



# Permagarden

3-Day Training Guidelines *Second Edition*



### **The Technical and Operational Performance Support (TOPS) Program**

is the U.S. Agency for International Development (USAID) Office of Food for Peace-funded learning mechanism that generates, captures, disseminates, and applies the highest-quality information, knowledge, and promising practices in development food assistance programming, to ensure that more communities and households benefit from the U.S. Government's investment in fighting global hunger. Through technical capacity building; a small grants program to fund research, documentation, and innovation; and an in-person and online community of practice (the Food Security and Nutrition [FSN] Network), The TOPS Program empowers food security implementers and the donor community to make lasting impact for millions of the world's most vulnerable people.

Led by Save the Children, The TOPS Program draws on the expertise of its consortium partners: CORE Group (knowledge management), Food for the Hungry (social and behavioral change), Mercy Corps (agriculture and natural resource management), and TANGO International (monitoring and evaluation). Save the Children brings its experience and expertise in commodity management, gender, and nutrition and food technology, as well as the management of this 7-year (2010–2017) US\$30 million award.

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**Thomas Cole**

## Acknowledgements

The TOPS *Permagarden 3-Day Training Guidelines* Second Edition forms part of the TOPS Permagarden Toolkit. The toolkit resulted from an identified need for a practical resource and training program that outlines the purpose and science of permagardens, and provides detailed guidance on the implementation of permagarden components in a development context. The contents of these training materials, and the broader toolkit, were adapted and developed under the Agriculture and Natural Resource Management component of The Technical and Operational Performance Support (TOPS) Program. Many of the practices and key principles used in the permagarden methodology originate from Bio-Intensive Agriculture (developed by John Jeavons) and Permaculture (developed by Bill Mollison and David Holmgren). Additional content for the TOPS Permagarden Toolkit, including these 3-Day Training Guidelines, was developed from the methodology and trainings implemented by Thomas Cole and Peter Jensen.

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## Background to the training

U.S. Agency for International Development (USAID) Office of Food for Peace (FFP) programs aim to increase food security for the most vulnerable populations. These populations often live and farm on small parcels of marginal land that are prone to droughts and/or floods. This farmland has generally been cultivated for many generations with low input techniques, causing long-term declines in soil fertility and widespread reduction in agricultural productivity. It is necessary for FFP programs to build the capacity of program participants to sustain or increase agricultural productivity by increasing soil fertility and resilience to shocks and stresses.

Women with small children are often the target audience for home garden initiatives in FFP programs, but regardless of the target audience, FFP programs need to take into account the time and labor requirements required to build a permagarden. Strategies that make preparing the garden easier, like working in groups and digging after a rainfall, should be integrated into program work plans to increase the likelihood of successfully implementing a home garden initiative.

The TOPS Permagarden Toolkit is composed of various materials:

- The 3-day training in permagarden materials, including the *Permagarden 3-Day Training Guidelines* which aims to gather farmers who want to improve their home gardens and increase production of nutritious foods near their home. The aim of the training is to enable farmers to adopt key principles and create a permagarden at their house.
- The 5-day training of trainers (ToT) in permagarden materials, including the *Permagarden 5-Day Training of Trainers Guidelines* which aims to gather program staff and local extension agents from INGOs, NGOs, UN, donors, universities and government agencies who are leaders in promoting and implementing food security activities. Participants to this ToT will later train farmers in the practical application of the permagarden method using the 3-day training in permagarden. It also contains a *Permagarden Adult Education Training Resources* document which offers a compilation of selected resources for trainers on adult learning and participatory training.
- The TOPS permagarden resource materials, including the TOPS *Permagarden Technical Manual* which is a resource for agriculture project staff implementing permagarden projects with farmers. The manual explains how to create a permagarden that utilizes local resources, has an efficient design, improves soil health, increases water management, and protects crops and plants for maximum benefit.

# Training overview

## Permagarden 3-Day Training Guidelines

### Primary target audience

The participants are smallholder farmers who will implement the permagarden method.

Participants should have:

- strong interest in learning how to improve food security
- commitment to having and improving their home garden
- a 'good enough' command of the local language where the 3-day training is delivered.

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### Aim and objectives

The aim of the training is to enable farmers to adopt key principles and create a permagarden at their house.

At the end of the 3-day training in permagarden, participants will be able to:

- describe key components of the permagarden method according to the *TOPS Permagarden Technical Manual*
- demonstrate practical knowledge to use and implement key messages of the permagarden method
- apply the permagarden method at their household.

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### Methodology

- Classroom discussion can be conducted at a gardener's house within a project community. The program staff or extension officer will lead the gardeners through the permagarden method by creating a garden.

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### Take away

- Shared learning and experience from neighbors on the practical implementation of permagarden.
- Understanding of how to create and maintain a permagarden.

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### Location

It is highly recommended that this training take place at the household level, in the communities where the beneficiaries live and most activities take place.

The location is preferred to be outside, if possible, with easy access to a number of household plot level gardens that can be used for discussion and practice.

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### Time

3 days.

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## Introduction

These training guidelines provide guidance to staff and extension agents on delivering the 3-day training in permagarden for farmers. It is best for the trainers to have completed the 5-day ToT in permagarden before delivering the training.

## Audience

The participants are smallholder farmers who will implement the permagarden method.

## Context, approach and adaptability

These training guidelines are ordered in a logical flow, comprising the key components of the permagarden overview:

- Local assets and resources.
- Design.
- Soil health.
- Water management.
- Bio-intensive planting.
- Plant health and protection.

The trainer can adjust the order of activities depending on what is best for the training, respecting the adult learning principles and rules taught during the ToT. The trainer should also be flexible in case of disruptions from weather, or if more time is needed on a topic.

■ The training should be led using a participatory approach, allowing participants to continually ask questions while they build their permagarden.

## Aim

The aim of the training is to enable farmers to adopt key principles and create a permagarden at their house.

## Learning objectives

At the end of the 3-day training in permagarden, participants will be able to:

- describe key components of the permagarden method according to the *TOPS Permagarden Technical Manual*.
- demonstrate practical knowledge to use and implement key messages of the permagarden method.
- apply the permagarden method at their household.

### Key concepts

- Utilize local resources.
- Create an efficient garden design.
- Improve soil health.
- Increase water management.
- Plant for maximum benefit.
- Conduct proactive crop health and protection.

### Core content areas

- An introduction to permagarden training.
- An overview of the resilience and needs of plants and people.
- A practical step-by-step guide of the design and creation of a garden.

### Materials, tools and supplies

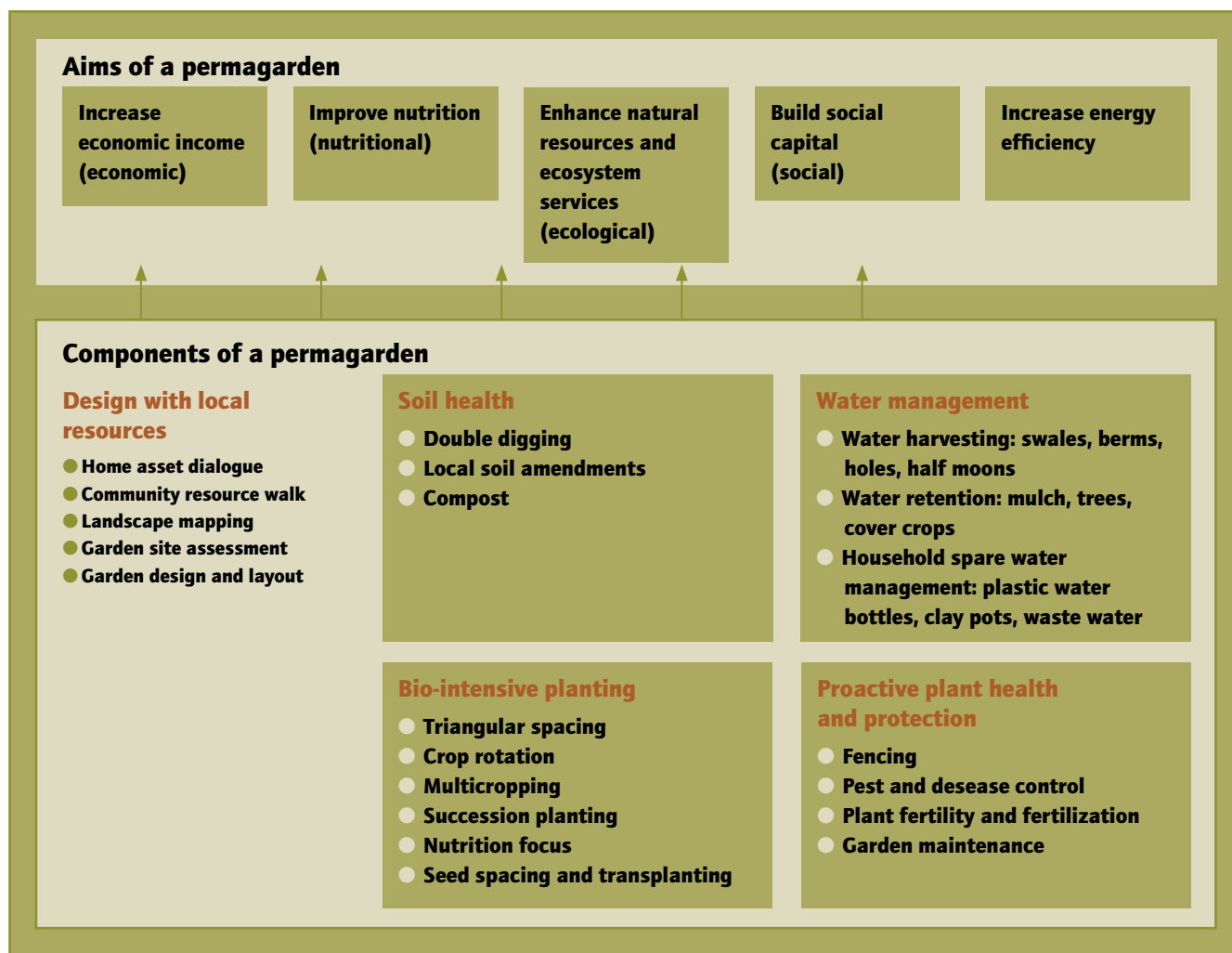
- Hoes and pangas/machetes (the total number of these tools should equal the number of participants).
- 4 watering cans.
- 1 kg of nails to make fence (if applicable).
- Hammer.
- 4 wash basins (to carry manure, ash, etc.).
- 4, or more, empty maize seed bags (large sizes that held 100+ kg of seed).
- Access to manure, wood ash, charcoal dust.
- 6–8 jerry cans for water.
- Vessel to hold a bag of manure or chopped leaf material suspended in water.
- Fencing material (can source locally).
- Flipchart.
- Markers (different colors if possible).
- Sisal twine.
- 20 g of seed for each of 8–10 locally-available vegetable varieties (i.e., greens, amaranth, kale, spinach, cowpeas).
- Vegetable seedlings (i.e., onions, tomatoes, peppers, eggplant, broccoli).
- Tree seedlings (i.e., papaya, banana, citrus, avocado, moringa, neem, tephrosia).
- Bamboo or sticks used to make an A-frame.

