



Module 12: Grafting



Goal

Farmers will learn and practice appropriate grafting techniques for fruit trees in their Forest Garden.

Learning Objectives

1. Learn the concept and benefits of grafting.
2. Identify desired characteristics of a tree to use for scions.
3. Learn how to prepare scions.
4. Learn common grafting techniques.
5. Learn how to care for grafted seedlings.

Venue and timing

This module should take place at the lead farmer's or a participant farmer's Forest Garden, once seedlings reach the correct size for grafting.

Relevant Technical Manual Chapters

Before this training event, the facilitator should read, review, and thoroughly understand the following chapters and sections in the Technical Manual:

- Chapter 4: Seeds
- Chapter 6: Fruit Trees (Grafting section)

Preparation

- Identify fruit trees on or near the host's farm that can be used as a source for scions.
- 7-10 days before the workshop, the host farmer prepares scion branches (3 for each participant farmer): removes all leaves for 20 cm down from the terminal bud to promote swelling of the buds.
- Inspect nursery to check if seedlings are the correct size for grafting (i.e. when they are around a year old or at least the thickness of a pencil).
- Draw cross section of stem on flipchart paper.

- On the day of the training event, collect two sticks for each farmer – one about 1 cm thick and the other about 2 cm thick and .5 m long – from living trees for farmers to practice making grafting cuts.

Supplies

- Seedlings (3 per participant)
- Sharp knife or utility knife (one for every 2 or 3 participant)
- Alcohol or bleach for disinfecting the knives
- Electrical tape or other weather resistant tape
- Plastic (transparent and thicker plastic is best), sourced from a grocery bag or polyethylene tubes (tree sacks) to use for binding (often used in tree nurseries)
- Grafting compound (optional, if available), such as tar or beeswax; if beeswax is used, be sure to have the necessary tools in place to warm the beeswax to liquid form.
- Rubber Bands (optional), often a cheap and effective way of keeping the cambium layers of you graft in tight contact.
- A selection of fruits from the market

Total time

3-4 hours

Handouts in Farmer's Workbook

- Side Grafting
- Crown Grafting

Module 12: Grafting

Summary of Activities

Opener: How do we find the perfect fruit tree? (30 mins)

- Discuss characteristics of a high quality fruit tree
- Discuss market benefits of grafted fruit varieties

Activity 1: Preparing and collecting scions (45 mins)

- Discuss the characteristics of a good scion source
- Demonstrate how to prepare and collect a scion
- Farmers practice preparing and collecting scions

Activity 2: Grafting demonstration and practical (2 hours)

- Demonstrate local grafting techniques
- Demonstrate side graft
- Farmers practice grafting on seedlings in nursery

Activity 3: Caring for grafted seedlings (45 mins)

- Review the steps
- Discuss aftercare of grafted seedlings
- Debrief grafting practical

Take Home Activity 4: Grafting practical (15 mins)

- Practice grafting on sticks and agroforestry trees
- Collect scions and graft them onto your fruit tree seedlings
- Follow-up

Opener: How do We Get the Perfect Fruit Tree?

Description

This activity prompts farmers to think about qualities of a good fruit tree and understand the benefits of grafting.

Instructions for Farmers

1. Discuss characteristics of a high quality fruit tree

Imagine the best fruit tree on your farm. Why is it a good fruit tree? What does that fruit tree look like? What makes it a good fruit tree? I would like a volunteer to come to the front and draw our best fruit tree and the fruit it produces.

- What are qualities of a desirable fruit tree?
- How can you get more fruit trees like this?
- Do you always get the same fruit if you plant it from seed?
- Does anyone have a fruit tree with small fruits or bad fruits? How could you change the type of fruits coming from that tree? (i.e. top-working)
- What is grafting?
- How does grafting work?
- What are three benefits of grafting?
- What are some types of trees that should be grafted?
- Does anyone have experience grafting?

2. Discuss market benefits of grafted fruit varieties

By improving the yield and quality of fruit in your Forest Garden, you can get more for your fruits at the market. Here are some fruits I brought from the market.

- Which of these will get the best price at the market today? Why?
- Who is selling fruit at the market?
- Are you happy with the price you are getting?
- How can you get a better price? Can you bring your fruit to market at a different time? Can you sell a different variety?
- Has anyone eaten a fruit that you cannot find easily at the market?

Activity 1: Preparing and Collecting Scions

Description

The facilitator takes the farmers to the trees the host farmer prepared to use as scions and describes the desired length, width and other characteristics of a scion. Then farmers practice collecting and preparing scions.

Instructions for Farmers

1. Discuss the characteristics of a good scion source

The branch of the mature fruit tree that you use to graft onto another tree is called a scion.

