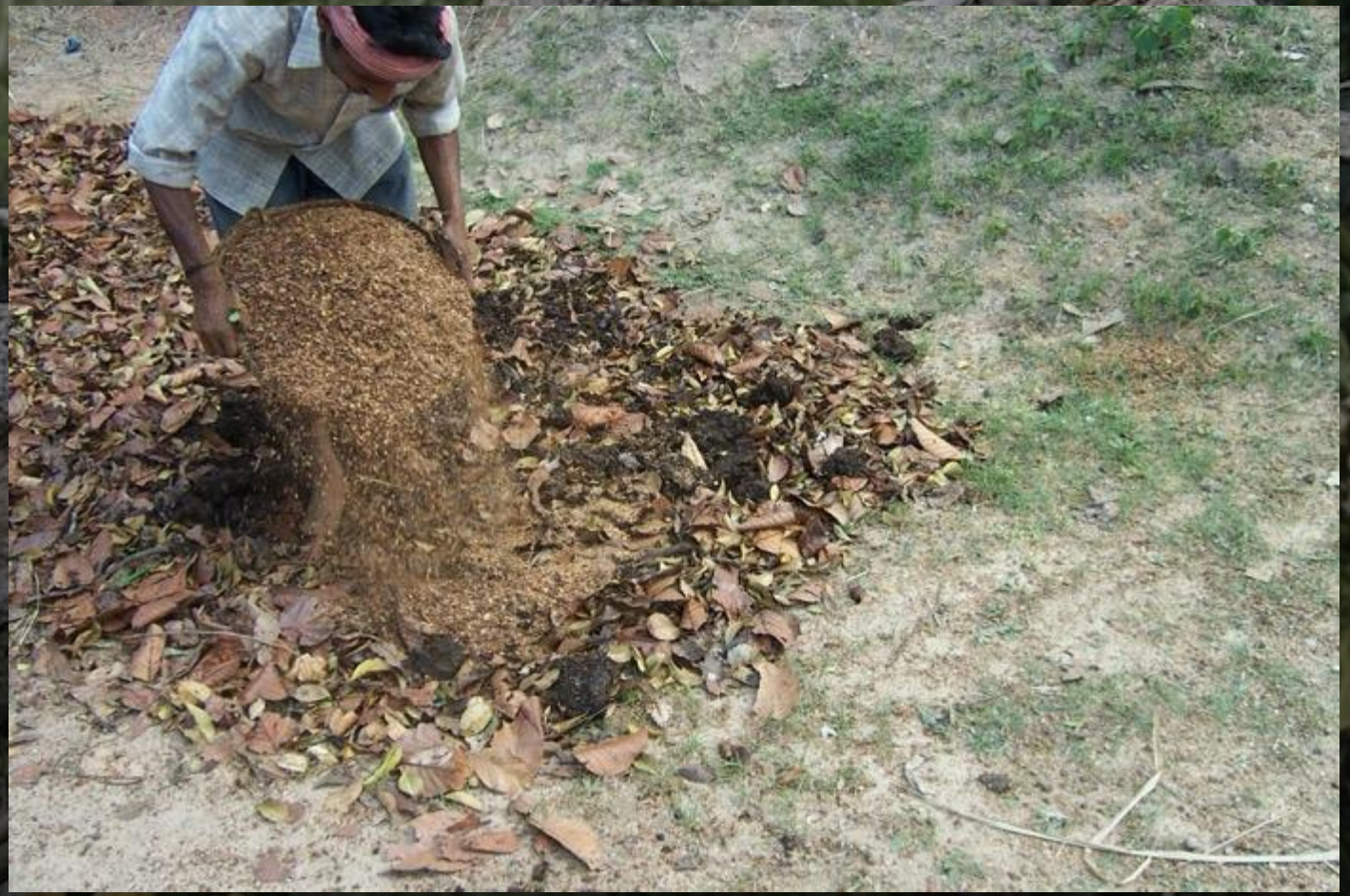
Base layer



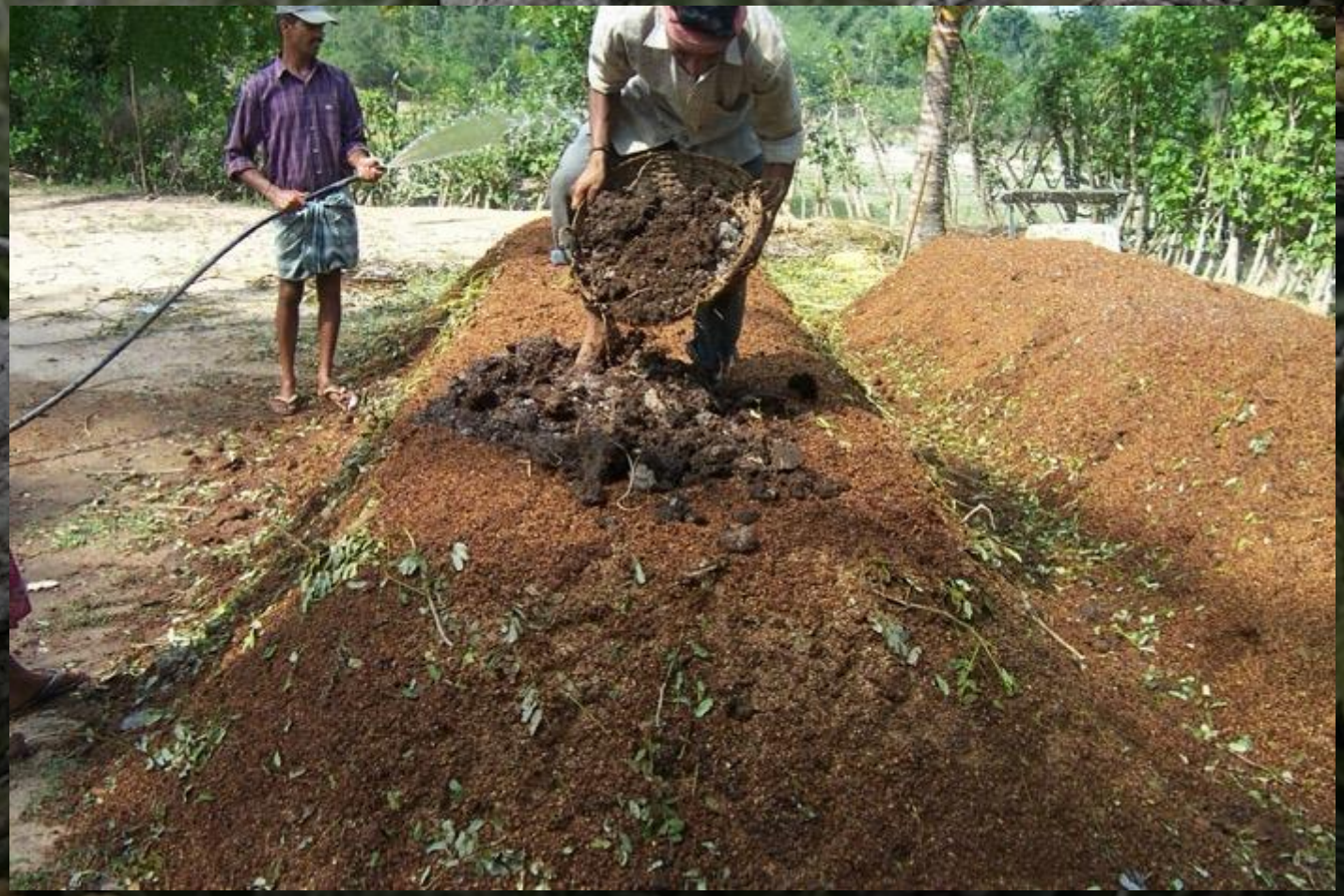
1st layer – green material



2nd layer – cherry husk



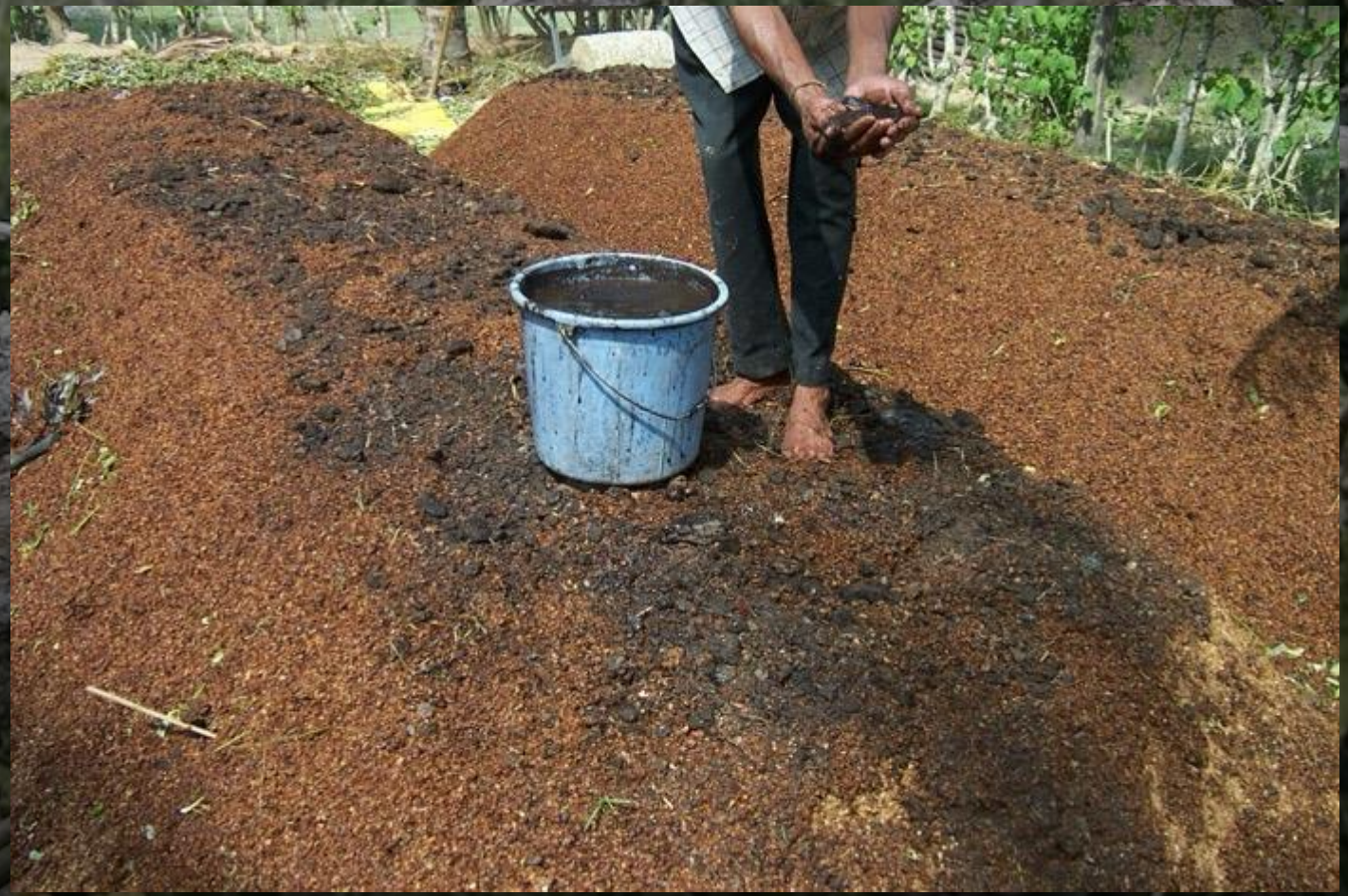
3rd layer – cattle manure



Preparation of compost enhancers

Decomposing microbial formulation mixed with slurry

Sprinkling of slurry



Repetition of steps & finishing heap construction

Turning the heap

- Turning the heap is necessary to prevent buildup of heat and excess carbon dioxide ($CO_{2)}$
- Excess heat and CO_2 destroy the microbes that help in decomposition/ breakdown of raw material

