Session 7

**TREES FOR FODDER**

**Objective**

1. To know how to raise healthy animals by supplementing their diet with nutritious leaves and fruit from trees.

**7.1 Why it is good to integrate trees into a farm system with animals**

Long dry seasons are periods of stress for cattle and other farm animals, just as it is for humans. During these months fodder, especially grass, is scarce and of poor quality. Its content of protein, vitamins, and minerals is very low. The protein content in most grasses is satisfactory for animal production for only some months of the year. As grass matures it becomes more fibrous, loses much of its protein, and becomes less digestible. This makes it very difficult to keep the animals healthy. Some farmers can let their cattle browse in the bush or graze in dambo areas, but what can be done when even these food sources finish or are not available? One solution to this problem is to grow trees on your farm that will supply nutritious food for your animals during the dry season. Tree fodder maintains its protein content and digestibility throughout the year.

The number of microbes therefore declines, and this slows the rate of digestion of food. This in turn slows the passage of food out of the rumen and so reduces the amount of food the animal can consume.

The conclusion you can draw from this information is that if you supply additional protein to your animals during the dry season they will be much healthier than if they eat only dry grasses. They will eat more food and with the help of the microbes, be able to digest it better.

Mr. Muzevengu of Buhera District in Zimbabwe started managing trees on his piece of land. His cattle fed on the leaves, fruits and pods from over six different local tree species. During the unforgettable drought of 1991/92 season, he managed to keep his cattle alive on the leaves and fruits from the trees Colophospermum mopane and Kigelia africana. Most of the cattle in the rest of the district died. Because Mr. Muzevengu’s cattle were in better condition than those of his neighbours, he managed to sell his cattle for double the price that the other farmers received.

During the same drought, Mr. Bhamar of Matamba school in Shirungwi district of Zimbabwe, harvested pods of the tree Pilostigma thonningii. He took the pods to a grinding mill where he milled the pods for his cattle. Most of his cattle managed to survive the drought.

**7.3 Where can I find proteins?**

An excellent source of this protein-rich food is tree leaves, especially from leguminous trees. Many indigenous trees and several fast-growing exotic species produce good fodder and can be left to grow in the fodder bank. Other examples include Pigeon pea, Mulberry, Sesbania sesban, Acacia angustissima, Calliandra calothyrsus, Glicidia sepium, Albizia lebbeck and Leucaena leucocephala. Leucaena leucocephala has so far proved to have the highest potential for sustaining high milk yields – 14 litres per cow per day. Another excellent source of protein is Moringa oleifera, an exotic tree that grows very well and that will be mentioned again in sessions 8 and 9.

Some trees not only produce protein-rich leaves but also nutrition pods that can be fed to livestock. Examples of suitable trees are Pilostigma thonningii, Dicrostachys cinerea, cinerea, Amblygonocarpus androgonis, Faidherbia albida and Acacia species. These five kinds of trees supply not only nutritious leaves for your animals, but also very good pods which become available in the midst of the dry season.
7.4 Some ways in which I can grow these trees on my farm

Protect local trees

There are several different ways in which these trees can be integrated into a farm system with animals. The first and simplest way is to protect any local trees, especially legumes, already growing on your farm.

? Are the local trees found in your area a good source for fodder? Are there any good browse trees left on your land? Which ones? When are the pods ripe? Could you plant some seeds from these trees in a nursery? Where would you plant the seedlings?

Plant trees

If there are no more local trees left on your land, or too few, then you could collect seeds from local trees growing nearby and plant them in your tree nursery.

Plant seedlings when the rains are well established. You can plant the seedlings in the field with other crops, on contour bands, around the homestead and fields or in their own field.

- Plant with crops

If planted with crops it is common to plant the trees in rows that are 3 to 10 metres wide. The spacing between trees in a row can be about 25 to 50 centimetres. You can then plant rows of crops in between the alleys of trees. Plant the crop with the spacing you would normally use.

- Plant along contour bands and borders

Along contour bands or borders the spacing is less critical because the trees are not competing with any crops. Use the spacing you prefer but make sure that the distance between two trees is always more than 3 metres.

- Plant in fodder bank

You may also plant the trees close together in what is called a fodder bank. A fodder bank is a way to save fodder for the time you need it. Just as money can be stored in a bank until needed, fodder is stored on the trees. A piece of land 50 metres by 50 metres is sufficient for about 4 animals. It is best to plant a mixture of 3 or 4 different kinds of trees in your fodder bank. Plant the trees in rows, with spacing of 30 to 40 centimetres within a row and 50 centimetres between the rows. Protect the seedlings well. Session 3 guides you on how to do this.

