What is Stone Grafting ?

Grafted mango in fruit, Nepal

In the tropics and sub-tropics, many farmers like to plant mango trees. Demand for good fruit is increasing, and farmers are understanding the benefits of this. Farmers want to plant mangos, but often the seedlings aren't available, or if they are, they're expensive. But there is an easy way of producing good quality mango seedlings. This is called ***Stone Grafting***. Using this method, mango seedlings can be grown quickly and cheaply at home, producing good quality fruit. Grafted trees also are fast to produce fruit. This means that poorer farmers can easily plant mangos without going into debt, and get faster benefits.

In this booklet you can learn how to do stone grafting for quick and easy mango production at home.

Why do Stone Grafting ?

Nowadays most mango grafting is done using the "Inarching" method. But this takes 2-3 years to produce a seedling, which is why mango seedlings are so expensive. Also, in Nepal, the skilled grafters live in the south, so it is difficult to obtain mango seedlings in the poorer northern hill districts. Transport is expensive, and many seedlings can die during the journey in the hot summer, when they are distributed. Seedlings costings 2 or 3 times as much after they have been transported from the nursery into more remote hill districts.

So there are many benefits from using **stone grafting** to produce mango seedlings :-

- quick production - while it takes 2-3 years to produce a seedling for distribution with inarching, it takes 2 months with stone grafting;
- stone grafted seedlings are cheap to produce
- stone grafting is an easy method
- many seedlings can be produced in a small place, unlike inarching
- seedlings can be produced near to where they are to be planted

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How to do Stone Grafting ?

When to do Stone Grafting ?

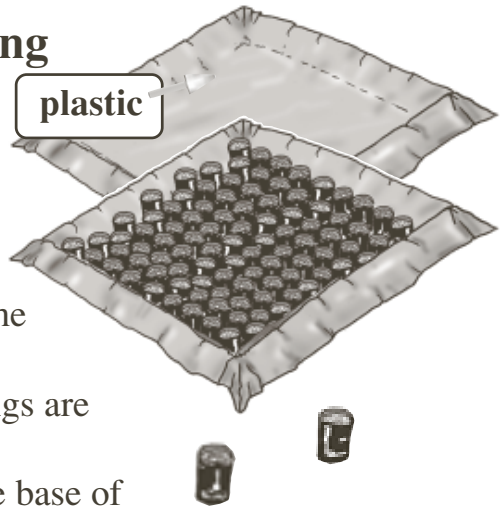
Stone grafting is done in the early summer, at the time when wild mangos are ripe and the tips of the branches have new red shoots.

Where to do Stone Grafting ?

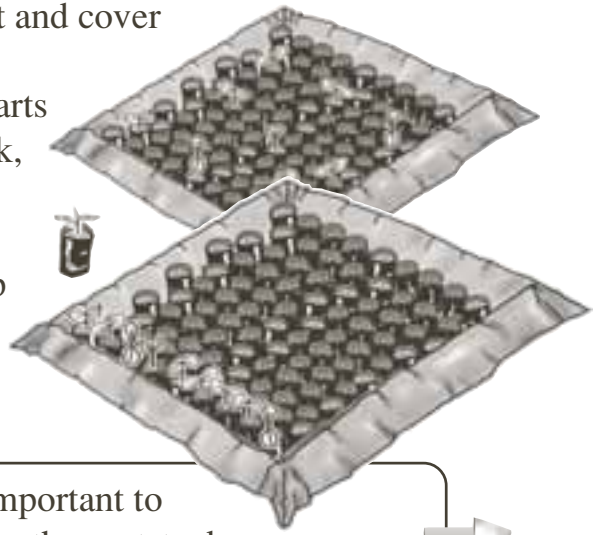
A stone grafting nursery can be made at home on a small plot to grow just a few plants, or on a big plot with 2-300 plants. One square metre of nursery bed can contain about 100 plants. For this, a well shaded spot is needed, protected from livestock, and easy to visit for care and maintenance. If possible, there should be good fruiting mango trees nearby from which to take scion for grafting.

