

Water for Home Gardening



OVERVIEW

LEARNING OBJECTIVE

Gardeners will learn how to water their gardens more effectively and think through how to prevent problems with excess water or a lack of water.

DURATION



MATERIALS NEEDED






- Flipchart and markers
- Spades
- Sticks
- Stones
- Bits of banana leaf
- Half a bucket of mulching material
- Water bottle full of water



KEY CONCEPTS

- Water is key to a successful garden!
- There are effective and low-cost strategies to either avoid excess water or conserve water that are easily implemented in a home garden. Many of these solutions require gardeners to design their gardens thinking about how water flows across their landscape.

TRAINING AGENDA

1	Introduction and warm-up	 DISCUSSION	10 min
2	Irrigating smartly	 DISCUSSION	45 min
3	Strategies to deal with excess water	 PRACTICAL ACTIVITY	45 min
4	Strategies to conserve water	 PRACTICAL ACTIVITY	45 min
5	Closing discussion	 DISCUSSION	15 min

1. Introduction and warm-up

Welcome gardeners to the training. Do a brief introduction to today's topic and review the training agenda. You may want to outline the training agenda on your flipchart or board so gardeners can see it when they arrive.

Conduct a warm-up exercise or ice-breaker to make sure all gardeners feel welcome and are ready to fully participate. Suggested warm-up and ice-breaker activities can be found in the Facilitator's Guide: Encouraging Learning through Participant Engagement.

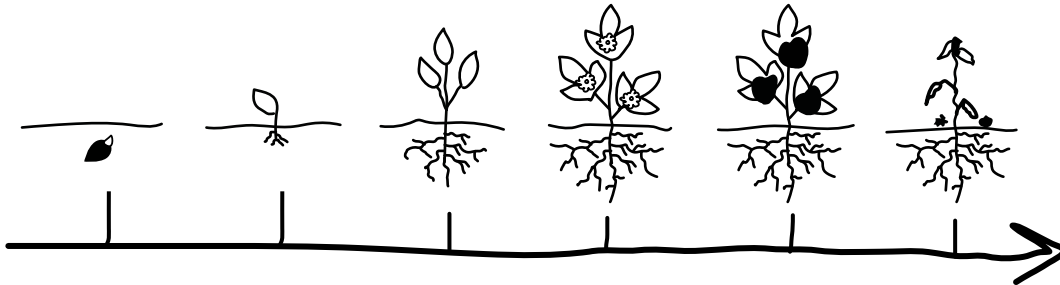
2. Irrigating smartly

INTERACTIVE DISCUSSION

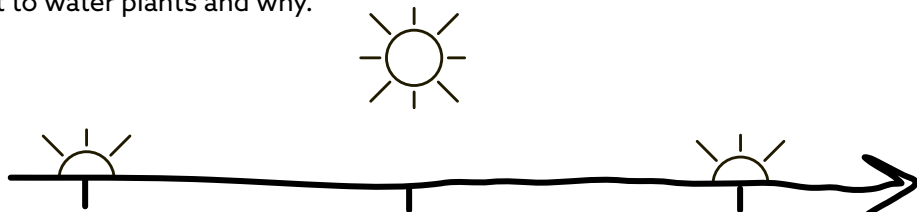
GOAL OF DISCUSSION: Gardeners will have a deeper understanding of the watering requirements for different crops in their home garden.

MATERIALS NEEDED: Flipchart and markers

1. On your flipchart or board, draw a timeline of the different growth stages of a plant (germination, young seedling, leaf and root growth, flowering and fruiting, fruit ripening and drying). Draw pictures along your timeline so the growth stages are easily understood by gardeners. Note that not all plants go through every growth stage, for example, leafy greens do not produce fruits (seed pods) when we grow them for their leaves. Ask gardeners why crops may have different water requirements depending on what stage of growth they are at.



