TREES TO IMPROVE SOIL FERTILITY

Objectives

1. To understand how trees can be used to improve soil fertility.

2. To become familiar with different trees that can improve soil fertility and yield firewood.

4.1 How do trees improve soil fertility?

Multiple uses from one tree is a very common feature of the trees used in agroforestry. We looked at several different ways that trees or shrubs can be integrated into your farm. In this session and the following two we will study how trees can improve the fertility of your soil.

What is soil fertility?

One way to describe soil fertility is the capacity of the soil to produce a good crop. This includes the structure of the soil, the water holding capacity of the soil and the nutrients in the soil.

Do you have problems with soil fertility? If you do you are not alone. Southern and eastern Africa is dominated by sandy soils with low soil fertility. If you do have problems with soil fertility, chances are you also have problems with erosion. Is that so?

Topsi runoff after months of heavy downpour. This is a common feature in Southern Africa.
Mukuka is talking to her grandfather. She is trying to understand how people could clear area after area. She gives one reason why this is not possible anymore. Can you think of other reasons why the practice of slash and burn has to be abandoned?

How did farmers improve soil fertility in the past?

Farmers in the past used to take care of the problem of soil fertility by leaving the land under natural vegetation fallow for several years. The leaf litter and roots would gradually decompose and the fallow would then be slashed and burned at the beginning of a new cropping cycle. In this way the fertility of the soil was restored, and the farmer was able to cultivate the land again with good crop yields.

1. Why do you think so many trees have been chopped or burnt? Are you still practising slash and burn in your area? Why or why not?

2. How can we achieve the benefits of slash and burn without moving from one area to another?

By practising agroforestry instead of slash and burn you benefit from trees more effectively. You grow special types of trees that improve the soil more quickly than traditional bush fallow such as slash and burn. The traditional bush fallow may require a fallow period of 10 to 20 years. In an improved fallow system, fast growing, nitrogen fixing trees or shrubs are grown for 1 to 3 years in order to raise the fertility of the soil in a short period of time.

The dead leaves, roots and other parts of these trees give back nutrients to the soil. These trees also trap nutrients in the soil which crops can use later. Some legume trees cooperate with soil bacteria to make nitrogen available to plants. This means that you are quickly boosting the fertility of that same plot over and over again so that you don't have to move to a new area.

Another benefit of agroforestry is the way ‘fertiliser trees’ have been identified and domesticated. ‘Fertiliser trees’ are those trees that have proved to improve the fertility of the soil in a very effective way. The most promising and commonly adopted species by farmers in eastern and southern Africa are Sesbania sesban, Tephrosia vogelii, Leucaena leucocephala and Gliricidia sepium. These species have potential to restore fertility of fallow land and at the same time produce fuel wood or fodder on your farms as by-products.

Look at the illustrations below. Do you recognise them? Are these species growing in your area? What do you call them?
4.2 Summary: How do trees improve the fertility of the soil?

Trees are able to improve soil fertility in a number of ways.

- They add substantial amounts of organic matter to the soil from litter and root decay.
- They absorb nutrients from deep layers of the soil or the atmosphere.
- They reduce erosion and promote recycling of nutrients.
- They improve soil physical properties, including water-holding capacity and breaking the hard layers that often form just below the soil surface.
- Some trees have nitrogen-fixing bacteria in their roots.

Look at the picture. What benefits of trees are illustrated?

How do you normally return nutrients to the soil?