Integrated Farm Management

World Neighbors Practical Guide to Dryland Farming Series Number 3

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Practical Guide
To Dryland Farming

III

INTEGRATED FARM MANAGEMENT

Integrated Farm Management is number three in the **Practical Guide to Dryland Farming Series**, a set of booklets initially put together with upland farmers in the Nusa Tenggara provinces of southeastern Indonesia. Other booklets in this expanding series cover aspects of farm management such as soil and water conservation, animal husbandry, planting tree crops, and on-farm experimentation.

The **Dryland Farming Series** is a collaborative effort between World Neighbors, Studio Driya Media and Yayasan Tananua with additional input from several other grassroots programs working throughout eastern Indonesia. The booklets were designed to be used together with farmers, extension agents, or program personnel who are already somewhat familiar with the practices described. These methods are specifically applicable to the conditions found in the semi-arid regions of southeastern Indonesia; some of the practices, therefore, may not be suitable to areas with different climates, soils, or farming traditions.

If you have any questions about the material contained in this publication or others in the **Practical Guide to Dryland Farming Series**, please contact World Neighbors. Comments and suggestions are welcome as well!

English language versions* of the series can be ordered from:

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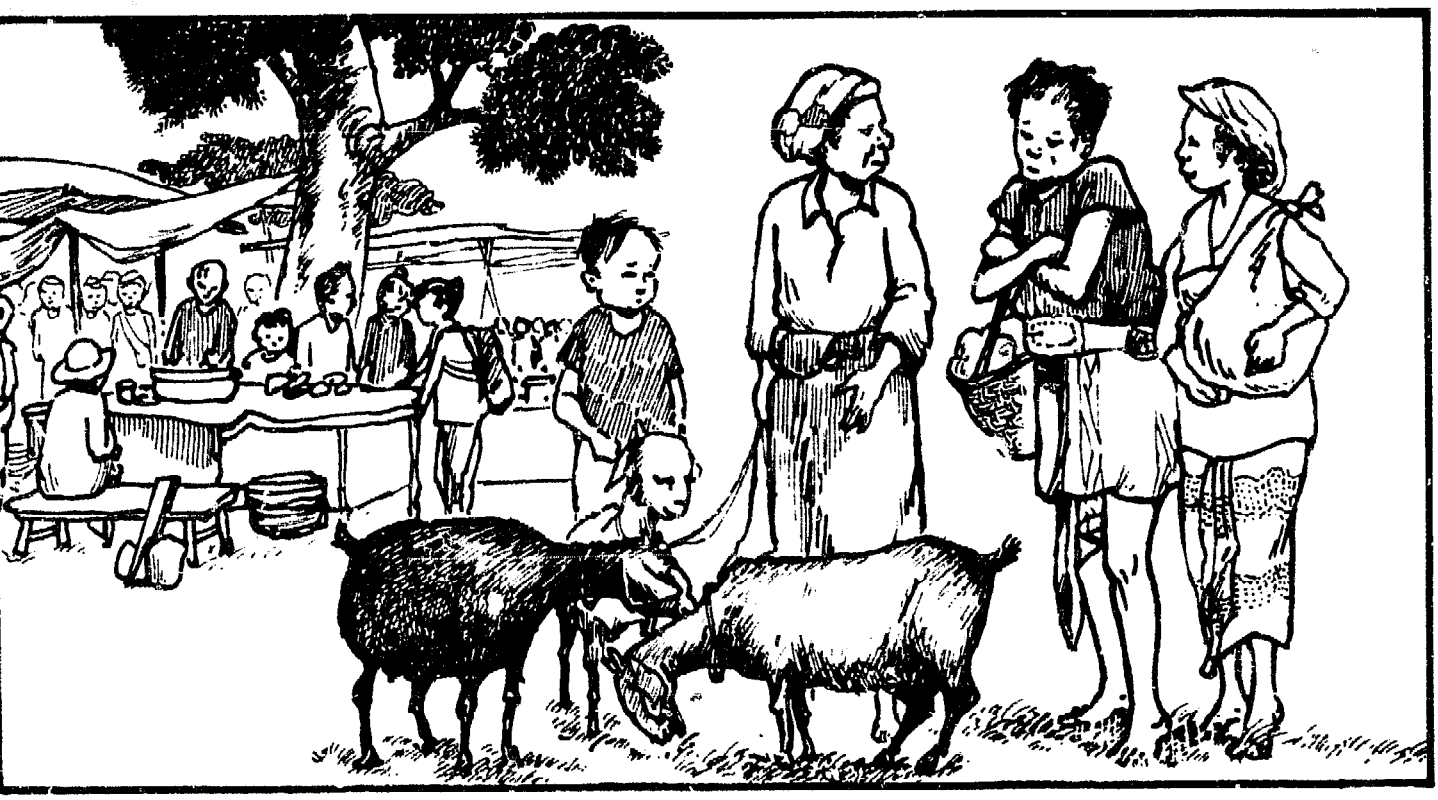
*Not all booklets in the series are available in English

Farmers in upland communities face many challenges. They must often farm on steep hillsides with infertile soil in areas with irregular rainfall. In addition, many upland communities are located in remote areas, making marketing of surplus crops difficult. These conditions are common to upland farmers of Nusa Tenggara Timur and similar semi-arid areas throughout the tropics.

Of course, these farmers know very well the risks and challenges they face. When some of their farming efforts fail, they know how to make up for their losses through other more successful activities.

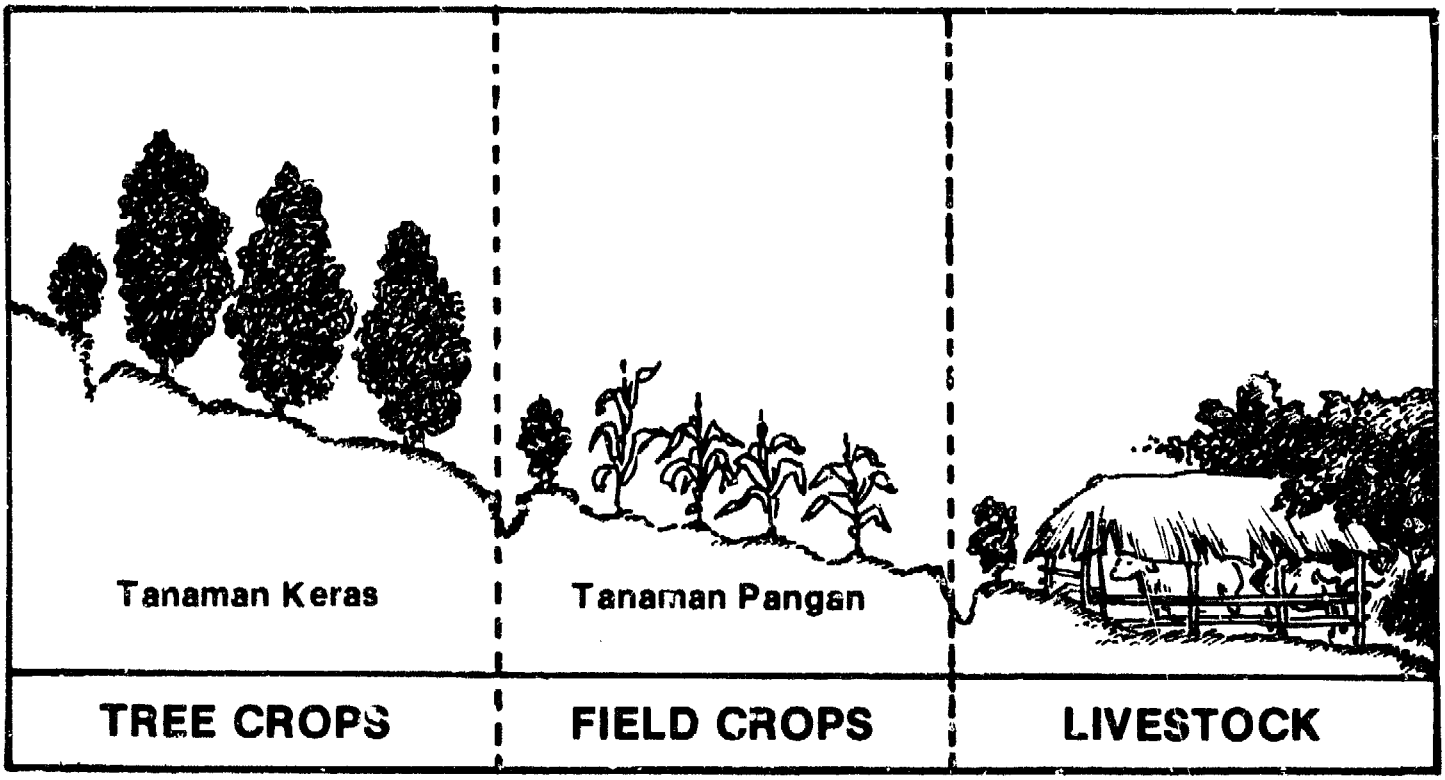
For example, tapping the lontar palms that grow in several dry areas provides a syrup that replaces corn or rice in the diet when the staple crop fails or surpluses run out. Villagers often use the lontar sugar when food is scarce during the long dry season. The lontar sugar can also be sold when cash is needed.



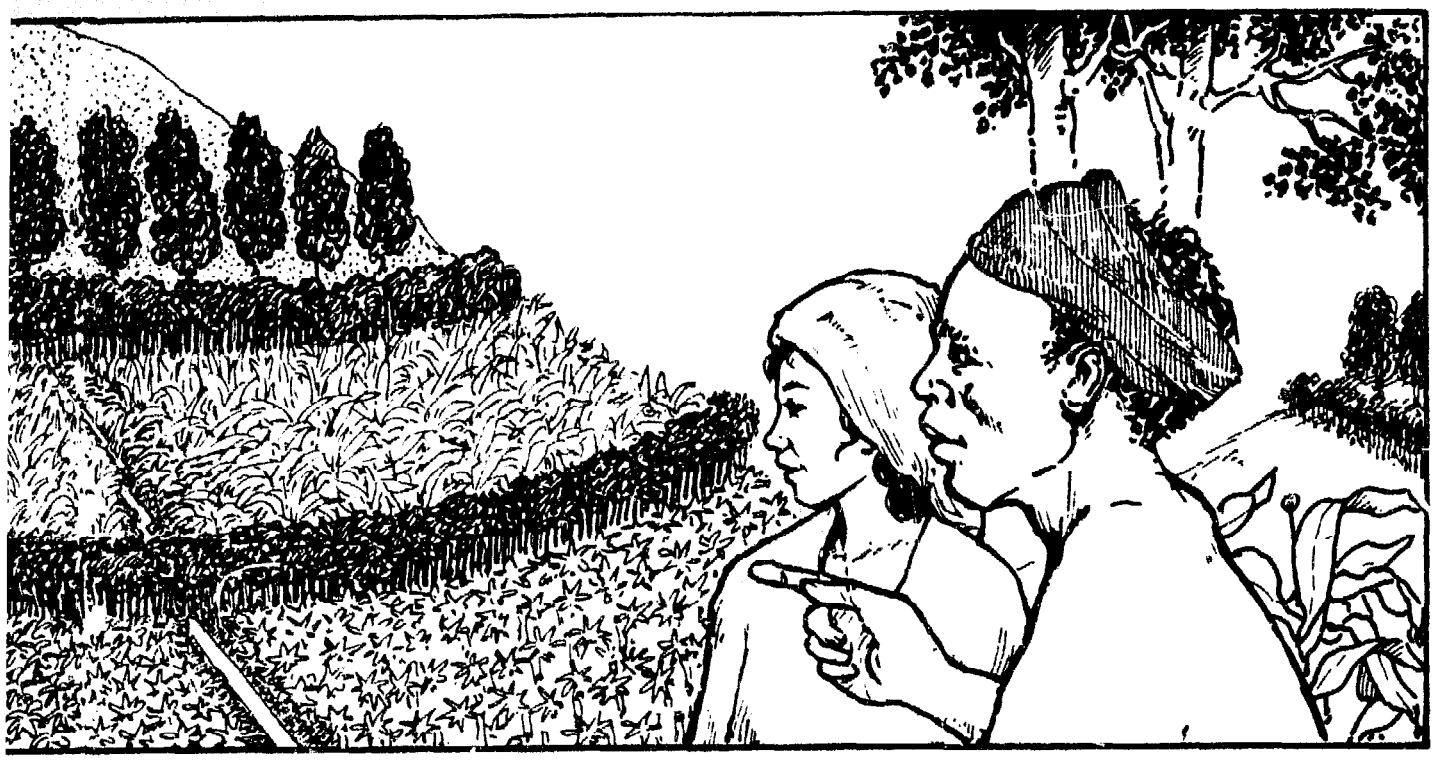
In other areas, livestock provide a backup source of livelihood that reduces the hardship caused by crop failure. Animals can be sold for corn, rice, and other necessities when the staple crop fails or yields are poor.

Upland farmers carry out many different activities in their fields. They plant a variety of crops such as corn, rice, beans, cassava, and sweet potatoes. At the same time, most of these farmers also find time to raise vegetables, care for livestock, and plant trees that provide an additional source of income.

Carrying out a variety of farm activities (such as those pictured here) helps farmers to reduce the risk of failure that stems from the harsh and unpredictable conditions found in the uplands.



Using these integrated farming practices is a method of reducing the risks involved in upland farming. Diversifying farm activities also can provide farming families with many of their daily needs: a variety of nutritious foods, wood for cooking and construction, various other household needs, and cash for things that the farm cannot provide.