2. Divide gardeners into five groups. Have each group discuss the watering needs of a group of plants:
 - a. Cole crops (*broccoli, cabbage, cauliflower, collards, mustards, kale, etc.*)
 - b. Root and tuber crops (*carrot, sweet potato, onion, beetroot, ginger etc.*)
 - c. Lettuce and leaf crops (*lettuce, spinach, amaranth, etc.*)
 - d. Beans and peas (*county bean, yardlong bean, garden peas, etc.*)
 - e. Nightshades/tomato family (*tomato, pepper, potato, eggplant, etc.*)
3. Have each group share their findings with the larger group. Note these findings on your flipchart or board.
4. On the next page of your flipchart, draw a timeline representing a full day. At the start of the line draw a rising sun, in the middle a full sun, and at the end a setting sun. Ask gardeners when in the day is best to water plants and why.



When do plants need to most water?

Healthy plants are full of water all the time. Every time a plant wants to grow a new part—such as a root, a stem, a leaf, or a fruit—it needs water to do so. If we want our plants to grow, we must provide them with enough water, especially during critical growing periods when plants want to grow very rapidly. This means that water is especially critical during: seed germination, the first few weeks of development, immediately after transplanting, and flowering and fruit production. Water is less important as plants age because they are not growing as many new roots and leaves as they were before. In fact, sometimes it is desirable to stop or slow watering so that the flavors in fruits (such as tomatoes) can develop and fruits do not absorb so much water that the skin cracks.

Water evaporates off the soil surface faster when temperatures are high. The best time to water your crops is early morning or late afternoon so water can sink into the soil instead of evaporate.

Different crop groups have different watering needs

Cole crops (broccoli, cabbage, cauliflower, collards, mustards, kale, etc.) need consistent soil moisture throughout their life span. These crops have shallow roots; they need frequent watering since water can quickly evaporate from their root zone. For cole crops that develop a head, water use is highest and most critical during head development.

Root crops (carrot, sweet potato, beetroot, onion, ginger etc.) also need consistent soil moisture throughout their life span. Root and tuber crops have shallow roots; they need frequent watering since water can quickly evaporate from their root zone. Without sufficient water, root crops will be irregularly shaped or cracked and may develop unusual flavors.

Lettuce and other leaf vegetables need water at every stage of growth to make sure they are continuously growing the leaves we eat. For lettuces that form a head, water is especially critical during the heading stage.

Beans and peas have the highest water use of any common garden vegetable. Blossoms drop with inadequate moisture levels and pods fail to fill, therefore water is especially critical during flowering and pod development. On hot, windy days, blossom drop is common. When moisture levels are enough, the bean plant is a bright, dark green. The leaves of bean plants may become slightly gray under water stress.

Nightshades/tomato family (tomatoes, peppers, potatoes, and eggplant) have higher water requirements when they are establishing and—most critically—during flowering and fruiting. Flowers can drop and fruits remain small if plants are water stressed. After fruits have developed, irrigation should be reduced so that fruit skins do not crack. Potatoes also require a dry period before harvest to harden their skin. Blossom end rot is a symptom of both too little and too much water. Blossom end rot spots look like a dark bruise on a fruit at first. As the spots enlarge, they become sunken and turn black or dark leathery brown in color. Overall, this crop family has a smaller water requirement than many other vegetables because of their deep roots. Gardeners should be wary of overwatering.

Adjust your watering schedule to fit your soil type; sandy soils need more frequent watering, but loamy and clay soils do better with longer, less frequent watering because these soil types can retain water for longer.

3. Strategies to deal with excess water

PRACTICAL ACTIVITY

GOAL OF ACTIVITY: Gardeners will identify why water floods or pools in their gardens and devise strategies to avoid excess water.

MATERIALS NEEDED:

- Flipchart and markers
- Spades
- Sticks
- Stones
- Bits of banana leaf
- Half a bucket of mulching material
- Water bottle full of water

STEP 1. Ask gardeners if too much water can be a problem in their gardens. Have gardeners share experiences of floods or pooling water in their gardens. When does this happen? Where does the water come from? What is the result? Write the reasons why gardens flood or have pooled water in them on your flipchart or board.

STEP 2. Draw a large square, minimum 1m x 1m, on the ground using a stick. Tell gardeners this represents a homestead. Draw a square or circle for a house and a rectangle for the home garden and put a couple of sticks in the ground to represent trees. .