7.5 How do I harvest and use this nutritious food supplement?

There are 2 different methods which you can use, and you may use one or the other or both of them. The first way is simply to let your animals browse the leaves and pods directly from the trees or, especially the pods, from the ground. This method might be appropriate for trees scattered in your field or along the borders.

In the case of a fodder bank, the method of choice is to cut the trees every few weeks and feed the leaves, either fresh or dried, to your animals. This is called a cut and carry method. Wait to cut the trees until they are about one year old or about 1 to 2 metres tall. If you cut them earlier, their growth will be slow and future yields will be low.

After the first cut the trees may be cut every 8 to 12 weeks depending on the season and the amount of growth since the last cut. Cut the trees at a height of about 50 to 70 cm.

Yield of fodder of Leucaena trees varies with soil fertility and rainfall. Fodder yield ranges from 3 to 10 tonnes dry matter per hectare per year. The most suitable cutting or grazing intervals vary with site. A long interval increases overall yield but tends to increase the amount of wood that is not eaten by our animals. At good sites, you can harvest at intervals of 6-8 weeks but on poor or dry sites you have to wait for at least 12 weeks. Many pods are more nutritious than maize. Feeding cattle with pods can result in high weight gains. Using a mixture of pods is also much cheaper than buying concentrated livestock feeds. Below you can see an example of how to mix nutritious feed.

Mixture of grain and tree pods for cattle fattening

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize stover</td>
<td>250</td>
</tr>
<tr>
<td>Maize grain</td>
<td>200</td>
</tr>
<tr>
<td>Sorghum grain</td>
<td>200</td>
</tr>
<tr>
<td>Sunflower seed chaff</td>
<td>100</td>
</tr>
<tr>
<td>Pods from Pilostigma thonnongii</td>
<td>200</td>
</tr>
<tr>
<td>Pods from Acacia erioloba</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>1000</td>
</tr>
</tbody>
</table>
1. From what tree species can you get nutritious pods in your area? From your knowledge, what could be a good mixture for the animals you wish to feed using what you could grow locally?

2. Even though the cut and carry method requires more labour than simply letting your animals browse from the trees, there are advantages to the cut and carry method. What are some of these advantages?

Learn more on fodder in the two study circle materials, fodder banks in livestock and dairy production and feeding and routine management of dairy animals. You can get these books through your study organiser or the SCC office.

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**Session 8**

**TREES FOR THE CONTROL OF PESTS**

**Objectives**

1. To understand organic integrated pest management better.
2. To know different ways in which trees can support this management on your farm.

**8.1 What is organic integrated pest management?**

Organic integrated pest management, like agroforestry, uses old traditions and practices that have been improved to help you manage your farm. In fact, it is a way to help you manage pests better. It is a way of keeping crop and animal pests at acceptable levels, using methods that cause little or no damage to the environment or danger to human health. It is named organic integrated management because it uses as much as possible natural mechanisms to regulate the pest populations, such as the natural enemies of the pests. It strives to maintain the natural balance in the environment of the farm. Pesticides, even from an organic source, are used only as a last resort when other methods fail.

Organic Integrated Pest Management is called OIPM in short. Perhaps you have seen this acronym before. Discuss your understanding of the words "Organic" and "Integrated".

It is defined that the level of the pests is acceptable if the economic damage it does is not significant. How would you state the practical meaning for you of "an acceptable level" of pests not being "economically damaging"?

**8.2 How trees contribute to organic integrated pest management in my farm system**

Trees can help you control your pests in many ways:

- by improving the soil fertility
- by increasing the biodiversity on your farm
- by rotating with your crops
- by providing pesticides, repellents and anti-feedants.
The importance of each of these for organic integrated pest management will now be explained briefly as will the way trees fit into this management.

8.3 How soil fertility controls pests

We discussed earlier a variety of ways in which you can use trees on your farm to improve soil fertility:

- improved fallow
- yielding material for leaf teas
- compost, green manure and mulch
- intercropping trees with other crops.

All these methods improve the nutrient status of your soil and may also improve the physical structure of the soil. The organic matter content of the soil will be increased, and this will foster the growth of a great variety of different organisms in your soil. The result of this improved soil quality will be that the plants you grow on this soil will be healthier and stronger than those grown on poorer soil. Healthy plants may not be as attractive to pests as are weak, sick ones, and are more able to resist diseases and pests.