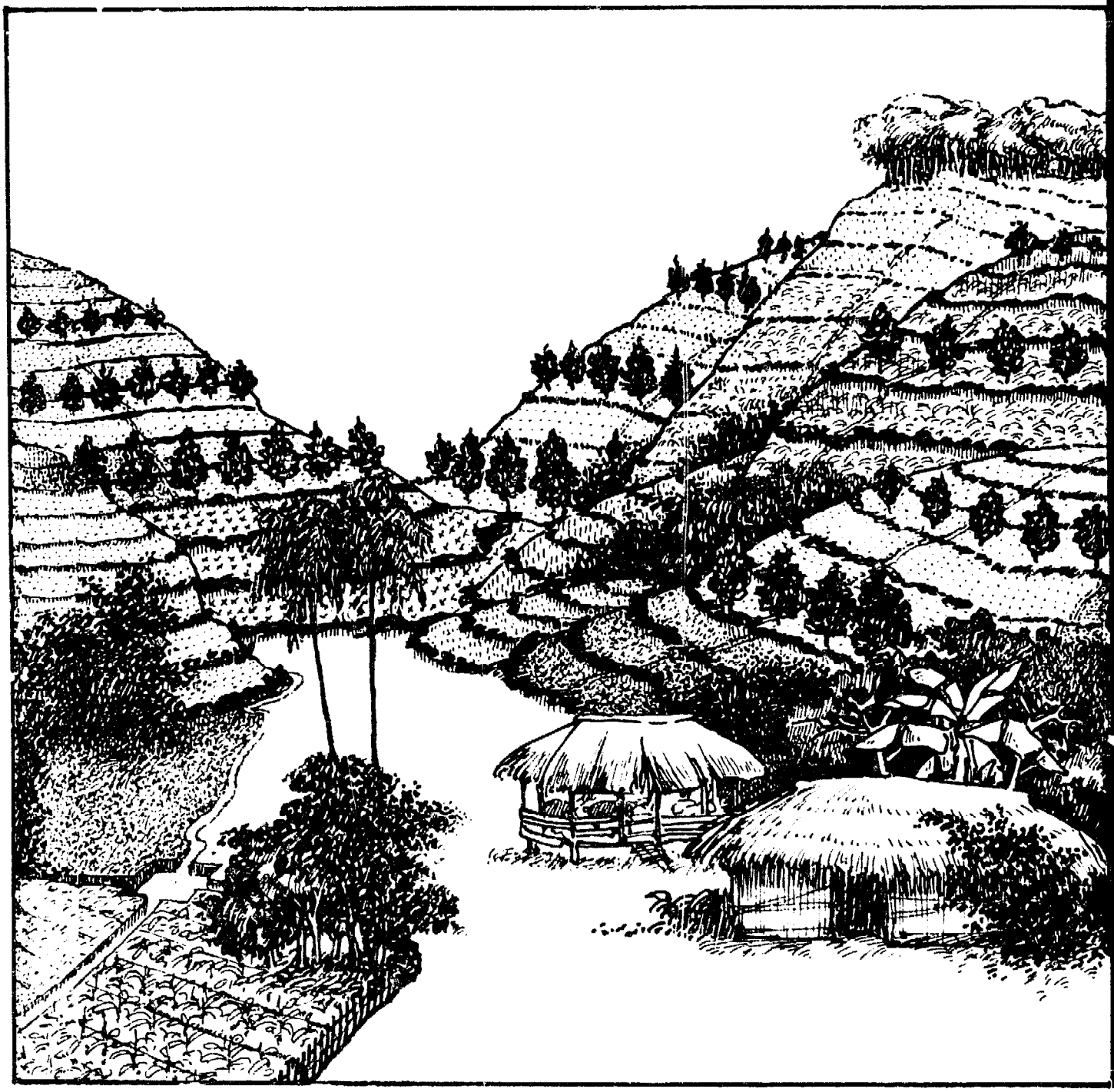


Because of harsh natural conditions and limited available area, farmers must plan the use of their fields carefully so that all the space will be as productive as possible. Soil, water, time, and labor must all be used wisely because these factors will determine whether or not the harvest can fulfill the families' needs.

This booklet can be used as a guide for beginning discussions about how farming practices can maintain or increase productivity over the long run. This means carrying out various farm activities that will meet the needs of the family with the least amount of risk. This cannot be done by hard work alone: Farmers must "integrate" their various activities in order to make their farm more productive.

Soil and Water Conservation as the Basis for Integrated Farming

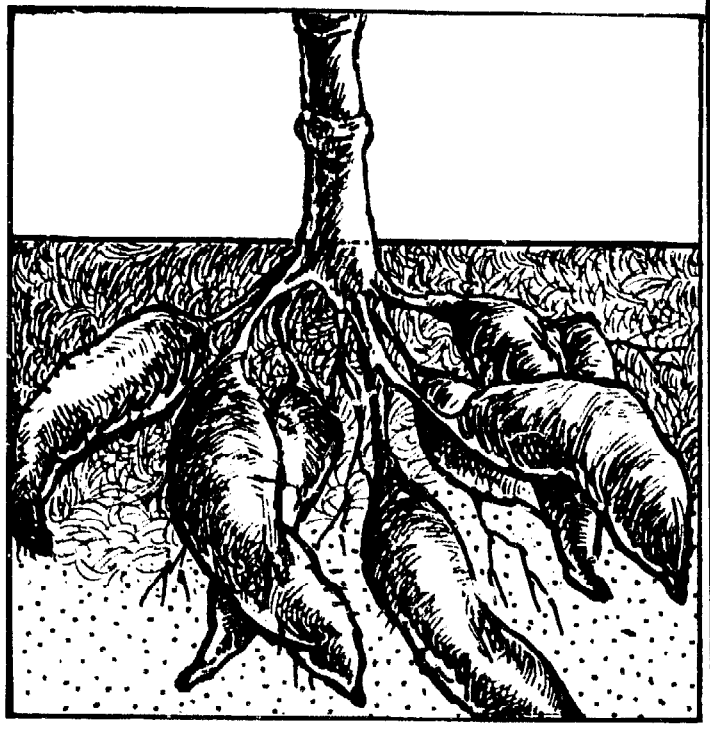
6 Soil and water conservation on hillsides generally involves planting rows of fast-growing plants on terraces in the field. Carrying out soil and water conservation practices can reduce "erosion", increase soil fertility, and trap rain water so that it can be used more efficiently. (For more detailed information on these practices, see booklet #1 in this series, "Introduction to Soil and Water Conservation Practices").



Improving field conditions through increased soil fertility and better water penetration can result in more satisfying yields. Proper soil and water conservation makes it possible to increase the productivity of basic food crops, livestock, and tree crops — all of which are connected to one another in the upland farm.

Most farmers have experienced that planting year after year in the same field eventually reduces soil fertility to a point where the yields no longer justify the effort of planting there. Because available land for new fields is becoming scarce and opening a new field is difficult work, maintaining soil fertility is **very important**.

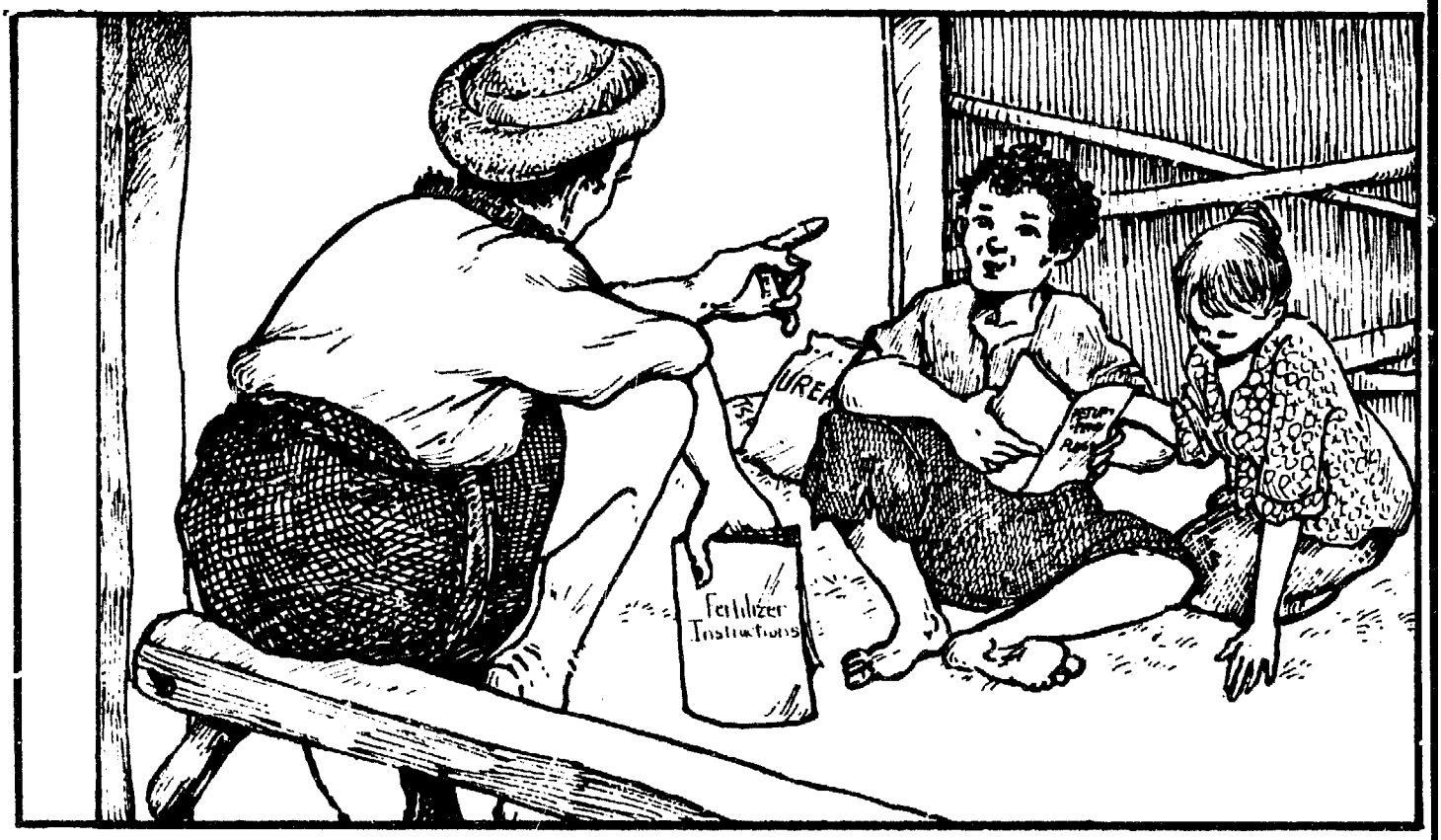
Leaves from the soil conservation terraces can be used as "green manure" to increase soil fertility. Green manure also improves the soil by making it more friable and easier to cultivate.



The green manure is worked into the soil when the field is prepared for planting. By the time the crops are planted, the leaves have decomposed, improving soil structure so that the roots of the crops will grow better. This means that the plants will be healthier and the yields will be greater.

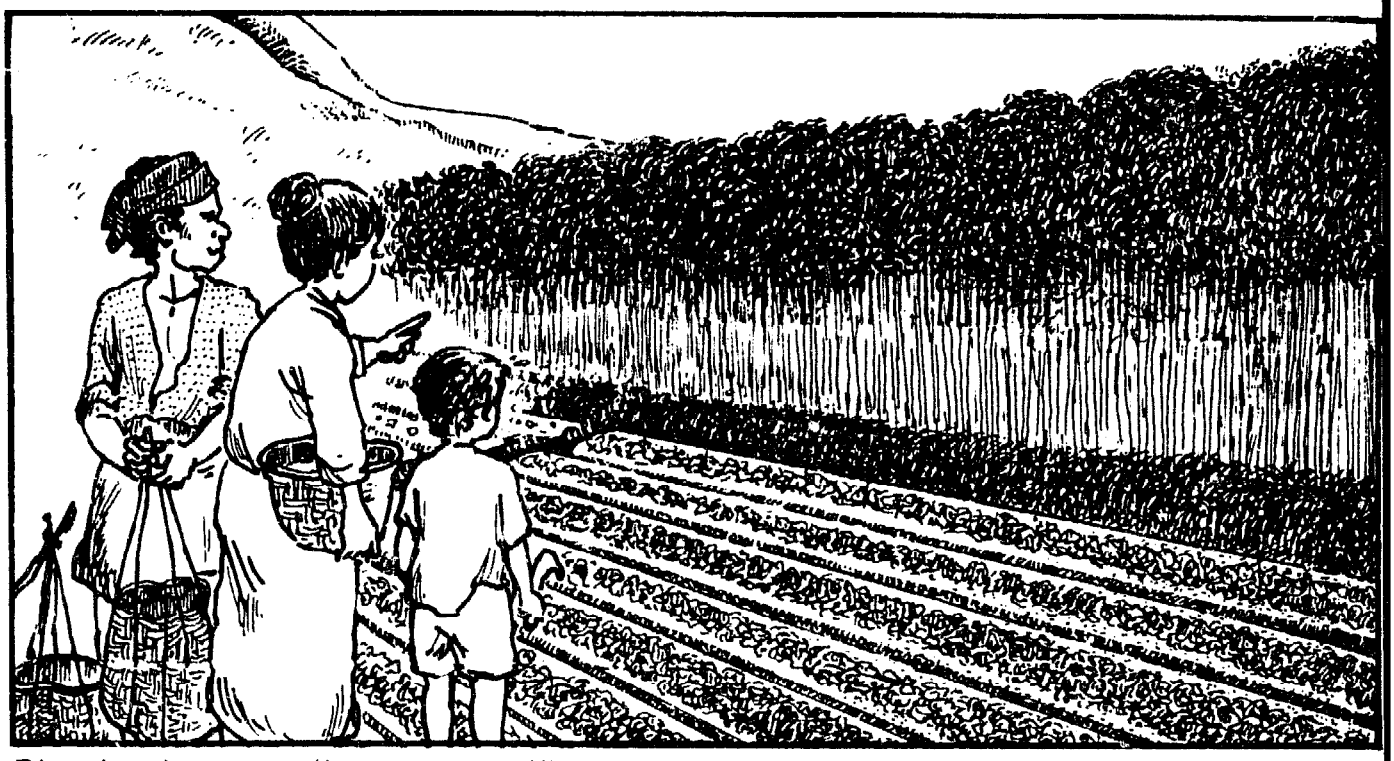
In addition to green manure, other material can be used to increase soil fertility, such as compost, prunings and other plant waste, and animal manure.

