Leucaena Based Farming

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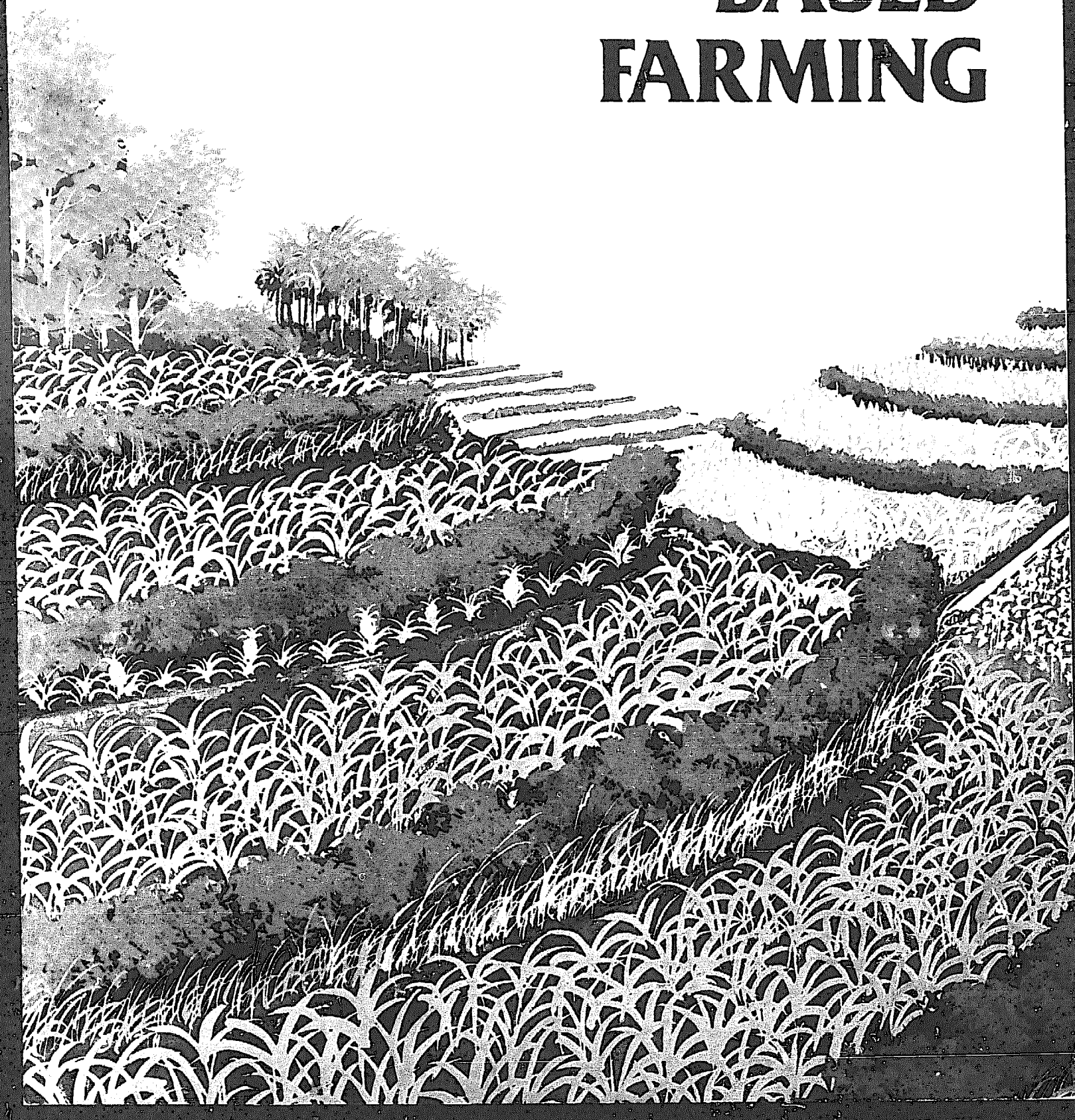
PRACTICAL GUIDE
TO DRYLAND FARMING

II

LEUCAENA BASED FARMING



LEUCAENA BASED FARMING

This series of farmer training manuals was developed in Indonesia, and is the result of cooperation among many organizations. The following agencies participated in a variety of ways in developing the ideas presented in the booklets :

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February 1986

Much of the Nusa Tenggara region of Indonesia has an environment which is considered very harsh. With rainfall limited to a short rainy season, and only a thin layer of topsoil covering limestone or volcanic rock, much of Nusa Tenggara is difficult to farm successfully.

In order to survive in this harsh and challenging environment, farmers cultivate their land using simple techniques which they have developed through centuries of experience.

In close-knit working groups, farmers work shoulder to shoulder to open fields, till the soil, plant and harvest.

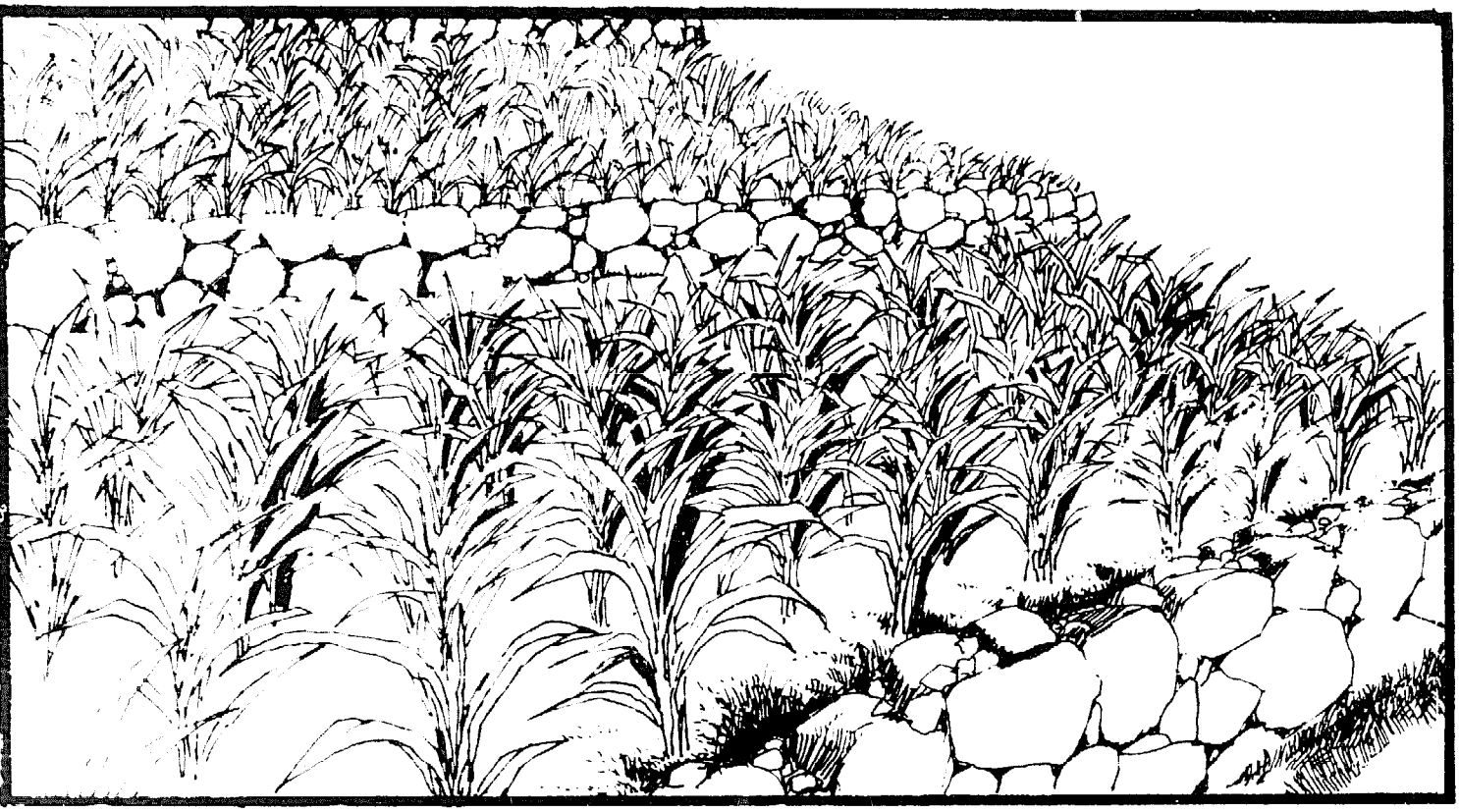
However, these methods are not without problems! After a few years of cultivation, a farmer's field begins to lose fertility, and crops grow poorly.

When the soil is no longer fertile, the harvest becomes so poor that it is no longer worth the energy needed to produce it.

In addition to lowered fertility due to repeated planting, matters are made worse by "erosion" on hillslopes. Erosion is the washing away of topsoil when there are not enough trees or other plants to absorb the rainwater.

When the soil loses its fertility through continuous cropping and erosion, farmers are forced to open new fields by cutting and burning the forest. This is very hard work.

Abandoned fields, on which farmers have already expended a lot of energy, are often overrun with weeds such as alang-alang **(Imperata,** or sword grass) and become less productive for farming.

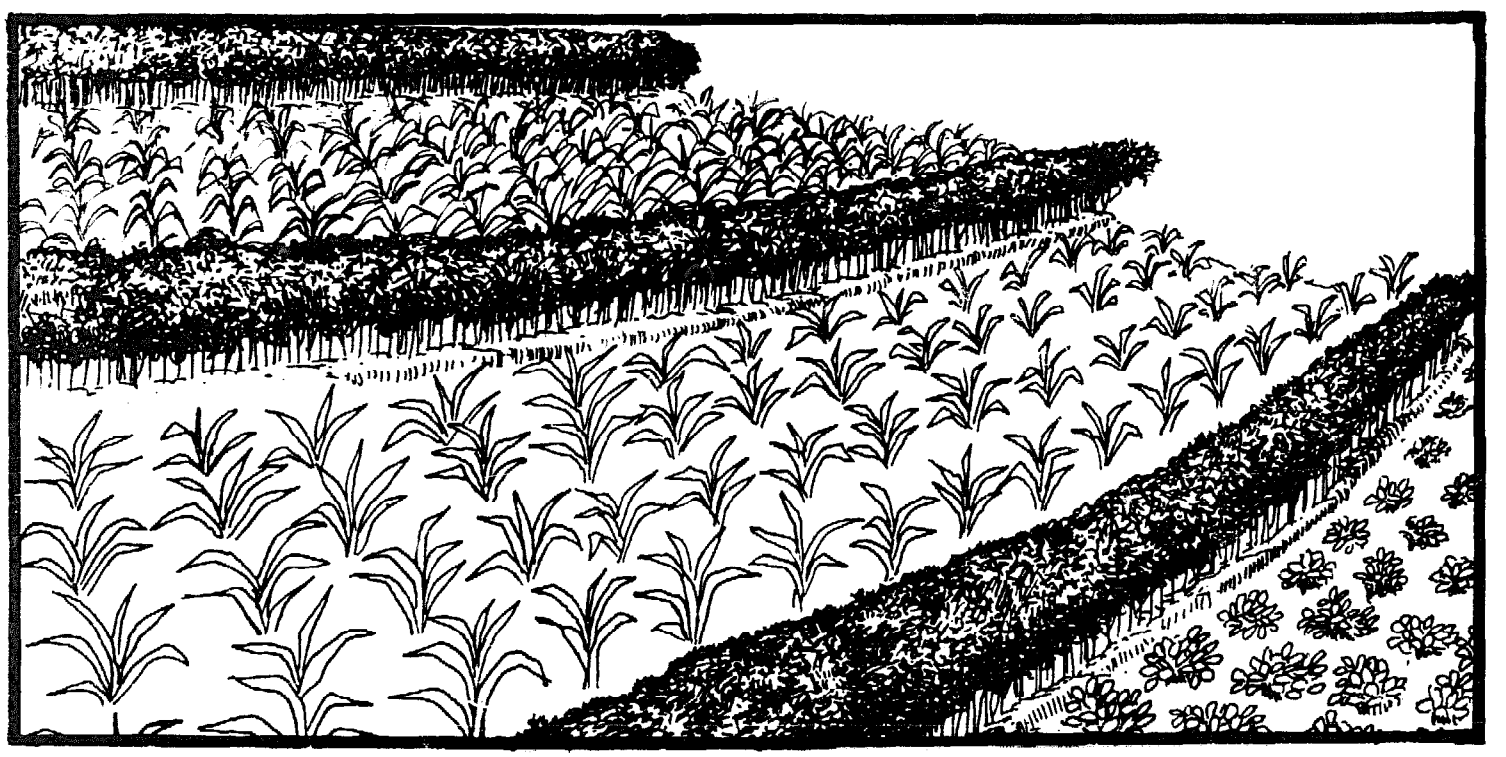


Farmers are very aware of these problems and have developed a number of practices to overcome them. One example is the construction of rock barriers.

