What is an Integrated Orchard ?

Kamal Pun (right) and his orchard, Jajarkot

An orchard is a planted and managed area of fruit trees. A well managed orchard will give benefits to people's health, their income, and the environment. There are ways of improving an orchard with small inputs which can greatly increase its productivity. To get more benefits, the orchard should be managed in a sustainable way. To get more production and easy maintenance, the orchard should be like a forest. The orchard can be rich, fertile and sustainable, just like a forest. One of the forest's qualities is its diversity. So our orchards should also contain a great variety of plants, and then they can be more productive and sustainable, like the forest.

So, an **integrated orchard** is a diverse mix of fruit and multi-purpose plants growing together. In this chapter,we show how to design and manage an integrated orchard for quick and sustainable production.

Why make an Integrated Orchard ?

Benefits of the Integrated Orchard

- Other trees can be planted in between the fruit trees;
- These other trees can provide fodder, fuel, timber, medicines, nectar, vegetables and other useful products;
- More production from less land;
- Soil and water conservation;
- Degraded land can be regenerated;
- Pests and diseases are more easily and cheaply controlled;
- Farm production increases annually;
- There's a quick return on investment;
- As well as cash income, the integrated orchard also provides many basic resources for other farming systems.

Conventional farming education usually recommends an orchard of one variety. In a mango orchard, there are only mango trees, and in an apple orchard, only apple trees. Planting in this way leaves much wasted space in between the trees, and much work goes into maintaining these empty spaces. But if the spaces are ploughed to grow annual crops, then the fruit trees' roots may be damaged and production will be lower. So the answer is to plant perennial crops of useful trees and shrubs in between the fruit trees.

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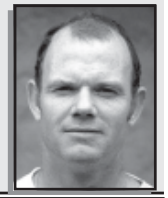
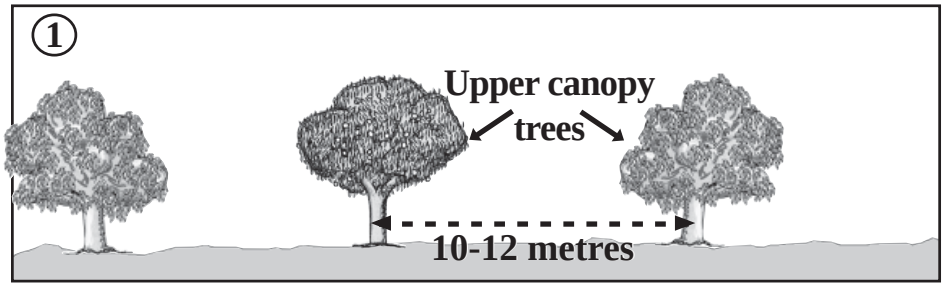


How to make an Integrated Orchard ?

Species' selection and planting design

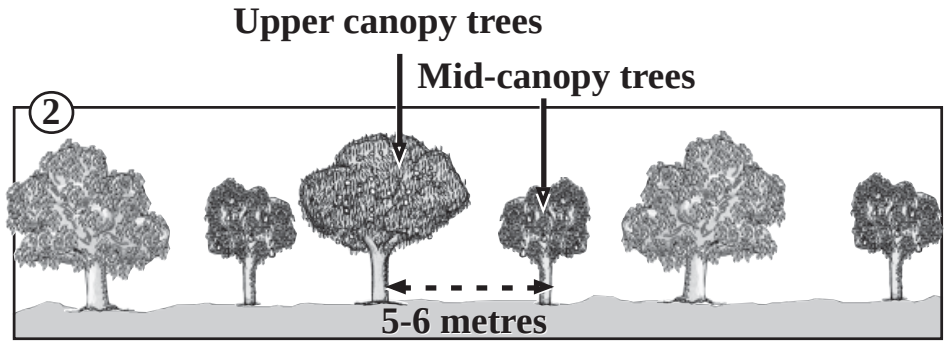
Good quality species should be chosen for the orchard. Species should be appropriate for the climate and landscape. The size of the different plants when they are mature should also be considered. According to size, 4 or 5 layers of trees and shrubs can be recognised :-

① **Upper canopy trees** :- these are the biggest trees, and usually take the longest time to produce fruit. They are also usually the longest lived. Fruit trees in this group include mango, jackfruit, avocado, walnut, chestnut, butternut, pecan, etc. Multi-purpose trees include soapnut, neem, toon, mauwa, etc. These trees should be planted 10-12 metres apart.



