



# GLOBAL AGRICULTURAL PRACTICES FOR SUCCESSFUL CASHEW DEVELOPMENT

## Botanical characteristics

The cashew tree, *Anacardium occidentale L.*, belongs to the *Anacardiaceae* family of plants, which also includes the mango, the pistachio and the poison ivy. The tree is a native of Brazil, but it has spread to other parts of tropical South and Central America, Mexico and the West Indies. In the 1600s, Portuguese traders introduced the cashew tree into India and Africa to prevent soil erosion. It is now widely cultivated for its nuts and other products in the coastal regions of South Africa, Madagascar and Tanzania, and in South Asia, from Sri Lanka to the Philippines.

The cashew tree is a tropical evergreen, resistant to drought, which grows up to 12 metres high and has a symmetrical spread of up to approximately 25 metres. It grows with a minimum of attention and is easily cultivated. It is usually found from sea level to an altitude of 1000 metres, in regions with annual rainfall as low as 500 mm and as high as 3750 mm. For maximum productivity, good soil and adequate moisture are essential. Optimum conditions include an annual rainfall of at least 889 mm and not more than 3048 mm. The tree has an extensive root system, which helps it tolerate a wide range of moisture levels and soil types, but commercial production is only advisable in well-drained, sandy loam or red soils. The cashew tree can flourish in the sand of open beaches, but it grows poorly in heavy clay or limestone.

Most cashew trees start bearing fruit in the third or fourth year, and are likely to reach their mature yield by the seventh year if the conditions are favourable. The average yield of nuts of a mature tree is in the range of 7-11 kg per annum. Although the cashew tree is capable of living for 50-60 years, most trees produce nuts for about 15-20 years.

## Sowing

The cashew tree is usually grown from seeds placed directly in the field because seedlings do not transplant well due to their delicate root system. Seed nuts should be thoroughly dry, clean and free from insect or fungal attack. Unless there are irrigation facilities, or seedlings are raised in polythene bags in a nursery where water is available, the seeds should be stored until the next rainy season before they are planted in the field. After a few months, stored nuts gradually lose their germination capacity.

Seeds should be water tested prior to planting - those that sink should be chosen as they have a high success rate and tend to germinate quickly. Seeds should be planted at a depth of about 5 cm. The maximum depth at which a seed should be sown is about 10 cm, depending on the soil conditions.

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Two or three seeds should be planted together, stem end up, at a slight incline and covered with 5-8 cm of soil. Germination usually takes place in 15-20 days, although seeds of low density (i.e. those that float in water) may require as long as eight weeks to germinate. Using seeds of high density, from selected trees, considerably increases the chance that some of the seeds at one site will perform well. Two months after sprouting, the two weakest seedlings should be removed from the site, leaving only the strongest one to grow. By planting more than one seed, the occurrence of gaps in a plantation is reduced (Ohler, 1979).

In orchard practice, pits measuring from 30 cm x 30 cm x 30 cm to 60 cm x 60 cm x 60 cm are dug and left to weather for a month or two. They are then filled with soil which has been mixed with rotting manure about two weeks before seeding. In loose soils of sufficient fertility, the root system of the seedlings develops so quickly that, when growing naturally, root lengths would exceed the size of the planting hole within a few months and therefore in optimum growing conditions planting holes are not essential.

### **Advantages of sowing**

- The plant can develop its root system and especially its root tap quickly.
- It is the cheapest method of planting.
- It is the quickest method of planting - one person can plant 400-500 sites each day.

### **Disadvantages of sowing**

- Lower rate of germination.
- Danger of serious damage by animals.
- Less opportunity for selection of seedlings than when planting seedlings that are raised in plastic bags in the nursery.

### **Seasonal planting**

In areas without irrigation facilities, cashew seeds should be sown or planted in the rainy season. The best time for planting is when the rains have started to fall regularly so that the soil does not dry out again. If the soil dries out before the germinated seeds have become securely rooted, they may die. The advantage of early planting is that it gives the seedlings more time to develop before the dry season starts.

In climates with irregular rainfall and short rainy seasons, the risk of germinated seedlings drying out can be reduced by pre-soaking the seeds before planting, deep sowing (5-10 cm) and covering the site with mulching material to reduce evaporation. The mulching material should be carefully selected, and any weeds with mature seeds should be removed.

### **Raising seedlings in a nursery**

Where it is necessary to raise seedlings in a nursery, the seeds should be sown in containers of a type that can be set in the ground and readily disintegrate. In Cuba, baskets of uva-grass or cona brava are used, and cut away before setting the plant into the ground. In Jamaica, it has been found that nursery seedlings can be raised in the ground and transplanted with 90% success, providing the plant is taken up with a good ball of soil and the top is cut back by one third when it is put into the field. It is recommended that the seedlings are transplanted within a week of emerging, to ensure that the transplantation is successful (CTCS, 1993<sup>2</sup>).