If available, chemical fertilizers such as urea and TSP can also be used to fertilize crops. In fields protected by proper soil and water conservation measures, these expensive chemical fertilizers will not be washed away by the rains.

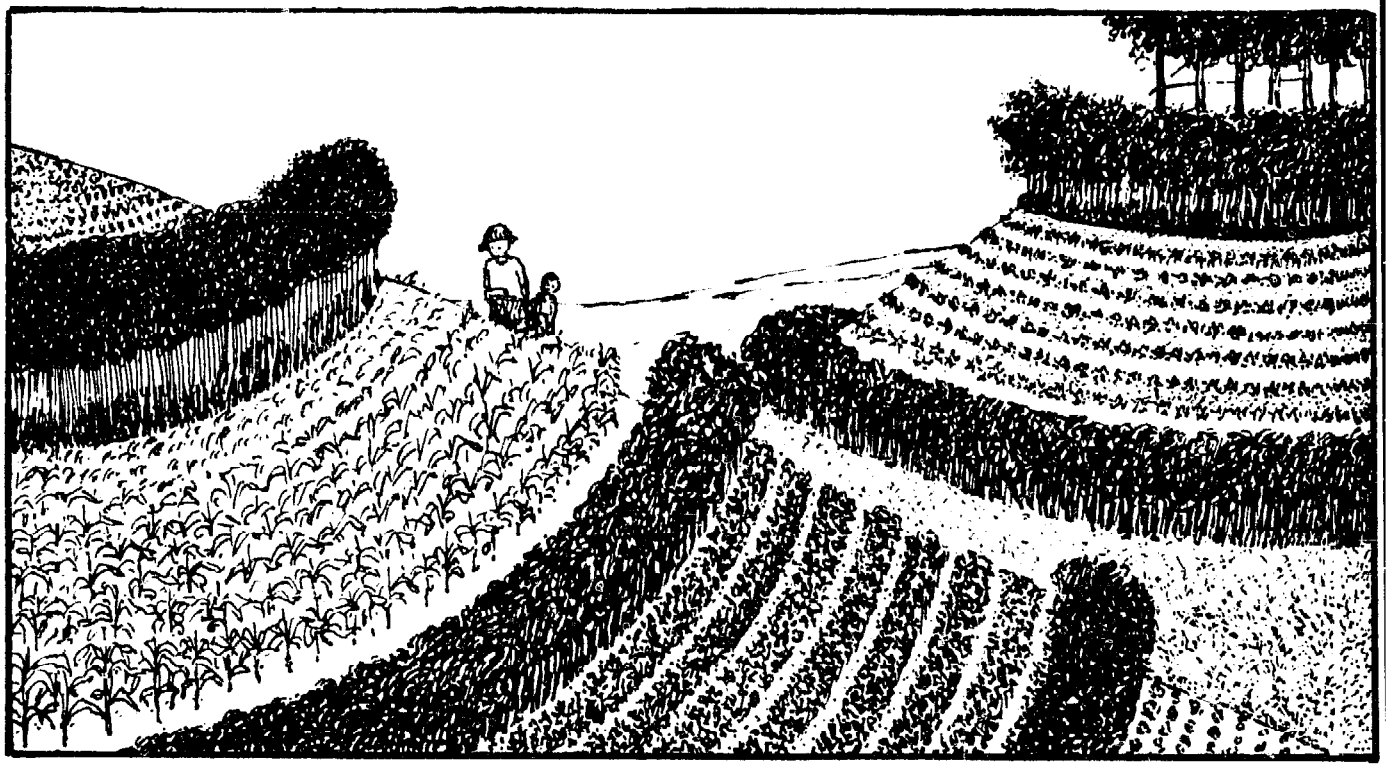


However, when using chemical fertilizers, it is important to follow the directions carefully as to how much to use, where they should be applied, and the right time to use them. If the directions are followed closely, these expensive fertilizers can be well worth their cost.

Using good cropping practices on soils that are more fertile and friable can greatly improve crop yields. Using exact planting distances can futher improve yields by making the best use of available land.

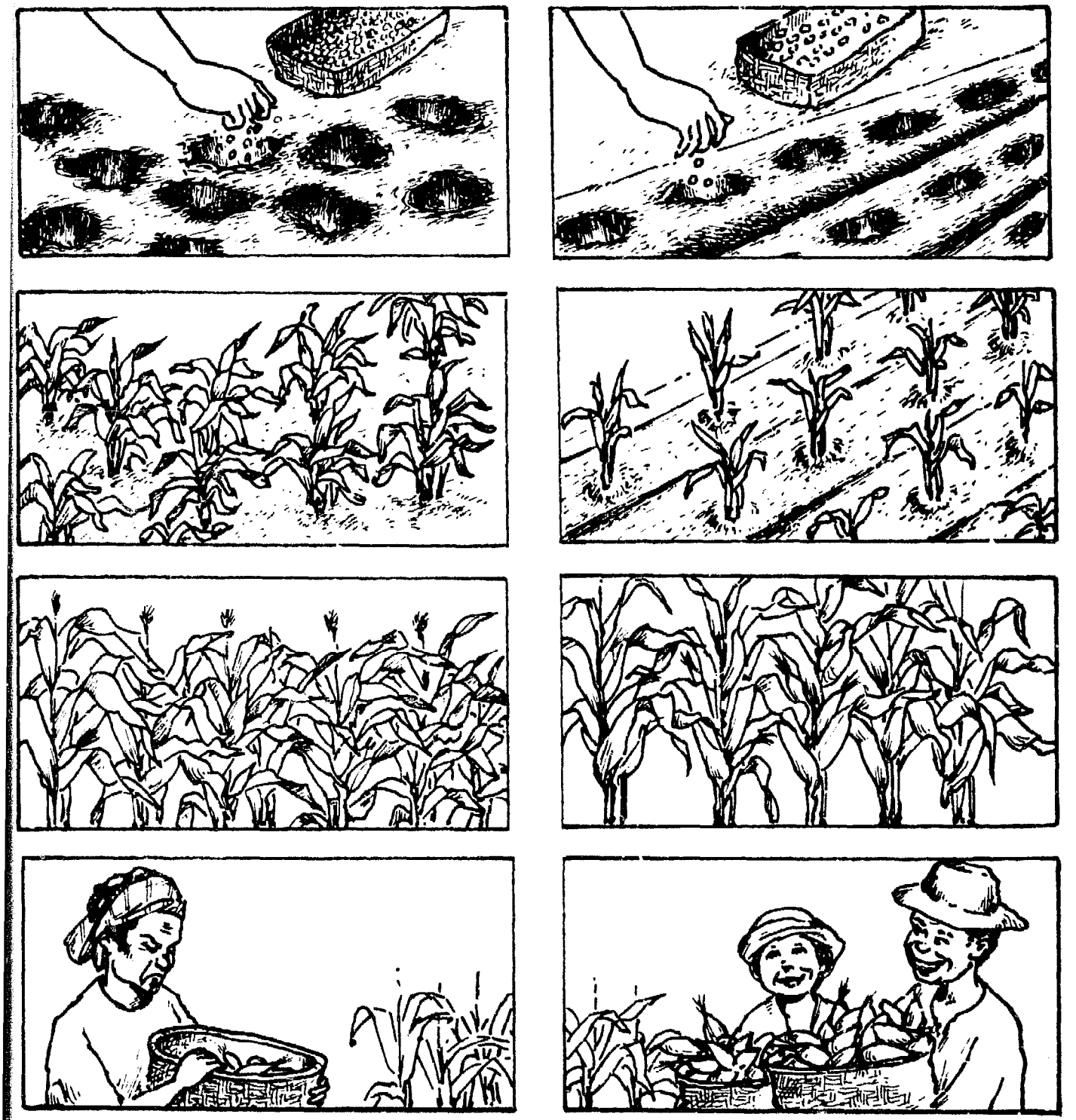


Planting in rows allows more efficient use of space. It is also easier to work among plants arranged in rows. This saves much time when weeding, fertilizing, spraying, etc.



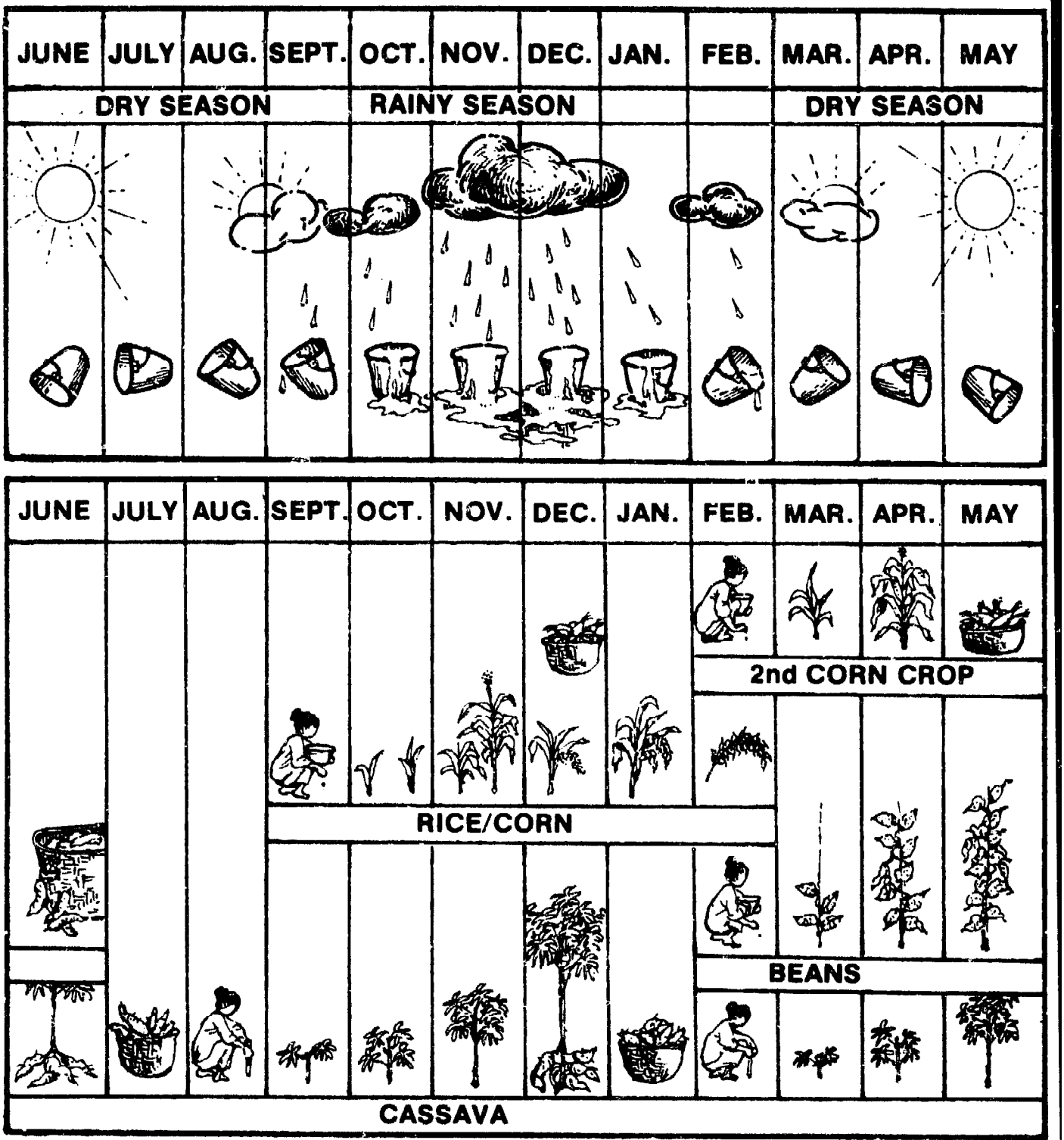
On steeper slopes where gardens have been improved with soil and water conservation practices, field crops should be planted along "contour lines" in order to futher reduce erosion. (Planting on contour lines means that all the plants in the row are at the same level on the hill.)

It is important to think carefully about the number of seeds planted in each hole. Planting seeds haphazardly or too far apart wastes both soil fertility and space. On the other hand, sowing plants too close together or planting too many seeds in one hole (even if orderly) causes plants to grow poorly.