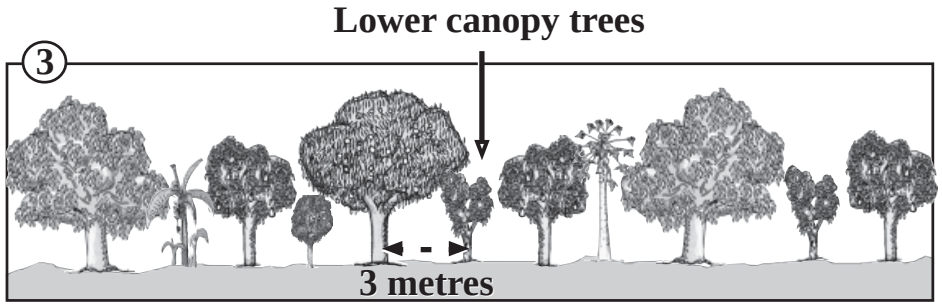
But planting trees at this spacing leaves 10-12 metres of space in between, which is wasted if nothing else is planted. Farming tilled crops may damage the trees when they are ploughed. So it is best to plant smaller trees in between.

② **Mid-canopy trees :-** apple, pear, peach, plum, apricot, persimon, cherry, etc. can be seen as mid-canopy trees. They can be planted 5-6 metres apart, in between the upper canopy trees. They will fruit sooner than the bigger trees, and usually do not live so long.



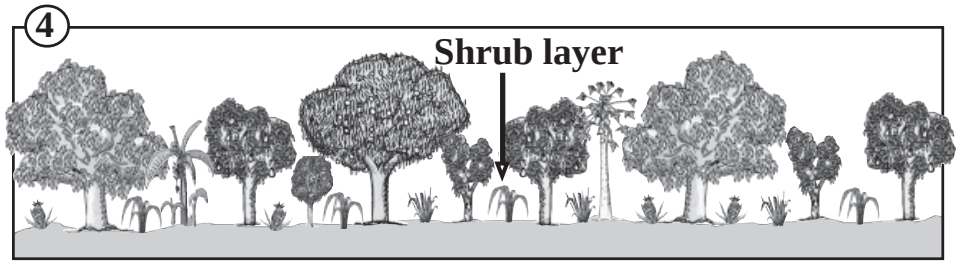
But even planted like this, 5-6 metres of lend is left empty. Other trees can still be planted in between.

③ **Lower canopy trees :-** orange, lemon, banana, custard apple, sea buckthorn, coffee, papaya, mulberry, etc. are small trees. They can be planted in between, 3 metres apart.

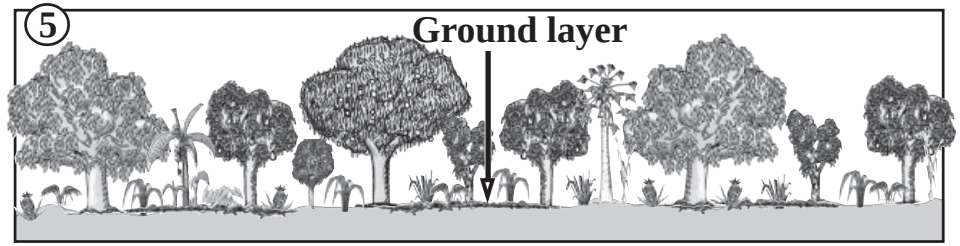


But even 3 metres is a lot of empty space. Even smaller shrubs can be planted in between.

④ **Shrub layer :-** After the smaller trees, shrubs like pineapple, cardamon, napier grass, lemon grass, blackcurrant, gooseberry, etc. have their turn. They can be planted 1-1.5 metres apart. They are fast to produce, and only live a few years.



⑤ **Ground layer :-** finally, as a ground cover to increase productivity even more, various types of sweet potato, taro, beans, peanuts, clover, comfrey, ginger, tumeric, etc. can be planted. Wild plants like wormwood and nettle can also be encouraged. They help to make the soil fertile. But the groundcover plants may need controlling if they harm the young trees. When the trees are bigger, climbing plants such as grapes, passion fruit, jasmine, yam, pepper and rattan can be planted. But these should not be allowed to climb on the fruit trees, or they will reduce the trees' fruiting ability.