## 3-day Permagarden training agenda

Timing	Day 1	Day 2	Day 3
8:30		<b>PG session E</b> ● Review of day 1	<b>PG session I</b> ● Review of day 2
9:00	<b>PG session A</b> ● Opening, introductions and training overview ● Introduction to permagarden ● Basic needs of plants and people ● What is resilience? ● The home-asset dialogue	● Garden design and layout ● Local soil amendments	● Bio-intensive seed spacing and planting ● Crop rotation and garden maintenance
10:30	Break	Break	Break
11:00	<b>PG session B</b> ● Energizer Partner Push ● Community resource Walk-and-talk <i>Landscape Mapping</i>	<b>PG session F</b> ● Bio-intensive soil preparation <i>Double digging</i>	<b>PG session J</b> ● Pest and disease control ● Plant fertility and fertilization <i>Botanical and manure teas</i> ● Water management strategies
12:30	Lunch	Lunch	Lunch
13:30	<b>PG session C</b> ● Energizer <i>Who is the Leader?</i> ● Garden site assessment: sun, slope, soil and water ● Site clearing	<b>PG session G</b> ● Bio-intensive soil preparation: <i>Double digging (cont.)</i>	<b>PG session K</b> ● Garden walk-through ● Consolidation and final reflection ● Final evaluation, certificates and closing
15:00	Break	Break	End of day
15:30	<b>PG session D</b> ● Water harvesting ● Daily evaluation	<b>PG session H</b> ● Fencing ● Making compost ● Review and daily evaluation	
17:00	End of day	End of day	



## Overview of a permagarden



Building resilience through permagardens means that programs must teach the basic agronomic principles and ideas behind the permagarden method instead of teaching how to replicate a particular practice. For example, at the end of the training, households should be able to manage rainfall runoff, not just build a swale. Households should be able to improve soil fertility, not just make compost. The fundamentals behind all of these practices are the keys to building resilient households.

The design of the garden should not rely on only one agricultural practice to improve soil health and increase soil moisture. Instead, the gardener should implement as many practices as possible to achieve these goals. For example, the gardener could use swales, berms, holes, and mulch to improve water retention in the garden. As a general rule, a gardener should try to have at least three different agricultural techniques for every function in the garden. Multiple practices are at the heart of the permagarden's success.

# Day 1

## PG session A

### Introduction to the training and permagarden

#### Activity 1

Opening, introductions and training overview

#### Activity 2

Introduction to permagarden

#### Activity 3

Basic needs of plants and people

#### Activity 4

What is resilience?

#### Activity 5

The home-asset dialogue

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*Morning break*

## Session A – summary points

### Why this session matters

This session introduces participants to each other and to the purpose of the training. It also provides them with an introduction to permagardens and the wider context.

### Objectives

- Introduce the participants and the training.
- Quote the TOPS permagarden resource materials available.
- Describe the contribution of permagardens to household food security.
- Explain the similarity between what is needed for healthy people and healthy plants.
- Describe the value and usefulness of materials and resources found around the home and how we can use them to meet our basic needs.
- Explain the meaning of resilience and why it is important for food security of the household.

### Key messages

- The purpose of a permagarden is to provide household members with an attainable, practical and sustainable method to increase their household food and nutrition security.
- The permagarden method focuses on teaching gardeners the principles of a successful home garden.
- The permagarden method is sustainable.
- There are similarities between caring for plants and caring for people. The more we provide care, the stronger the plant or the person.
- Resilience is the capacity of a person, household, community or system to deal with change (shocks and stresses) and continue to develop. Permagardens help plants and crops become resilient as well.
- The *Home-asset dialogue* is an opportunity for beneficiaries to give voice to what they see in their own lives, so it is important to draw out their own experiences.

### Resources

- Flipchart stand, pads and markers (preferably black and blue) OR papyrus mat leaning (secured to a tree as the flipchart stand) and butterfly clips to attach the flipchart.
- Different colored flipchart marker pens.
- Masking tape, or blank labels/name tags.

### Documents/Handouts

- Picture sheets, etc. translated into local language.
- Pre-tests, if necessary.

## PG session A

### Activity 1

#### Opening introductions and training overview (30')

#### Welcome and Introduction (5')

Welcome participants as they join the group where the training will be delivered (probably open space, outside). A representative of the host organization can introduce the training. Introduce yourself as the trainer and share your agriculture and/or training background as well as the fact that you completed a ToT in permagarden prior to this event in order to be equipped to deliver this training.

#### Participants' introductions (10')

Energizer activities can be used to create a good learning environment. You can use energizers throughout the training when participants are tired and need a boost of energy. Sometimes energizers can have a message behind the activity and sometimes they are just for fun. In this case you can use an energizer for participants to introduce themselves to each others.

The choice to use energizers and which energizers to use should be determined by the audience and what is appropriate within the culture.

#### **Option 1** Introductory energizer: *Pairs' interviews*

As an introduction, ask everyone to find a partner in the group whom they do not know. Each person should ask their partner for their name and what they want to learn during the training. They should also ask each other to share something personal and of interest. Randomly select pairs to introduce each other to the group until everyone has been introduced.

#### **Option 2** Introductory energizer: *Random interviews*

As an introduction, ask someone in the group to present herself/himself by saying her/his name, what they want to learn during the training, and something personal and of interest. Randomly select participants to introduce themselves to the group until everyone has been introduced.

**Note:** Any other option to introduce participants could be used here as long as it would not be too time consuming. Ideas can be found in the *Adult Education Training Resources*.

#### Participants' names

Ask participants to write their name on a piece of masking tape (or if available distribute empty blank name tags or badges), and ask them wear it for the duration of the training.

### Expectations and fears (5')

Ask participants to think about their main expectation of the course and about a 'fear' or concern they may have about the course.

Put up two sheets of flipchart paper with heading 'Hopes/Expectations' on one and 'Fears/Concerns' on the other sheet. Ask participants to share their thoughts, record them on a chart, and respond where appropriate. State which expectations will not be fulfilled when you go over the agenda and objectives next. Depending on your audience, this activity can be a discussion without using flipcharts.

### Objectives, agenda and methodology (10')

#### Training objectives

Share the aim and the objectives of the 3-day training in permagarden. Make sure they are clear to the group.

The overall training aim is:

- To enable farmers to adopt key principles and create a permagarden at their house.

The learning objectives of the training are:

- Describe key components of the permagarden method according to the *TOPS Permagarden Technical Manual*.
- Demonstrate practical knowledge to use and implement key messages of the permagarden method.
- Apply the permagarden method at their household.

#### Training agenda and methodology

Share *Agenda* (you may want to draw a simplified agenda).

Go over the agenda comparing it with the expectations shared earlier by the participants and explaining the methodological approach based on participation and sharing. Ensure that the chart remains visible during the training.

Share the overview of permagarden and explain how the group will go through each component during the training. Emphasize that the group will learn many practices for each component of the permagarden overview and that the success of the permagarden depends on integrating many practices into the garden design.

#### Ground rules

Elicit and discuss what should be the ground rules for the training. Summarize on a flipchart paper. Allow for comments. You may want to suggest choosing a time keeper from the group, as well as a 'ground rules' keeper.

## PG session A

### Activity 2

#### Introduction to permagarden (15')

#### Presentation (5')

##### Introduction to permagarden

Give a brief introduction of permagardens to the participants. Explain the purpose of this methodology and how it will be beneficial to their household:

- The goal of a permagarden is to provide household members with an attainable, practical and sustainable method to increase their household food and nutrition security.

##### Key concepts of a sustainable home garden:

- Utilize local resources.
- Create an efficient garden design.
- Improve soil health.
- Increase water management.
- Plant for maximum benefit.
- Conduct proactive crop health and protection.