How to do Stone Grafting

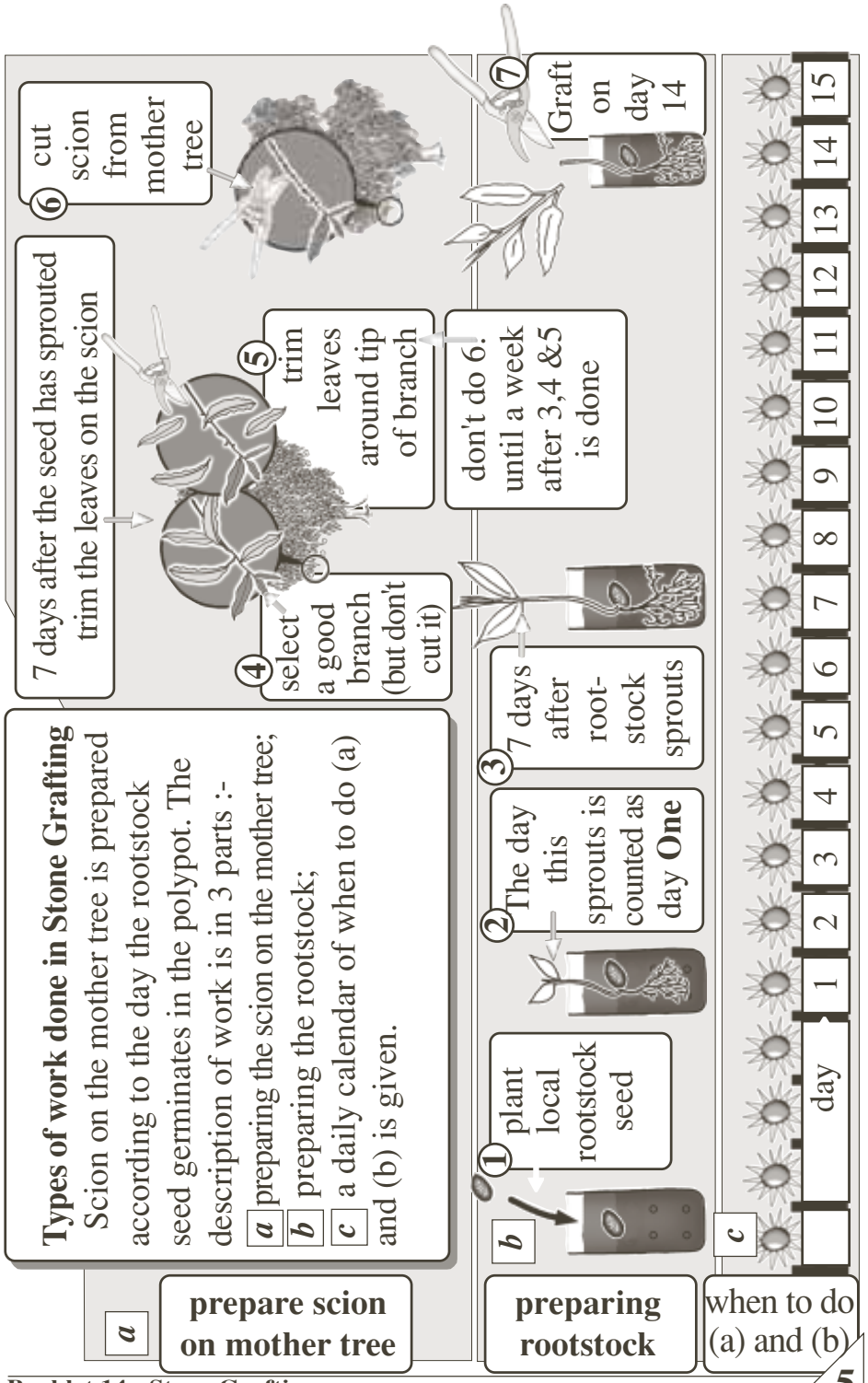
1. Planting the Seed



- Fill the polypots with fertile soil.
- Dig a trench for the nursery bed, about 4-6 inches deep. The width and length of the trench depends on how many seedlings are to be produced.
- Lay out the thick plastic in the base of the trench.
- Place the filled polypots in the trench.
- Collect ripe seed from healthy, disease-free wild local mango trees. They ripen at just the right time for stone grafting.
- Sow the seed in the polypot and cover with the soil.
- Watch for when the seed starts to germinate. Within a week, the first seeds will start to grow, but they won't all start at the same time. Keep the sprouted pots in one place.