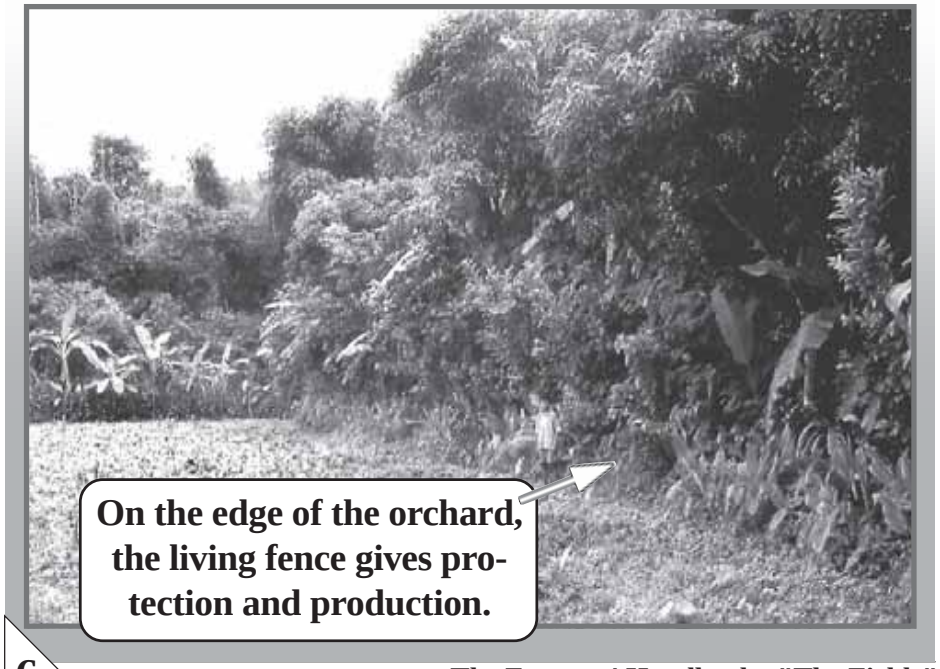


Note :- These pictures show how small and large trees and shrubs can be designed into the integrated orchard. When establishing the orchard, plants can either be planted all at the same time, or gradually, as time and labour allow.

Protecting the orchard

The orchard needs fencing to protect against livestock. Temporarily, thorny branches such as *Acacia*, blackthorn, wild blackberry, sea buckthorn, etc. can be cut and made into a fence. A **living fence** of planted trees and shrubs gives other benefits, and is a more productive and longer-term way of protecting the orchard.

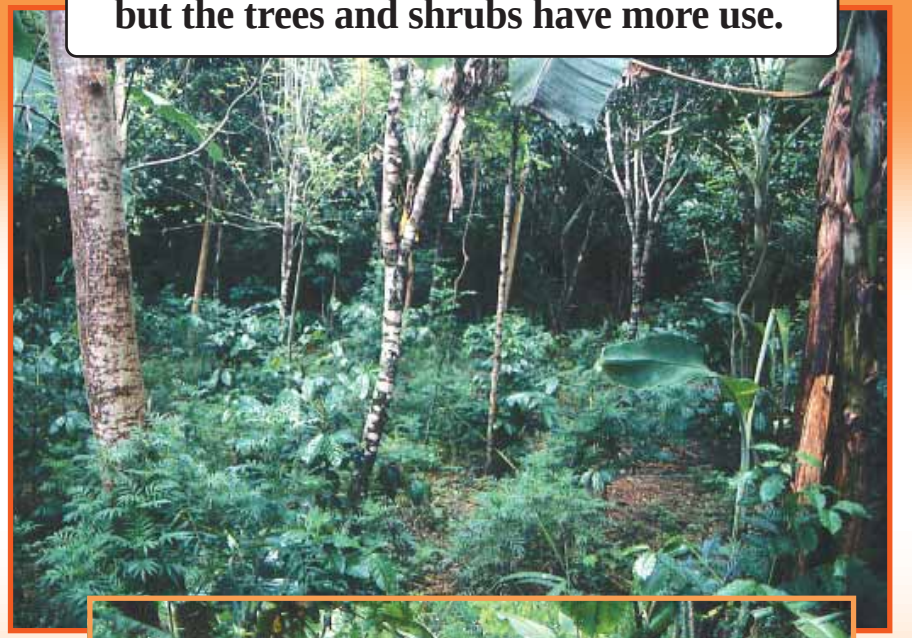
A living fence, or hedge, can be made of thorny species such as cactus, sisal, wild pear, hawthorn, some of the *Acacias*, *Prosopis*, sea buckthorn, honey locust, etc. Some can form a fence within 2-3 years, and give other products, too. Fodder, firewood, fruit, medicines, nectar, etc. can all be gathered from the fence. After several years, even timber for construction can be produced. The chapter ***Living Fence*** gives more information about this.