Explain that the permagarden method is sustainable as it:

- uses local materials
- strengthens the local environment in an economically-viable manner
- teaches proper water management strategies to work in the rainy season and dry season.

Share this key message:

The permagarden method teaches how to design and integrate multiple agricultural practices in order to increase production and create a more resilient garden. The success of a permagarden often depends on three things:

- 1 Understanding of key permagarden concepts (described in the manual),
- 2 How well the garden is designed to capture water and nutrients, and
- 3 Incorporating as many agricultural practices fulfill each key concept as possible.

#### Brainstorming (5')

##### What is Permaculture?

Ask participants if they know or can guess what permaculture means. Take few answers and then explain that 'permaculture' is a combination of the words permanent and agriculture.

##### Technical Information: permaculture

Permaculture, a combination of the words "permanent" and "agriculture," focuses on designing the garden to include permanent, soil-based structures. In essence, permaculture helps farmers to understand natural influences that affect the homestead, and results in a better garden location and design that optimizes the



use of available resources. For example, swales are used to direct and capture rainwater. Specifically, swales are used around the edges of permagardens to control and manage water, for pest management, and to provide the potential for year-round supplemental food production on the berms.

### What is Bio-intensive?

Ask participants if they can explain what 'bio-intensive' refers to. Clarify that it refers to the efficient system of deep digging, composting, planting and management of the annual crops in beds found within these protective and productive berms.

### Questions/Comments (5')

Allow time for participants to share questions, comments and/or examples.

### Group discussion (5')

Lead the group in a discussion on plant needs for the participants to understand the similarities between caring for plants and caring for people. The more we provide care, the stronger the plant or the person.

### Brainstorming in-group (5')

With input from the group, develop a list of basic needs of people to survive and thrive. Make sure you include food, water, air, shelter, sun. Write down the list on the left side of a piece of flipchart paper in front of the classroom.

Develop a second list on the right side of the paper that outlines the basic needs of plants to survive and thrive.

Point out the similarities in basic needs between people and plants to illustrate the fundamental simplicity of these ideas. Discuss where all of these needs can be found in the community.

### Wrap up (5')

Emphasize the idea that plants require all of these needs to be met in order to grow well and to be productive

Allow time for participants to ask questions for clarification only.

### Introduction (5')

Ask who could explain what resilience means.

Explain that resilience is the capacity of a person, household, community or system to deal with change (shocks and stresses) and continue to develop.

Explain the idea of resilient plants. Explore the concept that 'resilient soil = resilient plants = healthy, resilient households and communities.'

## PG session A

### Activity 3

#### Basic needs of plants and people (15')

## PG session A

### Activity 4

#### What is resilience? (15')

### Demonstration (5')

Describe the Ball vs Tomato demonstration from the ToT. Be sensitive to the fact that you may not want to do the demonstration if food is limited in the community.

- Hold a small ball and a ripe tomato in your hands. Explain that both are quite similar, and could represent neighbors in a community.
- Throw both in the air and let both drop to the ground.
- Ask participants what happened to each one and why? The tomato looks nice but cannot 'bounce back'. The ball rebounds, though often not at the same level as before.
- Discuss: what are the kinds of shocks and vulnerabilities participants currently face? What can we do to 'bounce back'?
- Link to our objective: We want our households to look and act like the ball in times of shocks. Permagardens help build and sustain this household resilience.

### Group discussion (5')

#### Being resilient

Ask participants if they think they are resilient. If so what makes them resilient? If they do not think they are resilient, how can they become resilient?

#### Shocks and stresses

Ask participants what shocks and stresses have occurred in their household, community, or area (droughts, floods, conflict, etc.), and brainstorm about their impact. Write each of the shocks and stresses on a piece of flipchart paper in front of the group.

Ask participants and discuss:

- How each shock and stress impacts food security.
- The characteristics of resilient households in their community.

This activity recaps the previous ones and lays the foundation for the entire training. The home-asset dialogue is an opportunity for participants to give voice to what they see in their own lives, so it is important to draw out their own experiences.

### Discussion (10')

Lead participants in a discussion to recap the topics covered previously, about the purpose of the training, the basic needs of plants and people and building resilient households.

## PG session A

### Activity 5

#### The home-asset dialogue (15')

### Why are we here today?

Draw a simple house outline on a piece of flipchart paper and ask everyone:

- What makes a home or a household?
- What gives a home value? (i.e., land, water, plants, fence, house, tools, people, neighbors, gardens, shop, windows, animals, trees and fruits.).

Encourage each participant to come up and draw the item from their answer on the flipchart.

### Discussion on household assets

- What are household assets? (Refer to the drawing just created and list.)
- Why do we talk about them? (We want to build and increase household livelihoods through an increase in food and economic security.)
- How do we encourage others to 'see' this?

### That is why we are here!

- To help gardeners recognize and enhance livelihood assets by increasing income and food production.

### Questions (5')

- Ask for questions and encourage participants to share brief examples from their experience.

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*Morning break*

### **Thank everybody and announce the morning break.**

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## PG session B

Community resource walk and talk *Landscape Mapping*

### Activity 1

Energizer *Partner Push*

### Activity 2

Community resource walk and talk  
*Landscape Mapping*

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*Lunch*

## Session B – summary points

### Why this session matters

This session provides participants with an opportunity to do a landscape walk. The end goal is for people to see the immense wealth all around them.

### Objectives

- Identify numerous assets and community resources at nearby homes and gardens.
- Develop strategies to use them and maximize their value.

### Key messages

- A simple walk around your local neighborhood can highlight many assets and resources that can be useful in building complementary gardens.
- Outdoor learning by doing is far more effective than simply talking in class.

### Resources

- Flipchart stand, pads and markers (preferably black and blue) OR papyrus mat leaning (secured to a tree as the flipchart stand) and butterfly clips to attach the flipchart.
- Different colored flipchart marker pens.

## PG session B

### Activity 1

Energizer *Partner Push* (10')

Stand in pairs facing each other, feet side by side (equivalent to crops planted too close together in the garden). One partner attempts to unbalance the other, and can easily do so. Next, each individual stands with their feet braced front to back (equivalent to the properly prepared garden). Repeat step 2. With their feet spaced properly, the individual cannot be pushed over. Discuss how these different stances demonstrate the importance of correct plant spacing.

## PG session B

### Activity 2

Community resource walk and talk *Landscape Mapping* (80')

### Introduction (5')

Explain that the key point during the landscape walk is to pay attention to detail: Name the different kinds of grasses and trees and their functions. Point out what plants are good medicines and what is poisonous, what can be used to build and what is edible. Highlight that the end goal is for people to see the immense wealth all around them.

Share key definitions:

- Assets: Assets are useful or valuable things that we have in our possession (could be personal or communal).
- Resources: People, assets, materials or capital that can be used to accomplish a goal.

- Influences: Structures or patterns that may have a positive or negative impact on the garden (e.g., sun, wind, slope, trash pits).

### Group work (70')

#### Make small groups and share instructions (5')

Break-up participants into 3 to 4 smaller groups (3 to 4 people in each group) to walk through the nearby village including gardens and household compounds.

The walk should last approximately 45 minutes. Tell participants that during the walk they should:

- identify and list available household and community resources that can be used to enhance livelihood assets (land, water, plants, animals, small businesses, neighbors, buildings)
- point out local waste products, garden areas, erosion problems, wind breaks, fences, water sources, and any other local assets or challenges.
- identify where they can find compost materials.
- gather examples of the range of plants they find- fruits, leaves, bark, etc., that they use locally for different purposes (food, medicine, pest remedy, etc.). (These will be shared and talked about when everyone is back together after the walk).
- Identify what natural influences may affect the site, including sun and shade patterns, livestock, trash pits, water flows, and nutrient flows.

#### Walk (45')

The walk goes on...

#### Debrief in the larger group (20')

After the walk, rejoin the larger group. Choose one or two of the following options that best fit your group's profile and the time available.

**Option 1** Participants share the examples of the range of plants collected and discuss how each of the assets can be used to improve a garden or how each challenge can be offset by concerted and thoughtful effort.

**Option 2** Ask each group to make a map and then present to the group. The map should list all structures, fields and resources that are seen (including how water flows, path of sun, prevailing wind direction, water points). It is important to point out the presence and location of 'waste' materials such as wood ash, charcoal dust or animal manures.

**Option 3** Step into a local garden area and discuss problem areas you see: shallow soil, hardpan, lack of mulch, wide plant spacing, uneven growth, etc. Suggest ways to improve (mulch, deeper digging, water capture, better spacing, poor soil health) using materials or resources identified previously.

### Wrap up (5')

Wrap up by asking what key ideas participants will take with them.

Reiterate the importance of the assets and resources. Elicit and share again the correct definitions if necessary.

Share key definitions.

- Assets: Assets are useful or valuable things that we have in our possession (could be personal or communal).
- Resources: People, assets, materials or capital that can be used to accomplish a goal.
- Influences: Structures or patterns that may have a positive or negative impact on the garden (sun, wind, slope, trash pits, etc.)

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*Lunch*

**Thank everybody and announce the lunch break.**

## PG session C

### Garden site assessment and site clearing

#### Activity 1

Energizer *Who is the Leader?*

#### Activity 2

Garden site assessment: sun, slope, soil and water.

#### Activity 3

Site clearing

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*Afternoon break*

## Session C – summary points

### Why this session matters

This session enables participants to review and run through the assessment and clearing phases in order to properly create a permagarden.