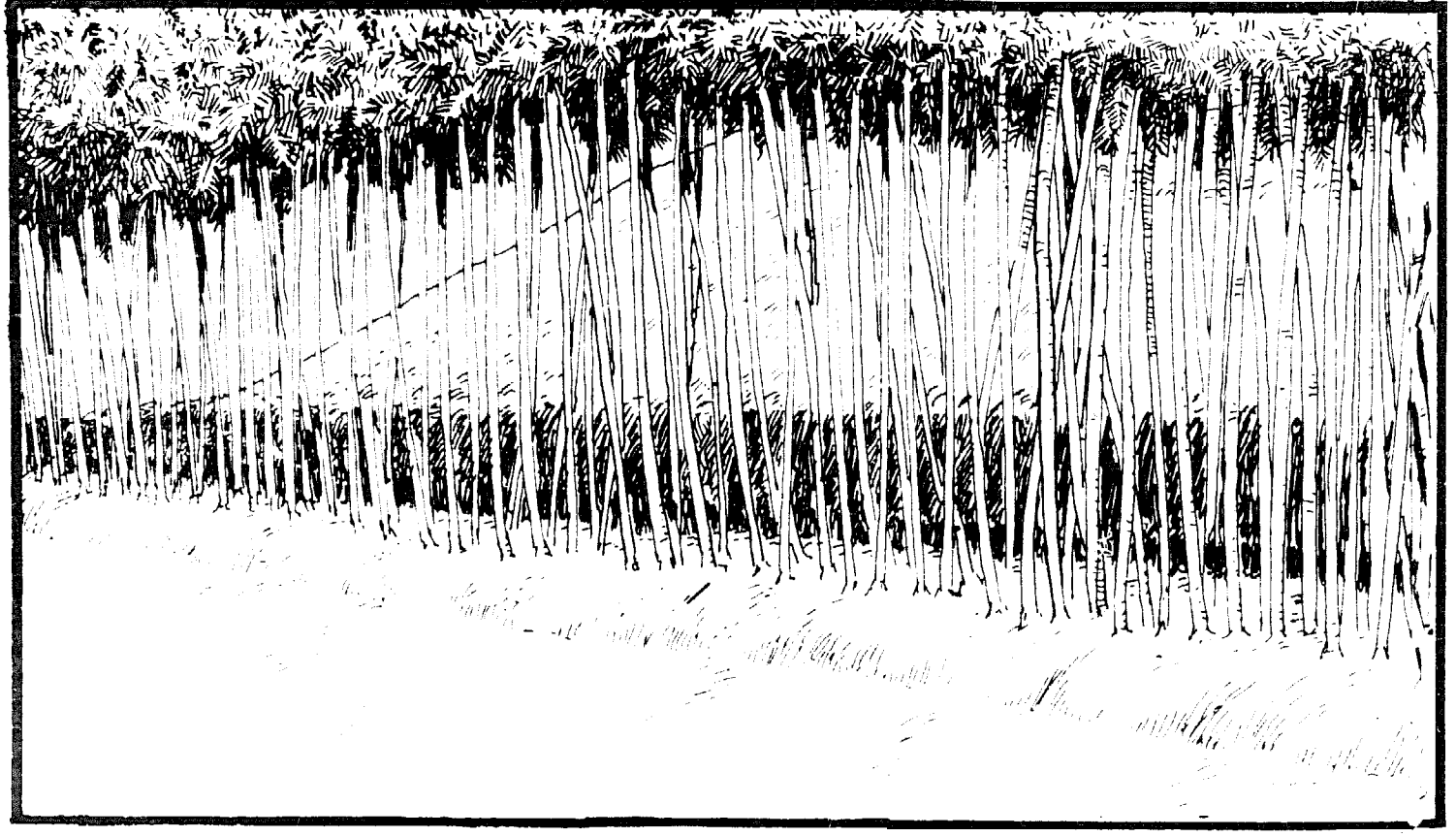
Another method commonly used is the planting of various crops (such as cassava, pineapples, or bananas) along lines of the hillslopes to slow down the loss of water and soil. These ideas are useful, and certainly help. But can they be improved upon ?

Yes, they can be improved upon,
by using a system of farming known as
"Leucaena-based farming".

LEUCAENA BASED FARMING



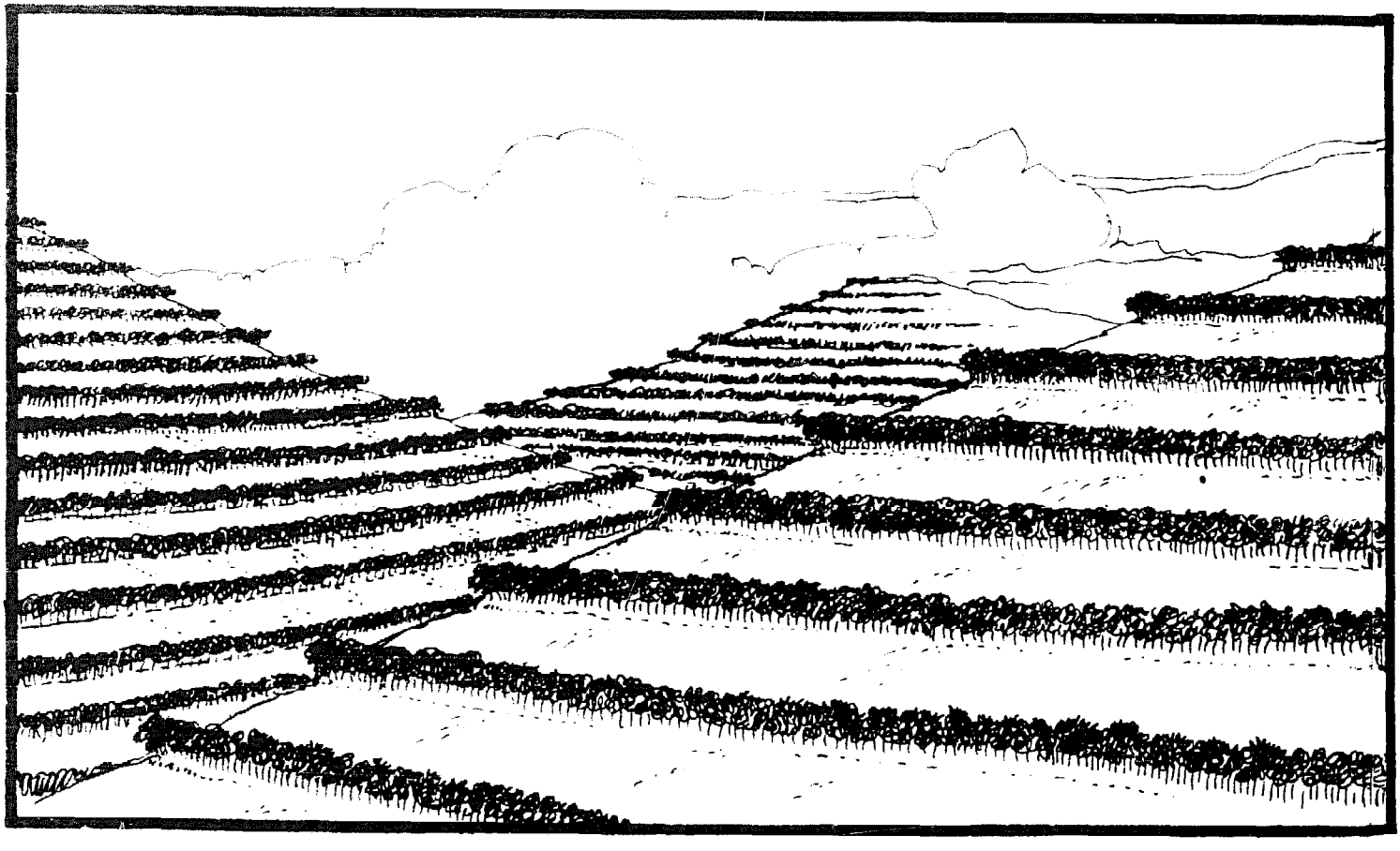
In Leucaena-based farming, Leucaena trees are planted in rows between food crops. This system both reduces erosion and helps keep the soil fertile year after year.



Closely planted Leucaena rows act as barriers to stop soil from washing down hillsides during heavy rains.

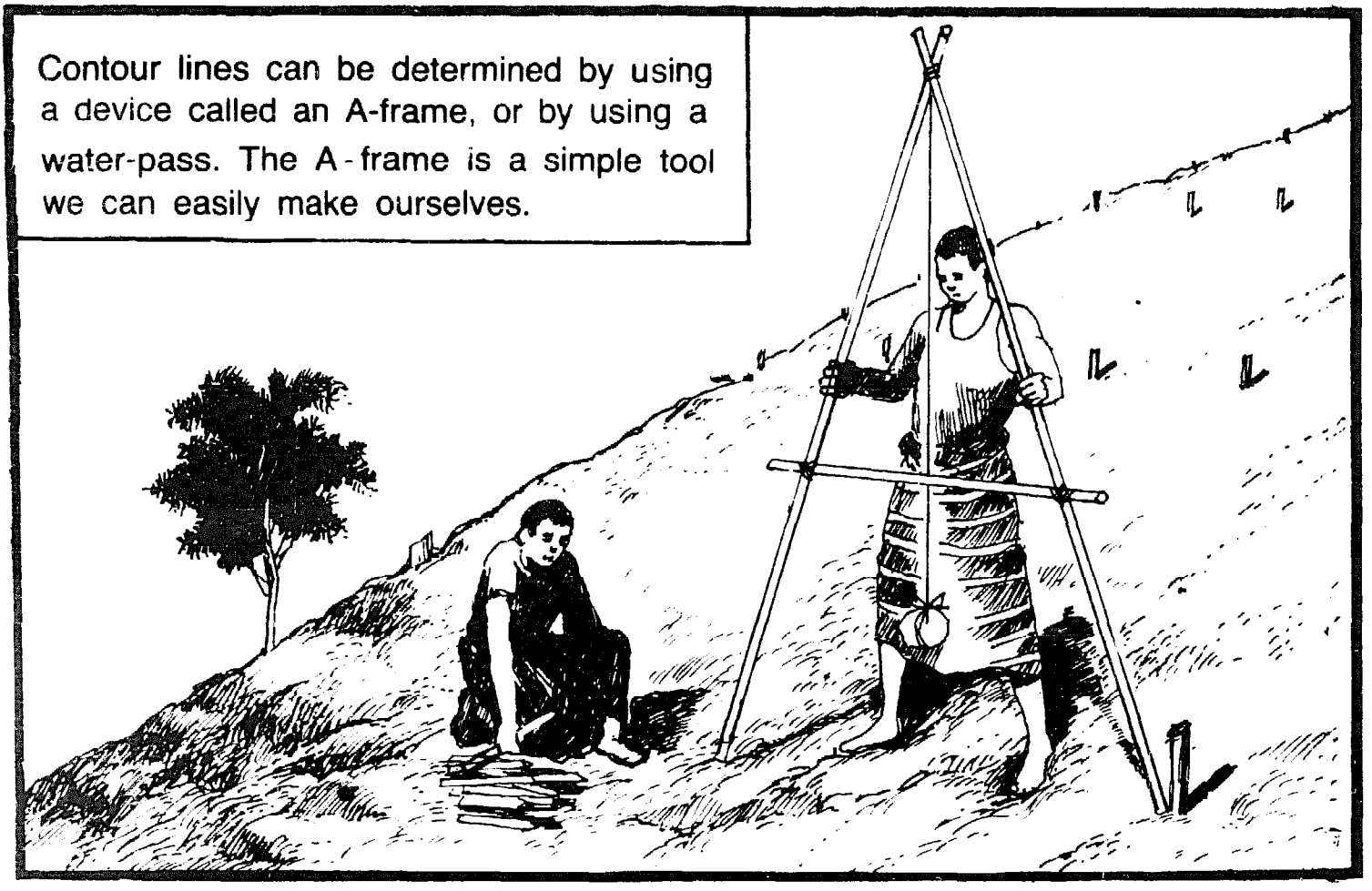
The Leucaena trees also help to keep the soil fertile. The roots penetrate deep into the soil and bring up nutrients. When the Leucaena leaves fall on the ground, they gradually release these nutrients into the topsoil. These leaves, then, act as a "green manure".