- What size should your scions be? Width? Length?
- Should you collect scions from flowering trees?
- How can you tell if a branch is a good candidate for a scion?

2. Demonstrate how to prepare and collect a scion

Let's now practice collecting scions from mature trees. First, watch me demonstrate how to cut a scion from a mature tree.

- What tool do you use to cut the scion?
- Should it be sharp and clean? Why?
- Why do you remove the leaves from the branch a week before you cut off the scion?
- Where on the tree should you collect your scions?

3. Farmers practice preparing and collecting scions

Now you all will practice collecting the scions the host farmer prepared last week. Once you collect at least three scions, find at least three more branches that would make good scions and prepare them like I showed you.

- What do you look for when choosing which scion to graft to your seedling?

Activity 2: Grafting Demonstration and Practical

Description

If a participant has grafting experience, they demonstrate what they know for the group. Then the facilitator demonstrates the side grafting technique with the scions collected and seedlings from the host farmer's nursery. Farmers practice the side grafting technique demonstrated by the facilitator. Farmers first practice cutting on sticks before using the seedlings and scions.

Instructions for Farmers

1. Participant farmer demonstrates local grafting techniques

Does anyone have experience grafting? Please come to the front and demonstrate what you know.

- What materials do you need for grafting?
- What do you call the part of the tree that you graft the scion to?
- What type of grafting technique are you demonstrating?
- What advice can you give for ensuring a successful graft?
- What qualities do you look for in a seedling/rootstock to use for grafting?

2. Demonstrate side graft

We have collected scions from mature fruit trees. We will use the seedlings planted in the nursery for our rootstock. I will demonstrate the side grafting technique and then you all will practice with the scions you collected.

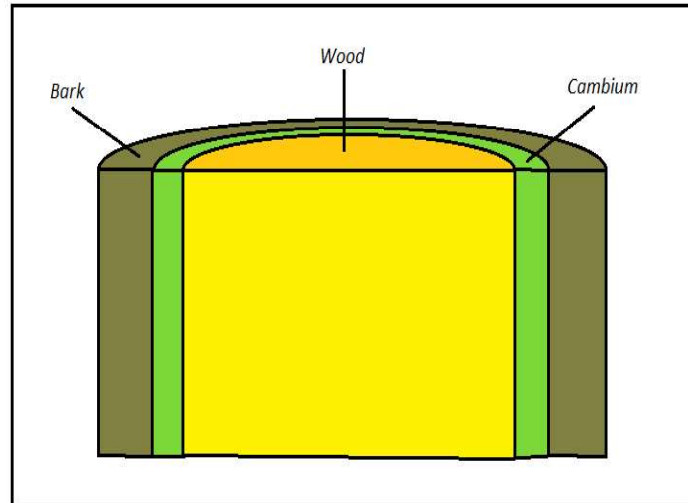
- How do you prepare your tools and materials for grafting?
- How do you prepare a scion for grafting?
- How do you make the cuts for a side graft?
- What do you need to do to form the union for a successful graft?
- What is the cambium layer?
- Why is it important to line up the cambium layer of the scion with the cambium layer of the rootstock?
- Why do you use a grafting compound?
- Why do you wrap plastic around the graft? How do you check to see if you have a good seal with the plastic? (check for moisture droplets the following day)
- Why do you remove all but a few leaves above the graft?
- When do you remove the terminal bud? Why?

3. Farmers practice grafting on seedlings from the nursery

Form a group of 2 or 3 people and come and collect the grafting materials. First collect one small stick to use as a mock-scion and one bigger stick to use as the mock-rootstock. Practice making the types of cuts I demonstrated for the scion and rootstock, then practice grafting the two together. You can practice cutting and

grafting a few times with the same sticks. I will walk around and inspect what you have done. When they look good, I will instruct you to select three seedlings from the nursery that are ready for grafting and you can practice grafting the scions you collected to the rootstock.

Figure 1: Cross Section of Woody Stem



Activity 3: Caring for Grafted Seedlings

Description

The group debriefs the grafting practical and discusses how to care for grafted seedlings.

Instructions for Farmers

1. Review the steps

Can someone come up to the front with their grafted seedlings and review the grafting process, explaining the importance or significance of each step?

2. Discuss aftercare of grafted seedlings

After the seedling is grafted using this technique, it needs to remain in the nursery until you can see if the graft was successful.

- How do you care for grafted seedlings?
- How will you know if the graft was successful?
- When do you remove the plastic and tape?
- How do you prune the seedling after removing the plastic? When? Why is pruning important for a grafted tree?
- Why does grafting sometimes fail?
- If the graft fails, will the seedling die?
- If it doesn't die, can you try to graft it again? When?
- What time of year should you prune grafted seedlings?