### Objectives

- Assess the challenges, opportunities and natural influences of the home landscape.
- Determine best possible location for the garden given the natural influences on the specific site.
- Develop a plan for the garden including swales, berms, fencing, compost area and soil amendments.
- Clear the physical space so as to better plan the location for beds and borders that will be able to capture and retain water within the actual garden.

### Key messages

- Regardless of not having space for a larger garden or farm field, every household has some space to grow plants in a 'complementary' garden that could provide food and income for the family.
- Water is the most critical element to successful plant growth. Often, it is also the most limited and precious resource.
- The permagarden can be designed to allow for efficient capture of nutrients and water. An effective design can reduce input costs and labor requirements.
- Swales, holes and their corresponding berms work to stop and slow the water down. Water is then able to spread and sink within the amended soil of the bio-intensive garden bed.
- The garden size should be appropriate for what can be managed by the household.
- The garden location should be determined based on proximity to the house and the benefit it receives from natural influences.

### Resources

- Hoes, Pangas/Machetes.
- Flipchart stand, pads and markers (preferably black and blue) OR papyrus mat leaning (secured to a tree as the flipchart stand) and butterfly clips to attach the flipchart.
- Different colored flipchart marker pens.

### Note to facilitator: preparation

Site clearing should be done as a group during the training, not done beforehand in preparation for the training.

This method can be implemented on a small garden site or a larger size.

For the training purposes, choose a garden size which allows the full group to actively build the garden.

Emphasize that the garden size should be appropriate for what can be managed by the household.

## PG session C

### Activity 1

Energizer *Who is the Leader?*

(15')

Participants stand in a circle. One volunteer leaves the room. After she/he leaves, the rest of the group chooses a 'leader'. The leader must perform a series of actions, such as clapping, tapping a foot, etc., that are copied by the whole group.

The volunteer comes back into the room, stands in the middle and tries to guess who is leading the actions. The leader must change the actions at regular intervals, without getting caught.

When the volunteer spots the leader, they join the circle, and the person who was the leader leaves the room to allow the group to choose a new leader.

## PG session C

### Activity 2

Garden site assessment: sun, slope, soil and water (30')

Explain the importance of the garden design. Share how an efficient design can reduce input costs and reduce labor compared to an inefficient design. Creating a good garden design requires the gardener to know the natural influences that exist on the site. This conversation can be used as a way to identify what natural influences are present.

### Brainstorming in plenary (15')

#### Global discussion (10')

Use the following questions to guide the discussion on natural influences:

- Look around the homestead and determine the challenges and assets within the home landscape: Where does the rainwater move?
- How can we determine exactly where water flows?
- How can water be slowed and allowed to sink into the ground?
- Can the slope be altered?
- Is terracing required?
- Is there adequate sun?
- Where can materials for compost come from and where can the piles be located?
- Is there adequate access to animal manures (if adequate compost materials are unavailable) or other important soil amendments?



- What is the quality and depth of the soil?

Brainstorm with the group where, at the household or community level, the garden should be sited. Highlight what are the advantages and disadvantages.

Brainstorm what types of materials are needed to create a successful garden.

#### Recap (5')

State that these are all questions to pose and answer throughout the garden creation.

#### Group work (15')

##### Group making and instructions (2')

Have everyone return to the small groups from the landscape mapping exercise. Ask participants to map the natural influences including sun movement, slope, water movement, etc. on their map.

If the group did not create a landscape map in session A, ask each group to discuss the natural influences by walking around the site and then choose a specific location for the garden.

Ask the participants to come up with a recommended garden site based on the natural influences and which site will best fulfill the goals of a permagarden.

##### Group work (10')

Run the group work. Ensure that every participant has an opportunity to express their views.



##### Conclusion (3')

Have each group share where they decided to place the garden and explain their reasoning. As a large group, determine the exact garden site for the training.

##### Introduction (5')

Recall where the garden space was located in the previous activity and recap the reasons this site was chosen for the garden.

##### Fieldwork (30')

Ask participants to:

- Mark out the border of the garden section to be cleared. If the training is at a farmer's house then the size of the garden should be appropriate for that household. Emphasize that the garden location, size and shape will be determined by the specific site context.
- Using hoes, rakes, pangas or shovels, clear the area down to bare ground.

Explain that this is the new space for the permagarden!

## PG session C

### Activity 3

#### Site clearing (45')

**Discussion** (10')

After clearing the site, have the group analyze the soil of the garden including texture and structure.

Have participants discuss whether they think the soil is healthy in its current state and why.

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*Afternoon break*

**Thank everybody and announce the afternoon break.**

## PG session D

### Water harvesting

#### Activity 1

Water harvesting

#### Activity 2

Daily evaluation

*End of day 1*

## Session D – summary points

### Why this session matters

This session allows the group to brainstorm different concepts and practices of water conservation.

### Objectives

- Describe the flow of water across the landscape.
- Explain what methods they can use to protect and harness water resources.

### Key messages

- Rainfall and surface water runoff can be controlled and managed through the Three S's of water management: Slow, Spread, Sink.
- You can store a lot more water in the soil than you can in buckets.
- Protective berms and swales allow us to maximize the water retention of the minimum rains AND minimize the destructive force of the maximum rains.
- Slowing and spreading water runoff will prevent soil erosion and increase soil moisture retention to continuously grow garden plants.
- Water can be used beyond its original purpose, saving money, time and energy.
- Wastewater can be used to grow plants in small spaces.

### Resources

- Bamboo or large sticks for A-frames
- Nails
- Sisel twine
- Hammer
- Pangas

## PG session D

#### Activity 1

Water harvesting (85')

### Discussion (10')

#### Brainstorming

Use the following key questions to lead a discussion with participants:

- How much rain falls in the area in a given season?
- Why is it important to know how to capture water?
- How do we do this around the home or garden?

#### The different concepts and practices of water conservation

Discuss the amount of rainfall in the area. With the participants, calculate how much rain falls in a 1 m x 1 m square. How many jerry cans is this?

- Example: 100 mm of rain falling on 1 square meter = 100 L.  
60,000 L of water falls on a 20 m x 30 m garden in a 100 mm rain.
- Emphasize that a lot of water is lost due to runoff and that the soil can hold a lot of water.

Describe different methods of water harvesting:

- Discuss techniques to harvest water in drier regions: swales, holes, half moons.
- Discuss the role that mulching and organic material play in water retention.  
Explain that later modules will cover these topics in depth.

### **Fieldwork (70')**

#### **Water management demonstration (10')**

On a slight slope prepare two 40 cm x 40 cm 'gardens' side by side. Slightly cultivate the land by raking the top with a hoe. Dig several small swales across the contour on the edge of the demonstration garden. Add grass to both as mulch, then burn the one without the swales. Pour out the contents of a watering can on both 'gardens,' emulating rainfall. Water will run off the burned garden without swales while sinking into the soil of the unburned garden.

Discuss how the swale and the covering on the one garden helped retain the 'rainfall' while the 'rainfall' left the garden that was burned. Explain how the water flowed off the the burned garden against the contour and down the slope.

#### **Building an A-frame to find the contour of the land (60')**

Build on your explanation of land contour in previous sessions.

Work with the group to make an A-frame from the bamboo or sticks.

Find the contour lines: choose an area with a gentle (or steep) slope. This is often just around the compound or in the planting field. Using the A-frame, determine which way the water flows. At the top of the compound, mark out where swales should go across the contour using stakes. Talk through the importance of the Slow, Spread, Sink approach to water control. Talk about how swales can be an important water management tool for their field crop gardens and fruit trees, as well as for their permagarden.

#### **Wrap up (5')**

Discuss the results, emphasizing how proper water management practices help retain rain in the soil.

Get participants to comment on the work and discussion.

## PG session D

### Activity 2

#### Daily evaluation (5')

#### Recap

Recall the overview of a permagarden and show how the group went through the components during the day.

#### Daily evaluation

Ask participants to provide an evaluation of the day before dispersing for the evening. This can be done by using any quick method described in the *Permagarden Adult Education Training Resources*.

**Note** Ask participants to bring materials from their homes for Activity 2 *Local soil amendments* on the next day in the morning; locally available materials that could be used to improve the soil (e.g., manure, wood ash, charcoal dust, blood meal, neem leaves, decomposed organic material from rubbish pits, etc.). Many of these will have been identified in the community resource walk.

**Thank everyone, announce the end of day 1.**

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*End of day 1*



## Day 2

### PG session E

#### Garden design and layout, local soil amendments

##### Review

Review of day 1

##### Activity 1

Garden design and layout

##### Activity 2

Local soil amendments

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*Morning break*

### Session E – summary points

#### Why this session matters

This session allows participants to design a garden on the site.

It then runs through local soil amendments.

#### Objectives

- Plan out the most productive and useful garden possible.
- Describe how many of the soil amendments and fertilizers that our crops and trees need can be found around the home and in the local community.

#### Key messages

- The design of the garden should not rely on only one agricultural practice to improve soil health and increase soil moisture. Instead, the gardener should implement as many techniques as possible to achieve these goals.
- Emphasize the concept of relative location. Every component is in relation to something else. For example, the site of the permagarden in relation to the kitchen, the house, the compound, animals, water, etc.
- Each element of the garden performs many functions. For example, berms can trap water, provide protection from rain flow and can be planted with a range of plants. Likewise, fencing can shade, protect against animals and provide support for climbing plants in the garden.
- Long-term planning and mapping of the homestead can help avoid further loss of resources and can actually build them for the future.
- Many local resources exist around the home or the neighborhood that can help grow and sustain productive activities.