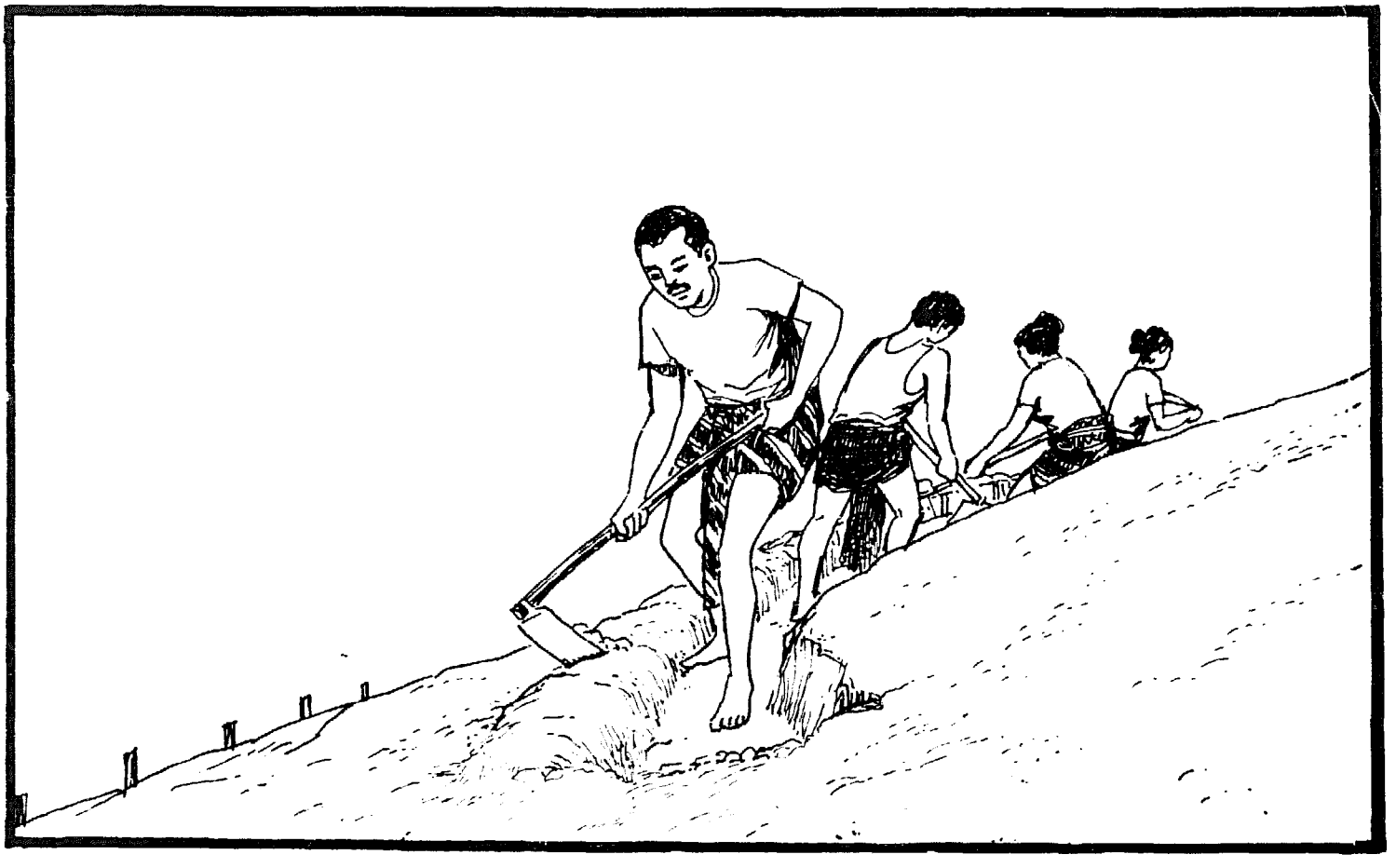
With the problem of erosion overcome and good fertility maintained, a farmer can continue to work the same field year after year with satisfying harvests.



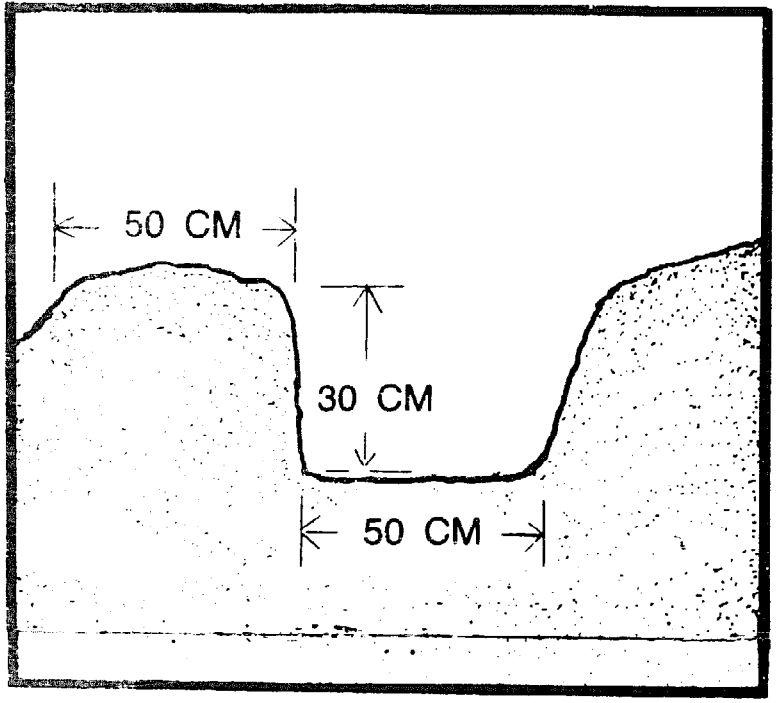
To use this new system, the first step is to find the "contour" lines on the hillside. The contour line is a line which is at the same level in all places.

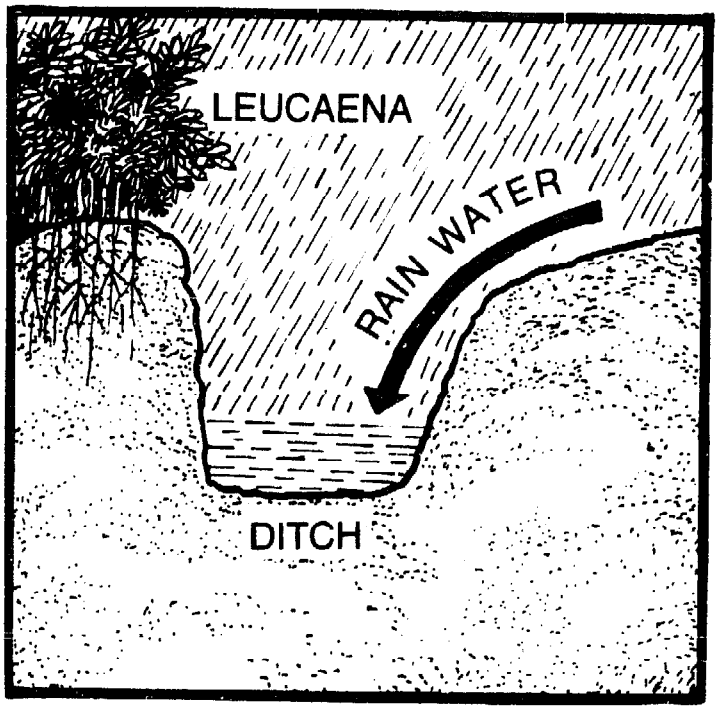
Contour lines can be determined by using a device called an A-frame, or by using a water-pass. The A-frame is a simple tool we can easily make ourselves.