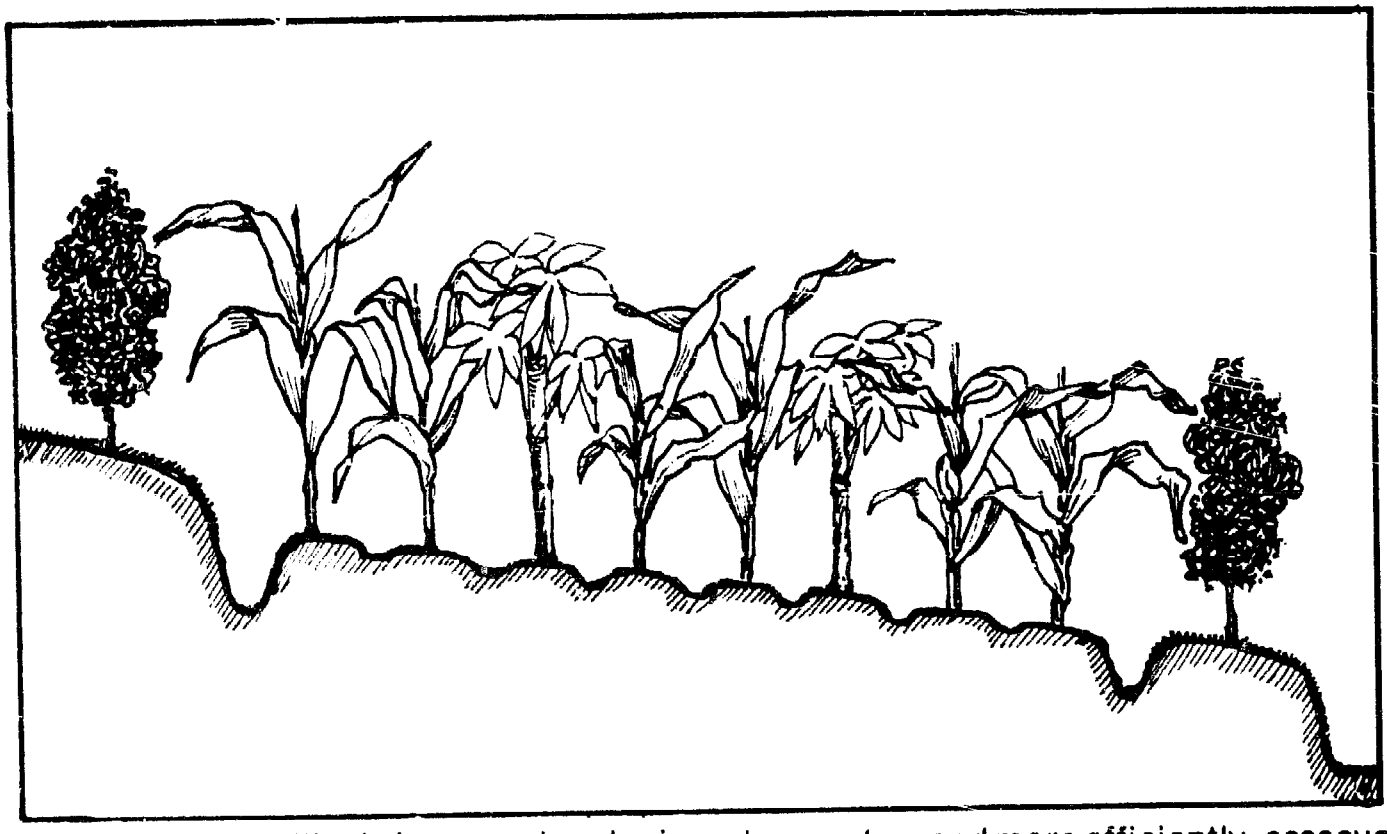


It is better to plant fewer plants per hole, and then replant spots where plants fail to grow. This will save seeds and guarantee better growth of individual plants.

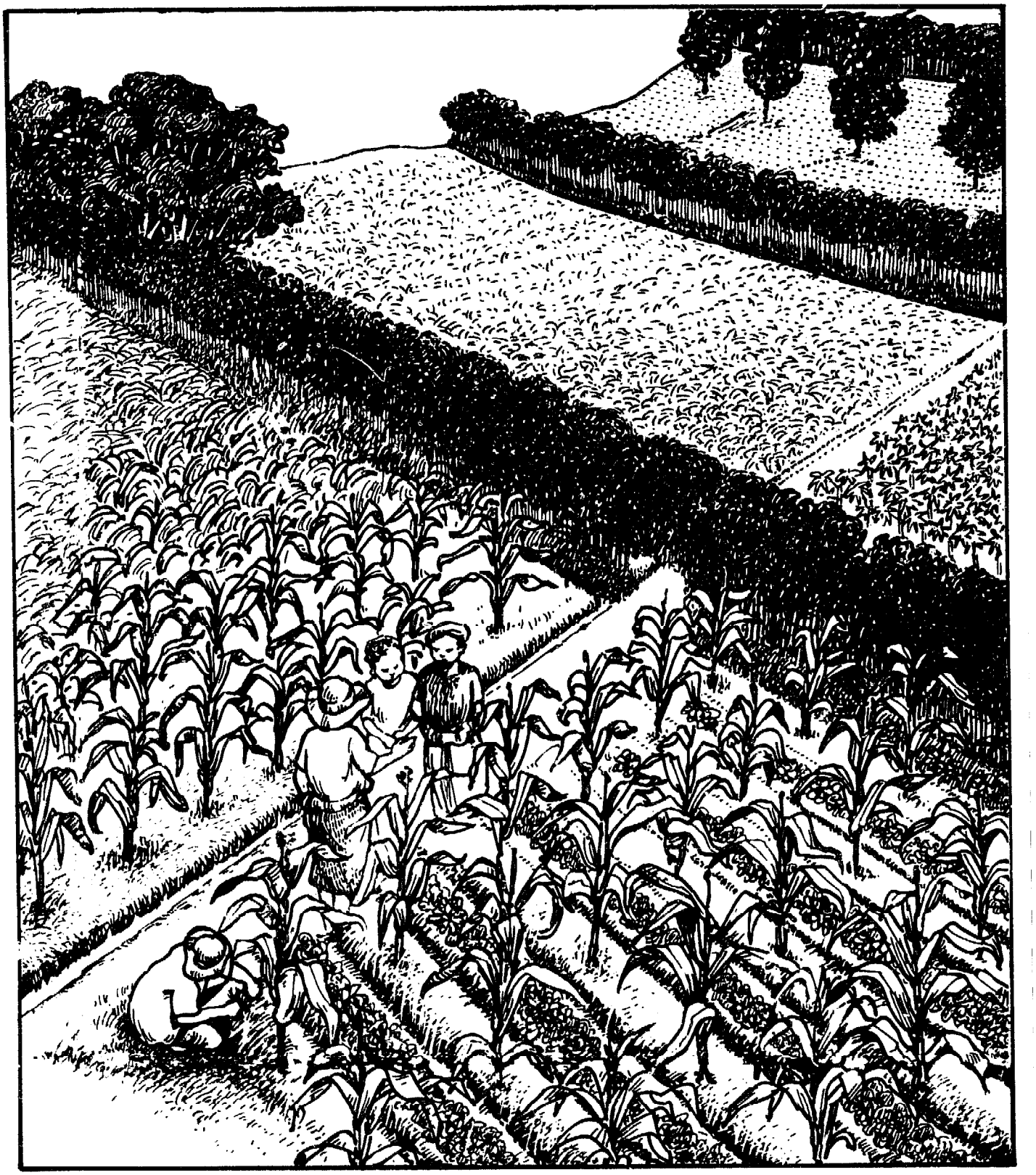
14 With increased soil fertility and better management of rain water, farms that previously could produce only one crop per year can begin to produce a second crop of corn, beans, or root crops.



Cropping patterns can be changed to take advantage of the improved soil and water conditions in the fields. For example, peanuts or mungbeans can be planted as a second crop after the corn or rice crop has been harvested.

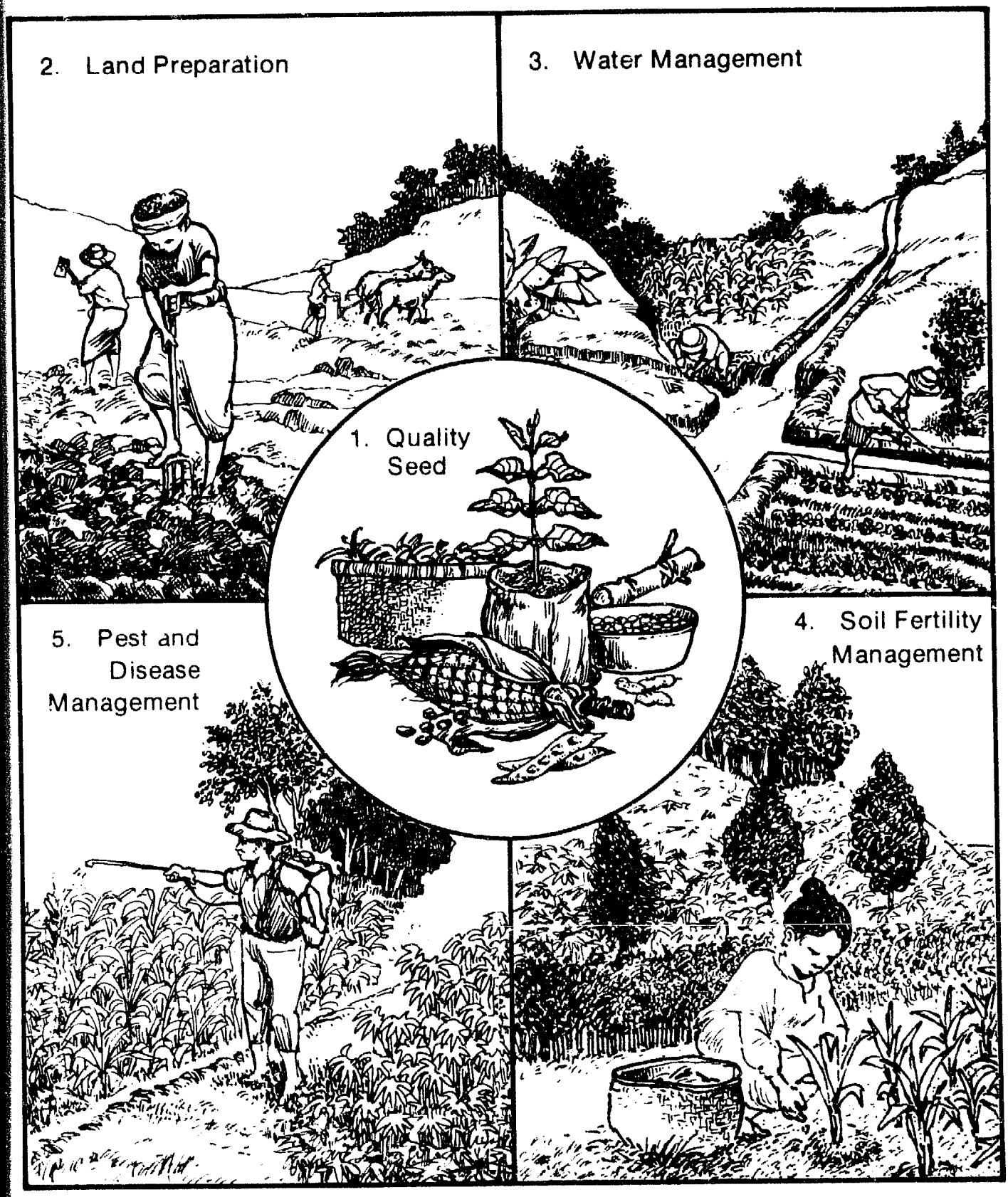


Or, when soil fertility is improved and rain water can be used more efficiently, cassava can be planted among the staple crop during the first planting. While these are planted at the same time in the field, the different crops are harvested at different times during the year.



Every new cropping pattern needs to be tested first to find out if it works well in any given place. Only after experimenting with different cropping patterns can farmers know which combination best uses the local soil and water conditions, is least affected by insects and diseases, and produces those crops which best fulfill the needs of the family.

Other basic steps to guarantee a continuing good harvest are shown below.