#### Resources

##### Activity 2 *Local soil amendments*

##### *Materials needed*

- Wash basins
- Empty maize seed bags

Participants can be asked to bring material from their homes for this activity: locally available materials that could be used to improve the soil (e.g. manure, wood ash, charcoal dust, blood meal, neem leaves, decomposed organic material from rubbish pits, etc.). If so, brief them the day before so they come in the morning with the materials.

## PG session E

### Review

#### Review of day 1 (30')

Recap the key messages from Day 1 using any of the energizers suggested in the *Adult Education Training Resources*, adding substance to it.

Recall the overview of permagarden and show how the group will go through during the day.

## PG session E

### Activity 1

#### Garden design and layout (60')

During this activity, participants should take the lessons from the first day to design the garden on the site.

Ask the participants why this site was chosen in Day 1 for the garden. Emphasize the specific natural influences and considerations which led to this site.

While looking at the garden site, ask the participants how they think the garden should be oriented. Ask what direction should the berms and beds go in relation to the slope. Explain that a good permagarden design includes choosing the best site and having an effective layout of the garden.

### Instructions

- Emphasize that each garden design may be different. Explain that the design is determined by the context of each household and that an effective design will improve production of the garden and reduce labor.
- Locate the highest point of the garden space and talk about how water moves through the space, understanding the slope of the land. This should build off the practical in Session C.
- Plan the beds. Mark out the location of one or two beds, depending on the size of the garden and number of participants, to be double dug. These should run across the slope and be approximately 1 m wide x 3–4 m long. These can be marked by using wooden sticks gathered and cut by the farmers in the group. Alternatively the garden beds can be marked by digging outlines in the bare dirt with a hoe.
- Plan and dig the swales. Mark out the location of swales above and below the beds. These will provide protection to the main garden, as well as a means to capture water and enable more productive planting space. The swales should be configured to harvest as much water as possible, as well as designed to divert water away from the garden in times of heavy rainfall. Participants should now dig the swale. Depending on the situation, larger planting pits can be dug at the ends of the swales to hold larger amounts of water.
- Dig the berm. Use the swale as a basis to dig a berm. Once the berm is marked out, then decide on the placement of the 1 m x 3–4 m long beds that will form the basis of the permagarden. Talk about how the berms are only 'single-dug.'
- Plan the fence. Talk through what type of fencing is needed or possible and where it should be built. Considerations include: what local fencing materials

exist (termite-resistant main posts, thorn bushes, etc.), location of paths to facilitate free movement in the garden, water flow, growth of plants and their need for support, the entry way and how to keep out small animals like chickens.

- Discuss how the garden can be integrated into the rest of the compound and the everyday activities of the inhabitants.

## PG session E

### Activity 2

#### Local soil amendments (30')

#### Group work

##### Group making (2')

Group participants into 3 to 4 new small groups (3–4 people in each group).

##### Instructions (3')

Tell participants to go into the community and gather locally available materials that could be used to improve the soil. Link this to the resources identified earlier (e.g., manure, wood ash, charcoal dust, blood meal, neem leaves, decomposed organic material from rubbish pits, etc.). They should put these materials at the new garden site. Participants can also bring material from their homes.

##### Group work (15')

Run the exercise.

##### Debrief (10')

Lead a discussion on what each group brought. Allow the groups to see all material samples.

Ask: what are commonly available amendments and what nutrients do they have?

- Wood ash = calcium, potash, phosphate and magnesium.
- Charcoal dust and burnt rice husks = carbon.
- Manure (cow, pig, poultry) = nitrogen, phosphate, potash, micronutrients, beneficial microbes.
- Green plant leaves (shredded) = nitrogen, organic material.
- Compost = soil organic matter (SOM).
- Coffee grounds = nitrogen.
- Crushed eggshell = calcium.

Conclude and tell the group that the materials they collected will be used during the upcoming double-digging exercise.

**Thank everybody and announce the morning break.**

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*Morning break*



## PG session F to G

Bio-intensive soil preparation:  
double digging

### Activity 1

Bio-intensive soil preparation:  
double digging

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*Lunch*

## PG session G

### Activity 2

Bio-intensive soil preparation:  
double digging (continuation)

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*Afternoon break*

## PG session F

### Activity 1

Bio-intensive soil preparation:  
double digging (90')

## Session F to G – summary points

### Why this session matters

This session introduces double digging and using soil amendments, and participants practice preparing garden beds.

### Objectives

- Practice double digging and using soil amendments that are essential to improve soil health.

### Key messages

- Soil is living and needs to be healthy just like plants and people. Emphasize the concept that “healthy soil = healthy plants = healthy people = healthy communities.”
- Managing soil fertility and depth enables higher yields from smaller areas.
- Nurturing soil is a continual process.
- Building soil fertility is a low-cost way to increase harvests and potential profits.
- Maintaining soil health does not require special tools. Most homes already have what they need (hoe, digging spade, machete, buckets).
- Deep digging allows the roots to go deep to reach air, water and nutrients.
- Deeper digging allows closer plant spacing so that the leaf canopy closes, capturing CO<sub>2</sub>, holding moisture and eliminating weed growth.

### Resources

- Hoes
- Picks
- Soil amendments from Session E

### Introduction (5')

Share that the goal of this session is to obtain deep soil quality. Deep soil quality (healthy soil in both the topsoil and subsoil) is important for good plant root growth. In permagardens, double digging and adding soil amendments are two key practices to achieve deep soil quality.

Explain that double digging allows for closer plant spacing, as the roots grow down rather than to the sides. Double-dug beds are permanent, which allow them to retain water more effectively. Crops are then rotated between beds from season to season to maximize pest control and achieve higher yields.

### Instructions (15')

Ensure that all locally-found materials are added to the soil to amend and improve its quality. Go over the steps for double digging the beds prior to letting the group conduct the activity.

- 1 If the beds were not marked out earlier, then begin by marking out the edge of the beds using sticks and string or using a hoe in the dirt.
- 2 Measure 40 cm segments along the bed lengthwise. Put small stakes at 40 cm marks or simply mark with a hoe.
- 3 Remove 20–30 cm of topsoil from first 40 cm section, digging down until hard pan (subsoil) is reached. The removed topsoil should be kept at the end of the bed.
- 4 A partner will dig the next 20–30 cm of subsoil, loosening and digging but not removing the soil. Keep digging the whole section until most of the larger pieces have been broken up.
- 5 Add compost, manure, wood ash, charcoal dust or any other soil amendments to the loosened subsoil. One shovel or several handfuls of each amendment is enough.
- 6 Using the shovel, mix these amendments into the subsoil.
- 7 A partner will dig the topsoil of the next 40 cm section. This topsoil needs to be moved on top of the subsoil section that was just amended. Make sure that all the topsoil gets removed.
- 8 A new person then loosens the subsoil as in Step 4. Repeat Step 4.
- 9 Amend the soil, following Steps 5–6.
- 10 Repeat Steps 3–6 until bed is complete. The topsoil at the end of the bed should be used to build up the bed at the other end.
- 11 Once the double digging process has been completed, add more manure, compost and soil amendments to the finished bed. Add one shovel full or several handfuls every 50 cm.
- 12 Smooth out the top with a rake, hoe or by hand, creating a flat planting space. You are now ready for planting or seeding.

### Fieldwork (70')

Run the activity, which will continue after lunch.

**Thank everybody and announce the lunch break.**

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*Lunch break*

## PG session G

### Activity 1

Bio-intensive soil preparation:  
double digging (continuation)  
(90')

### Fieldwork (80')

Continue the double-digging activity from session F.

At the end of this session, an entire permagarden should be prepared, including single-dug berms and swales, and double-dug garden beds. There may be only one double-dug bed if at a farmer's house.

### Debrief (10')

Visit and comment on the results. Discuss ways to decrease the labor for each person while not cutting corners and digging the appropriate depth.

Ideas can include:

- Digging in teams. Three people each work on digging each other's garden beds.
- Digging after it rains and the ground is softer. Breaking up the digging between rains.
- Digging when it is cool out and not in the middle of the day.

**Thank everybody and announce the afternoon break.**

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*Afternoon break*

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## PG session H

### Activity 1

Fencing

### Activity 2

Making compost

### Activity 3

Review and daily evaluation

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*End of day 2*

## Session H – summary points

### Why this session matters

This session allows participants to practice fencing the garden and teaches participants how to make compost.

### Objective

- Describe how to adequately protect the garden using materials found locally within the community.
- Explain what, why, when, where and how to make a simple compost pile.

### Key messages

- Chickens, goats, dogs and other small animals are problems for the permagarden and can destroy and eat the crops very quickly. The fence will also prevent animals from stepping on the beds and compacting the soil.
- Wind can also be a problem drying the soil.
- Termite resistant wood is preferable for the main corners of the fence, with bamboo, thorny branches and other types of materials working to fill the rest of the fence.
- It is important to make sure that chickens cannot enter along the base of the fence. Various trees can be used as truncheons to create living fence poles that will eventually bear leaves and/or fruit.
- Animal manures, ash, charcoal dust, burned crop residue, fish waste and organic plant material are all valuable assets available locally that can be used to improve the long-term quality of the soil.
- Compost contains important nutrients and organic material. It is also beneficial for sandy soils to hold water and clay soils to drain water.
- While compost will contain vital plant nutrients, its greatest value comes in the way it helps sandy soil hold water and clay soil drain water.
- The microbial life in compost helps improve soil fertility. One handful of compost contains over 6 billion beneficial microbes, which over time helps the soil release its own natural fertility in a form that plants can readily use.
- Following crop harvest, compost is applied and mixed into the soil before the next crop is planted.
- An ideal, active family permagarden should have three working compost piles or pits at any given time.