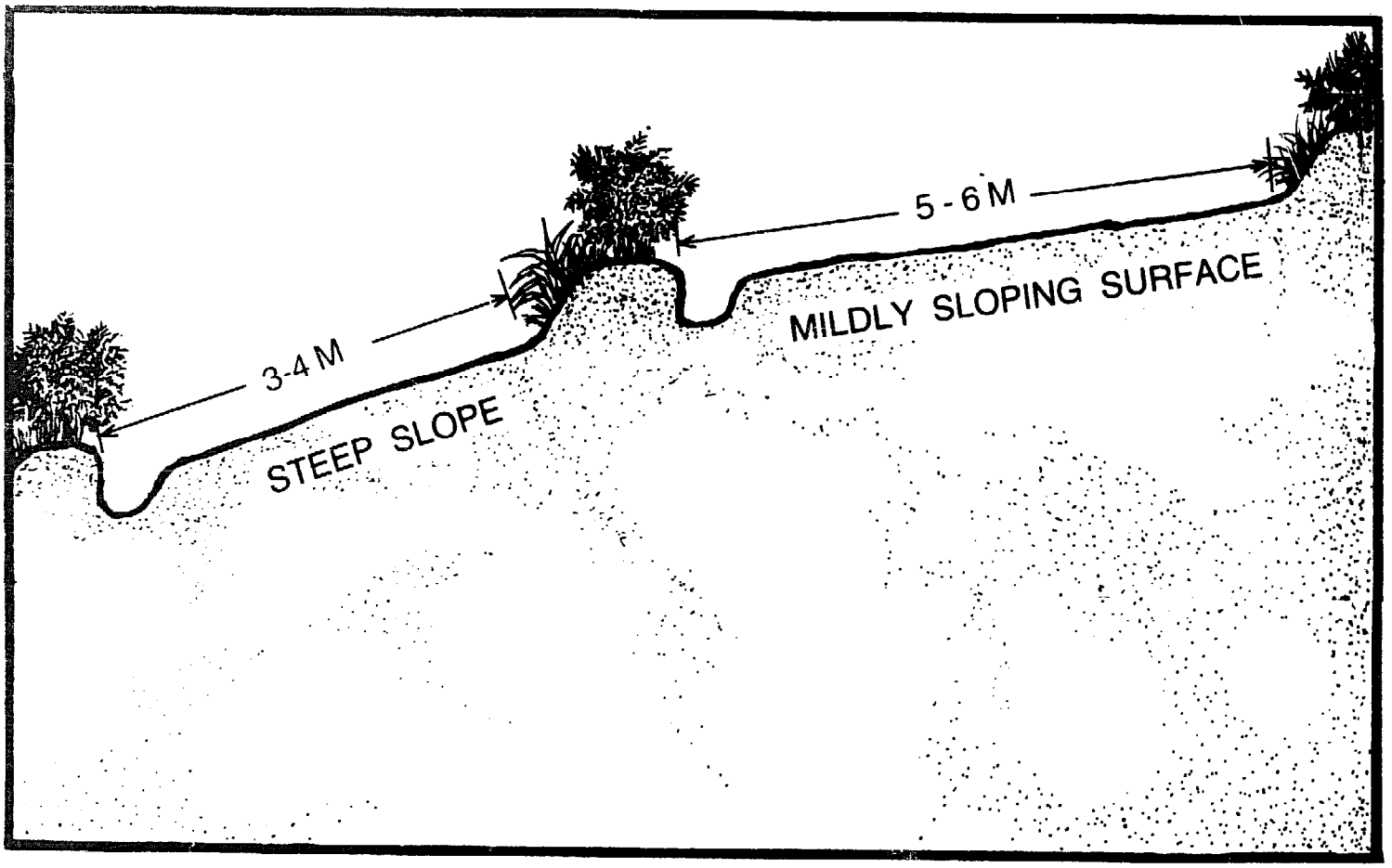


The Leucaena trees should be planted along these contour lines. First, a ditch is dug along the entire length of the line. The dirt removed from the ditch forms a dike directly below it.

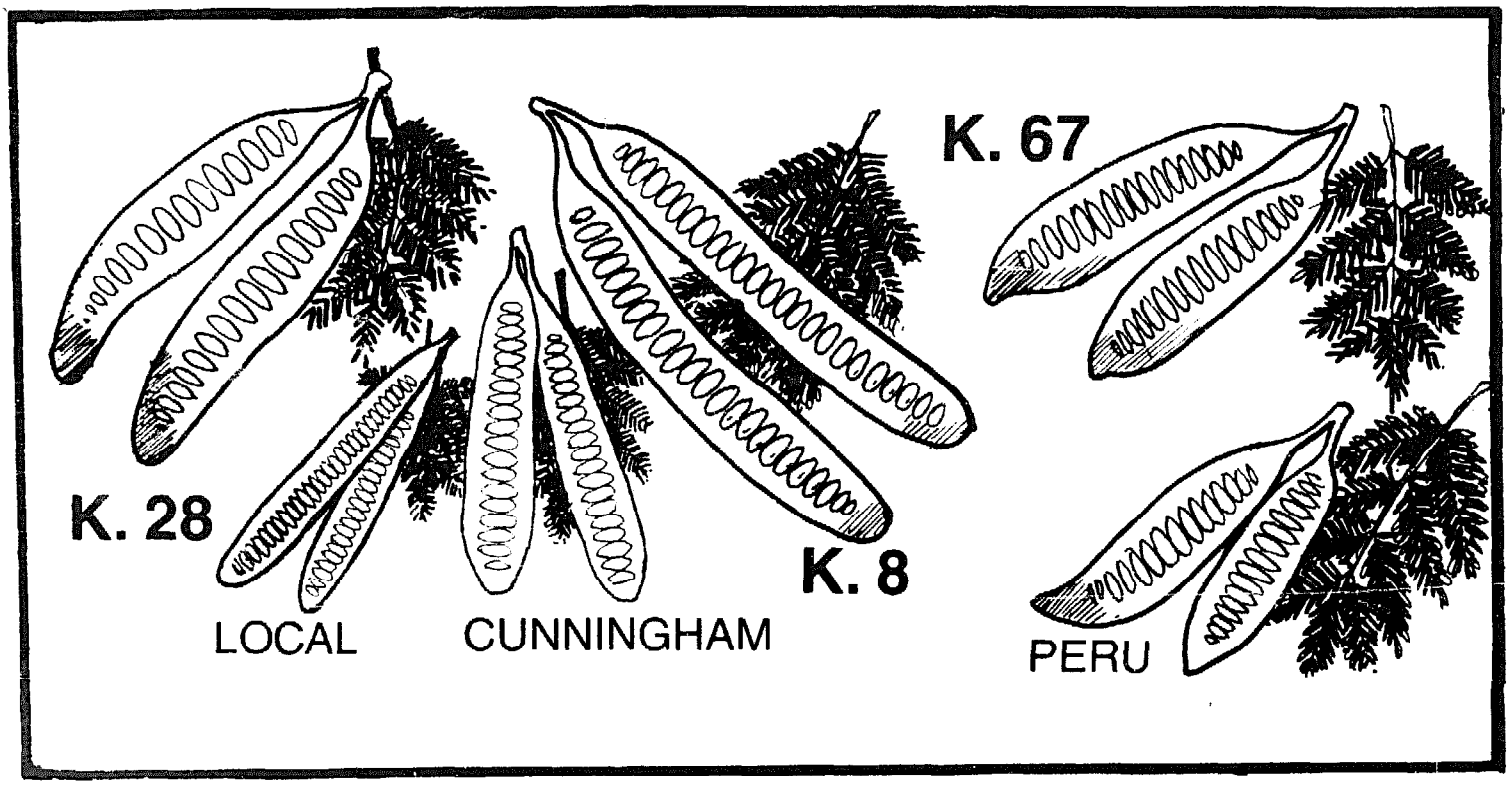




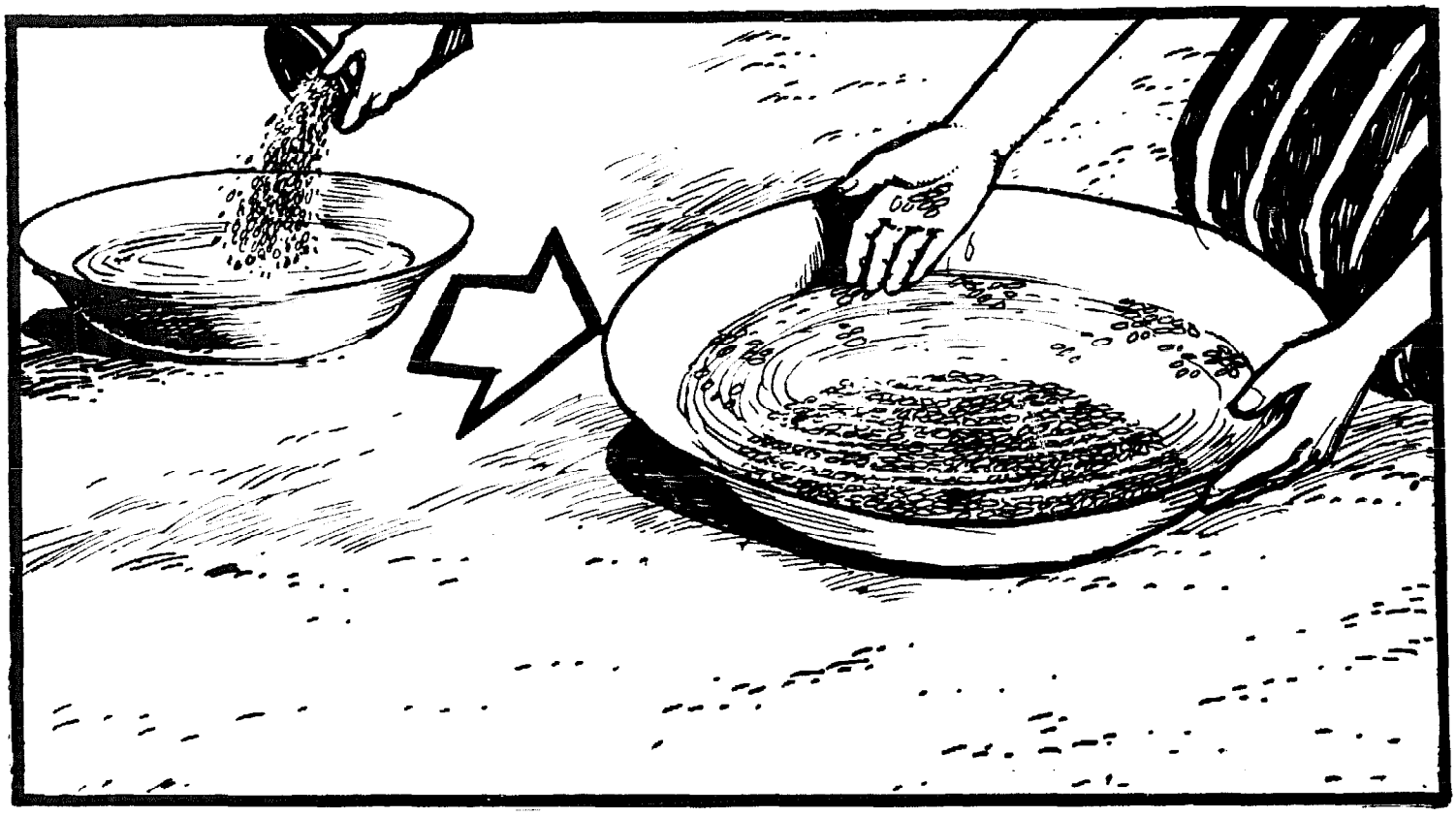
As a general rule, the ditch should be about 30 cm deep and 50 cm wide, with the dike of similar measurements. However, the depth of the ditch should increase with the slope of the land.



The Leucaena seeds are planted along the top of the dike. The ditch is needed to slow down and absorb rainfall while the Leucaena trees are still too young to hold back erosion.