On the edge of the orchard, the living fence gives protection and production.

Let's See how to make an Integrated Orchard

The integrated orchard looks like a forest, but the trees and shrubs have more use.



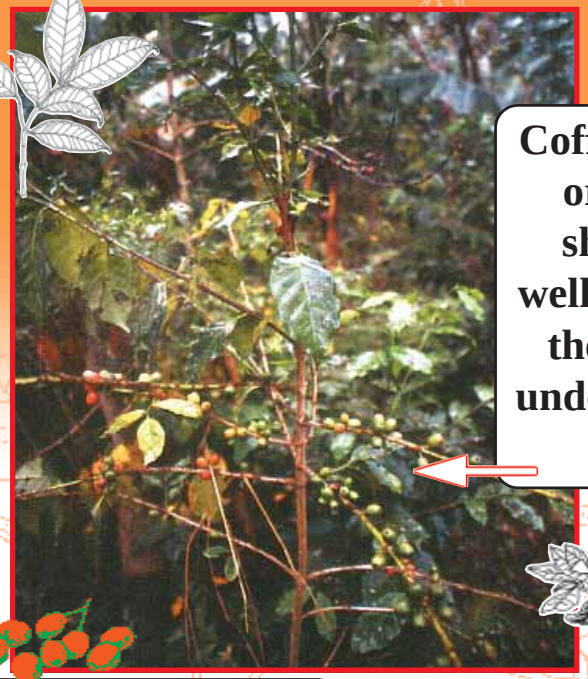
Farmers visit to learn the methods

Above is fruit, below ginger, tumeric, pineapple, etc. all producing benefits

On big trees, vine plants such as pepper, betel, grape and passion fruit can climb up.

Marigolds are seen planted in the ground layer. These were planted to help with pest control, and now self-seed.

No space is empty in the integrated orchard



Coffee trees in the orchard need shade to fruit well, so are best in the lower level, underneath bigger trees.

In 1989 this land was bare. Then, Mr Surya Adhikari started his integrated orchard, and now see ! (in 1999)

Maintenance

How to maintain an Integrated Orchard

For an integrated orchard planted in this way, maintenance is mainly harvesting. The succession of production from the orchard is described below.

1st year :- sugar cane, various vegetables, fodder grass from weeding.

2nd year :- the above, plus banana, cardamon, ginger, tumeric, broom grass, currants, etc. start producing.

3rd year :- all the above, plus pineapple, coffee, papaya, sea buckthorn, etc. start to produce.