8.4 How mulch controls pests

Apart from improving soil fertility and thereby controlling pests, mulch can repel pests.

Spiky grass or leaf mulch repels nematodes, cutworms, grasshoppers, ground beetles, termites, thrips, slugs and snails. Mulch made from dippings of strong-smelling plants repels insects. Such plants are herbs, Mexican marigold, lantana and gum trees. Ash deters ants which attack strawberries, beans and carrots.

The problem with mulch is that it can also attract pests. It is therefore important to choose the right mulch material for the plant you wish to protect. Share your experience on mulching. Which mulching material has been successful on which plants? Which material was not successful? What were the problems?

8.5 How “increased biodiversity” controls pests

Increased biodiversity means that there is a greater variety of living creatures in an area, such as on your farm. Obviously, every different kind of tree or shrub you grow means one more kind of living creature on your farm. But that is not the only way the trees or shrubs contribute to increased biodiversity. They also serve as the home or provide nutrients for many other living creatures such as birds, insects, frogs and lizards. How, then, does this increased biodiversity contribute to your organic integrated pest management?

- Many of the creatures that find a home in the trees or get some of their food from them are enemies of the pests on your crops. They may either eat the pests, as many birds do, or they may be parasites of the pests, as are many insects.

- Trees or shrubs make it more difficult for the pest to find your crop. They do this either by acting as a physical barrier, by repelling the pests through aromas released by their leaves, flowers, and roots, by obscuring the crop’s shape and odour, or by trapping the pests (the pests prefer the tree/shrub to your crop).

In Session 1 we spoke about agroforestry being a successful farming system since it imitates a natural ecosystem. Discuss the role of increased biodiversity in organic integrated pest management as an example of this.

8.6 How rotation of trees with crops reduce the probability of having pests

In session 4 we considered one way of rotating trees with your crops. How does this help you control pests and diseases? Pests and diseases tend to increase year after year if you practice continuous mono-cropping, for example maize every year. The pests become so many that they are economically damaging. But if you rotate your crops carefully the pest population will not become too large, because the pest on one crop will not find its food during the years you do not plant its food crop. Trees are excellent to include in your rotation system, because the crop pests will not survive on them.
8.7 How to get pesticides, repellents and anti-feedants from trees

You know that many local trees are used to provide human medicines. In a similar way, many local trees and several introduced ones provide chemicals that help to control pest populations.

**Beetles**

Dried and powdered leaves of several trees will protect stored seeds from beetle damage. We have protected cowpeas and sesban seeds with powdered leaves of *Tephrosia vogelli*, *Melia azedarach* (Chinaberry), *Senna siamea*, *Eucalyptus* (Blue Gum), and *Azadirachta indica* (Neem). Mix about 200 grams of powder with 50kg of seeds. Of course the leaf powder should be thoroughly washed away from any seeds to be eaten by humans.

**Termites**

If termites are numerous in the soil where you planted the trees then you will probably have to take some action to control these wood-eating insects. Most local trees and some exotic ones (again, *Senna siamea*) are resistant to termites, but many introduced trees, such as *Leucaea* species, are not resistant. Some control methods are 1) putting wood ash into the planting hole and around the base of the tree and 2) putting crushed pods of *Swartzia madagascariensis* (Snake Bean) or of *Cassia abbreviata* (long pod Cassia) around the base of the tree. Soak the crushed pods in water for 2 hours or longer, even overnight.

**Aphids, Red Spider Mites, Termites**

An excellent local shrub for pest control is *Tephrosia vogelli*, a legume which can also be grown in rotation for soil fertility improvement. For good germination its seeds should be given the hot water treatment (see session 2). Plant the seeds or seedlings about 1 meter apart. Harvest the leaves carefully without damaging the stem, crush the leaves and soak them in water for two hours or overnight. A good mix is 200 grams of leaves per litre of water. Filter the extract through a piece of cloth and spray on your infested plants. This is a successful treatment against aphids, red spider mites and termites.

**Aphids, Bugs, Caterpillar, Cutworm, Root-knot Nematodes, Termites, Coffee Rust, Powdery Mildew, Rice Brown Leaf Spot**

The Pawpaw leaf spray will help you control most pests. Add 1 kg finely shredded leaves to 1 litre of water, shake vigorously, filter, add 4 litres of water, 2 teaspoons of paraffin and about 20 g of soap. Spray, or water into the soil for cutworm. Extract the juice from immature fruit to control termites.