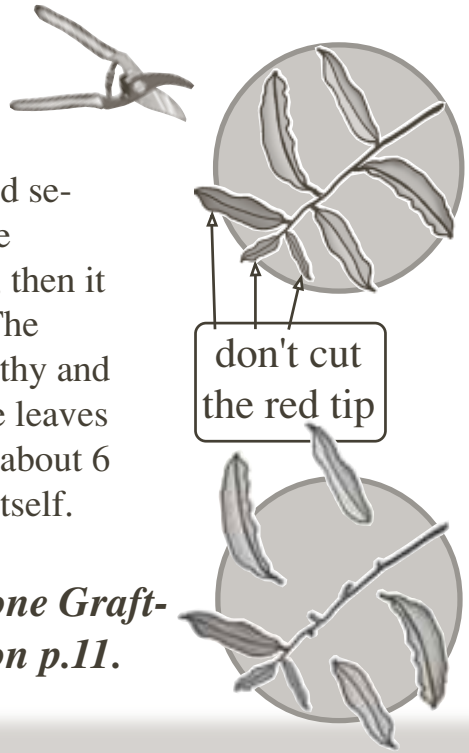


With stone grafting it is important to keep note of the time when the rootstock germinates. On the next page is a type of calendar showing which work needs to be done, at what time.



2. Preparing the Scion

A scion needs to be cut and brought from a healthy, good fruiting mango tree. This is called the **mother tree**. Before the scion is cut it needs to be prepared while still on the mother tree, and the time to do this depends on when the rootstock seed had sprouted in the nursery. Five to seven days **after** the seed has sprouted in the nursery, you need to go to the mother tree and prepare the scion. However many seedlings in the nursery are 5-7 days old, the same number of scions need to be prepared on the mother tree.



Preparing the Scion

Go to the mother tree and select branches for scions. If the branch has red sprouting tips, then it is suitable to use as a scion. The branch and tip should be healthy and disease free. Now trim off the leaves around the tip for a length of about 6 inches, but don't trim the tip itself.

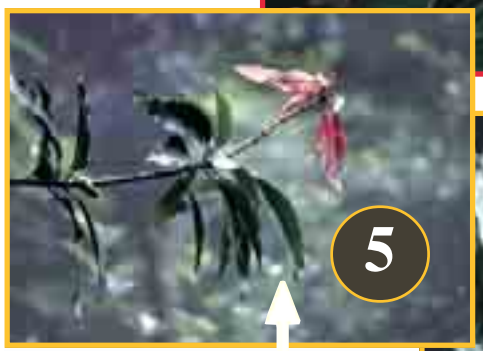
The third part of Stone Grafting is continued on p.11.

Let's See how to do Stone Grafting

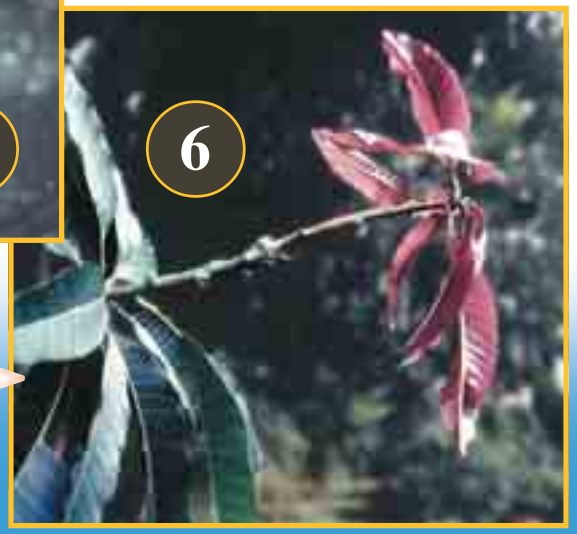
Local mango seed planted in polypots filled with fertile soil

Close up of local mango seed planted in polypots

On the mother tree, leaves are trimmed down to 6 inches from the red tips, but the tips are not cut.



A scion prepared on the mother tree looks like this.



After a week the scion is cut from the mother tree.

The scion should immediately be put in water, and its leaves trimmed.