STEP 3. Ask gardeners what strategies can be put in place to address flooding or pooling water in their gardens. As they give suggestions, discuss them and have the gardeners model them within the square. Elicit the following strategies if they are not mentioned, explaining as you model them:

- a. Mulching and digging in organic material
- b. Diversion drains
- c. Holes for storing water and/or mulch pits
- d. Small ditches dug on contour above gardens to slow, sink and spread water
- e. Soil cover (mulches or living plants)

STEP 4. Ask a couple of gardeners to share which strategies they want to use in their own home garden and why. Encourage them to draw or mold the strategy in a new square representing their homestead.



Why do gardens flood?

- Gardens experience flooding or pooling of water when water is applied, either from irrigation or natural sources, faster than it can be absorbed into the soil. When soils are compacted or have a crust on top of them, water can only enter the soil very slowly. The majority of the water will pool on the surface or run down the slope.
- Gardens can also be located in a flood plain or low-lying area that is seasonally inundated with water.
- Gardens can be located at the bottom of a slope that does not have any means of slowing down water as it moves from the top to the bottom.

Why is too much water a problem?

- Too much water can wash away topsoil and seeds. Heavy rains can damage plants and create waterlogged conditions that suffocate plant roots.
- Excess water can allow fungi to grow within the soil or make plant roots rot because they are sitting in water. It also reduces their access to air.
- Poorly drained soils allow moisture-loving diseases to spread.
- Water flowing over beds can move seeds out of position, damage young seedlings, and erode topsoil.

Where does excess water come from?

- Rain
- Irrigation/watering
- Overland flow from areas close to the garden
- High water table under garden beds
- Water from nearby areas draining into garden
- Flood water from channels or nearby rivers

What strategies can address too much water in a garden?

- Improve your soil's ability to absorb water by regularly **digging in organic material**.
- **Build diversion drains** around gardens to redirect water flowing in from strong storms. Observe where water tends to pool in your garden and then build a drainage system around the garden that collects water before it hits garden beds and diverts it around the beds. Ideally the drainage system will collect water in a place where it can be stored for later use (like a deep hole or a mulch pit).
- **Divert water into deep holes** in the corners of your garden to collect water and store it for later use or plant bananas or fruit trees around it. The holes will collect water and allow it to slowly seep into the ground. This can be a useful strategy for soils that can alternate rapidly between too wet and too dry. If soils are permanently too wet, then it is better to divert excess water out of the garden rather than store it in holes.
- **Divert water into mulch pits** and plant bananas or fruit trees around it. A mulch pit is a deep hole filled with mulch. As the mulch decomposes, it adds nutrients to the soil that can be used by the bananas or fruit trees.
- **Dig small ditches along the land's contour above your garden** if your garden is located on a slope or at the bottom of a hill. The ditches will slow, spread, and sink water so your garden is not hit with water running down the hill.
- **Keep the soil covered with mulches or living plants.** Mulches and living plants help slow water down so that it can absorb into the soil instead of run off. If water is entering the garden from areas up slope, then keep areas outside the garden covered as well.

4. Strategies to conserve water

PRACTICAL ACTIVITY

GOAL OF ACTIVITY: Gardeners will identify how their gardens are affected by too little water and devise strategies to conserve water.

MATERIALS NEEDED:

- Flipchart and markers
 - Spades
 - Sticks
 - Stones
 - Bits of banana leaf
 - Half a bucket of mulching material
 - Water bottle full of water
-

STEP 1. Have gardeners take five minutes to discuss with their neighbor if they tend to have problems with too little water for gardens in their area. Have them describe what happens and when, such as a delayed start to planting or mid-season droughts. What is the result of having too little water for gardens? Bring the group back together and collectively summarize how gardens experience drought. Write key points down on your flipchart or board.

STEP 2. Draw a large square, minimum 1m x 1m, on the ground using a stick. Tell gardeners this represents a homestead. Draw a square or circle for a house and a rectangle for the home garden and put a couple of sticks in the ground to represent trees..