3. Debrief grafting practical

Let us talk about successes and challenges from today's activity.

- What are five basic steps for performing a graft.
 - sourcing the scion and the rootstock
 - preparing the scion and the rootstock for grafting
 - grafting the scion and the root stock
 - waiting for the graft to take and for the scion to sprout new growth
 - removing the wrapping and maintaining the grafted tree
- What did you think about the work today?
- What was easy about today's activities? What was difficult in today's activities?
- What observations do you have?
- What other types of grafting are there? Do scions always have to be grafted to potted seedlings?
- How do you plan to apply grafting and other vegetative propagation methods on your farms?

Take Home Activity 4: Grafting Practical

Description

Each farmer practices grafting directly onto their agroforestry trees. The lead farmer will come and inspect their grafting technique and then the farmer will practice grafting on fruit tree seedlings under the supervision of the lead farmer.

Instructions for Farmers

1. Practice grafting on sticks and agroforestry trees.

When you go back to your farm, practice grafting first on sticks, and then when you are comfortable, on some of your agroforestry trees. Use sticks that have similar qualities to seedlings: small, fresh branches that are the same thickness and greenness of the seedlings in your nursery.

If you want, you can practice whip grafting and other grafting techniques in addition to side grafting. Please come and talk to me if you are interested in learning different grafting techniques. The lead farmer will come and visit your farm and help you to perfect your grafting technique.

2. Collect scions and graft them onto your fruit tree seedlings.

Once you have more practice grafting on agroforestry trees, you will practice grafting your fruit tree seedlings under the supervision of the lead farmer. Collect scions from mature fruit trees using the practices you learned today, then graft them on seedling rootstock from your nursery. You should practice making ten graft unions and I will come visit your Forest Garden in a few weeks to see how you did.

Follow-up

The lead farmer visits and oversees fruit tree grafting. The facilitator will visit and check to see if the grafts were successful and advise the farmer on grafting techniques, including techniques not covered during the training.

Evaluation Checklist for Skills Learned in Module 12



At the end of the year you will be evaluated on the following practices that you learned and discussed during training events. Those in bold are topics that we discussed or practiced today. In demonstrating that you have completed the Year two evaluation criteria, you will be invited to continue into the third year of the project.

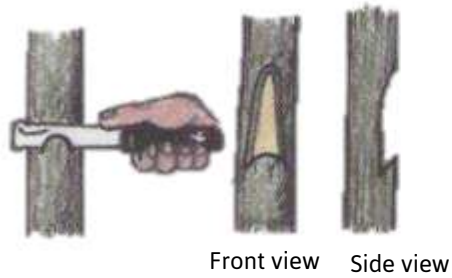
Year 3 Evaluation Criteria

- Green Wall
 - Three rows, fully surrounding the Forest Garden site
 - Gaps replanted
 - Well-managed
 - Dead fence surrounding green wall if still needed (for all projects where this is determined to be a requirement)
- Alley Cropping and/or Contour Planting
 - Optimum number planted
 - Gaps replanted
 - Well-managed
- **Fruit Trees**
 - At least 4 species planted
 - **At least 2 species grafted**
 - Proper spacing between trees
 - Each tree mulched and weeded
- Timber Trees
 - At least 1 species planted
 - Proper spacing between trees planted
 - Each tree is weeded and mulched
- Compost
 - Three active piles
 - Well-managed
- Permagarden
 - Multiple species
 - Demonstrated use and explanation of at least 3 IPM measures
 - Production timed for demand
 - Demonstrated use of the 4 S's
 - Perennials planted on berms around garden