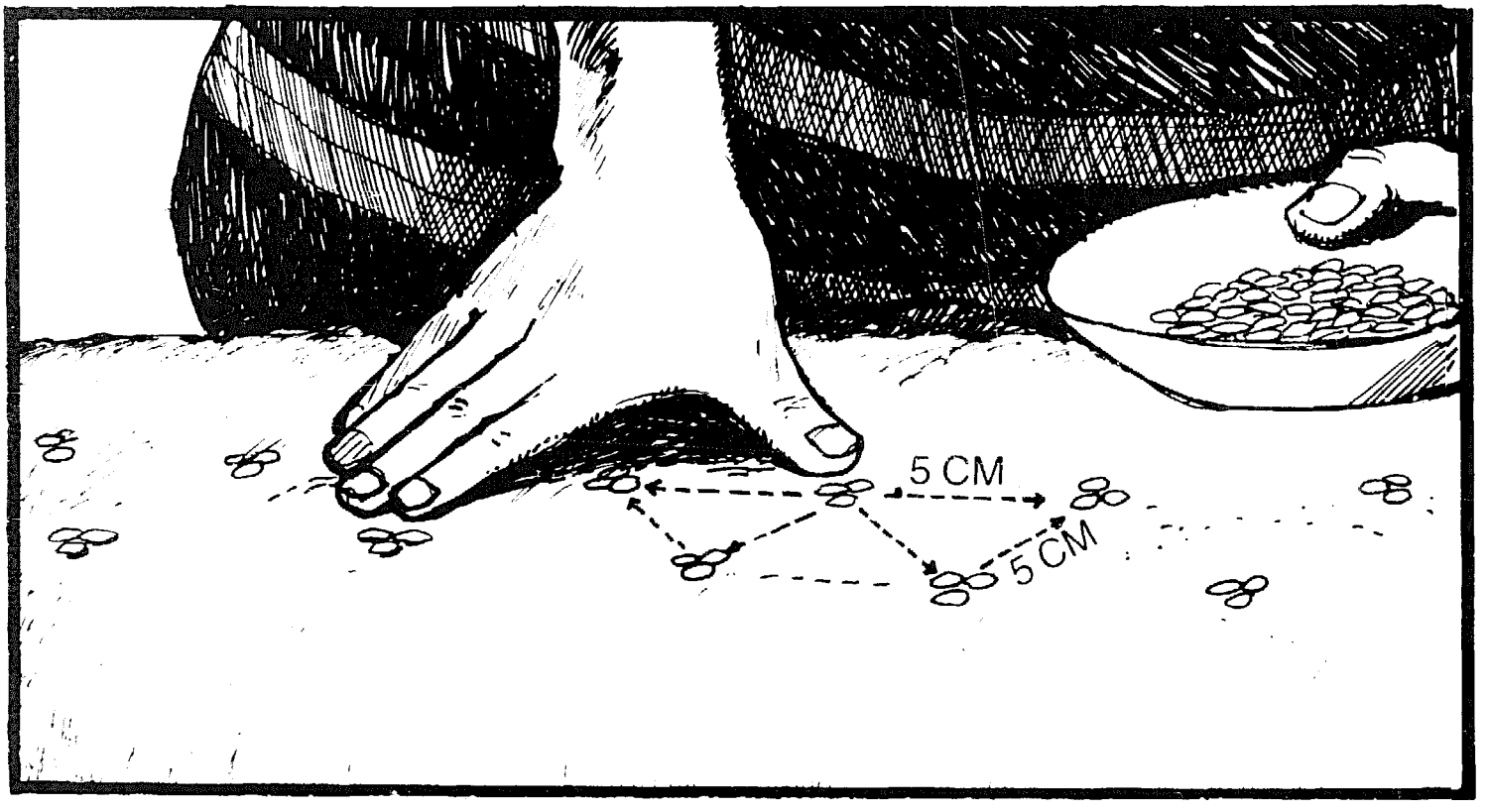


There are many different varieties of Leucaena that we can plant. In general, the "giant" varietes are recommended, since they can produce about two to three times the amount of leaves and wood of the native, or local varieties. The most preferred Leucaena varieties for hedgerows include K-8, K-28, Peru, and Cunningham, because of their more vigorous growth.



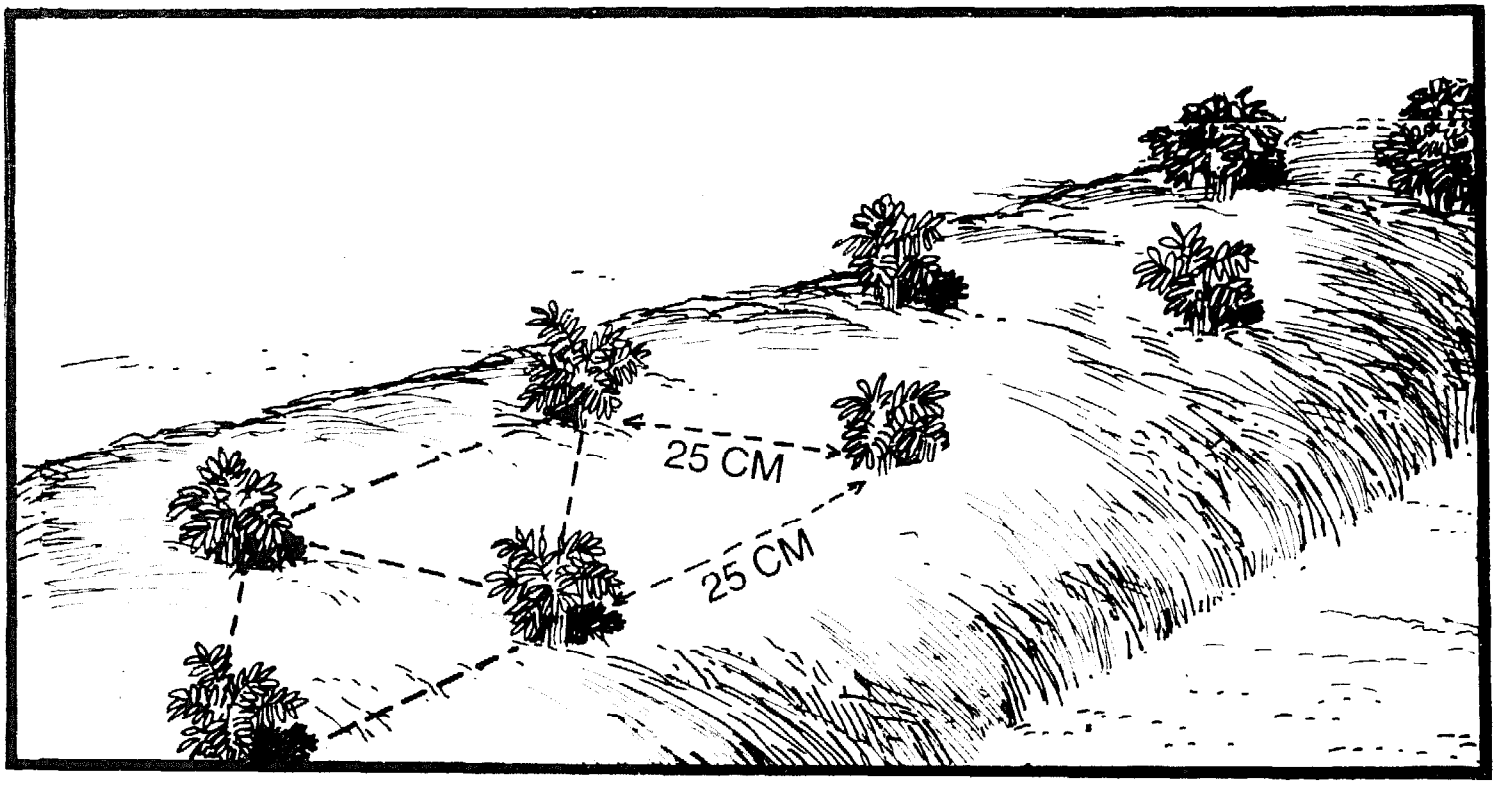
Good seeds are selected by soaking the seeds in water. The ones that float should be thrown away. Only the seeds that sink should be planted.

Before planting Leucaena seeds, they should be mixed with soil taken from underneath a large Leucaena tree. This soil contains "Rhizobium" bacteria which helps the trees to grow better.



To plant Leucaena, 2 or 3 seeds are sown every 5 centimeters (about the length of a thumb) in 2 rows. The seeds in the second row are staggered making a triangular shape with the first row as shown here. Using this method, one kilogram of seed will be enough to plant over 200 meters of Leucaena terraces.

When the rows are planted like this, the trees should be close enough together to stop erosion.



On slightly sloping or level land, where erosion is less of a problem, we can plant the Leucaena seeds or seedlings farther apart. The planting distance within the rows and between the rows is 25 cm (about the span of an extended hand). As before, the seeds are staggered or criss-crossed as shown here.

Planting trees farther apart like this means that the trees can grow larger and produce more wood and leaves for "green manure". In open areas the trees can act as a windbreak.

A few weeks after the Leucaena seeds are sown, we can already see the rows of trees growing. We can see that, here and there, there are places where the seeds did not grow. We should replant these empty spaces so that the rows will be even and unbroken.

We should remember that like all plants, Leucaena seedlings must be well cared for during the first few months. It is important to weed and cultivate the rows of trees from time to time.

In time, the ditch in front of the dike may fill up with soil which is washed down the hill by rainwater. While the trees are still too small to stop erosion well enough, the ditch should be cleaned and re-dug as it becomes full.

If well taken care of for 6 to 8 months, the Leucaena trees can grow as tall as 2 meters. By this time the roots will have grown deep enough into the soil to survive the long dry season. It's best though not to prune the trees during the first season, even though they may be very tall by this time.

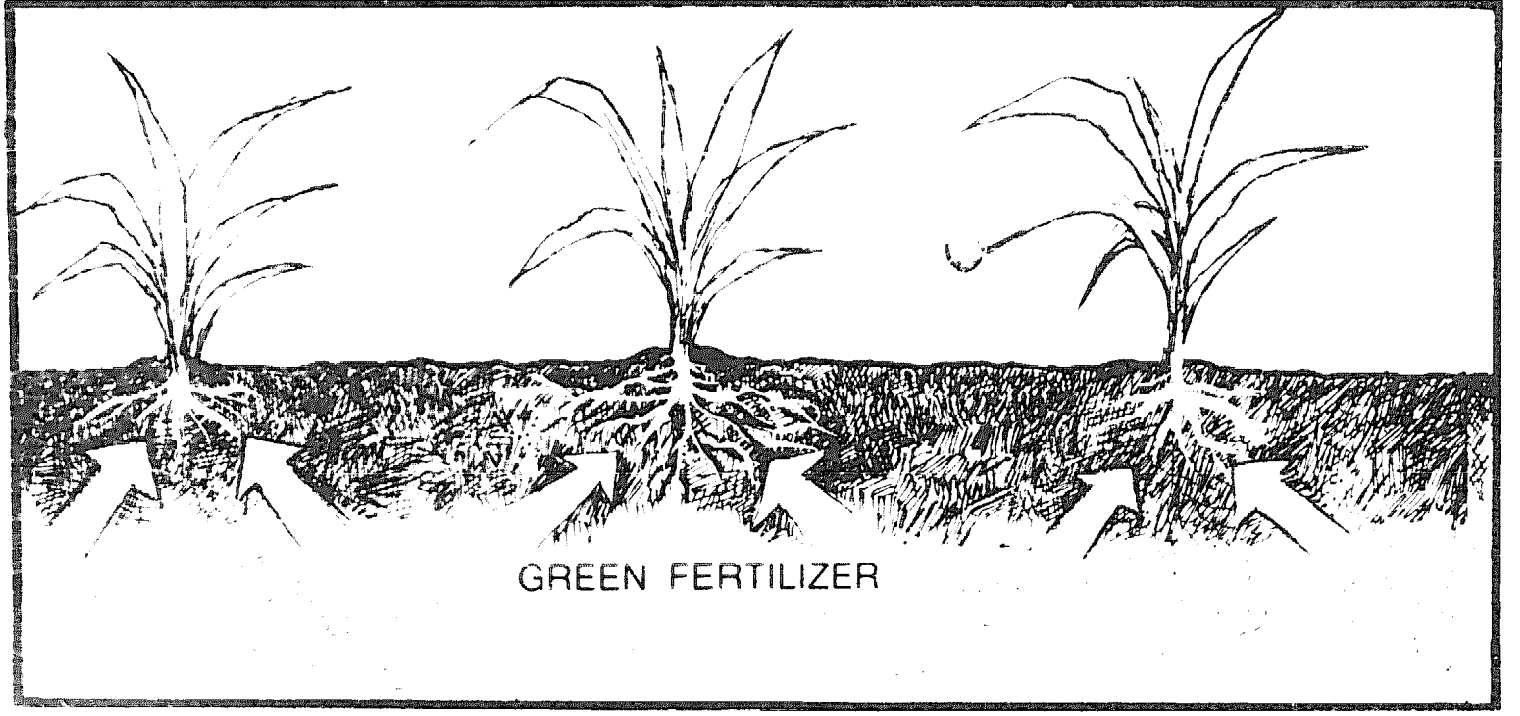
The following planting season, we should cut back the Leucaena trees and use the leaves as green manure for the new crop. Pruning should be done at a height between one half and one meter (or about knee-to waist-high) so that the trees will not shade the crops growing between the terrace rows.