Make a 1 inch cut down the centre of the local root-stock with a razor blade.

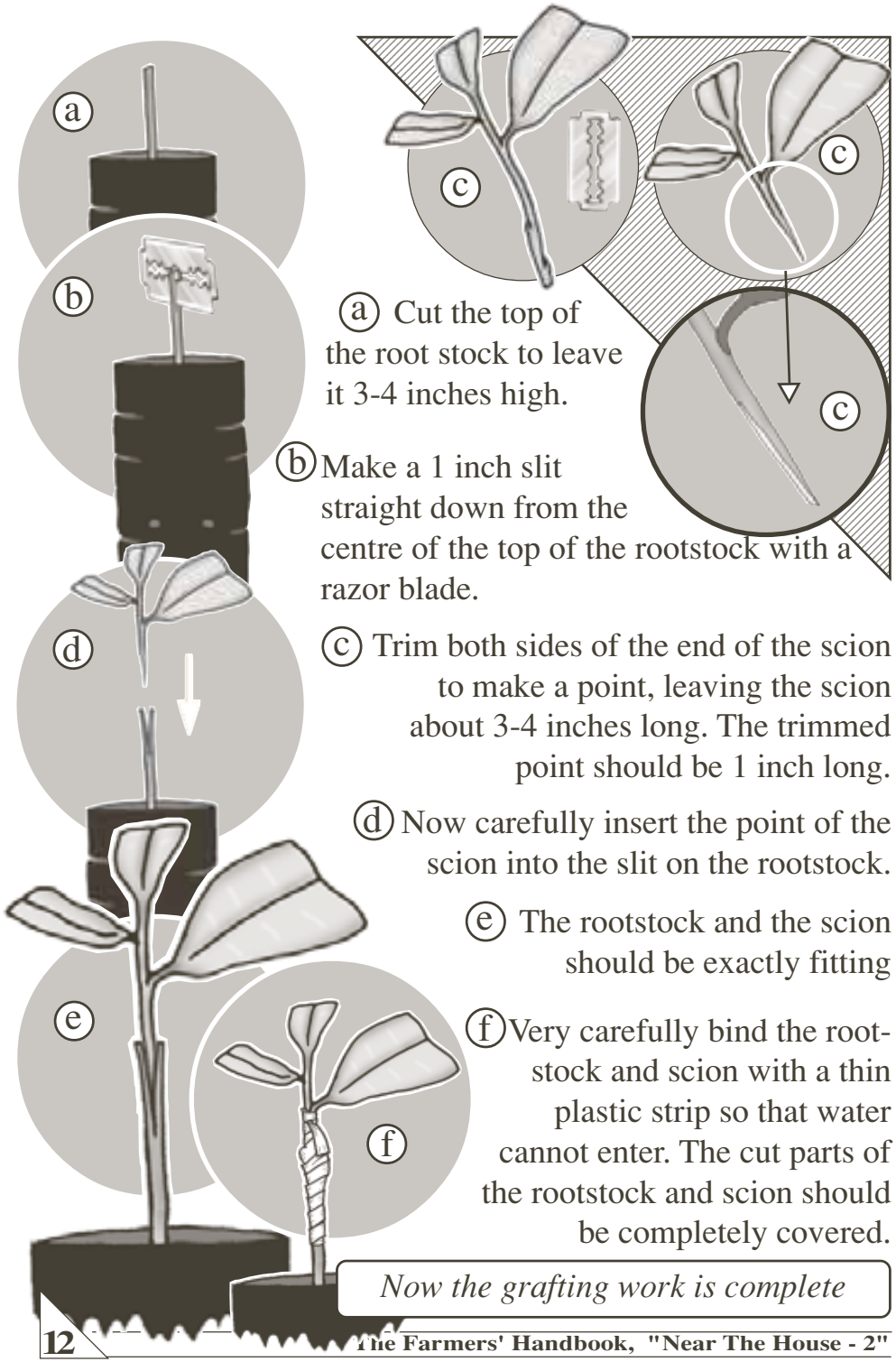
3. Cutting the Scion

The trimmed branch will be cut for use as a scion to join to the rootstock, but not yet. It will be another week before this is done, and until that time the trimmed, red branch tip will remain on the mother tree.