Advantages of turning the heap

- Removes excess heat and CO_2 inside the heap
- Improves the aeration of the heap
- Gives a chance to check the moisture content of the material. If the material is too dry it should be watered
- Helps in evenly mixing of un-decomposed materials to get good quality compost

Turning of heap

Time for turning

- The first turning should be done after 2-3 weeks of heaping
- Subsequent turnings in 3 weeks after the first turning
- Depending upon the temperature and kind of residues, turning is done two to three times at an interval of about three weeks
- If the heap is prepared using residues having different C:N ratios with proper aeration and moisture, only one turning after 3-4 weeks would be sufficient

Maturation of compost

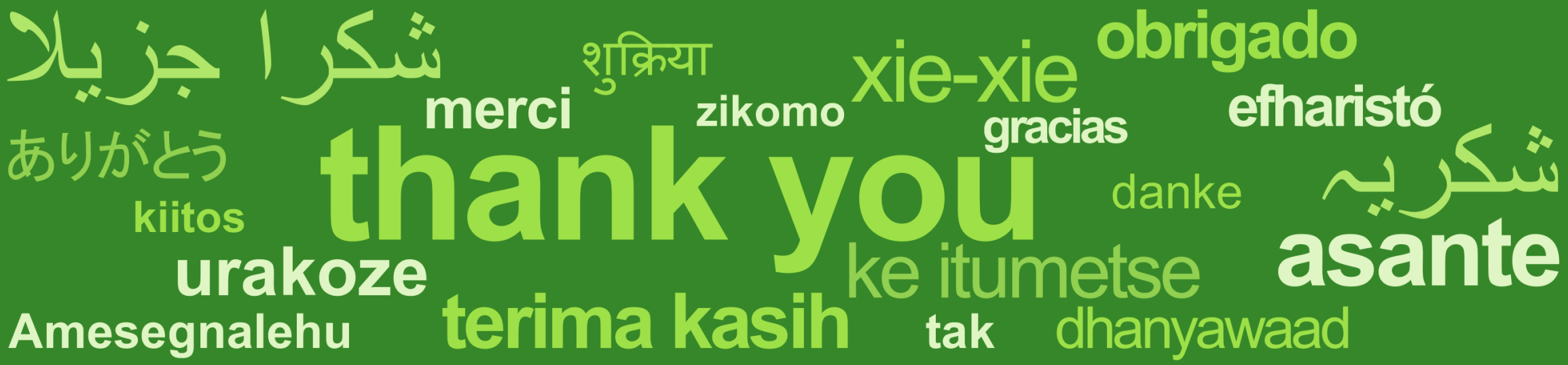
- The time required for composting depends on local climatic conditions and the materials used
- If the weather is warm, the heap is moist, well aerated and good combination of materials is used, the compost is ready in about 3 months time
- In colder or dryer conditions and when materials with high C:N ratio is used, the heap usually takes about six months to ripe

How to know when the compost is ready

- **Volume/ size of the heap**: Shrunk to about 50% of original size
- **Texture**: Crumbly and loose with no clumps of large chunks. No recognizable raw material
- **Colour**: Dark brown to black
- **Smell**: Pleasant earthy smell
- The Carbon to Nitrogen Ratio (C:N Ration) reduced from 30:1 to 10:1

Application of compost

- Planting time: 1-2 kg per planting hole
- Young plants: 1-2 kg per plant once in 2-3 years
- Mature plants: 5-10kg per plant once in 2-3 years
- To be incorporated into soil around the basin or covered with dry leaves after application



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