The pruning of the rows should be done, then, when we are ready to cultivate our fields. The leaves should be mixed well into the soil.

After pruning and working the green matter into the soil, the remaining branches can be put behind the Leucaena rows to further prevent erosion, or they can be used for firewood. All uprooted weeds and agricultural wastes should also be placed above the hedgerows to help slow down the flow of surface water.

Leaves and green branches from the pruning should be spread over the soil between the hedgerows, and worked into the ground as we cultivate our fields.

When cultivating our fields, the soil should be pulled to the lower section of the field to create terraces which are more level. The contour ditch is then moved from above the Leucaena hedgerow to the lower side in order to continue to prevent erosion and to catch excess rain water.



GREEN FERTILIZER

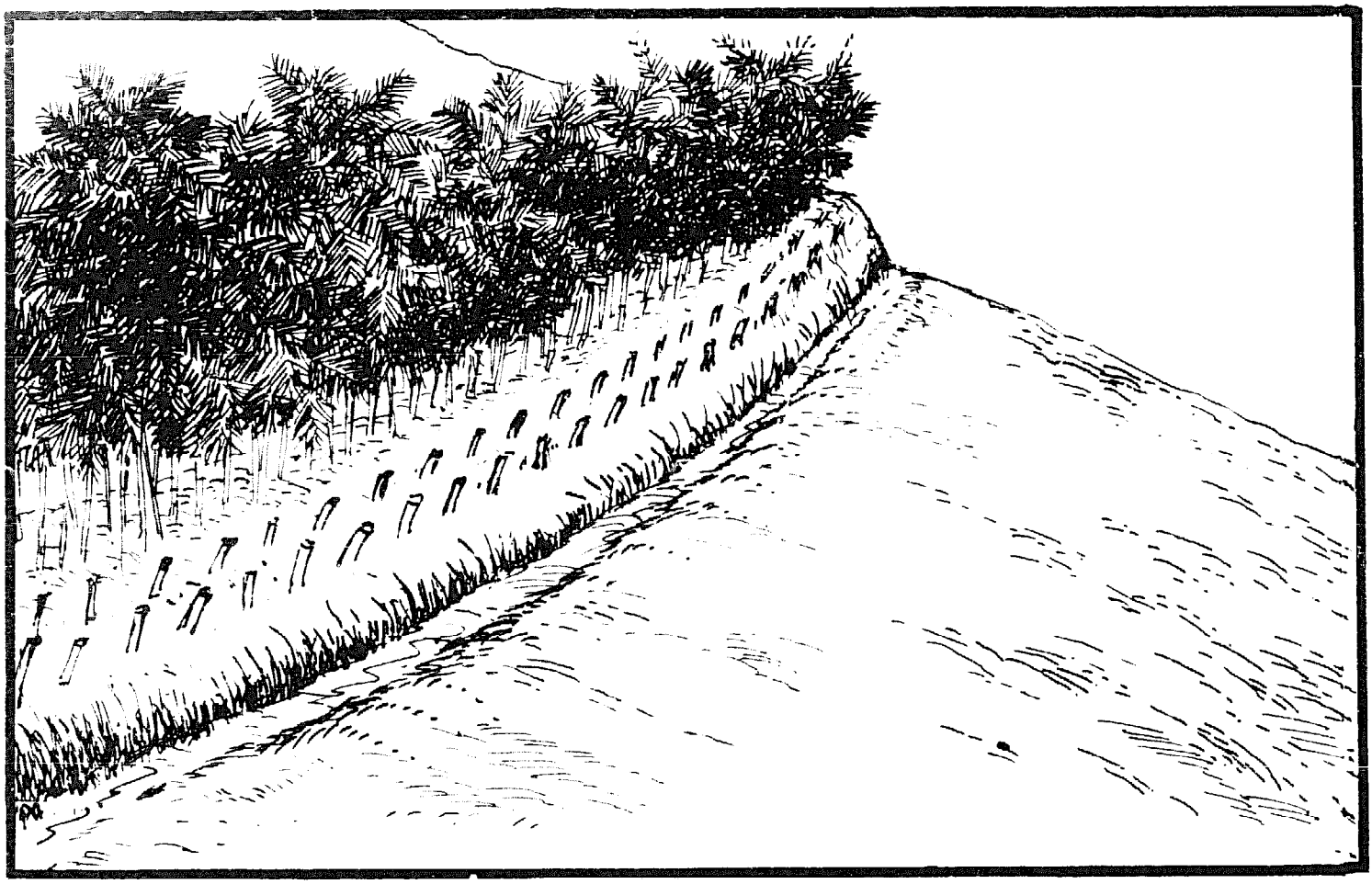
If incorporated into the soil, the leaves should break down rapidly, providing a rich supply of nutrients. This will improve the soil and result in a bigger harvest.

Pruning can be carried out every 2 to 3 months. If done while crops are growing, the smaller branches and leaves can be used as a "mulch" to cover the soil. Using the leaves in this way will prevent the soil from losing too much moisture. It will also slow the growth of weeds.

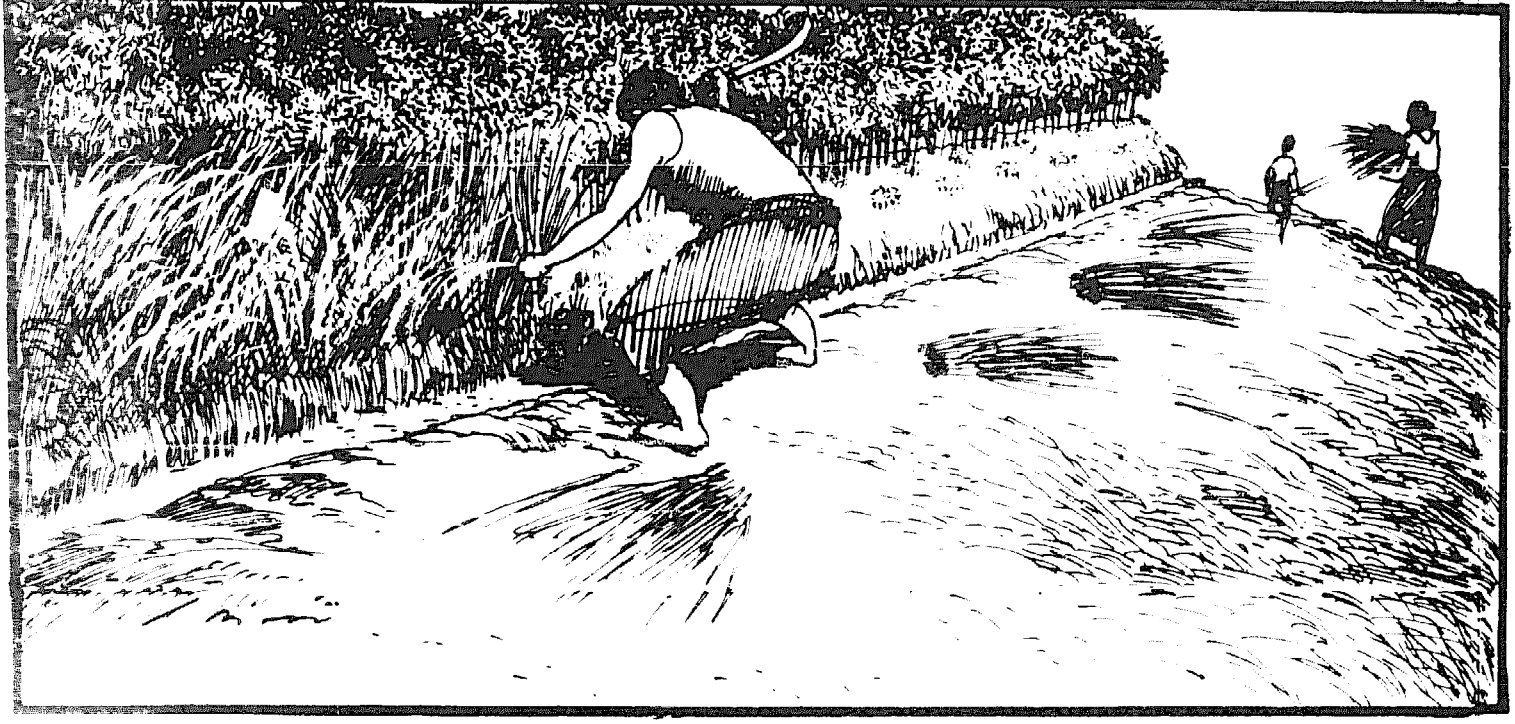
In general, the Leucaena rows should be allowed to grow out during the long dry season, so that they remain dense and leafy. This will protect the soil from the harsh rays of the sun, which will conserve moisture and fertility in the soil. In addition, the growth of weeds will be reduced, and the result will be great quantities of green material for the following planting season.

However, it is important to remember to prune the Leucaena trees if they begin to go to seed. If not, the seeds can drop on the ground, sprout and become weeds.

The lower portion of the terrace, called the **terrace riser,** must also be protected from erosion. We can plant useful grasses (such as napier grass, or NB-21, a napier hybrid) to hold the soil on the riser, while producing good quality forage.

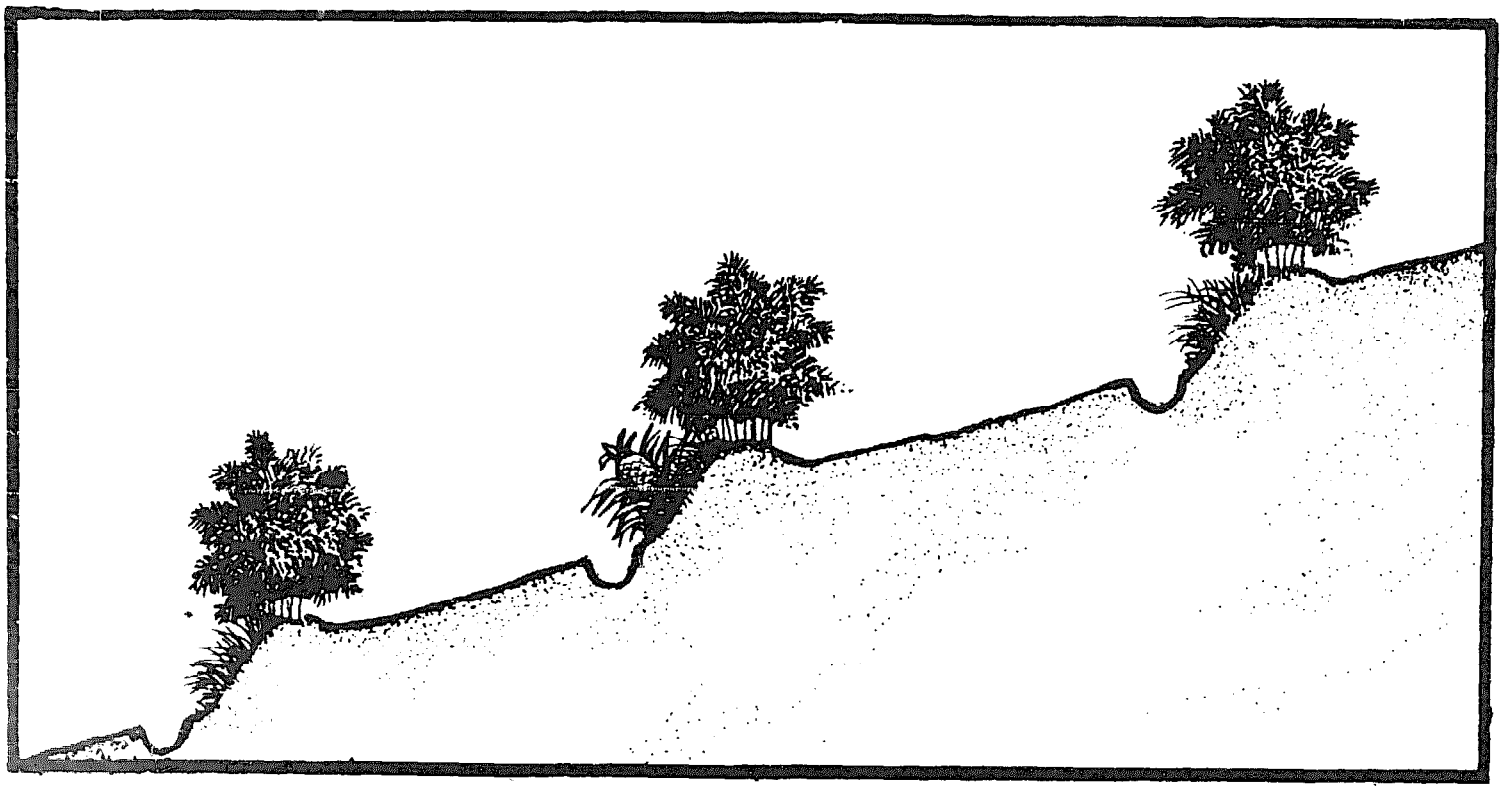


These grasses should be plante ely together, so that they cover the soil quickly and completely prevent erosion. Ho , they should be planted a bit below the Leucaena hedgerows so that they don't interfere with each other's growth.