## Resources

### Activity 1 *Fencing*

Materials needed

- Fencing material (identified by participants)

### Activity 2 *Making compost*

Materials needed

- Brown/dry leaves or grasses – about 6 large sacks.
- Green grass, leaves or weeds from garden area (no seeds!) – about 2 large sacks.
- One 20-L bucket of manure or good top soil (source of bacteria).
- Three or four 20-L buckets of water.
- A 1-m long stick as thermometer.

Advance work on your part is required if not enough materials can be gathered from the immediate area at that time. You want to pre-place local 'browns' and 'greens' enough to make a 1 m x 1 m x 1 m pile. The compost pile often requires more materials than participants originally think.

## PG session H

### Activity 1

### Fencing (50')

#### Introduction (5')

Participants should have marked out where the fence needs to go around the identified garden space in Session E. Make sure there is enough room to walk and work in the garden.

#### Discussion (5')

Discuss with the group what type of materials are best to build a strong fence. Find out from the inhabitants of the compound or other local participants where the best fencing materials are located.

#### Group work (40')

#### Group making (2')

Group participants into 3 to 4 new small groups (3 to 4 people in each group).

#### Instructions (3')

Ask participants to:

- Collect materials as discussed.
- Begin building the fence, keeping in mind that chickens and goats are the main domestic animals that might enter.
- Ensure that there is adequate thorn bush or other tight material located along the bottom of the fence.

## PG session H

### Activity 2

#### Making compost (30')

#### Fieldwork (30')

Conduct the activity. Let the participants know that they should finish the fencing on their own if they do not complete it during the allotted time in the training.

#### Debrief (5')

Visit and conclude the activity.

#### Instructions (5')

Following the resource walk, participants will have discovered various 'waste' materials that can be gathered and made into compost. This will now be gathered by the group and may be complemented by materials brought by participants from their homes.

Explain that the pile temperature can be tested by pulling up the test stick to feel the heat and to watch the steam roll. Encourage participants to monitor the temperature for the next couple of days following the training. A well-made pile will be 120–140 degrees Fahrenheit (49–60 degrees Celsius) after just 2 days. Feeling (and seeing) the heat created by all those beneficial bacteria can be a real 'eye opener' for participants.

#### Technical Information: making compost

To make a 1 m x 1 m x 1 m compost pile, bring the following to a shady or covered area near the garden:

- Green vegetative materials (water hyacinth, tree leaves, grass, plant waste).
- Brown material (dried crop residue, straw, grass, shredded or chopped branches).
- Manure (small amounts to sprinkle through the layers as bacteria source).
- Water: 60–80 L.
- Long, sharp, pointed stick (to aerate and measure pile moisture and temperature).

#### *Making the compost pile:*

- Dig a 1 m long x 1 m wide x 10 cm deep hole.
- Add a 5 cm layer of coarse sticks to the hole.
- Add a 12 cm layer of dry brown vegetative material (carbon).
- Add a 4 cm layer of wet green plant material (nitrogen).
- Add 4 large handfuls of topsoil, manure, or finished compost.
- Blend all layers, except for the underlying stick floor, together with 5 L of water.
- Continue adding and mixing layers until the pile is 1 m tall.
- From the top of the pile, put a long, straight stick down through the center. This helps to aerate the compost and can be used to measure the temperature.

- Mix and add a small amount of water to the entire pile every 2 or 3 weeks.
- With regular turning and adequate moisture, the compost will be ready in 2–3 months. You can tell the compost is finished when the material is dark and crumbly with no warmth to the touch.

**Activity** (20')

Run the exercise.

**Debrief** (5')

Lead a discussion on the major learning points.

**Review** (5')

Recap the key messages for both activities and for the day.

Recall the overview of permagarden and show how the group went through the components during the day.

**Daily evaluation** (5')

Ask participants to provide an evaluation of the day before dispersing for the evening.

**Thank everyone, announce the end of day 2.**

**PG session H**

**Activity 3**

Review and daily evaluation  
(10')

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*End of day 2*



## Day 3

### PG session I

Bio-intensive seed spacing and planting, and crop rotation and garden maintenance

#### Review

Review of day 2

#### Activity 1

Bio-intensive seed spacing and planting

#### Activity 2

Crop rotation and garden maintenance

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*Morning break*

### Session I – summary points

#### Why this session matters

This session emphasizes the value of bio-intensive seed spacing and planting, crop rotation and garden maintenance.

#### Objectives

- Demonstrate bio-intensive planting and use of locally-available annual and perennial plants with year round diet potential.
- Implement the triangular plant spacing method to maximize space and capture of water, nutrients and carbon dioxide.

#### Key messages

- Every plant has a specific space requirement to allow full root and leaf growth without creating competition with neighboring plants.
- Triangular spacing allows for more and healthier plants per square meter, thus increasing yield. Triangular spacing:
  - increases plant density
  - increases plant/root health
  - decreases weed pressure (canopy shading of bare soil)
  - decreases hand water requirement (canopy shading of bare soil)
  - decreases erosion (decreased speed and impact of rain on the soil)
  - regulates soil temperature (canopy shading of bare soil).
- Crop rotation, succession planting, and multicropping are key management practices that ensure ongoing harvests of healthy vegetables.
- Crop rotation helps to break or disrupt pest and disease cycles in the garden.
- Succession planting enables ongoing harvests.

#### Resources

- Seeds.
- Vegetable seedlings.
- Tree seedlings.
- Watering cans.

### PG session I

#### Review

Review of day 2 (30')

Recap the key messages from Day 2 using any of the energizers suggested in the *Adult Education Training Resources*, adding substance to it.

Recall the overview of permagarden and show how the group will go through during the day.



## PG session I

### Activity 1

#### Bio-intensive seed spacing and planting (60')

#### Discussion (10')

Discuss the values and rationale for multicropping, creating a diversity of plants within the garden at any one time. Plants should be chosen based on the different characteristics of each plant found in a garden (as they share the same space): protection, food, and climber. A garden can serve as an excellent metaphor for a strong and supportive family, community or school where the value of the whole is greater than the sum of the parts.

List out different types of plants known from this area and their growth characteristics (perennial or annual, vertical or horizontal grower, bushy or compact). This discussion can occur in the field at the garden.

#### Discussion on nutrition

Use this session to discuss the role of certain plants and crops to provide important nutrients for an improved and diversified diet, for example leafy green vegetables. A permagarden can provide households with access to a wide variety of vegetables, fruits, herbs, whole grains, and medicinal plants throughout the year. With careful planning, a permagarden can be a key component for a family to achieve a complete diet. A complete human diet is a diet that provides sufficient calories (the amount of energy provided in food) and all of the required nutrients. List out all known vegetable varieties from the area and discuss how to integrate and grow them in the permagarden.

#### Fieldwork (50')

Introduce the exercise to think about how to fit more plants into the garden using the same plant spacing measurement.

Divide into the same digging and planting teams from previous exercises.

#### Fieldwork Part 1: Triangular Plant Spacing (15')

- Give each group a 25 cm stick and challenge them to show how they can fit as many plants as possible in a 1 m x 3 m bed. Have them mark planting locations using small rocks or sticks.
- After a few minutes ask each group to comment on each other's work.

#### Technical information

Based on the same inter-plant spacing (15 cm, for example), the triangular pattern enables more plants to be planted in the same area as the square method. Triangular spacing also provides more coverage for the soil once the plants grow. This will protect the top soil from drying out as fast. Therefore, a minimal-cost, minimal-input practice, the only cost is more seeds or seedlings per area, can significantly increase production and yields for the farmer over conventional spacing patterns.

### Fieldwork Part 2: planting (25')

Using this knowledge, work with the group to plant the double-dug beds as well as the single-dug berms. Make sure to incorporate a range of annual and perennial crops, along with different planting techniques and spacing approaches. Follow up by applying mulch on all the beds after planting.

### Fieldwork Part 3: incorporating fodder crops into the permagarden (10')

Introduce the idea and explain that improved varieties of fodder grasses and plants can be an important part of the permagarden.

#### Technical Information

##### *Improved varieties of fodder grasses and plants*

Improved varieties of fodder grasses and plants are an important part of the permagarden. They are often high in vitamins and minerals, and eating them will significantly increase both the weight of animals and the quantity and quality of milk from goats or cows kept at the homestead. Having a year-round local fodder source also enables at least one cow to be raised on a minimal graze system. Households benefit from increased milk production, greater control and use of manure, and the potential to harvest slurry and urine for pest remedies and fertilizers. These crops and grasses can be planted on berms and other protective areas linked to the protective swales.

#### Discussion (30')

Discuss the importance of crop rotation and the strategy behind planting different crops at different times in order to harvest consistently throughout the year.

Discuss the importance of crop rotation to minimize fertility loss, disease and insect attack. Share that the benefits of crop rotation will also be discussed in the next sessions on pest and disease control.

#### Technical information: leaf, fruit, root, legume rotation

Crop rotation is important to minimize fertility loss, disease and insect attack. Crop rotation is arguably one of the most important organic cultural practices a gardener can employ to both enhance soil fertility and limit garden pests and diseases. Planting the same crop – even a crop within the same family – from season to season will cause nutrients to decline and pest and disease cycles to flourish. Different crops have different primary fertility needs. Take note that before planting any new crop, additional compost is needed to maintain micronutrient, organic matter and beneficial microbe levels.