- After 7 days return to the mother tree to collect the scion.
- Using secateurs or a sharp tool, cut the branch 6 inches from the red tip. As soon as it has been cut, put the scion in a glass of water. This is because it is very soft and will otherwise dry out quickly.
- When the scion is in the glass, trim each leaf as shown. This also reduces water loss.
- Now take the scion to the nursery, where it should be grafted immediately onto the rootstock.

4. Grafting the scion to the rootstock

- By this time, the seedlings growing from the local, wild mango seed should be 12-14 days old. Their leaves and stem should be soft and red, like the scion on the mother tree.



ⓐ Cut the top of the root stock to leave it 3-4 inches high.

ⓑ Make a 1 inch slit straight down from the centre of the top of the rootstock with a razor blade.

ⓒ Trim both sides of the end of the scion to make a point, leaving the scion about 3-4 inches long. The trimmed point should be 1 inch long.

ⓓ Now carefully insert the point of the scion into the slit on the rootstock.

ⓔ The rootstock and the scion should be exactly fitting

ⓕ Very carefully bind the root-stock and scion with a thin plastic strip so that water cannot enter. The cut parts of the rootstock and scion should be completely covered.

Now the grafting work is complete

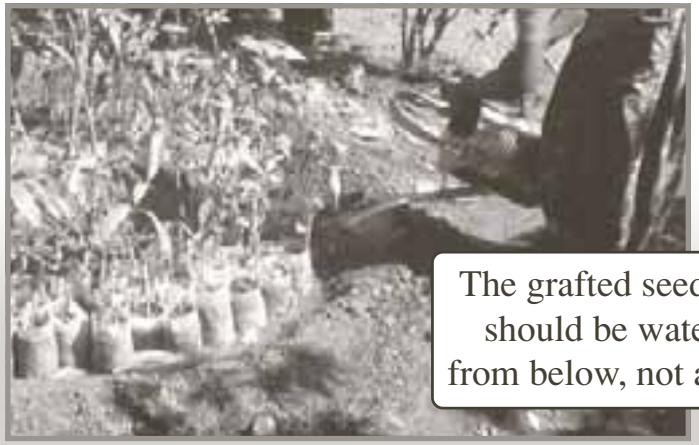
Maintenance

How to maintain a grafted seedling

Care for the seedling after stone grafting

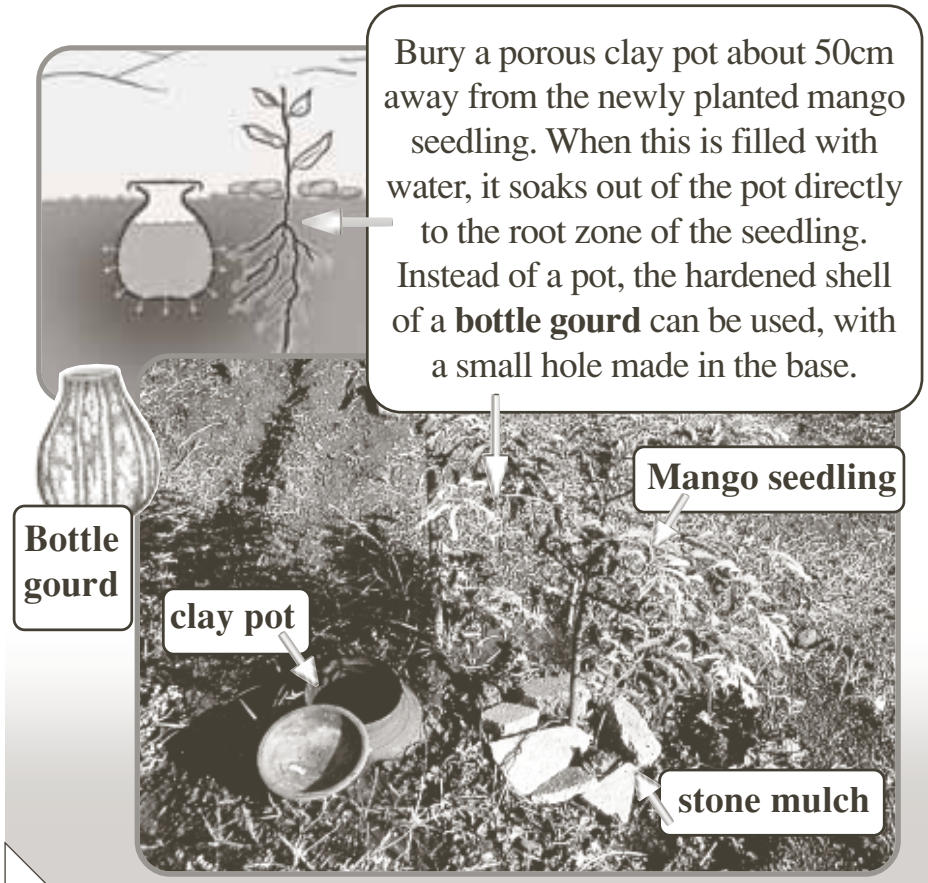
At first the grafted seedling is very weak. Even though it may be well grafted, if it is not cared for properly the graft can fail and all the work will be wasted. Care should be given as described below.