LIVESTOCK

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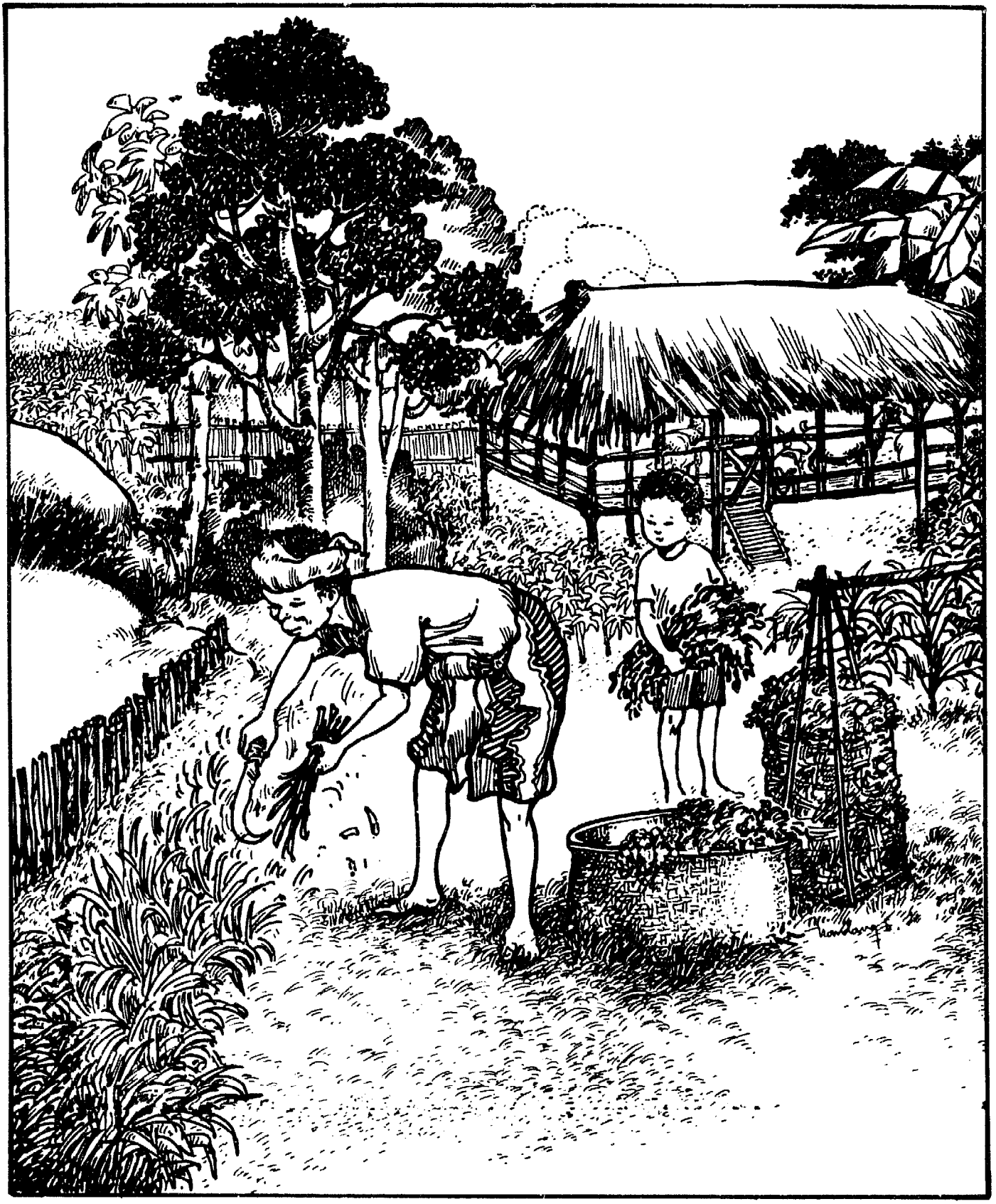
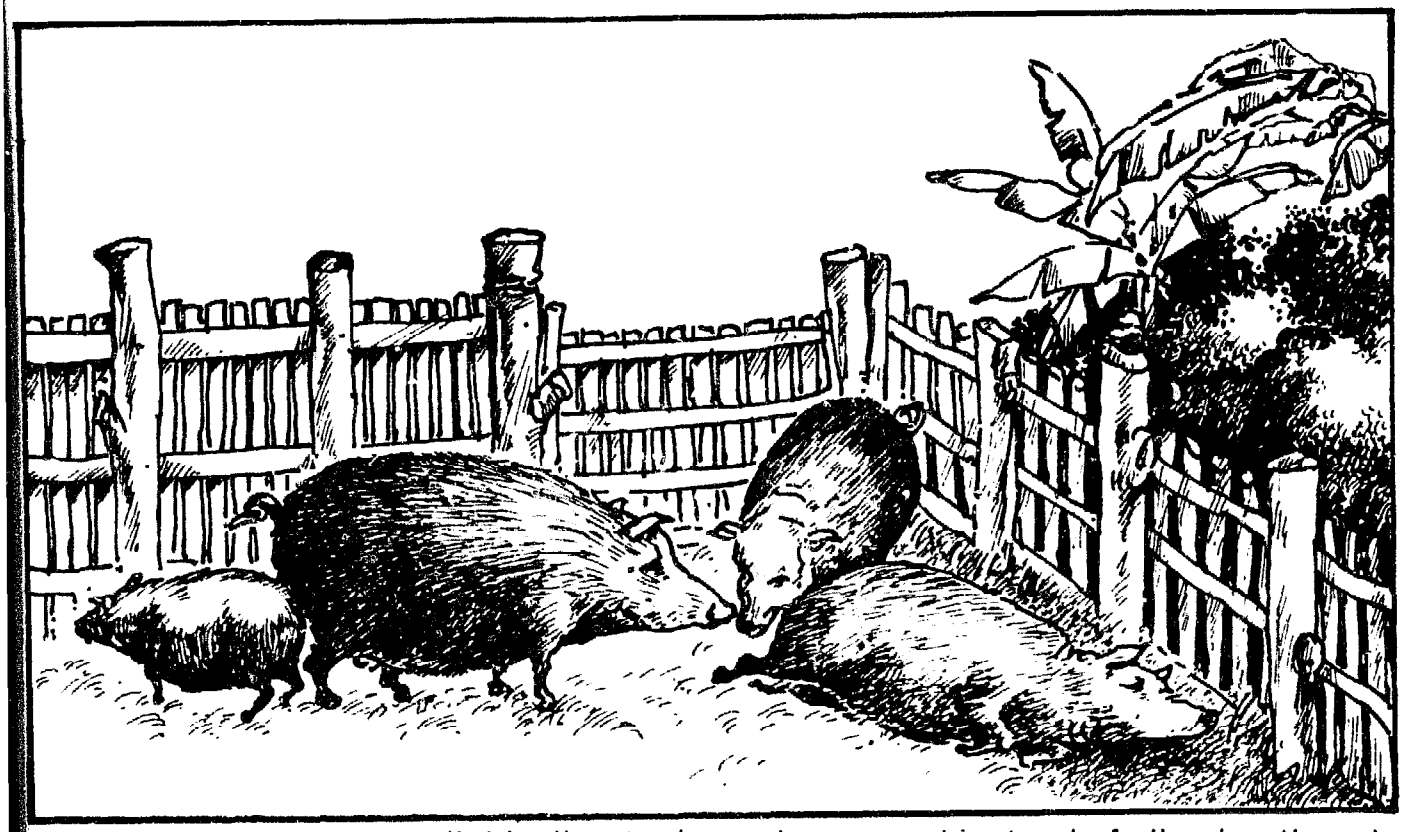


Increasing agricultural production also means raising livestock using better methods. Because the soil conservation terraces on the hilly fields can provide a year-round source of fodder for livestock, both the quantity and quality of the animals raised can be increased.



When enough feed is available, livestock can be penned instead of allowing them to roam freely. Raising animals in a pen has many advantages.

First, livestock can be fed regularly with a proper diet (mixture) of leaves and grasses so that they will grow faster.

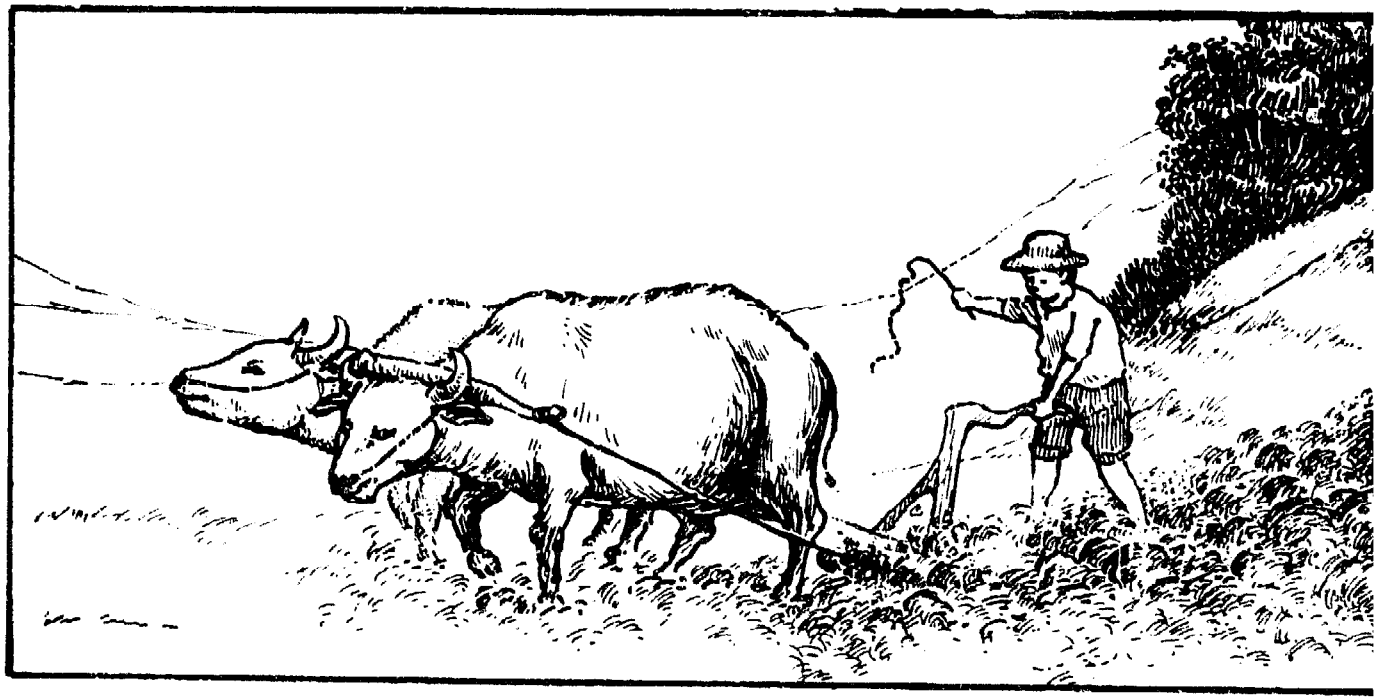
Time need not be wasted on shepherding animals that are raised in a pen. Also, penned livestock do not waste energy searching for food in the hot sun.

Animals raised in a clean, strong pen are healthier and less likely to suffer from worms and other diseases — animals that do get sick can be cared for better when penned. Also, the spread of diseases is more difficult to manage when livestock are allowed to roam free.

Caring for livestock in pens allows manure to be collected more easily. Animal manure is an important source of fertilizer for cash crops and the home vegetable garden as well as basic food crops in the field.

The most important advantage of penning animals is keeping them away from field crops. Crops damaged by free-roaming or herded livestock cause many disputes in the village.

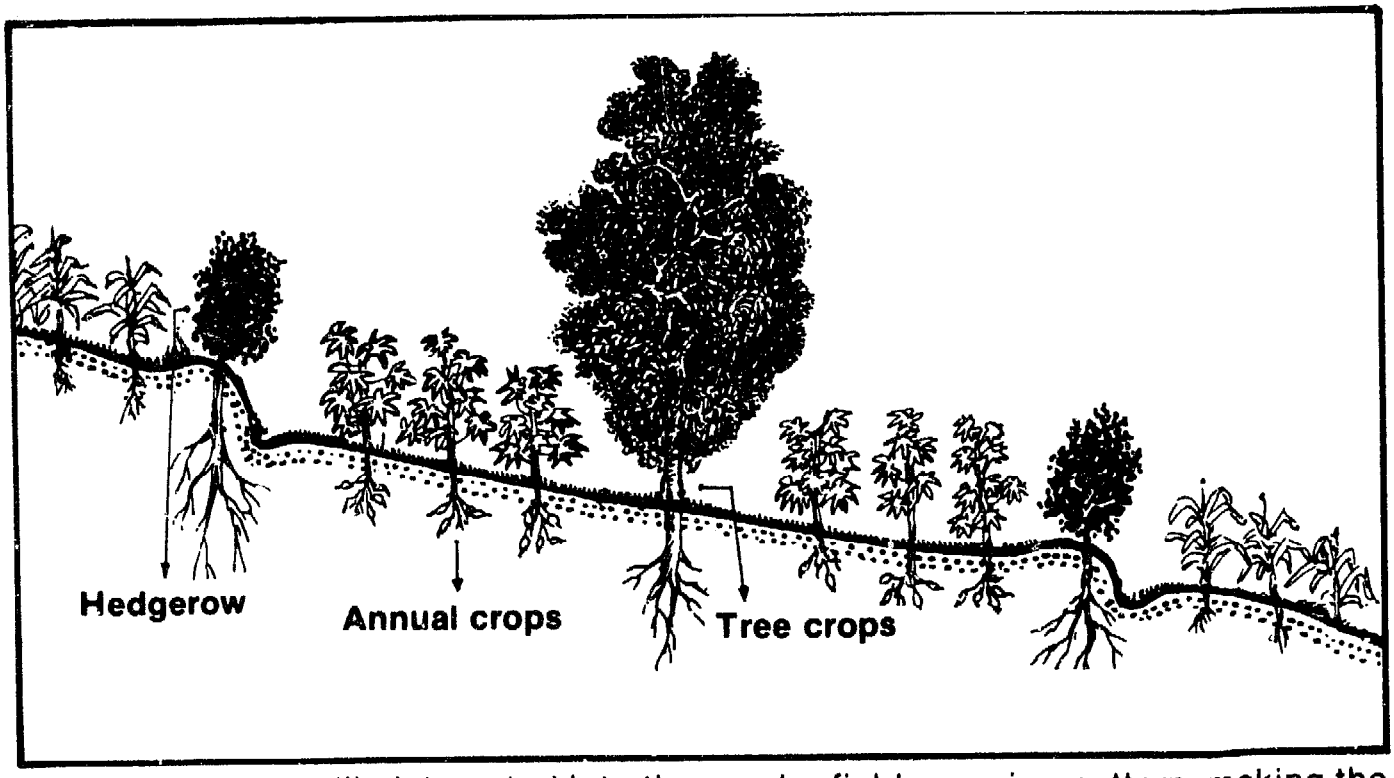
While most villages have rules about keeping livestock away from crops, hungry animals often stray into neighbors' fields. As everyone in the village knows, damaged crops can cause arguments and even fights.



The reasons for raising penned livestock are clear: healthy animals provide more income, easily collected manure is available to fertilize crops, and (for cattle and water buffalo) animals provide an important source of draft power for plowing.

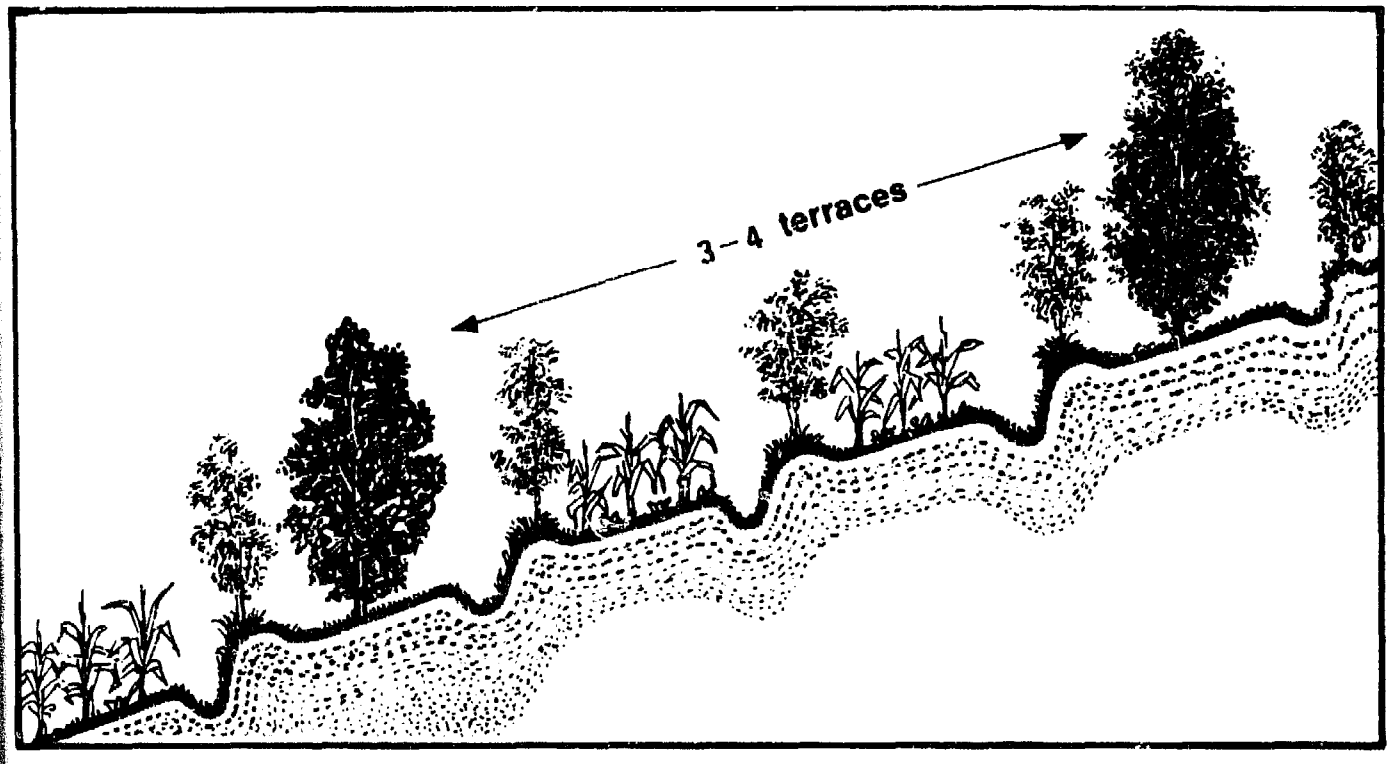
Tree Crops

Maintaining and increasing the productivity of trees is another important farming activity. Tree crops can be used directly as well as provide an additional source of income for other needs of the family.