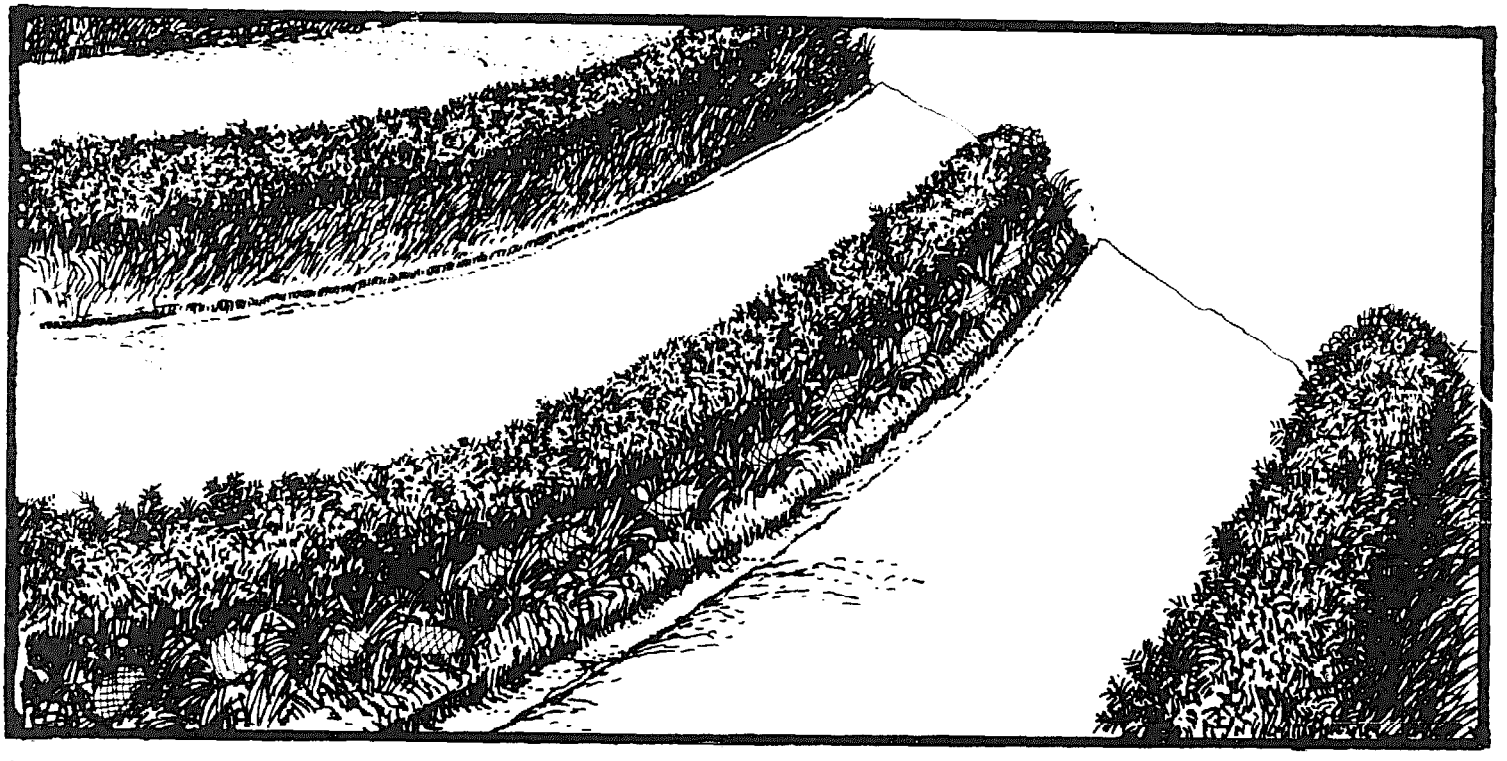


These grasses can be cut very short about 2 - 3 cm. above the ground (about the height of a thumb). If allowed to grow higher than one meter, these grasses become tough and less palatable to livestock.

In some areas, farmers prefer to plant pineapples on the terrace riser. Besides being an erosion-preventing plant, pineapples are a delicious and nutritious fruit which can also be sold in the market.

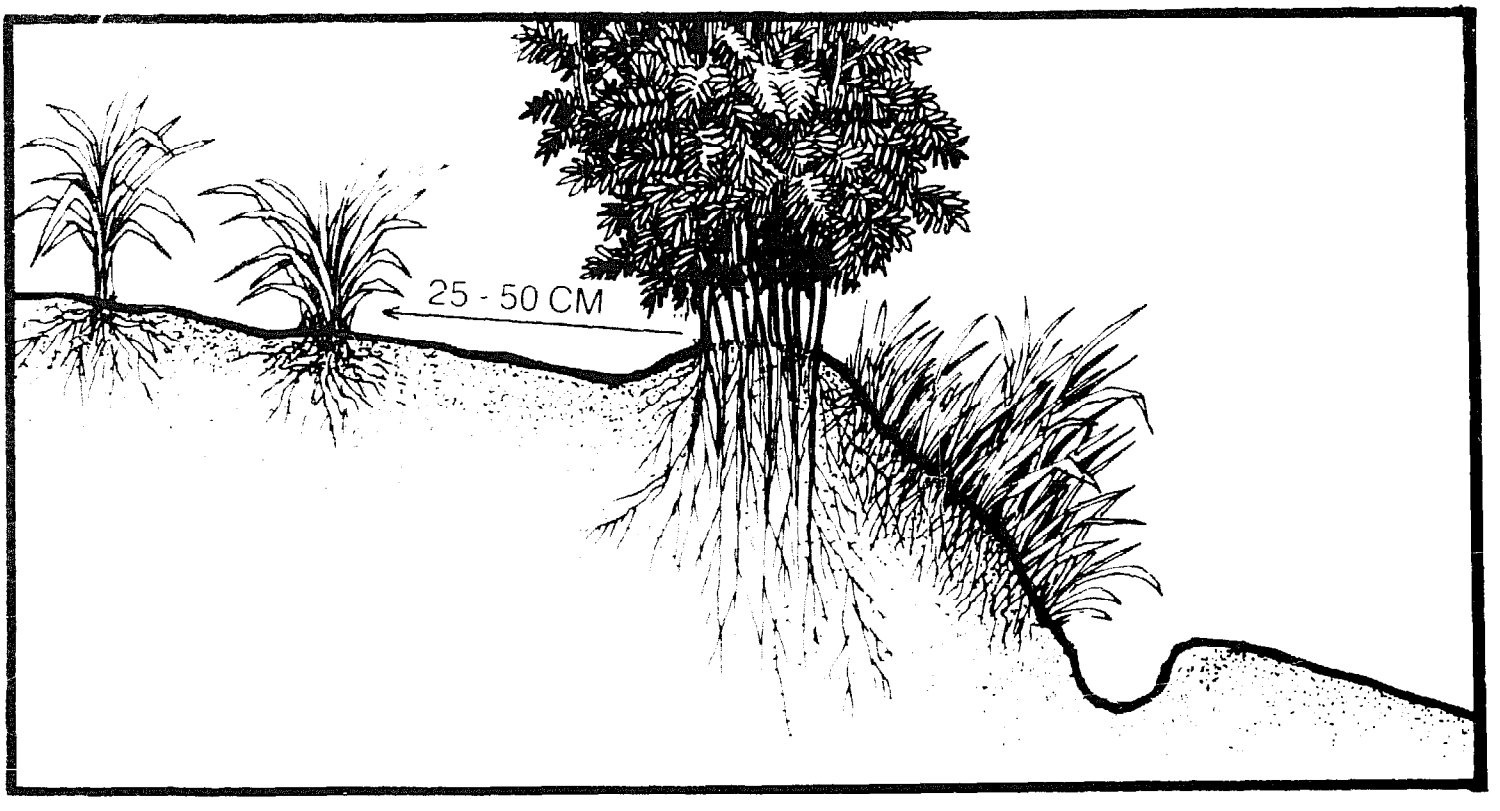


In sandy soils which erode easily, we should plant grasses or pineapples on the riser at the same time we plant our Leucaena hedgerows. Alternatively, we can wait until the second year to put the grasses and/or pineapples in, when the Leucaena rows are pruned back and the ditches are moved to the lower side of the hedgerows.

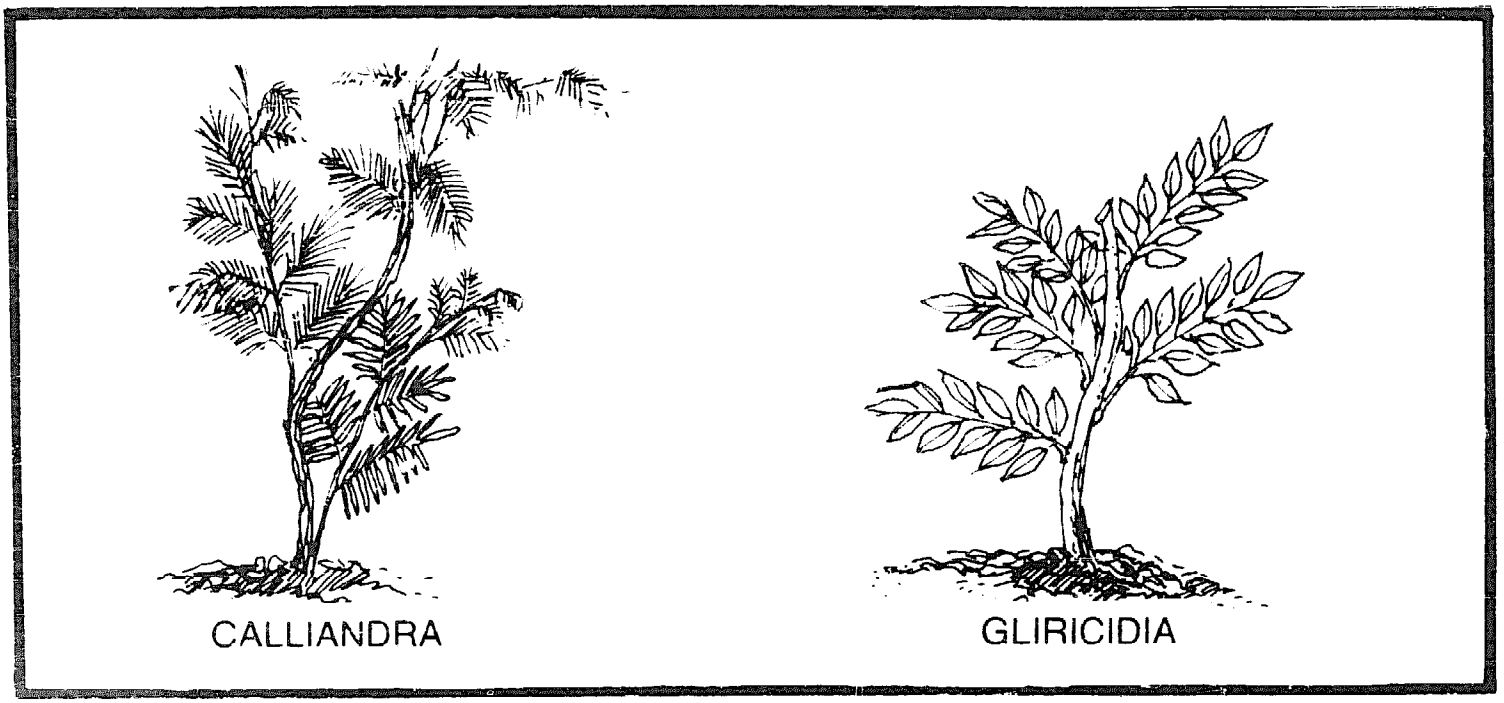


Combining Leucaena hedgerows with grasses and/or pineapples along the riser will result in a long-lasting terrace system. These plants all help to stabilize the soil and increase the productivity of our farms.