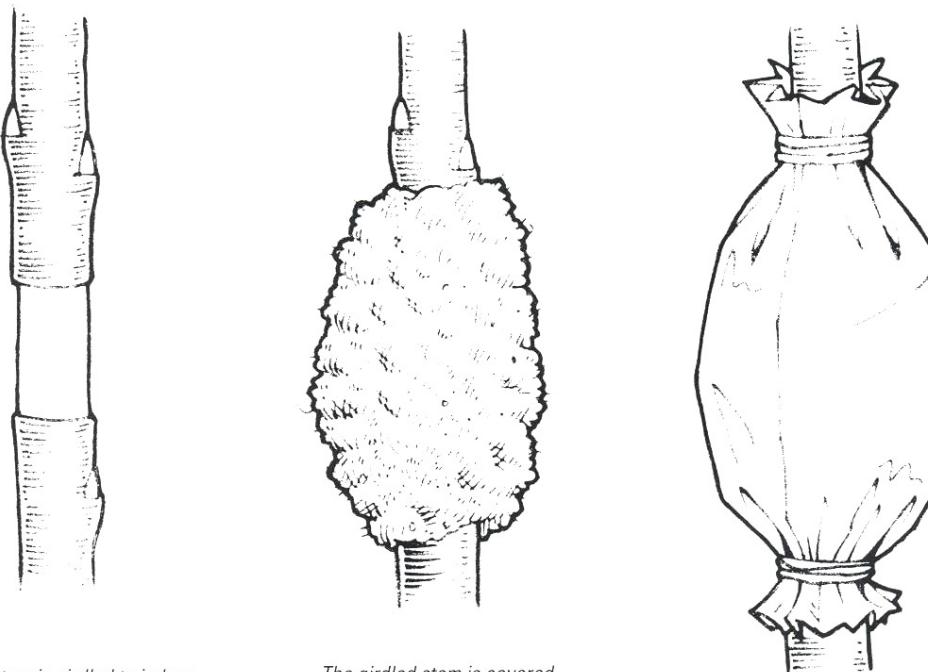
Seedlings can also be planted using plastic bags as containers. The seedlings should be lifted into their planting holes in the plastic bags, which are then carefully slit with a sharp knife and removed.

### **Air-layering**

Air-layering has been one of the most successful methods of vegetative propagation in cashew. The method is rather laborious and the cost is relatively high, but the advantages of obtaining a plantation from high yielding, uniform material make these costs extremely worthwhile. A

vertical column of large orange letters spelling out "brief guide to cashew cultivation techniques".

disadvantage of this method, as with all methods of layering, is the relatively small number of layers that can be produced by one tree per year. It is estimated that from one tree, 80 to 120 successful layers can be obtained.



*The stem is girdled to induce root formation above the cut.*

*The girdled stem is covered with damp moss.*

*Aluminium foil or plastic sheeting is wrapped around the moss and tied at both ends. This cover is removed 2–3 months after tying or when roots can be seen.*

Figure 1: Air-layering.

A strip of bark about 0.5 cm wide is removed from either a year old branch or a pencil-thick shoot (about 1 cm diameter) of the current season, at about 20-30 cm from the growing point. The exposed wood is wrapped with twine to prevent the bark from growing over it during the healing process and covered thickly with moist moss, wood shavings or sand. It is then wrapped securely in a sheet of 100-150 gauge plastic and the ends are tied tightly to the branch with twine (Figure 1).

After 20-30 days, callus is formed at the foot of the layer and 40-50 days later, small roots emerge from the callus tissue. After approximately 75 days, there should be adequate root formation (five or more well formed roots measuring 1.0-1.5 cm long) to separate the twig from the tree. The part of the twig below the layer is cut about halfway through. One week later, the cut is deepened and a few days later the layer can be removed and transplanted into plastic bags or other containers and hardened off before planting. If the layer is separated from the tree in one cut, the shock will be too great for it to survive. The whole process takes about two and a half months.

### **Ground layering**

The lowest branches of the cashew tree tend to trail on the ground at a distance of several metres from the trunk. Where branches touch the ground, spontaneous rooting may occur. Covering such branches with soil and keeping the area moist encourages rooting, a method which has been used in India for a long time. However, such layers cannot be easily transplanted to other places, and the shape of the material tends to produce low trees of spreading habit. The number of layers that can be obtained in this way is also rather low.

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techniques

### Approach-grafting or inarching

The technique of approach-grafting is relatively easy but labour intensive, and like air-layering has to be done in the field. Seedlings to be grown as rootstocks are raised in containers. Once they are 8-9 months old, they are cut back to half their height, and kept in grass baskets for a month in the shade until new shoots appear. The basket is replaced by a sheet of 100 gauge plastic to retain moisture and the seedling is joined to a year old branch of the same diameter on a selected tree as described below (Figure 2).