- The seedling should not be touched or moved.
- The seedling needs lots of water. However, water cannot be given from above because the falling water will shake the seedling and the graft can break. Therefore, water should be given from the bottom by pouring it into the trench where the polypots are placed. This will seep into the polypots through the holes, and go directly to the roots. This is better for the seedling.
- The seedlings need to be kept in a moist environment. So cover the nursery with plastic and bury the edges, like in the hot bed nursery, so no air can get in. Only open when watering.



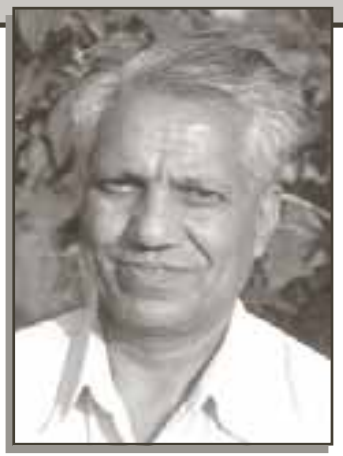
The grafted seedlings should be watered from below, not above.

- The seedlings should be well shaded.
- Within 1-2 weeks you will know if the graft has been successful or not. If not, the top will dry out and die.
- If the graft is successful, the seedling can be planted out into its permanent position after 2 months in the nursery. For this, a pit needs to be dug and composted beforehand.
- The mango may flower after a year, but it is not good to allow it to fruit for at least 3 years. During this time, the flowers should be removed to stop fruiting.
- How to plant fruit trees such as the mango is descibed in the ***Fruit Tree Planting*** booklet.



Farmers' Experience

Mr Ishwari Prasad Panti



From Nepal, Rupandehi district, Butwal town, Mr Ishwari Prasad Panti is a horticulture expert who has done lots of stone grafting. Now let's hear about his experience.

Mr Ishwari Prasad Panti

" The first thing to pay attention to in stone grafting is the nursery. The rootstock as well as the mother tree need good care. When grafted, the seedlings should be under plastic, and in the shade. In the full sun, all the work will be wasted. Too much wind can also dry out the seedlings. For the rootstock, plant ripe seed from wild, local mangos (which grow everywhere) in the nursery. After the rootstock has germinated, it is grafted when it is red. The scion from the mother tree should also be red. One week before grafting the scion should be trimmed while still on the tree. The rootstock should be cut to 3inches tall, and slit down the middle. The scion should be the same size, and cut to a 1 inch point. Making sure the edges are matching, the scion is inserted into the rootstock. This method is very quick, and I can get a 65% success rate. It's also possible to stone graft even when the rootstock seed has just split and the stem is just pushing out. "

Read On !

Subjects Related to Stone Grafting

Fruit Tree Planting booklet

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

Integrated Fruit Orchard booklet

Information is given in this booklet on how to plant fruit trees with various other multi-purpose trees, giving extra and quicker benefits for less work.

Agroforestry booklet

Planting trees on farmland can bring farmers many benefits. Different types of trees grow better in different places. This booklet gives information on how to plant trees to increase farm diversity and productivity, without affecting crop yield.

Pit Latrine booklet

A fruit tree grows best if planted in a big pit. If you have an old pit latrine to plant in, you can double the benefits. In this booklet learn how to make a hygienic, cheap and productive pit latrine.