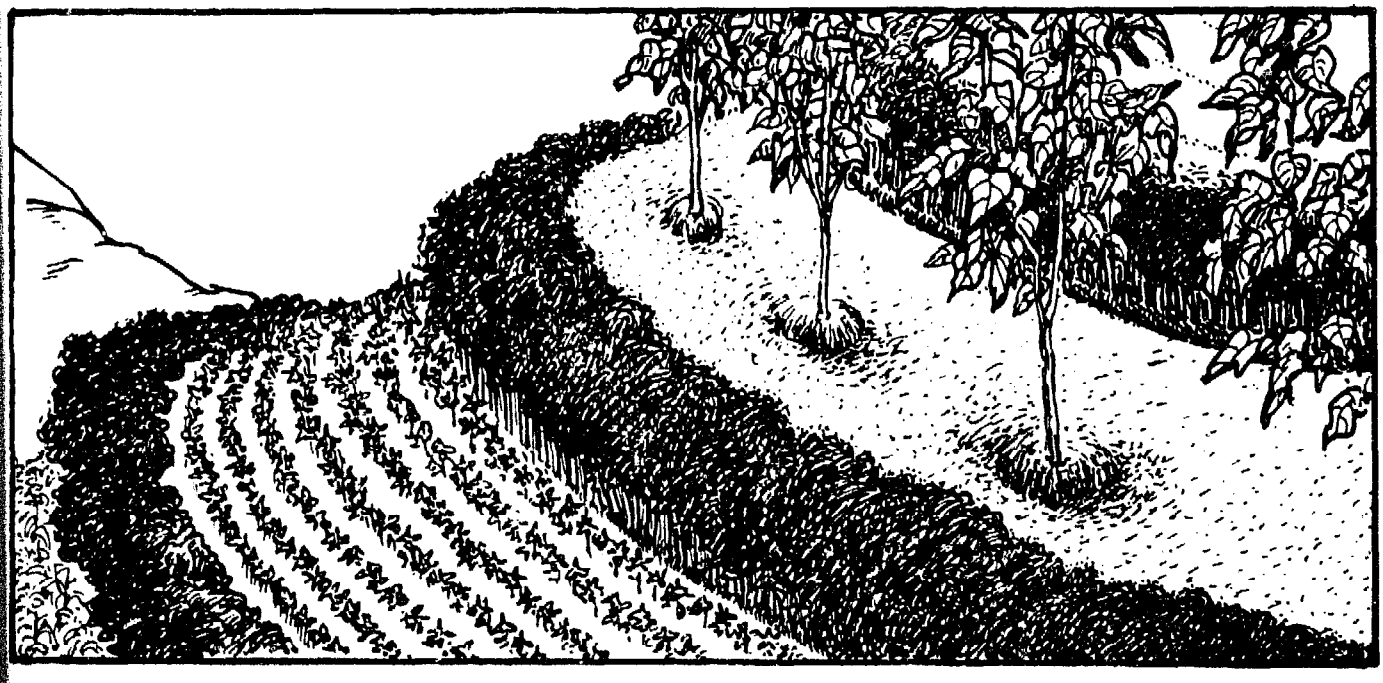


Tree crops are readily integrated into the regular field cropping pattern, making the farm more productive. Trees can use soil fertility and water found at greater depths because their roots go much deeper than the roots of most staple crops. Tree crops are also harvested and sold at different times than staples such as rice and corn. This provides extra money at a time of the year when farmers might otherwise have no other income.

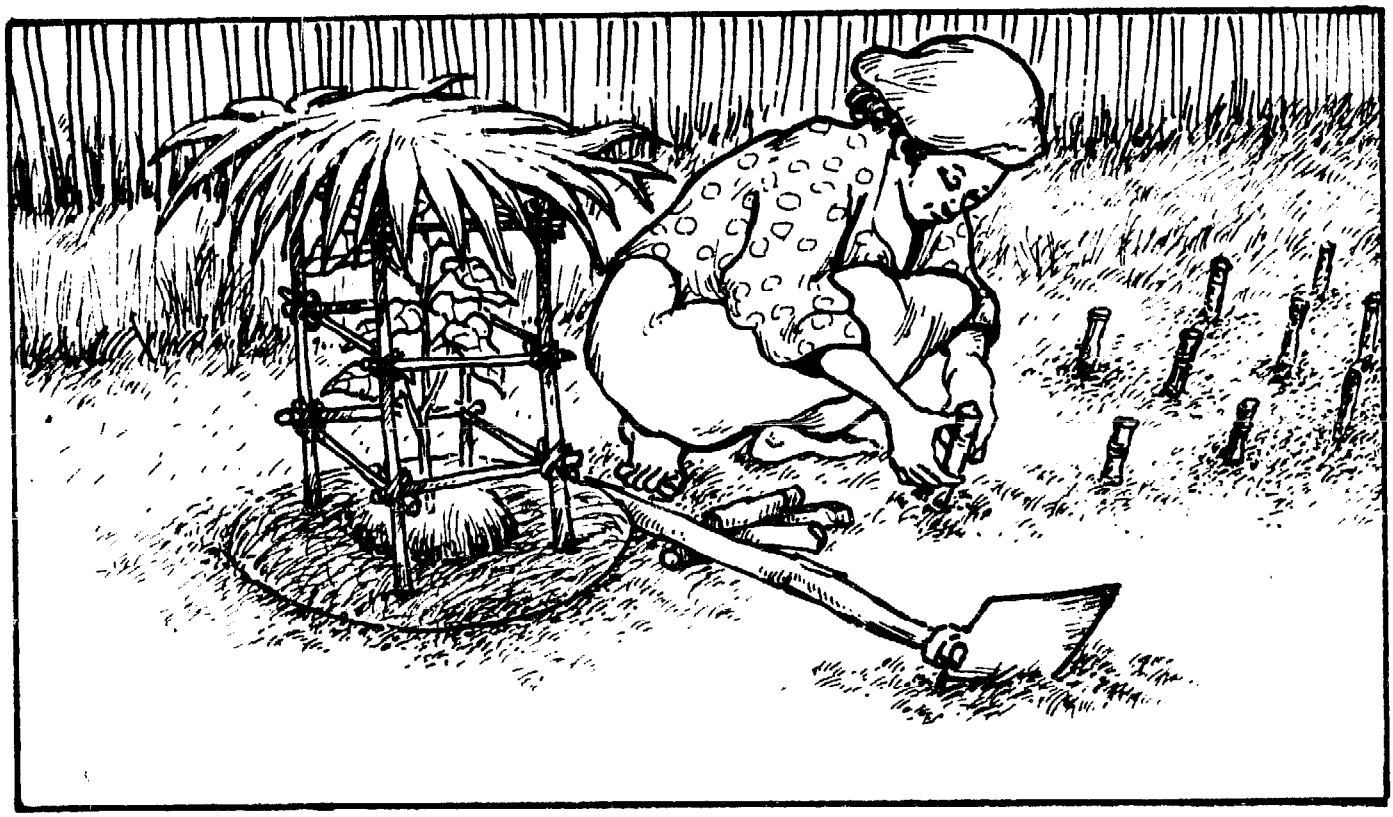
So, it is no wonder that farmers are becoming more interested in planting tree crops such as coconut, coffee, cloves, cacao, and many kinds of fruits.



Trees and other perennial plants should be combined with field crops in a cropping pattern that fits both local conditions and farmers' needs. Generally, it is a good idea to plant trees on every third to fourth terrace so that most of the field remains planted to staple crops.



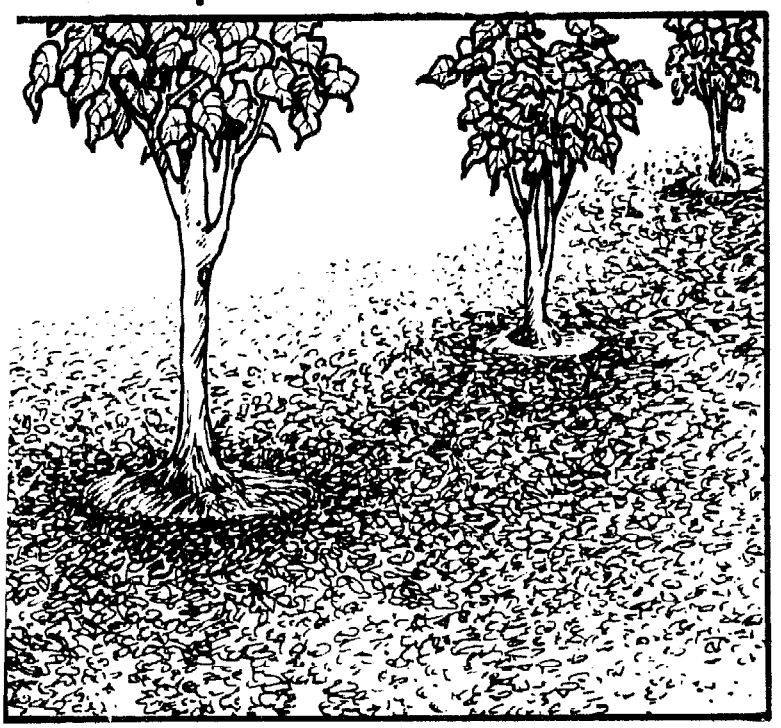
Trees are best planted in the middle of the terrace at fixed distances. Distances should be planned to make the best use of space, while making sure that the trees will not shade out nearby field crops in the coming years.



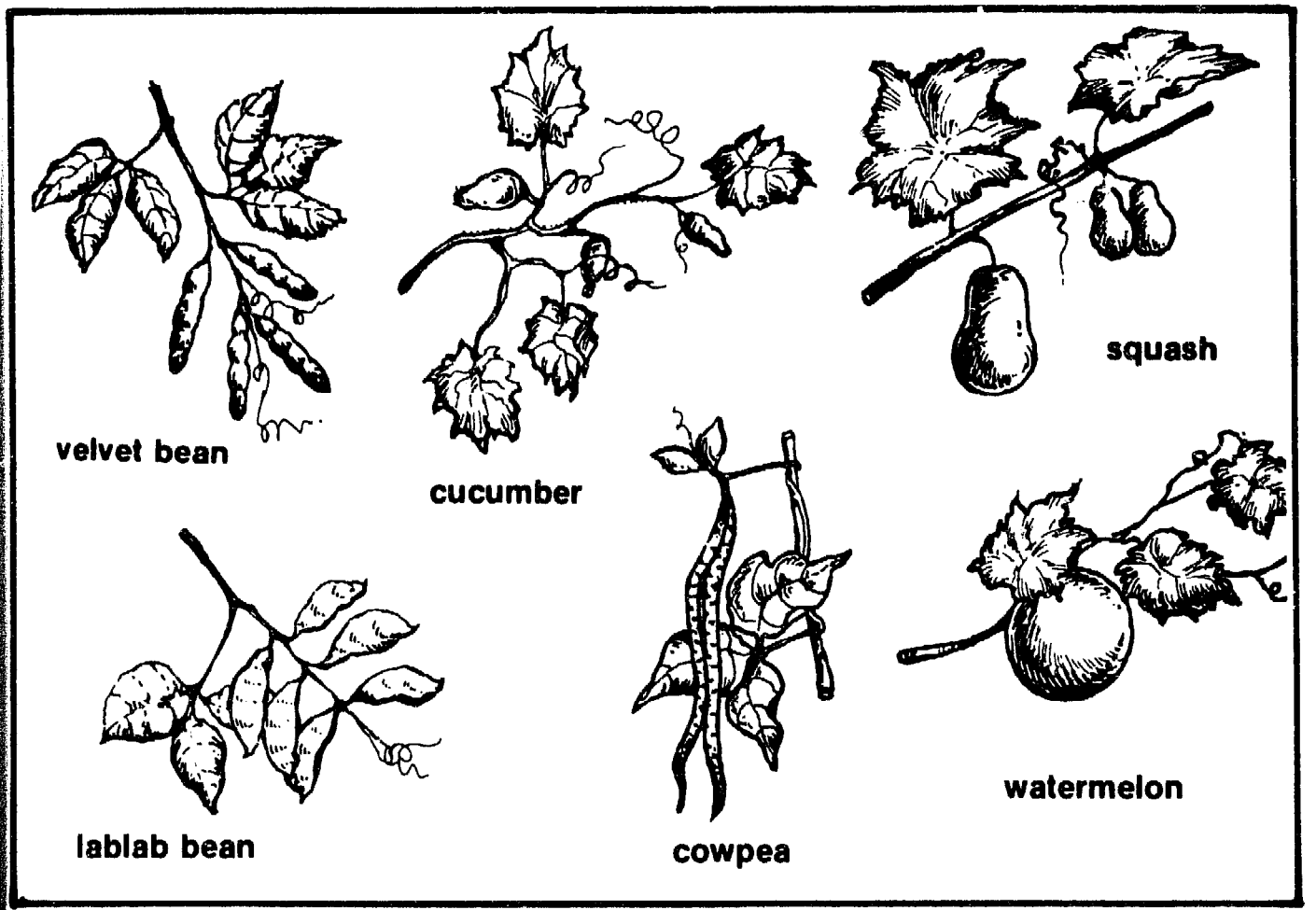
While the trees are still small, annual crops can be planted close to them. This allows space near the trees to be used productively while the trees are still too small to be harvested or to shade out nearby crops.