Adding Leucaena rows to our fields does not mean we must change the way we grow our crops. We can still plant beans, maize, rice, cassava, vegetables, tree crops-whatever we like.

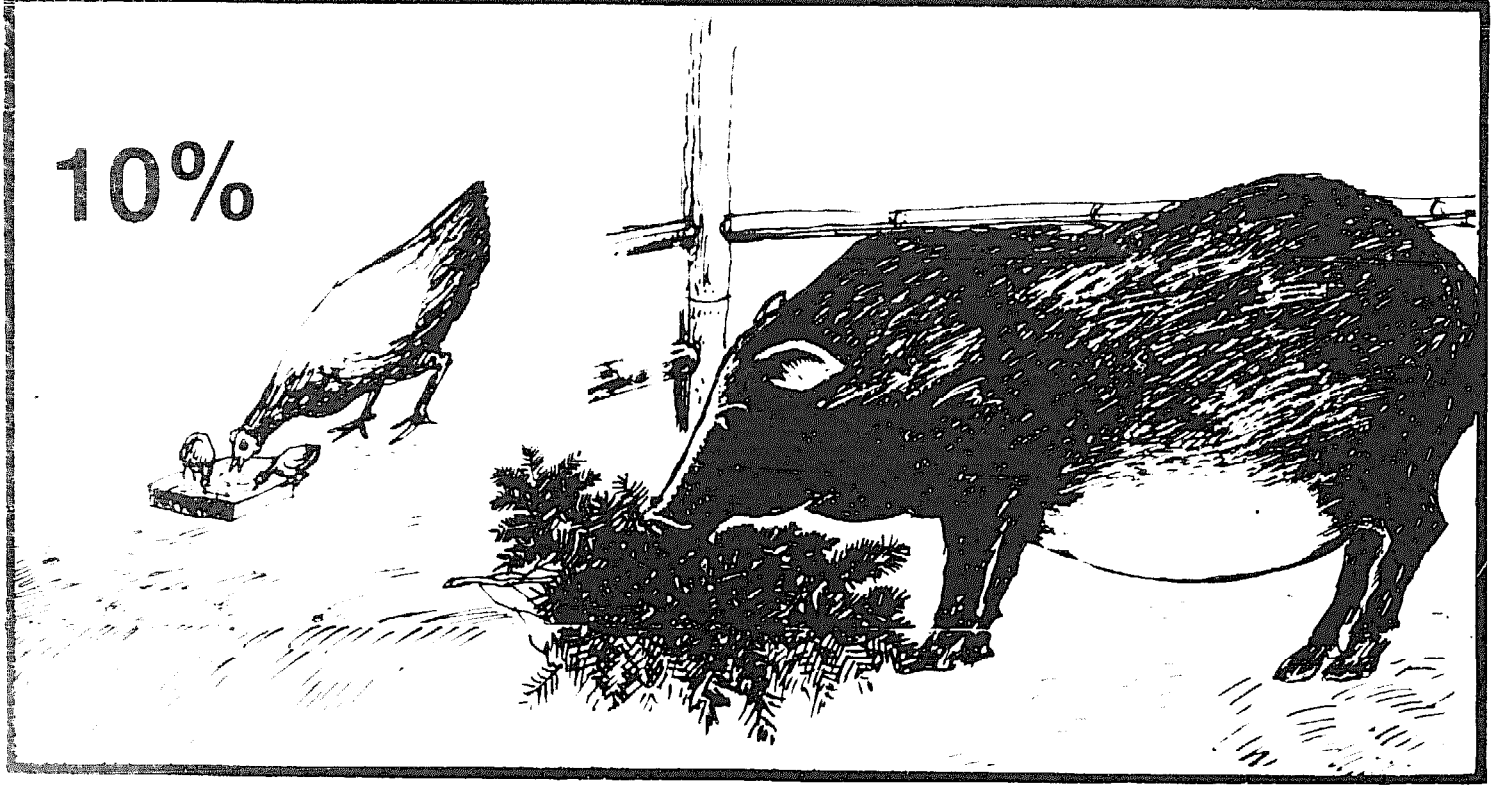


Even though the roots of the Leucaena trees go deep enough into the soil that they will not bother our crops planted nearby, we should leave some space between them. Crops should not be sown closer than 25 - 50 cm. to the Leucaena rows.



In addition to Leucaena, it should be emphasized that other trees, such as Calliandra and Gliricidia, can be used in a similar way to prevent erosion and improve soil fertility. These plants may be especially useful where Leucaena does not grow well (for example, above 1000 meters, or in acidic soils).

In addition to improving the soil and stopping erosion, Leucaena has several other uses. Some of the Leucaena leaves from pruning can be fed to livestock, such as cattle, water buffalo, and goats. This is especially useful when other animal feed is hard to find,as during the long dry season. No more than half of these animals' feed should be made up of Leucaena leaves, however. The other half (grasses and other leaves) should be mixed with the Leucaena first.



Chicken and pigs can also be fed Leucaena leaves, but in much smaller amounts. Only about 10% of these animals' feed should be made up of Leucaena leaves.

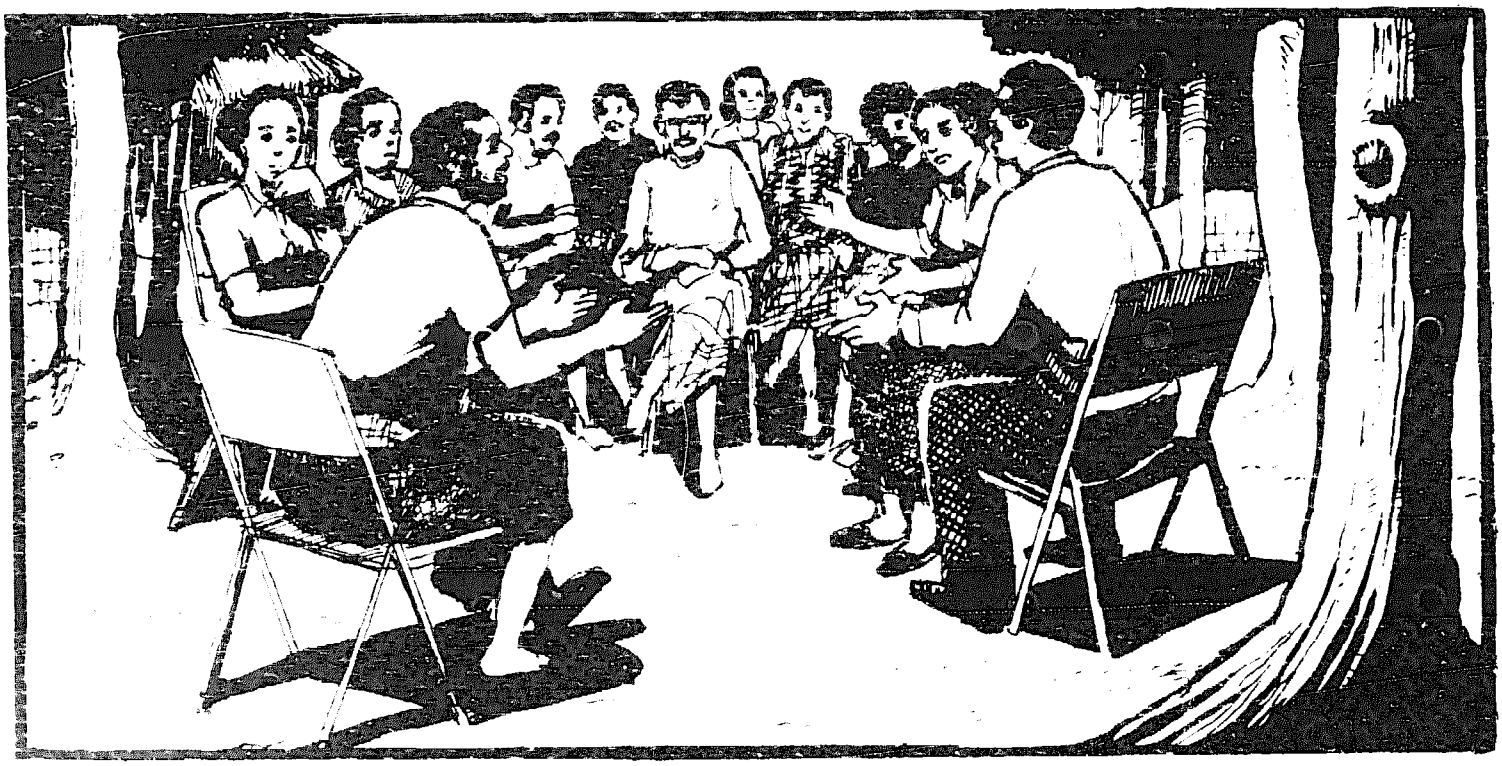
The Leucaena rows also provide an excellent source of firewood and building material for our homes. We will no longer have to walk a long way to fetch wood, since we can grow more than enough for our needs in our own fields.

If we follow the steps explained in this booklet for planting Leucaena hedgerows along the hillslopes, terraces will eventually form behind these hedgerows. Because the soil will be held and will build up behind the rows, the slope of the hillsides become less steep and easier to cultivate.

Our fields will become fertile as we mix the Leucaena leaves into the soil. Our yields will be higher.... and we will not have to move to new fields as often as before.

Water benefits of the new system can be seen as water resources in the area begin to improve. If many people begin to use the Leucaena terracing methods, more water will be absorbed into our hillsides. Springs and rivers will be less likely, then, to dry up during the dry season.

It is clear that farming with Leucaena can help us in many ways. Several methods of using Leucaena terraces have been explained in this booklet. It is up to us, though, to decide which practices are right for our area and our own fields.



It's good to talk about these new ideas with our neighbors in our working groups. In this way, we can plan to use these practices together and learn from one another's experience.

We can work together to achieve what each one of us wants for ourselves and our families, for our village and for our futures. By using wisely the natural resources we own together, we can guarantee a healthier environment for us all.