Session 7: GREEN MANURE CROPS

Objectives

1. To know how to increase organic matter and nitrogen content to the soil with green manure crops.
2. To know which green manure to use.

What is green manure?

Green manure involves incorporating immature legumes into the soil. The plant material can come from a crop that was grown after or within the main crop, or from a plant that grew during a fallow period. It can also come from a shade plant or tree whose cuttings or fallen leaves are suitable for incorporating into the soil.

Why use green manure crops?

Green manure crops improve the tilth of both sandy and clay soils through addition of organic matter. If you use leguminous plants as green manure it will also help to fix extra nitrogen from the air, which becomes available to the following crop.

In addition to recycling nutrients and fixing nitrogen, green manures improve the structure of the soil. They conserve the soil by providing shade and ground cover to prevent soil erosion by wind and water and to retain moisture. Green manures also improve the structure of the soil because of the penetration of their root system. They also act as living mulch keeping weeds down.

Green manures also add organic matter and stimulate the growth of soil organisms. Soil organisms include the small microbes and larger organisms like earthworms, beetles, mites and termites. These
organisms are good for the soil structure because they mix the soil and dig channels that can be used by plant roots or as pores for the entry of air and water into the soil.

The green plant material produced through the action of the sun means that less fertiliser will have to be applied such as teas and compost.

The purpose of green manuring is to:
- Make nutrients available for the main crop
- Improve the soil structure
- Increase or maintain the level of organic matter in the soil
- Increase the ability of the soil to hold moisture
- Protect the soil against hard rain and wind erosion, dehydration and extreme temperature fluctuations at a time when no other crops are present

Does it seem wise for you to grow green manure?

How do legumes work?

A speciality of legumes is that bacteria living in their roots are able to fix (incorporate) nitrogen from the air into the soil. These nutrients are held in the plants. When the plants are incorporated into the soil they decompose and release nutrients for the succeeding crops.
Deep-rooted legume crops such as pigeon peas and sesban are able to bring nutrients that were washed down to lower levels in the soil to the upper levels where they can be used by shallow-rooted crops like maize.

Deep rooted plants draw nutrients from lower levels in the soil. When the leaves decay, the nutrients become available for shallow root systems.
What if the legume does not work?

Some legumes will not grow well nor fix nitrogen if the correct bacteria for that particular legume are not present in the soil where they are sown. This might happen if you plant a legume that is not already growing in your area. You can solve this problem by taking soil from an area where the legume is growing. Pull up some of the plants and break open the root nodules. If the nodules are pink inside you will know that bacteria are present and fixing nitrogen. Take a small amount of soil from that field and mix it with your seed before planting them.

If you cannot access soil with the bacteria you need, you can buy innoculants specific for the legume you are planting.

1. **Test the presence of bacteria in a legume near you by breaking open its root nodules.**

2. **Many farmers feel that they cannot spare some land to plant a green manure crop or that ploughing under a green manure is hard labour. What would be the benefits from growing green manure crops in your field? Do you see any problems with growing or using green manures?**

Which green manure crops can you grow?

Discuss which green manure crops you can grow in your area. Ask your neighbours, extension officers or other resource persons for advice. A few species that are often used as green manures are *Crotalaria juncea* (sunnhemp), *Mucuna pruriens* (velvet beans), *Sesbania sesban*, *Vigna unguiculata* (cowpea), *Vigna mungo* (black gram) and *Vigna radiate* (green gram).
Below you can read about two green manure crops and learn to grow them.

**Sunn hemp**

Sunn hemp is an excellent green manure crop. It fixes nitrogen, provides a lot of material for organic matter, and helps control weeds. To have effective weed control, it should be broadcast thickly so that the plant population is high per given area. It is sufficient if you plant 20 kg per hectare. Sunn hemp does not require weeding. Planting sunn hemp also means that you would have fewer weeds the following year.

This excellent plant can also be planted between rows of maize after the last cultivation. Immediately after you finish with the weeding or cultivation, you may spread sunn hemp seed in the area between the rows of maize. Cover the seed lightly with soil. The sunn hemp will continue to grow after you harvest the maize, and it will supply organic matter to the soil and nitrogen to the maize crop. Planted in this way, the sunn hemp also helps to reduce damage done by termites to maize.

**Velvet beans**

Velvet bean (*Mucuna pruriens*) is another good green manure crop. It gives a very dense ground cover that smothers weeds. It also fixes nitrogen and provides a lot of plant material. Velvet beans are easy to grow and will do well in most countries either with high, moderate or low rainfall and in fertile or poor soils. However, it is important to weed the crop at least once shortly after emergence to ensure that weeds do not overtake the plant in its early stages of growth. Velvet beans are susceptible to cold and fluctuating temperatures when very young.
When can you incorporate green manure?

If you plough under the green manure when it is still young, the material is broken down quickly by the soil organisms. This means that nutrients are also released quickly. Within a few months the material is completely decomposed.

Green manure can also be left to rot on the soil surface. This is called mulching and you can learn more about it in session 9. What is recommended in your area – ploughing under or mulching?

1. **Give the advantages and disadvantages of green manure.**

2. **Why is cultivating green manure not a common practice amongst small-scale farmers? How can green manuring become a common practice?**