Proper care of young trees is very important if they are to produce well later. Seedlings and young trees must be carefully watered, fertilized, and pruned for the best growth. The ground around the trees must also be kept weed-free and well cultivated.

Cover crops



Even when the trees are growing well, the ground around them must be protected from erosion and direct sunlight so that soil fertility will not be lost. Several types of "cover crops" can do this by acting as a ground cover. A good cover crop protects the soil from both direct sun and rain, while keeping the soil moist, preventing weeds from growing, and increasing soil fertility over time. Some cover crops can also be eaten as a vegetable and/or fed to livestock.

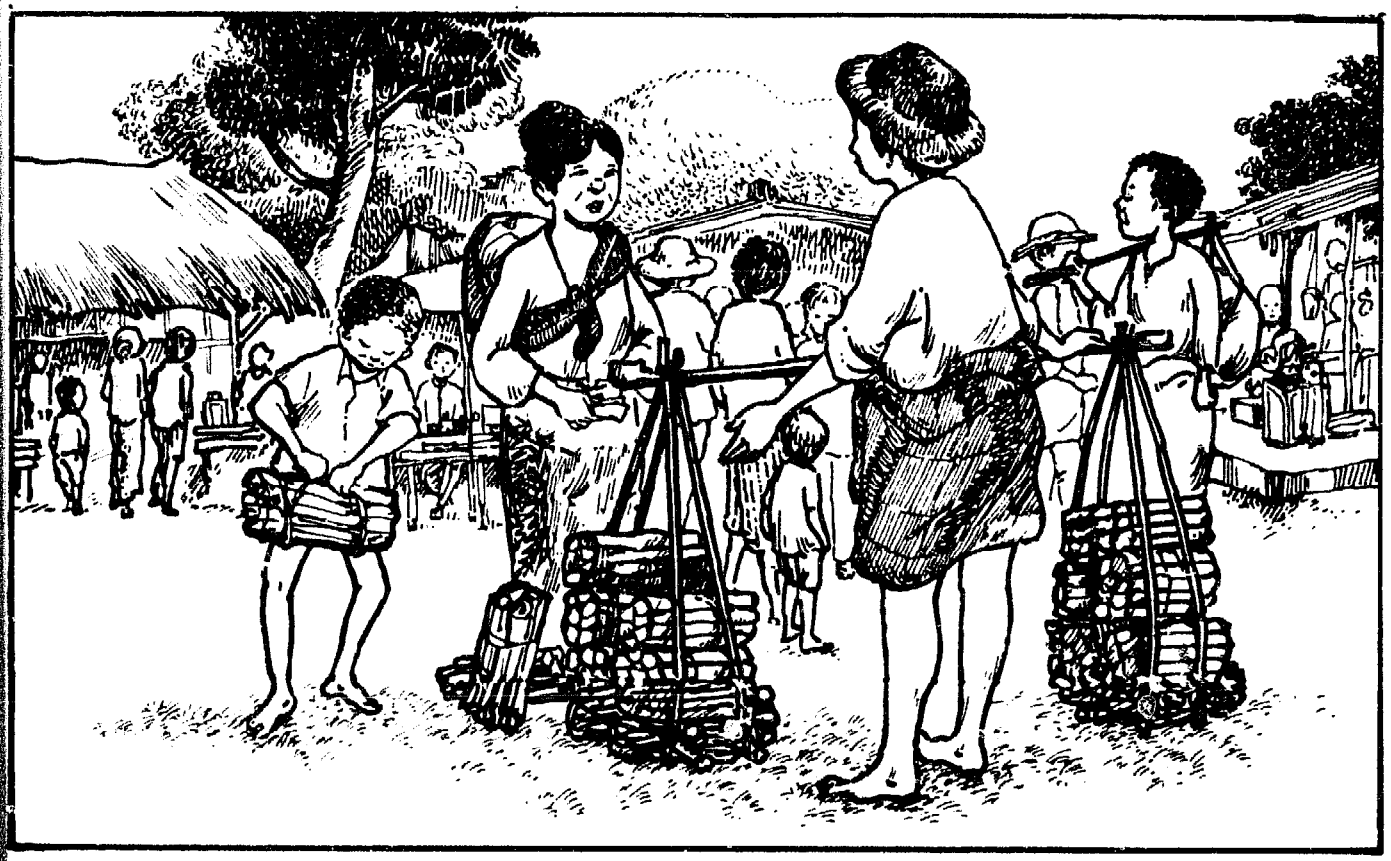


Cover crops are chosen according to local conditions and availability of seed.

WOOD

28 A reliable source of fuelwood for cooking and heating the home is one of the most important daily needs. If well cared-for, the trees on the soil conservation terraces can provide nearly all the family's fuelwood.

This will save both time and energy of women and children who often must walk a long way to search for firewood in the forest. It is much easier to just collect the wood in their gardens or fields.



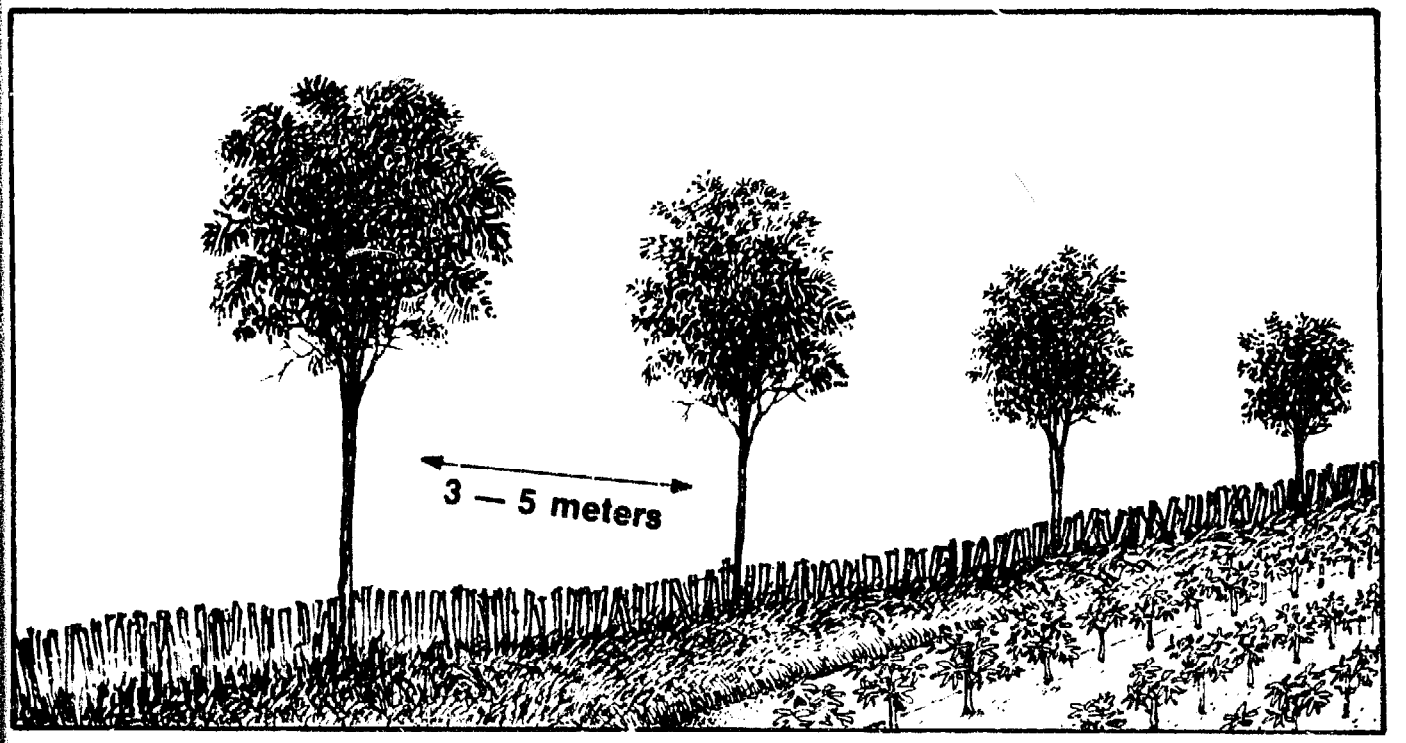
And, in areas where firewood must be purchased, money can be saved by using wood from the terrace hedgerows.

A less obvious advantage to growing one's own firewood is the protection of remaining forested areas, since they are often destroyed by those looking for fuel. Conserving these forests will be much more productive in the long run.

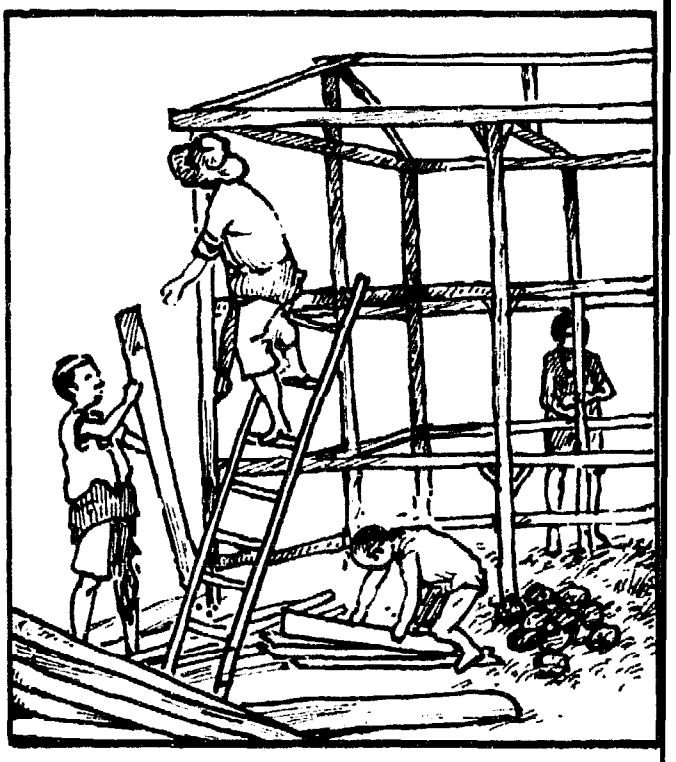
Some farmers allow their hedgerows (madre de cacao, leucaena, calliandra, etc.) to grow without pruning during the dry season. If the growth is good enough, the canopies of the trees on nearby terraces will come together.

In addition to producing more fuelwood, the soil between the hedgerows is protected and remains cool and moist. The shade from the canopies reduces weed growth, while the leaf fall from the hedgerows increases soil fertility and prevents the soil from becoming too hard.

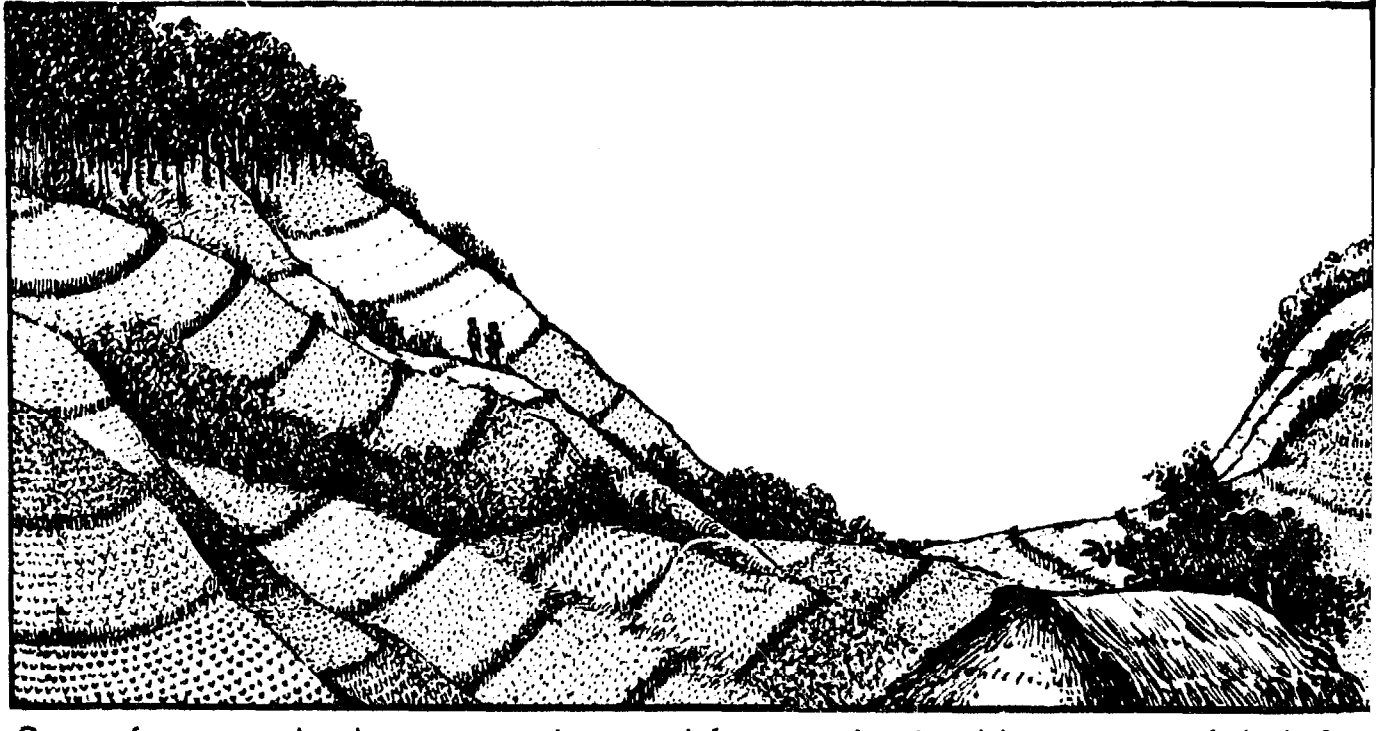
If possible, it is useful to leave part of the fields fallow while other portions are being used. Allowing a field to "rest" for a while also means the terrace hedgerows can develop without being pruned back. The extra leaf matter produced will increase soil fertility, while the additional wood can be used later for fuel and construction. The fallowed areas should be rotated every few years to a different area within the farm.