From the stem of the seedling, and from the shoot with which it will be united, strips of bark and inner wood, measuring about 5-8 cm in length, are removed. Both cut surfaces, which should be of the same size, are bound together with twine and the join is firmly tied with string, binding the seedling stem and the shoot together. In 90 days the union should be complete, and the grafted plant is gradually separated from the parent. A "v" cut is made half way through the branch 2 cm below the graft, and a similar cut is made in the rootstock 2 cm above the graft. Seven or eight days later the cuts are deepened and after a further period of four days the severing is completed. About 60% take is expected.

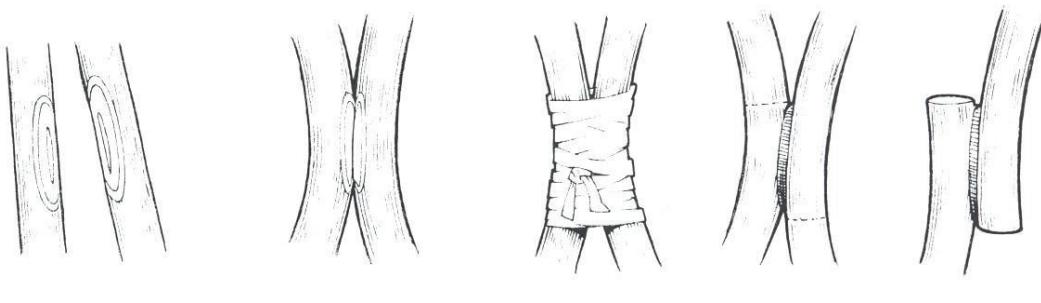


Figure 2: The processes involved in inarching.

### Land preparation

Cashew seedlings are very sensitive to competition with weeds, but in many areas, especially on sloping land, the vegetation should not be removed completely before planting because of the danger of water and wind erosion. In tropical countries with a marked dry season, and where the rainy season tends to start with torrential rains, the danger of erosion increases if large areas of land have been cleared.

If the soil is very sandy and subject to strong winds, clearing the land may result in severe wind erosion which is virtually impossible to stop. In these areas, the land should be cleared in strips which are perpendicular to the direction of the prevailing winds. Once the cashew trees have developed to such an extent that their rows act as wind breaks, the remaining land can be cleared. Another important reason for leaving strips of natural vegetation is to ensure that the insect population required for pollinating the cashew flowers is maintained.

The removal of tree stumps is an expensive but essential part of the clearing process. The sprouting stumps need to be slashed each year as they compete with the cashew trees and prevent a good view between the rows.

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## Spacing

To promote maximum development and reduce competition for available moisture, it is recommended that the seedlings are planted 10-15 metres apart. This is considered to be the most productive spacing for mature trees. The average yield per hectare will be 700-1000 kg but yields outside these limits are encountered. However, cashew trees are normally planted more closely, which results in overcrowding, and they are often intermixed with other trees either in small orchards or in the wild.

## Diseases and pests

Cashew seedlings can be affected by a number of different diseases. The fungus, *Colletotrichum gloeosporioides*, is one of the most common pathogens in cashew (Ohler, 1979). Initial symptoms show the development of reddish-brown, shiny, water-soaked lesions, followed by resin oozing out onto the affected parts. As the lesions grow, the affected shoots and inflorescences are killed and the leaves become crumpled. The affected nuts and apples decay and shrivel, and the flowers turn black and fall off. The trees can be sprayed with various fungicides, including Bordeaux mixture, to control the fungus.

Several diseases that result in the terminal twigs dying off are grouped under the name "die-back" or "pink disease" which is produced by *Glocosporium*. There may be associated pitting of the surface of the nut. This serious disease requires the affected branches to be pruned and sprayed with a 1% Bordeaux mixture or other copper-based fungicides.

Characteristic symptoms of infections which attack cashew include wilting and withering; the yellowing of the lower leaves; the seedlings turning pale and showing water-soaked girdles of darkened tissue around the stems; or the rotting of the underground portion of the stem. Powdery mildew may appear on young leaves and inflorescences during dry weather.

Insect pests are a major source of crop loss in all cashew-growing areas of the world. More than 60 species of insects attack the crop during its different stages of growth. These pests include sap-sucking bugs, leaf-chewing caterpillars, beetles, aphids, scales, thrips and some mites. They can cause considerable damage to the tree and the crop by bringing about the death of the floral-flushing shoots, the early abortion of young nuts and loss of yield.

Rodents, such as rats, squirrels and porcupines, may cause serious damage to cashew seedlings, especially once they emerge above the ground. Cashew apples are sometimes attacked by fruit flies. Monkeys are partial to ripe apples and can cause damage to the cashew trees whilst foraging for the fruit. Bats and parrots also like to eat cashew apples.

## References

- 1 Ogler, J.G. 1979. Cashew. Amsterdam, Department of Agricultural Research
- 2 Carinorean Technological Consultancy Services (CTCS) Network, 1993. Information package on cultivation, processing and marketing of cashews. St Michael, Barbados, Caribbean technological Consultancy Services Network.

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