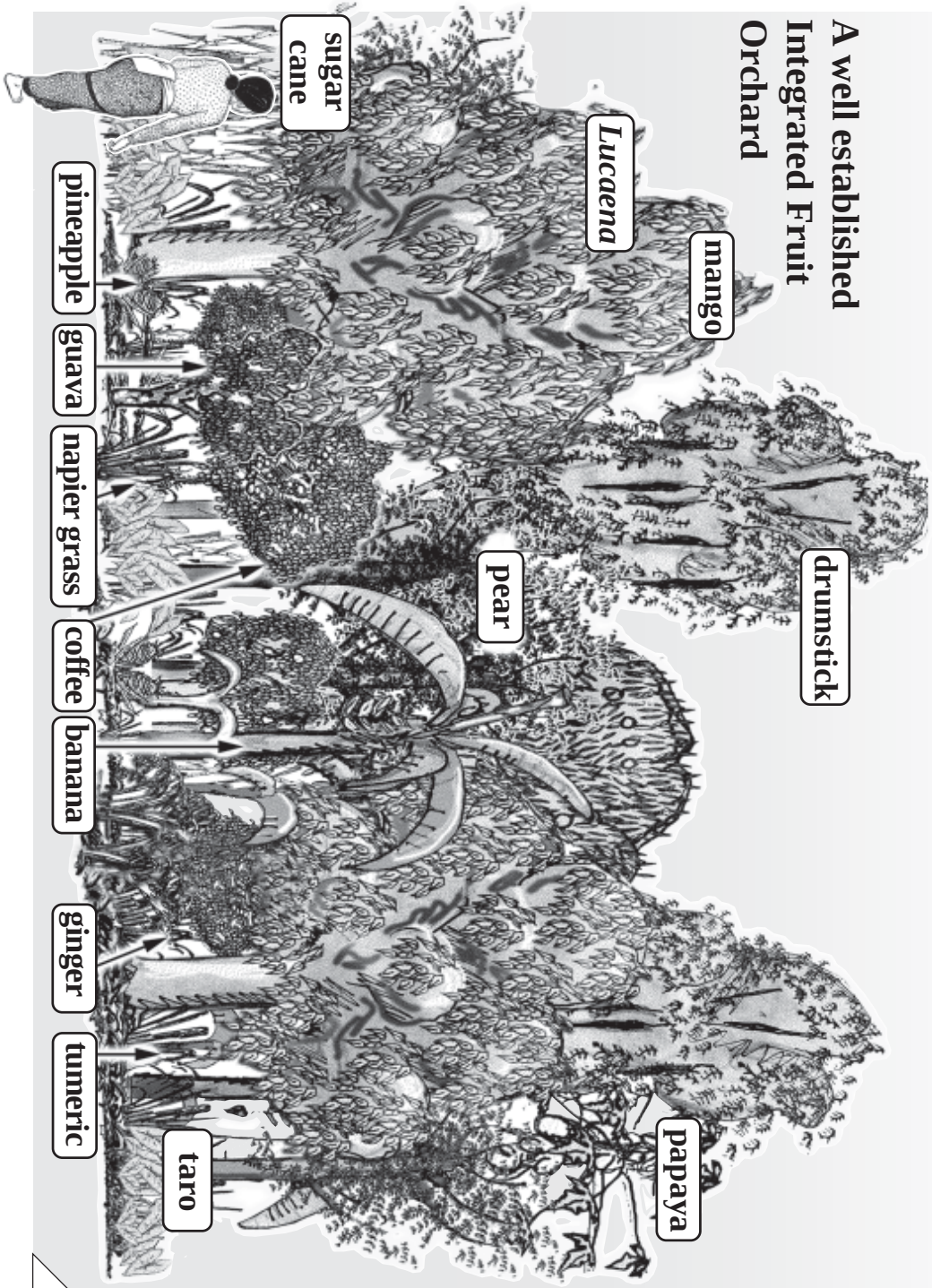
4th year :- all the above, plus grafted apple, peach, plum, apricot, pear, orange, etc. start to produce.

5th year :- all the above, plus grafted mango, walnut, lychee, chestnut, etc. start to bear fruit.

Trees that have grown from seed will produce fruit more slowly, such as soapnut, butternut, hazel, etc. They will start to produce fruit after 8-10 years.

Not just fruit trees

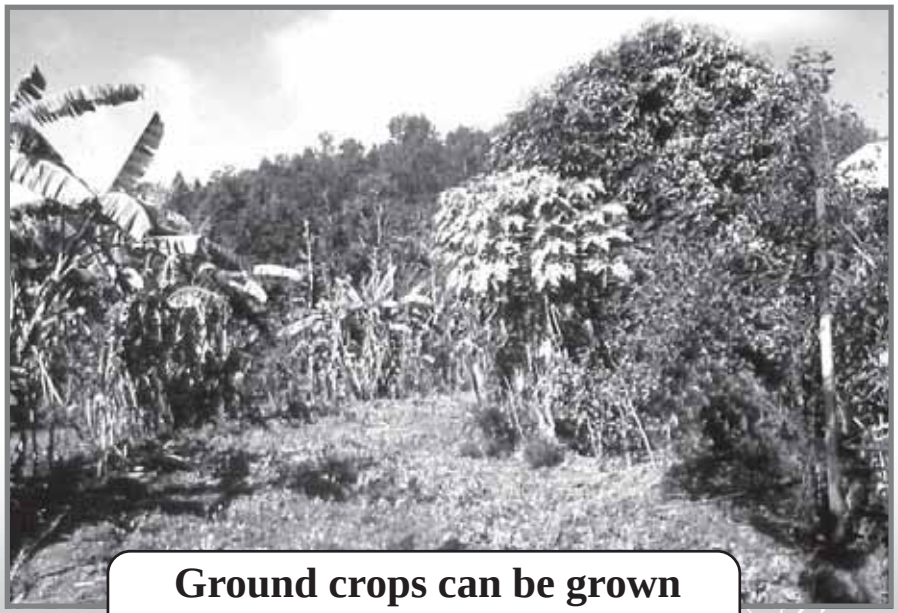
All the above species produce fruit. But once the shape and size of the tree is understood, any type of useful and multi-purpose tree or shrub can be fitted into any of the layers. Plants for fodder, timber, herbal medicines, fibre, etc. can be added to provide their particular type of benefit, according to the land and the needs of the farmer or community.



