



# Coconut Research Institute of Sri Lanka



Advisory Circular No C 3

## INTERCROPPING COFFEE IN COCONUT LANDS

Coffee is a popular intercrop in coconut lands in the wet and wet intermediate zones (Picture 1). Coconut growers in these zones are generally familiar with coffee cultivation and processing. Coffee requires shade for its growth and yield hence; mature coconut plantations are ideal for intercropping with coffee. Experiments conducted at the CRI show that coffee has no detrimental effect on coconut yield.



Picture 1: Coffee as an intercrop in coconut

### 1. Selection of coconut lands

#### 1.1 Rainfall

Most coconut lands in the wet zone (Rainfall exceeding 1875 mm) in the administrative districts of Colombo, Gampaha, Kegalle, Kalutara, Galle, Matara, Matale, Kurunegala, and Puttalam are suitable for coffee cultivation. In the Wet Intermediate Zone (rainfall 1500 - 1875 mm) coffee requires supplementary irrigation during dry months, especially in the early stage of establishment stage.

#### 1.2 Soil

A deep soil is essential for the successful cultivation of coffee. Shallow soils with a hard pan, sandy soils with low water retention capacity and hard clayey soils, with poor drainage are not suitable. A loamy soil containing organic matter with a depth of at least one meter would be ideal.

#### 1.3 Light

Coconut palms should be over 20 years of age. Plantations younger than this are not suitable as the available light is insufficient.

### 2. Varieties

The Robusta varieties, GCR, CC-1 and C-111 are recommended for intercropping in coconut lands (Picture 2). CC-1 is the most suitable variety for drier areas due to its drought tolerance. Arabica coffee varieties are not suitable. Although, a selection of Arabica type "Catimor variety" shows somewhat tolerance to drought, hence, that variety is also recommended only for wet zone.





Picture 2: GCR Coffee variety

### 3. Planting material

Growers can obtain planting material from nurseries managed or approved by the Department Export Agriculture. Growers can also raise coffee seedlings by the following method. Ripe berries from vigorous plants of the recommended varieties are harvested and remove the pulp. The seeds are then planted in sand beds in rows 7.5 cm apart and covered with sandy soil and mulched with dry grass or straw. Watering should be done

daily. The seeds will germinate in 3-4 weeks. Seedlings with two leaves are then transplanted in 15 cm x 20 cm polybags filled with soil mixed with sand and organic matter.

Vigorous plants with 6-7 pairs of leaves are suitable for field planting.

### 4. System of planting

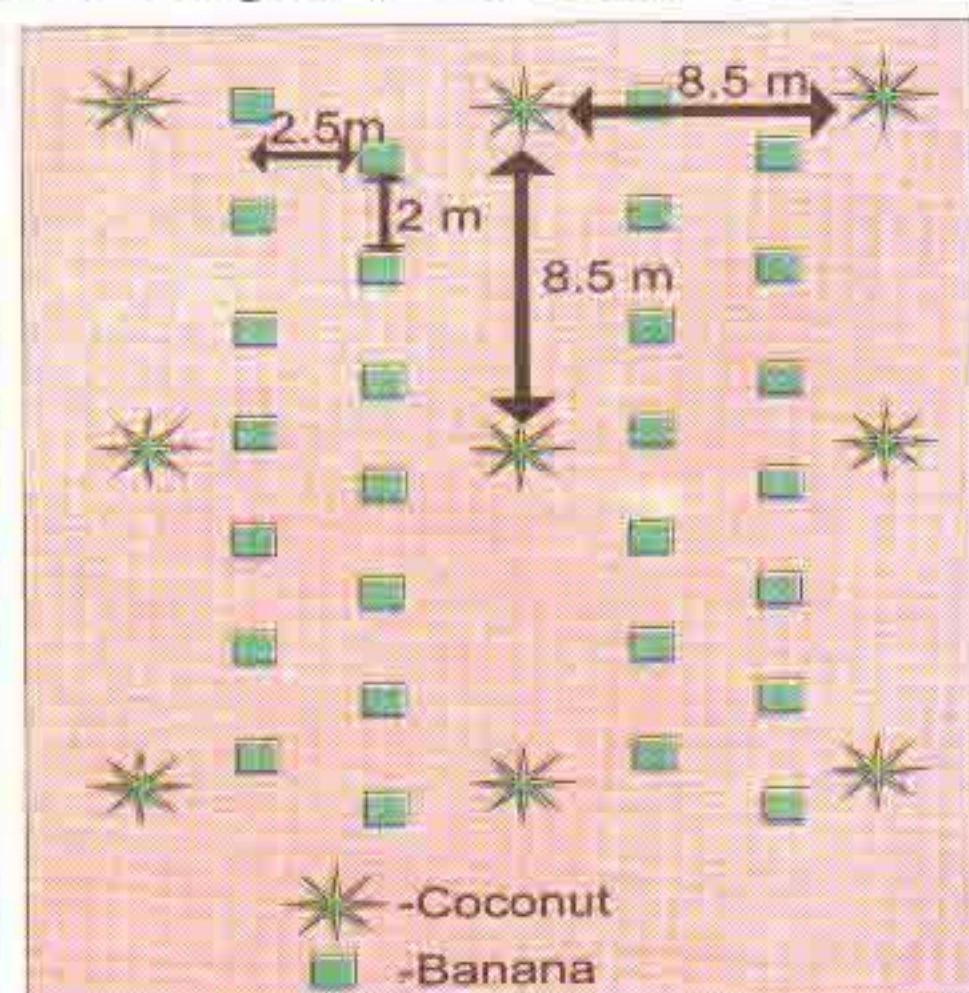
The following general guidelines should be considered.