STEP 3. Ask gardeners to share strategies that they have implemented or seen implemented for water conservation. Ask them to model the strategy in the dirt as they explain it, explaining how it is done and why. For example, draw a line for water-harvesting ditches or a half-moon berm or draw a circle for a rainwater harvesting tank. Elicit the following strategies if they are not mentioned, explaining as you model them:

- a. Mulching
- b. Sunken beds
- c. Recycling household wastewater
- d. Grouping crops with similar water requirements together in the garden
- e. Irrigating slowly and deeply
- f. Organic materials and manures
- g. Weed control
- h. Windbreaks
- i. Swales, berms, holes, and half moons

STEP 4. Ask a couple of gardeners to share which strategies they want to use in their own home garden and why. Encourage them to draw or mold the strategy in a new square representing their homestead.

Why do gardens not have enough water?

- Very little water may be available because of low rainfall and infrequent storms. This means it is important to use the available water wisely!
- Sometimes gardeners are located in areas where it is difficult to access the available water (especially in mountainous areas), which means some people will have more difficulty watering their gardens than others.
- Irrigation equipment could be expensive or unavailable.
- Soils do not retain water when it is applied, so gardens quickly dry out even if there is frequent rainfall.

What strategies can conserve water in a garden?

- Reduce the amount of water you need to apply by **mulching**. Mulching reduces the soil's exposure to sunlight, which reduces evaporation so water stays in the soil for longer.
- Use a **sunken bed design**. Sunken beds are cut into the ground rather than raised. This means the bed forms a basin to capture any rain or irrigation that falls, rather than having it run off the surface. Sunken beds can also be covered by large leaves or palm fronds to reduce evaporation when plants are small.
- **Recycle household wastewater** as much as possible. Water used for bathing or with large amounts of soap or washing powder can be applied to bananas or fruit trees, but water used for food preparation (such as rinsing rice or vegetables) can be used to water plants in the garden.
- **Irrigate slowly and deeply** so that water does not run off the surface or evaporate from the soil too quickly. This means irrigate for longer, but less often, to fill the root zone with water.
- **Dig in composted organic material and manures** to increase the soil's ability to retain water.
- **Control weeds** that compete with vegetables for water.
- Protect plants and soil from wind with **windbreaks** to reduce evaporation.
- Make **swales, berms, holes, and half-moons** in your landscape (see below).

Swales:

Swales are an important rainwater harvesting tool. A swale is a shallow trench dug along the land's contour, with a berm on the downhill side created with soil from the trench. This trench follows the contour of the landscape and captures water running down a slope, which slows it down and spreads it across the contour line.

Berms:

A berm is a raised earthen structure, which is often placed downhill from a swale. As berms are stopping runoff water from entering a garden too fast, they are also collecting and storing water. This water can be used if perennial plants are planted on them. Perennial plants will keep the berm from eroding over time and can be useful to households if they have a nutritious, cultural, practical, or medicinal purpose. Berms are constructed by mounding soil in a line along the contour or into small half circles to form a "half-moon."

Holes:

Rainwater catchment holes are deep holes in strategic locations around a garden that harvest and store rainwater. If holes are positioned at the end of a swale, they can also catch overflow from the swales. The catchment holes should be dug at least 50 cm deep (deeper for areas with greater rainfall) and 50–100 cm wide. As with a berm, the downhill edges of the hole can be amended with compost and planted with useful plants. In dryland climates, gardeners can plant their crops in shallow and narrow holes spread across their garden instead of a traditional garden bed. When amended with compost or manure, these planting holes can conserve more water than if crops are planted on level ground or raised beds.

Half-moons:

Half-moons are another strategy to harvest and retain rainwater. Half-moons are generally 2–3 m wide, curved berms or ridges in the shape of a semi-circle. The end tips of the half-moon are located along the contour of the slope, pointing uphill. Multiple half-moons can be placed in a row at the top of the planting area to trap rainwater as it flows down the slope. A second row is then placed below the first row, staggered in a way to catch any overflow that continues down the slope. The area within the half-moon, and even the berm itself, is often amended with compost or manure and planted with annual or perennial crops.

5. Closing discussion

15 min

1. Ask gardeners to discuss in pairs a technique they learned that they want to implement in their gardens to either reduce excess water or conserve water.
2. Ask each pair to share with the group as a whole.