Tillage in the orchard

If annual crops are needed to be grown between the fruit and multi-purpose trees, the trees can be planted in lines spaced wider apart, as in the photo below. This is the same basic design as for an **agroforestry** system. Terrace improvement is also a result. But you should not plough near the roots of the fruit trees.

When the trees are bigger, livestock can be grazed in the area from time to time. Because the integrated orchard is made up of many layers of multi-purpose trees, there is a high production from a small space. By planting in this way, production will gradually increase as time goes on.

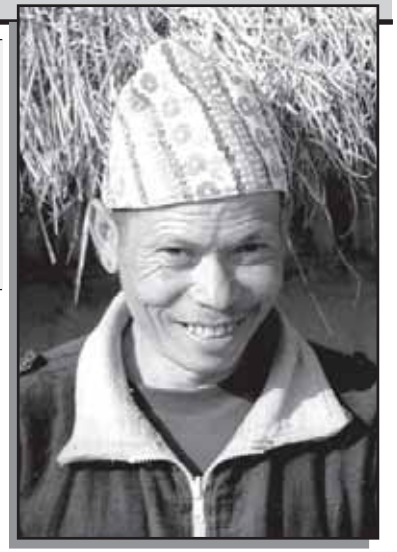


Ground crops can be grown between the lines of trees and shrubs of the integrated orchard. There are more than 50 species of plants in this picture.

Farmers' Experience

Mr Kamal Pun

From Jajarkot district, Dandagaun - 3, Kalpat village in Nepal, Mr Kamal Pun has planted an integrated orchard on his own land. Now let's read about his experiences.



Kamal Pun

"Since I took training in how to make an integrated orchard, I've been making my own orchard at home. My land is steep and dry, and was a bare grazing area for everyone's cattle. I made a design and began planting seedlings by layer. Now, I have mango, banana, orange, papaya, grapefruit, coffee, peach, plum, apricot, lychee and many more. On the ground are pineapple, napier grass, lemon grass, and others. I have grain crops and fruit, and both produce well. I also grow seedlings for sale. I keep livestock, and there's enough fodder from the orchard to feed them from the many types of local fodder trees that are planted there. Before, there was no production from this bare slope. But last year I earned almost $1000 from my farm. I've been able to pay off all my loans, buy cloth, medicine, etc., and still have some left to invest. Now I want to buy another piece of land with the income. This orchard has been seen by many local farmers as a model. I've been teaching them how it's done - they come from many villages in the district."

Read On !

Subjects Related to the Integrated Orchard

This book provides enough information for you to be able to design and maintain your own integrated orchard. However, this information is also linked to other methods. For extra benefits let's read, learn and practice from other related chapters.

Five Chapters on how to make various Nurseries

For planting a variety of plants in an integrated orchard, different types of nursery are needed to grow them. Information on how to build and manage the home nursery, fruit nursery, air nursery, hot bed and leaf pots is given in these chapters.

Grafting, Budding, Stone Grafting, Top Grafting & Air Layering chapters

Information about various easy methods to grow tasty and good-yielding fruit varieties at home for planting on the farm are given in these chapters.

Fruit Tree Planting chapter

After raising good seedlings in the fruit nursery, if they're not planted well all the work can go to waste. Information on more productive planting is given in this chapter.

Agroforestry chapter

Planting trees on farmland can bring farmers many benefits. But you can't plant any type of tree, nor anywhere. This chapter gives information on how to plant trees without affecting farm yield.

A-frame chapter

An easy method of mapping out contours for soil and water conservation on sloping land is descibed in this chapter.

Fruit Nursery chapter

How to grow root stock from local wild fruit seed for grafting and budding apple, peach, plum, apricot, walnut, etc. on your own land.

Living Fence chapter

The orchard also needs a fence. By planting a fence made of trees, the production from the orchard can be increased even more. This chapter gives information about making and managing a living fence.