The rotation cycle we promote is: leaf, fruit, root, legume.

Leaf crops (spinach, amaranth, sorghum, maize, cabbage) enjoy lots of nitrogen

## PG session I

### Activity 2

#### Crop rotation and garden maintenance (30')

so should be planted first in newly-manured and fertilized garden beds. The following season, plant a fruit crop (tomato, eggplant, pepper) which like some nitrogen but need more phosphorus for proper flower development. Actually, too much nitrogen and your tomatoes will be 'all plant, no fruit' and could develop various imbalances causing blossom end rot or making them susceptible to fungal diseases. Next comes a root crop (carrots, turnip, beets) as they require even less nitrogen but need more potassium for proper root development. Finally, follow it all by planting a legume (peas, beans, cow pea) which will use few nutrients while adding nitrogen back into the soil through the process of atmospheric nitrogen fixation.

### Staggered plant timing with amaranth: succession planting

This activity could use any other type of fast-growing plant.

- 1 Gather local amaranth seed.
- 2 Smooth and prepare first one-third of a garden bed.
- 3 Scatter seeds; cover and water.
- 4 Wait 2 weeks.
- 5 Repeat seeding, covering, and watering on next one-third of the garden bed.
- 6 Wait 2 weeks.
- 7 Repeat final one-third planting.
- 8 Harvest and eat from first one-third of the bed.

### Different classes of crops

- Leaf crops: spinach, sorghum, maize.  
Special considerations: demand high amounts of nitrogen for leaf growth.
- Fruits: tomatoes, eggplant, peppers.  
Special considerations: demand high amounts of calcium for proper fruit formation.
- Roots: carrots, sweet potatoes, turnips, beets.  
Special considerations: require uncompacted, well-drained soil for root development.
- Legumes: peas, beans.  
Special considerations: may require fencing for support. Act as "green manures" that supply nitrogen to the soil.

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*Morning break*

**Thank everybody and announce the morning break.**

## PG session J

Pest and disease control, plant fertility and fertilization, water management strategies

### Activity 1

Pest and disease control

### Activity 2

Plant fertility and fertilization:  
botanical and manure teas

### Activity 3

Water management strategies

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*Lunch*

## Session J – summary points

### Why this session matters

This session will allow participants to brainstorm three main topics: Pest and Disease Control, Plant Fertility and Fertilization, and Water Management Strategies.

### Objectives

- Demonstrate the use of plant material to make local pest and disease remedies.
- Describe the optimal nutrient needs of crops and how to provide them using locally-available resources.
- Demonstrate the use of plant material or animal manures to make liquid fertilizers or crop stimulants.
- Explain how to sustainably produce healthy crops in a small space throughout the entire year.
- Describe practical ways to conserve and reuse water in the permagarden.

### Key messages

- Soil health, correct watering, healthy seedlings and crop rotation will eliminate the great majority of disease and insect problems. Chemical control is only needed once you have done all the previous steps.
- There are three key methods of pest control: cultural, physical, botanical.
  - Cultural control: soil health, proper watering, crop rotation.
  - Physical control: mulch, fencing, netting, hand picking, pruning.
  - Botanical control: companion planting, soap/oil sprays, leaf infusions.
- All combined is known as Integrated Pest Management which starts with proper insect or disease identification.
- It is important to feed your plants after they start growing.
- Creating fertilizers from local inputs are cheaper and more ecologically sustainable than chemical fertilizers and are made from materials often in local abundance.
- Liquid fertilizers can be made from manures, vegetable waste and plant leaves. They can be applied at soil level to feed the roots or they can be used to foliar feed crops through the leaves.
- With good management, it is possible to grow continuous crops of vegetables.
- Water can be used beyond its original purpose, saving money, time and energy.

### 3 key ways to manage water

- Rainwater harvesting.
- Water retention.
- Household spare water management.

### Resources

#### Activity 1: *Pest and disease control:*

##### Materials needed

- Water
- Garlic, Chili Pepper, Neem
- Basin to make pesticide

#### Activity 2 *Botanical and manure teas*

##### Materials needed

Draw the list of materials based on what teas you want to prepare with the group.

### Note to facilitator: preparation

#### Activity 1 *Pest and disease control*

- You do not need to share all of the recipes. Choose which ones are relevant to the program area.
- Participants may need a reminder on how to make the teas after they plant, when the timing is closer to when they will use the teas.

#### Activity 2 *Botanical and manure teas*

Prepare materials needed based on your choice.

## PG session J

### Activity 1

#### Pest and disease control (30')

The trainer will not be able to demonstrate all of the pest, disease and fertilization practices. Therefore, choose which recipes are most appropriate for the context to demonstrate. Additional recipes can be found in the *TOPS Permagarden Technical Manual*.

### Demonstration (20')

Discuss and demonstrate different types of pest and disease control remedies as follows.

#### Technical Information: using neem, melia or tephrosia leaves

These plants all have several insecticidal properties that are of great use to the farmer, both in the field and in post-harvest storage. Extracts and powders of these leaves can help protect crops from pests like aphids in the field and protect harvested grain against weevil infestations.

### Instructions for crop protection

- 1 Crush 2 kg green leaves of tephrosia, neem, or melia.
- 2 Mix crushed leaves in 5 L of water. Steep for 2 weeks.
- 3 Spray on plants affected by aphids and other sucking and chewing insects.

### Instructions for post-harvest protection

- 1 Dry tephrosia, neem, or melia leaves in the shade.
- 2 Once leaves are dry, grind them into a powder.
- 3 Mix powder with harvested grain, using a mixture ratio of 2 kg of leaves for every 20 kg of seed.

#### *Preparation of neem or melia oil for botanical pesticide*

- 1 Collect, de-pulp, and wash clean the ripe seed of neem or melia.
- 2 Dry the seed in the shade for 3–7 days. Any bad seeds should be thrown out.
- 3 Crush seeds in a mortar or other vessel. Mortars used for edible crops should not be used.
- 4 Mix crushed seed with water, using a mixture ratio of 50 g of seed per 1 L of water. Let mixture sit overnight.
- 5 Filter the liquid through a cloth and put in container for use. Liquid can be used directly. If a concentration greater than 50 g seed to 1 L water is used, the mixture should be diluted before application. Using a sprayer or brush, experiment with different levels of concentrations in field trials.
- 6 Use no more than once a week; every 10 to 15 days is the optimal interval. Neem/melia oil is effective against most chewing and sucking insects on crops. Neem does not kill pests outright. It merely disrupts their feeding mechanisms so they eventually die. Neem is also good at controlling fungal outbreaks (such as early and late blight) on tomatoes, as well as controlling powdery mildew on squash and other cucurbits.

#### *Garlic and Chili Peppers Pesticide Recipe*

- 1 Crush one garlic bulb together with one small onion.
- 2 Add three crushed chili peppers and mix with 1 L of water.
- 3 Let soak for 1 hour and then filter.
- 4 Dissolve 50 g of soap in a small amount of warm water and then add to filtered garlic and pepper solution. Mix thoroughly.
- 5 Spray the entire plant, including the undersides of the leaves.

### Discussion (10')

Discuss how various plants within margins of garden or property can assist in pest control:

- Aromatic plants like lemongrass or mint discourage pests from entering garden.
- Trap crops can be used to draw pests away from higher value crops.

## PG session J

### Activity 2

#### Plant fertility and fertilization: botanical and manure teas (30')

- Flowering vines and shrubs like marigold attract beneficial insects that eat or destroy pests.
- Companion plant pairings assist each other by discouraging pests.

#### Discussion (15')

Talk to the farmers about the importance of feeding your plants.

#### Technical information: plant fertility and fertilization

Why do plants need to be fertilized?

- Fertility allows for the proper growth and development of a plant.
- Proper fertilization and plant growth limits pest and disease problems.
- Different types of crops have different fertility needs depending on the part of the plant we are looking to harvest (root, leaf, stem or fruit).

How can we best provide fertility (nutrients) for the plants?

- Plants take up nutrients through their roots and through their leaves, enabling us to provide nutrients in a number of ways.
- Liquid fertilizers are a quick and effective way to provide nutrients to growing plants.
- Soil-based fertilizers provide longer-term (slower release) feeding to the plant.

Compost is a good soil conditioner, but not a complete fertilizer. Therefore, compost should not be seen as the sole source of nutrients for a garden.

#### Botanical and manure teas demonstration (15')

There are a variety of different botanical and manure tea recipes. Provide a few examples from the list below.

Even though the teas will not be ready by the end of the training, show how to make a couple of teas.

Discuss what value there is to the garden from each tea and how it should be used.

#### Technical Information: making tithonia, moringa and manure teas

##### Tithonia

- Chop 5 kg of fresh, young tithonia leaves.
- Soak chopped leaves in 10 L of water for 2 weeks.
- Apply as a foliar fertilizer to vegetables, young trees, and specific grain crops.

##### Moringa

- Grind young moringa shoots (not more than 40 days old) and mix with water, following the ratio of one L of water per 10 kg fresh shoots. Only make enough for one application, as the compounds in the tea break down within 5 hours of extraction.

- Strain the solid out of the solution. This can be done by placing the solution in a cloth and wringing out the liquid. The solid matter, which will contain 12–14% protein, can be used as livestock feed.
- Dilute the extracted liquid with water at a 1:32 ratio.
- Spray directly onto plants immediately after extraction. Follow an application rate of 25 ml per plant. The foliar spray should be applied 10 days after the first shoots emerge from the soil, again about 30 days before plants begin to flower, again when seed appears and finally once more during the maturation phase.