Building a Productive Mulch Pit for Recycling Wastewater



OVERVIEW

LEARNING OBJECTIVE

Participants will learn how to productively reuse household wastewater with a mulch pit.

MATERIALS NEEDED

- Spades or other local digging tools
- 4 banana suckers
- 5-10 banana leaves
- Planting material for crops that provide ground cover (watermelon, sweet potato, cassava, pumpkin, taro)
- Mulching material
- Cardboard or old paper (optional)


DURATION



KEY CONCEPTS

- Household wastewater can be used in a low maintenance way to grow extra fruits and vegetable crops by building a mulch pit.
- Mulch pits should be located close to the homestead so that household water can easily be thrown into the pit.

TRAINING AGENDA

1	Building a productive mulch pit or banana circle for recycling wastewater	 PRACTICAL ACTIVITY	1 hour
---	---	--	--------

1. Building a productive mulch pit or banana circle for recycling wastewater

PRACTICAL ACTIVITY

GOAL OF ACTIVITY: Gardeners will make a mulch pit, also known as a banana circle, to productively use wastewater.

MATERIALS NEEDED:

- Spades or other local digging tools
 - 4 banana suckers
 - 5-10 banana leaves
 - Planting material for crops that provide ground cover (watermelon, sweet potato, cassava, pumpkin, taro)
 - Mulching material
 - Cardboard or old paper (optional)
-

STEP 1. Explain to gardeners what types of household wastewater should or should not be reused. Explain that a productive mulch pit, also known as a banana circle, is a way to use wastewater to grow more crops.

STEP 2. Identify a good location for the mulch pit. This could be near where the dishes are washed or kitchen water is thrown.

STEP 3. Ask one of the gardeners to mark out a circle two meters in diameter. Another bigger circle can be marked around it as a guide for the mounded garden bed.

STEP 4: Using the two-meter circle, ask a different gardener to dig out a dish-shaped pit to a depth of one meter.

STEP 5. Ask the gardeners to put the excavated soil around the edge of the pit so that a mounded, circular garden bed is created. At this point, you can create an opening in the mound and a trench for rainwater runoff to enter the mulch pit. If you anticipate water running into the pit from a household source, such as the kitchen, dig a trench from the water source to the opening in the mound so that the water can enter the mulch pit.