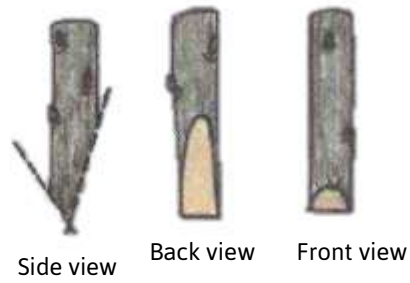
Side Grafting



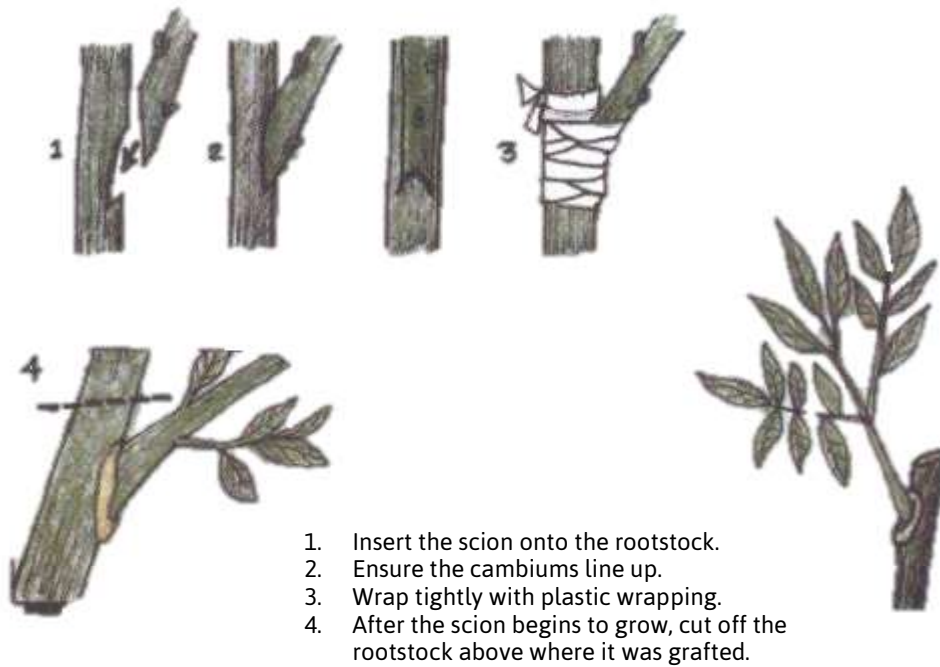
Rootstock Preparation



Scion Preparation



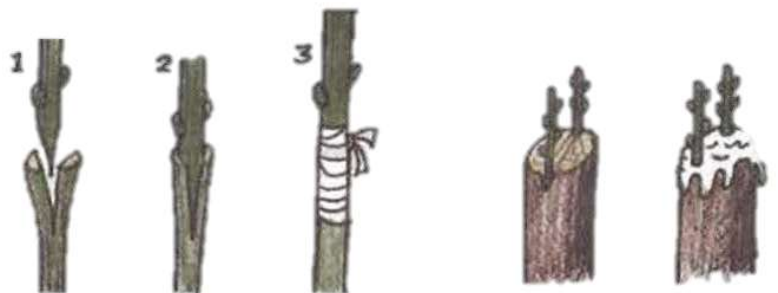
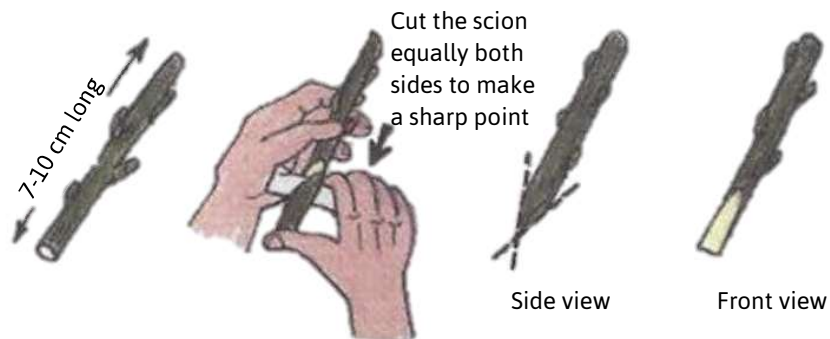
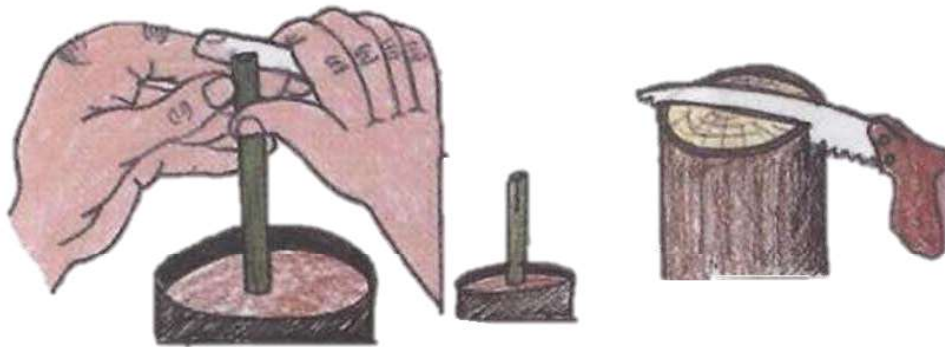
Make a downward cut 2.5-4 cm long



Crown Grafting



Rootstock Preparation



1. Insert the scion in the rootstock.
2. Line up the cambium layers
3. Wrap tightly the plastic

Use wax to seal the grafts for larger trees

Module 12: Facilitator's Notes



The facilitator should use the following pages to note down any questions or findings from the group that should be kept for or addressed at a later time. Depending on the module this may include species selection by group, crops identified in seasonal calendars, or anything else that should be noted.