#### **Chicken- or cow- manure tea**

- Gather as much chicken or cow manure as you can and place it in a breathable burlap sack.
- Place the burlap sack holding the manure in some type of bucket or modified jerry-can. Use a rock or heavy object to hold the sack in place.
- Add water to the bucket. Follow a mixture ratio of 8 L of water for every 1 kg of manure. For instance, 2.5 kg of manure will yield 20 L of manure tea.
- Soak for three weeks, making sure you aerate and stir the sack (as you would steep a normal tea bag) every 4 or 5 days.
- At the end of three weeks, pull out the sack. The manure that remains can be added to your compost pile or used to fertilize fruit trees around the courtyard.
- Dilute the manure tea until you have what looks to be weak coffee. This is now ready to be applied to your plants. The most efficient method for transplanted vegetables is with a watering can, though you can pour it directly into tree crop basins.

## **PG session J**

### **Activity 3**

#### **Water management strategies (30')**

#### **Demonstration (30')**

Discuss and demonstrate different practices for water management. Emphasize to the group that each garden should have multiple water management practices. Recall that the garden was designed based on the slope in order to harvest rainwater. Explain that the gardener can do several practices to retain water in the garden (mulch, triangular spacing, etc.) and to use waste water efficiently.

#### **Technical information**

#### **Practices for water management**

##### *Mulch*

- 1 Gather leaves, crop residue and dry grasses.
- 2 Keep them in or near an area where you wish to grow a garden.
- 3 Place a 3-5 cm layer of dry material around the base of plants, including trees.



- 4 Remaining material can be left on the soil surface to keep sun off and prevent erosion from rainfall impact.

*Why should you practice mulching?*

- Plant material, living or dead, left on the soil surface will help keep soil cool and moist because the sun will not reach it.
- Weeds cannot grow easily through the mulch, which leaves more water for growing crops.
- Decaying organic material improves the water-holding structure of the soil.
- As soil can hold more water, plants can continue to grow even during dry periods.
- Decaying organic material serves as food for good microbes that provide many values to the soil, as well as important "housing" for beneficial insects and earthworms.
- Mulch on the soil softens the force of falling rain, preventing erosion.

*Clay pot plantings*

- 1 Before planting, unglazed clay pots (20–30 cm in diameter) are dug into the bed, spaced anywhere from 50 to 100 cm apart. The pots are buried so that the soil line is level with the top of the pot.
- 2 Seeds are then sown or seedlings transplanted at the proper interplant spacing for the given crop. The seeds are placed 10 cm from the edge of the pot and all around it. There should be four plants around each pot.
- 3 The pot is filled with water and then covered (with a banana leaf or dry grass, for example) to prevent evaporation. Household wastewater works well here, as the clay pots help filter the water before it reaches the plant roots.
- 4 Seedlings need to be watered when first planted. Water in the clay pots will seep through the pots to the soil and reach the seedlings' roots.
- 5 Refill the pots with water as needed (usually around twice a week).

*Plastic water bottle*

- 1 Pierce small holes near the bottom of a plastic water bottle with the tip of a sharp knife.
- 2 Fill bottle with water and let the water run out so all can see the holes.
- 3 Now refill and cap the bottle. Notice that the water stays in the bottle until the cap is loosened a quarter turn, whereupon the water comes out slowly.
- 4 The bottle is then buried up to the neck in the space between plants, such as between 3 tomato seedlings. Water is now delivered slowly and directly to the root zone; not to the surface where it is often lost to evaporation or to the plant's stem, where it can make the tomato seedling prone to fungal attacks.

### *Wastewater*

Wastewater can be used to provide water to a small portion of a garden.

Wastewater should be poured onto the soil around plants; do not throw it on or over the garden. It is especially important to keep the water off plants' leaves as much as possible; many plant diseases need moisture to thrive. It is best to put the wastewater on a mulched garden bed, because the mulch helps filter any soap or impurities in the wastewater.

Possible sources of wastewater:

- Cooking water
- Dishwater from cleaning dishes
- Bathing water
- Water from washing and rinsing clothes

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*Lunch*

**Thank everybody and announce the lunch break.**

## PG session K

Garden walk-through and review of all steps, next steps, evaluation and closing

### Activity 1

Garden walk through

### Activity 2

Consolidation and reflection

### Activity 3

Final evaluation, certificates and closing

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*End of 3-day training*

## Session K – summary points

### Why this session matters

This session allows participants to review, reflect on and consolidate the learning from the training.

### Objectives

- Review all of the information and practical exercises of the training in the context of the new permagarden.
- Reflect on the learning from the training and possible next steps.

### Key messages

- Utilize local resources.
- Create an efficient garden design.
- Improve soil health.
- Increase water management.
- Plant for maximum benefit.
- Conduct proactive crop health and protection.

### Resources

- Flipchart stand, pads and markers (preferably black and blue). OR papyrus mat leaning (secured to a tree as the flipchart stand) and butterfly clips to attach the flipchart.
- Different colored flipchart marker pens.
- Prepared charts for Session B as highlighted throughout the activities in detail.

### Documents/Handouts

- Session K handout *Evaluation Form, if necessary*.
- Certificates, if appropriate.
- Post-tests, if necessary.

### Note to facilitator: Preparation

- Prepare accordingly if pre- and post-test were a chosen option.
- Check cultural norms to distribute certificates.
- Check who will close the workshop – host or facilitator, and format, formal or informal.

## PG session K

### Activity 1

Garden walk through (30')

### Review of all steps

Use the newly-planted garden as the center of the discussion:

- Review all the steps included in Sessions A to J.
- Make sure to answer any outstanding questions.

- Talk about how the participants will go back and build their own permagardens.
- Discuss what it means to pass this information on to others.

#### Note to conclude

- Visit the garden every day.
- Daily management of the growing plants is critical, making your shadow the 'best thing' to put on your garden to make it grow and flourish.
- Attending to problems, weeds or pests when they are minor will ensure a bounty of food even from the smallest of spaces.

Go through and review the key messages all together. You may want to ask participants to raise hands if they agree on each key message and feel it is relevant.

## PG session K

### Activity 2

#### Consolidation and reflection

(30')

#### Recap (5')

Recall the overview of permagarden and show how the group went through during the day and during the whole training.

#### Reflection on the learning (5')

##### Option 1 Individual exercise

Invite participants to take the agenda, and per session, reflect individually on what they learned each day, which skills and capacities they have developed, and which knowledge they have incorporated.

Secondly, invite them to identify which areas or sessions they feel they understand well, and those that they would like more information on. Do not open a discussion, leave this for themselves.

##### Option 2 Group consolidation

Ask participants to brainstorm the key messages that they will take away from the training. Key messages can be recorded on a flipchart by the facilitator.

#### Next steps (15')

##### Group making (2')

Ask participants to form small groups of 4 to 5 participants as they wish.

##### Instructions (3')

Explain that this is about their commitment to permagarden.

Ask the groups to reflect on:

- one action they plan to do as a result of the training; and
- what, if any, support they will need to do this.

## PG session K

### Activity 3

#### Final evaluation, certificates and closing (30')

##### Group work (5')

Run the exercise.

##### Feedback (5')

Get feedback from each group.

##### Training follow-up and support (5')

Summarize the next-steps plan based on the previous exercise.

Discuss key follow-up to the training, highlighting that support could be provided to the participants.

##### Post-test (5')

Distribute the post-test (if applicable) to the participants. Explain that the test can be anonymous but a reference (birth date, any important date, identical to the one in the pre-test) is needed in order to be able to compare pre- and post-test. Ask everyone to complete the test. Collect all completed forms.

##### Final evaluation (10')

Recall the aim, objectives, and agenda of the training.

Distribute the *Handout Evaluation Form* (for a literate audience) and allow some time to complete it, then collect all all completed evaluations.

##### Certificates (5')

When the evaluations are complete, ask the participants to form a circle for the presentation of certificates and closing.

Reflecting the participatory approach to the training, place the certificates on a table and ask the lead organizer to present the first evaluation. The person that receives will then present the next one and so on.

##### Closing exercise (10')

###### Option 1 Talking Stick

In the US, the original inhabitants used to meet to talk, solve problems, and make decisions, and to avoid talking all at the same time they used the talking stick. Prepare in advance a nice stick with colors, flowers, etc. Participants stand in a circle with the talking stick in the middle. Only the person with the stick in their hands can speak. Participants only speak if they wish to. This is usually a very emotive moment.

###### Option 2 Match Round

Participants stand in a circle, with a box of matches. One person starts the exercise by lighting one match; she/he can talk as long as the match is lighted.

Then he/she passes the box to the following one. If someone does not want to speak they can pass the box on (larger matches are useful for this exercise).

### Option 3 Giving gifts and thanks

Giving gifts and thanks: using a bag of chocolates or something similar, each participant picks another person to thank, on behalf of their group, and presents them with a chocolate. They should choose someone not already thanked, and give a specific reason for the thanks (e.g., thank you for your sense of humor, for your huge contribution, for your attention to detail, for your good time keeping, etc.). Make sure that everyone is covered.

### OR Any other you may know...

**Note** If there is a guest speaker for the closing, they should be an observer during this exercise, not a participant, since this is a special moment for the group to think about what they have been learning through the workshop.

Congratulate the group, thank the host.

Closing remarks from the host or guest.

**Thank everybody and announce the end of the 3-day training.**

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*End of the 3-day training*







Permagarden 3-Day Training Guidelines

A series of horizontal lines for writing, with two small green squares placed on the lines.