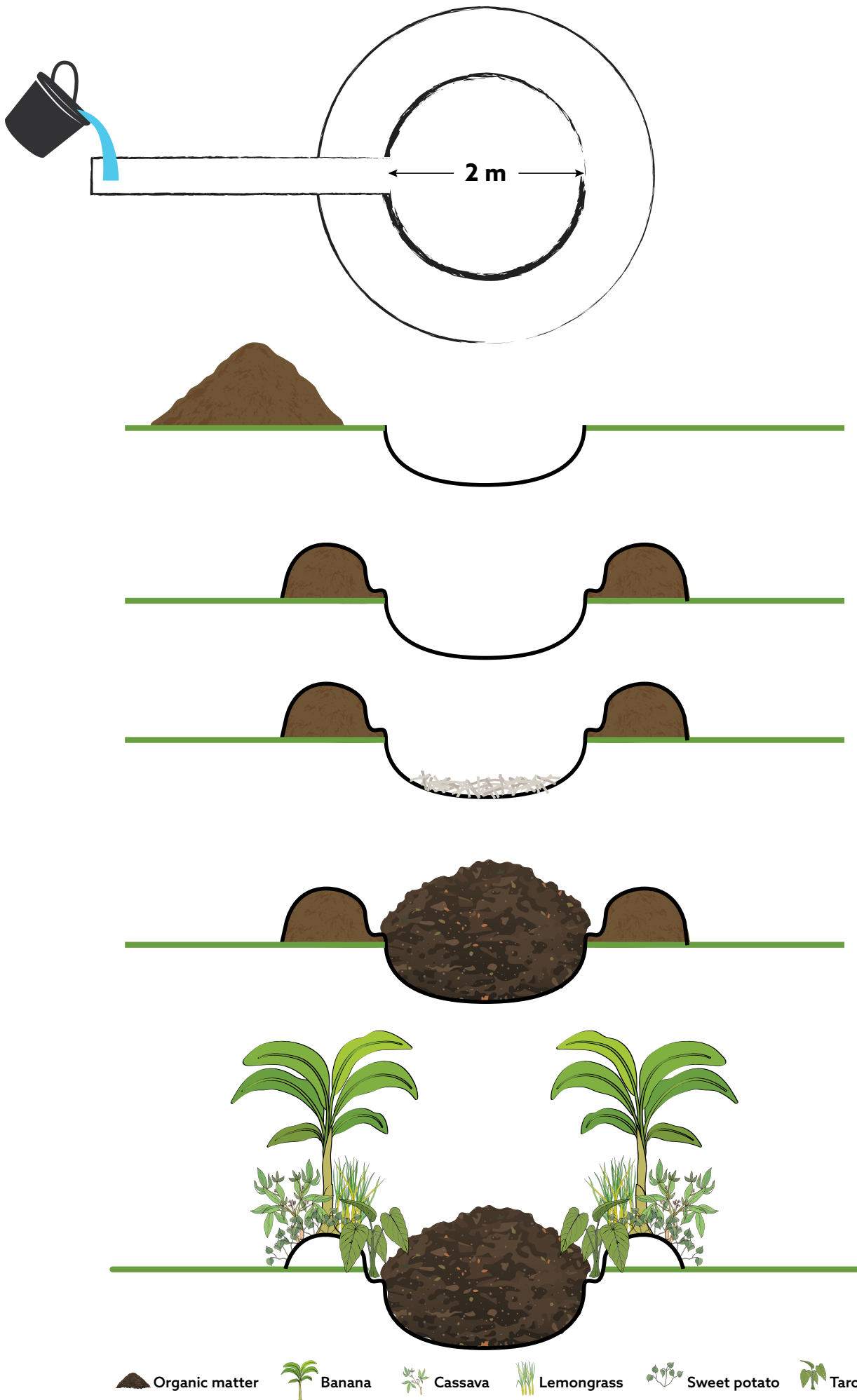
STEP 6. Ask one of the gardeners to line the bottom of the pit with old paper, cardboard, or a few layers of banana leaves to slow down the infiltration of the water once the pit is functional. This will make sure that water stays in the pit long enough to be taken up by the plants that will surround it.

STEP 7: Fill the pit with mulch. You can also treat the pit as a space for a compost pile and layer in green and brown organic materials the same way you would for a compost pile. The mulch or organic materials can be slightly mounded over the pit because they will reduce in size over time.

STEP 8: Together with gardeners, plant banana suckers around the rim of the mound. Normally, four banana suckers can be planted around a two-meter mulch pit. Papayas can also be planted. Gardeners can also add crops that provide ground cover for the mound, like watermelon, taro, cassava, pumpkin, sweet potato, and cowpeas. Plant water-loving crops towards the inner rim of the mound and more drought tolerant plants on the outer rim.

STEP 9. Cover the bare soil with mulch to protect the soil and minimize evaporation.

STEP 10. Ask gardeners to share a key insight and how they may implement this in their own homestead. What other crops would they plant around the mulch pit?



KEY MESSAGES

When households use water, some of it can be recycled into gardens rather than thrown away. Water that has been used for washing dishes or preparing food can be recycled, but water that is potentially contaminated with human and animal feces should not be used in the garden.

A mulch pit is a deep hole that is filled with mulch. As the mulch decomposes, it will add nutrients to the soil. Together with the household wastewater that is thrown in the pit, this will create a rich and low maintenance environment for growing fruit trees and vegetables. The mulch in the pit will need to be refilled as it decomposes.

What to plant around a mulch pit?

Bananas are excellent for mulch pits because their shallow roots can easily access the water that is maintained in the pit. When bananas mature, they can provide structural support for vines or climbing plants, such as passion fruit or beans, which can be planted around them.

Water-loving crops should be planted along the inside rim of the circle and drought tolerant crops should be planted on the outer rim.

Lemongrass or other thick grasses can provide erosion control for the mound so it does not collapse.