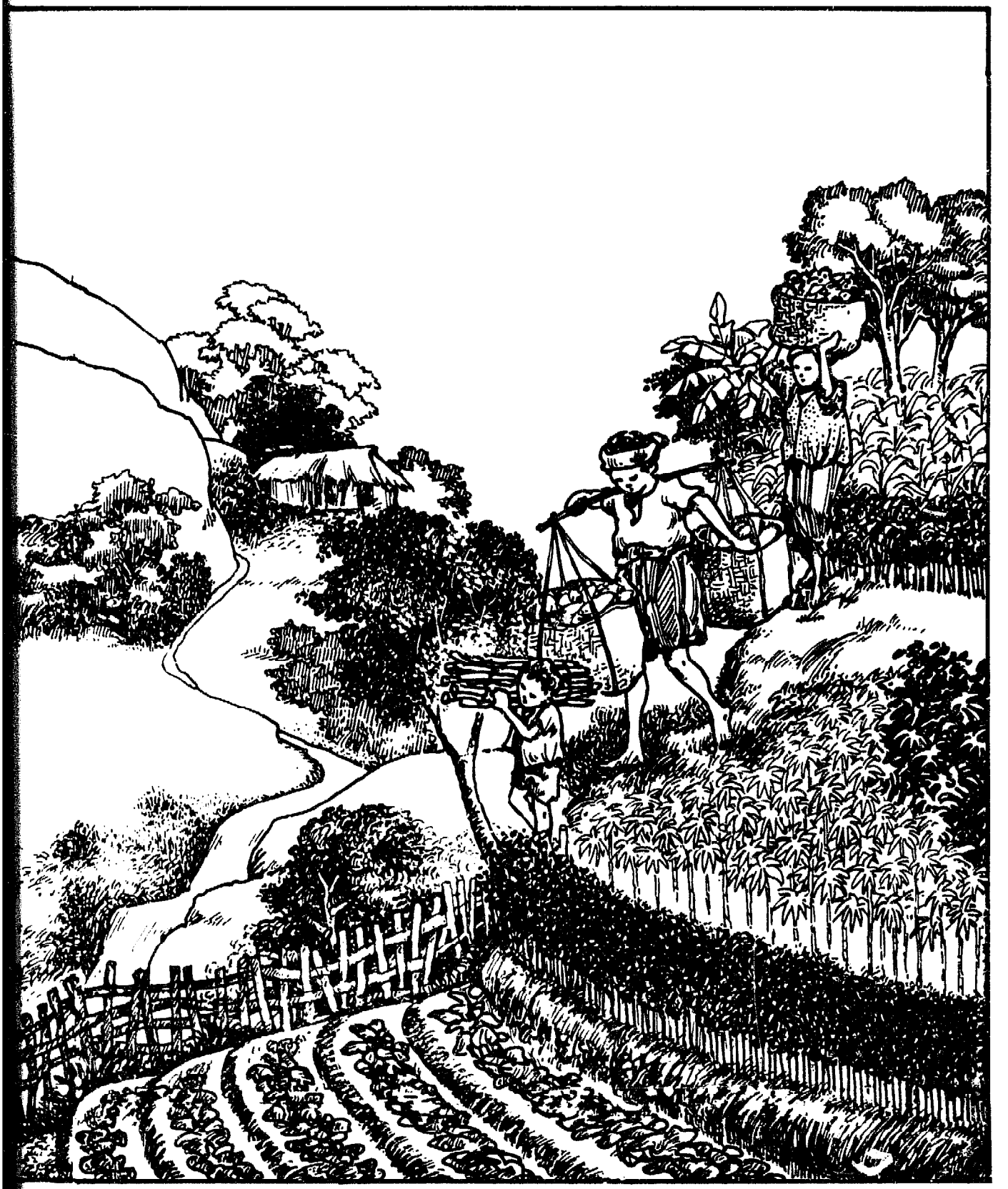
Some farmers do not prune **all** of the trees in the hedgerows of terraces under cultivation, but allow a tree to grow normally every 3 to 5 meters. As long as enough space is left between the unpruned trees, the shade will not affect the crops.



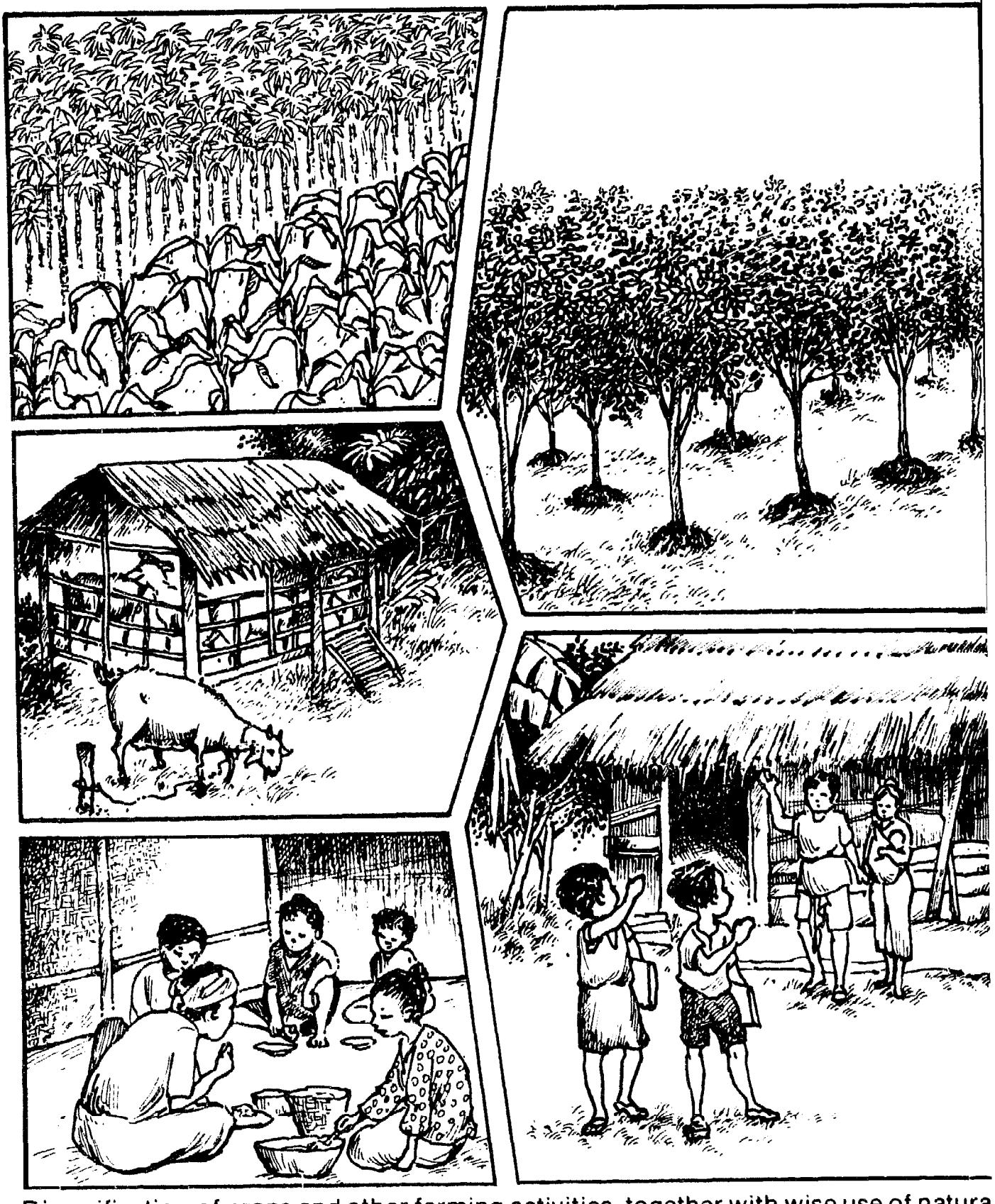
In addition to providing a source of fuel, wood from the unpruned trees can be made into charcoal, or used to make fences or livestock pens. When the trees are large enough, the wood can also be used for constructing houses or other building.



Some farmers who have a greater need for wood set aside an area of their farm especially for wood production. The best site for these "wood lots" or afforested area is above the cropping area on hillsides or on the top of a hill. These trees can also provide a source of income for the farmers in the future.



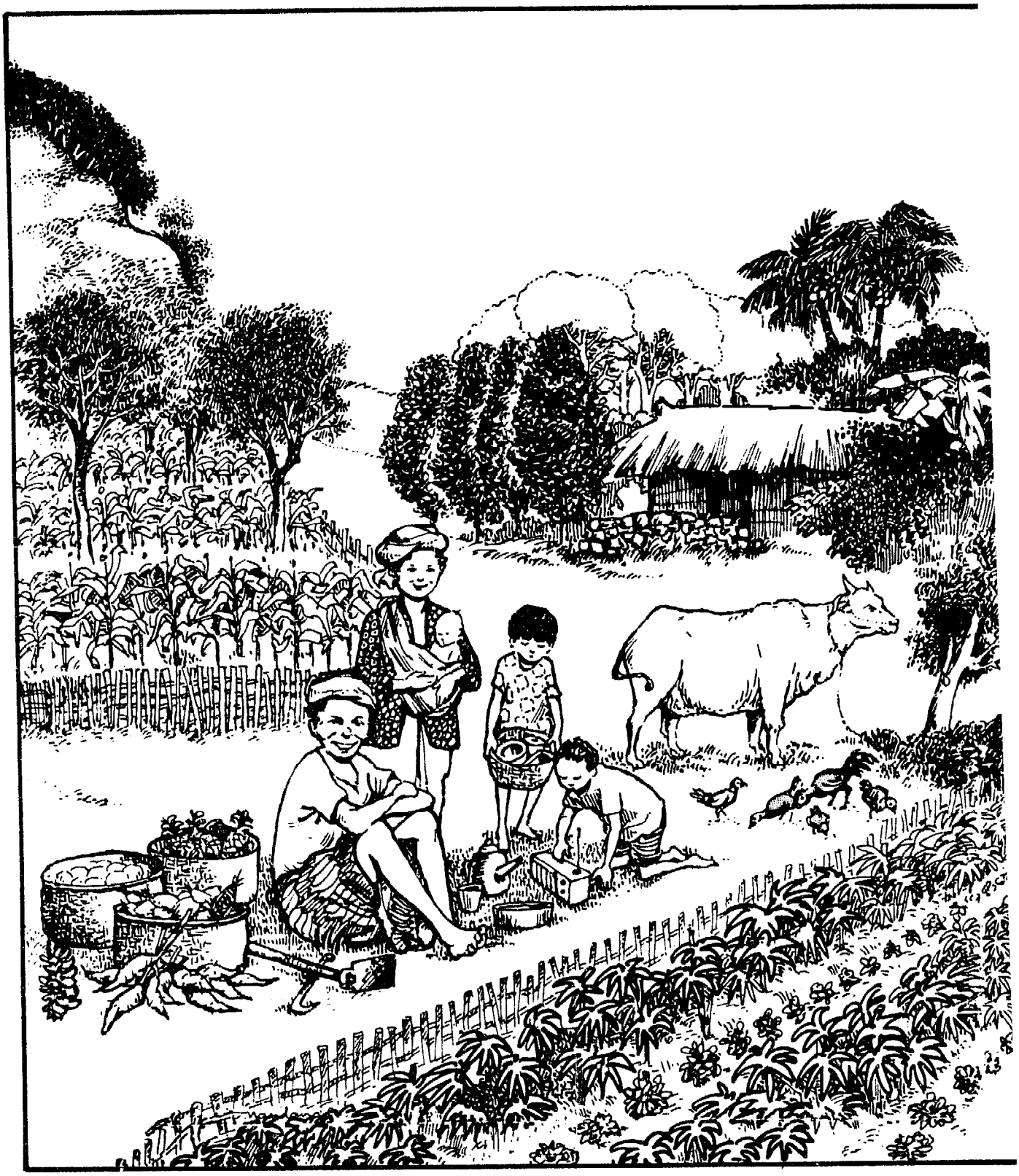
t is clear that soil and water conservation practices provide the basis for ensuring ood harvests over the long term. Successfully applying soil and water conservation echniques also makes possible many other types of productive farming activities.



Diversification of crops and other farming activities, together with wise use of natura resources, helps to ensure the farmers' basic needs will be met. "Integrating" these activities can futher increase farm production: use of soil conservation terraces car raise yields while providing fodder for additional livestock at the same time; more animals will provide more fertilizer and, in some cases, draft power to further increase crop production; increased production means more surplus and extra income

All of these ideas need to be carefully considered and discussed with one another in order to develop a broader vision of each farm's potential. Once this is done, it is best to set to work immediately in order to guarantee a prosperous future for the farmers' family as well as the generations to come.

Each new activity can be tested first on a small part of the farm to see if it gives good results. If the technique or activity is really useful, it can then be carried out on a larger scale.



One of the most important challenges facing farmers is to both integrate and diversify their farming activities in a way that provides for all the families' needs. Carrying out these activities in a manner that preserves natural resources (such as the remaining forests) also helps to ensure continuing prosperity for future generations.

END