- To avoid competition, coffee should be planted at least 2.5 m away from coconut.
- Coffee rows should be laid in the east-west direction.
- In order to allow movement of carts and tractors, it is advisable to have an avenue free of coffee every five or six rows of coconut.
- Double row system of planting is recommended. In this system, two rows of coffee 2.5 m apart are planted between two rows of coconut. The coffee plants should be 2.0 m apart in the row and arranged in a triangular pattern (Picture 3) (1350 plants/ha).

### 5. Planting

Planting should be done with the onset of monsoon rains in Yala. Avoid planting in the Maha as the risk of casualties is much greater. The planting holes should be 0.5 m x 0.5 m x 0.5 m in hard solid and 0.3 m x 0.3 m x 0.3 m in sandy loam soils.

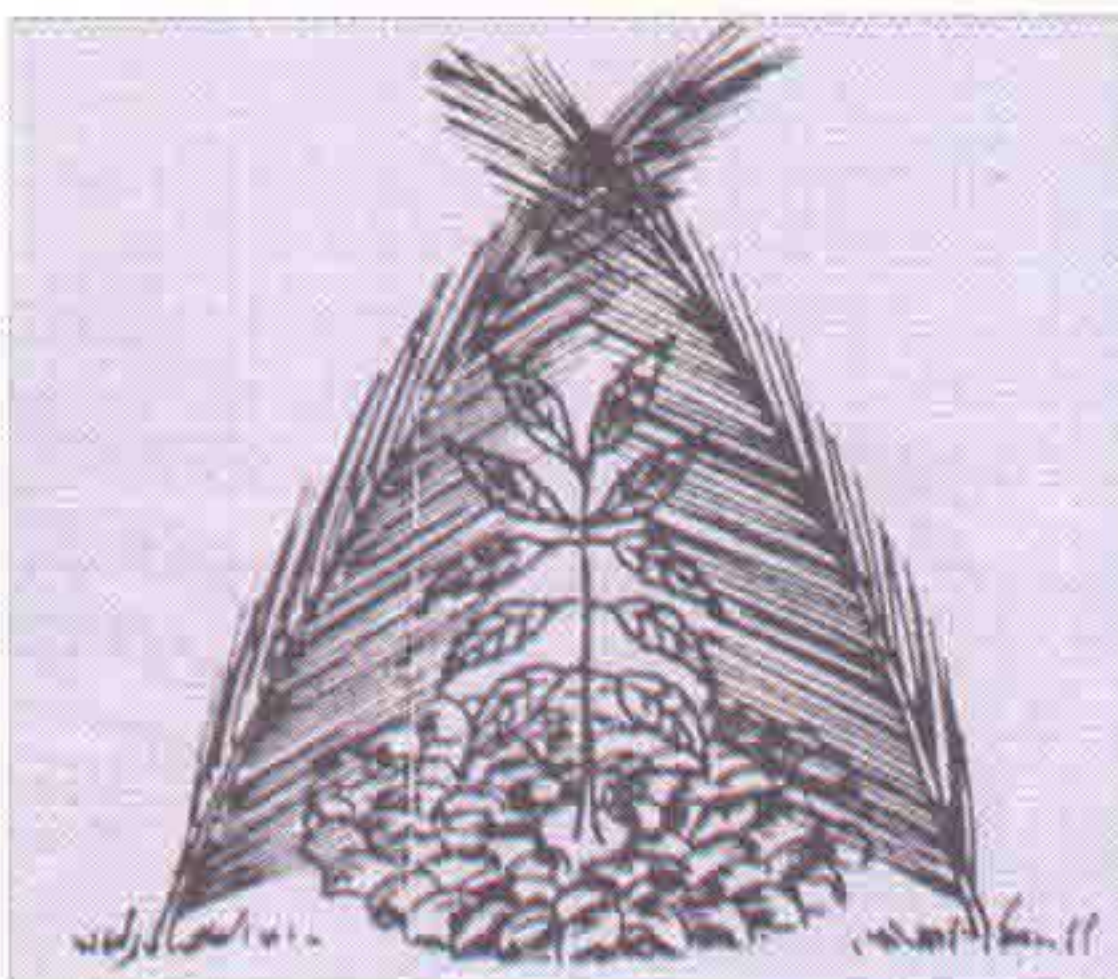
The planting holes should be filled with top soil mixed with dry cowdung, about 60 g of Saphos Phosphate and few coconut husks before planting. The pits should be filled upto 5 cm below the soil surface. The polybags



Picture 3: A diagram shows the planting system of coffee under coconut



should be removed before planting and ensure that the tap root is not damaged. After planting, the seedlings should be protected from direct sunlight and the soil around them should be mulched with weed trash or coconut husks (Picture 4).



Picture 4: Protect Seedling from direct sunlight

## 6. Fertilizer application

It is important to apply fertilizer to coffee in addition to coconut. The following fertilizer mixture is recommended for coffee. The ingredients should be mixed on the farm just before use.

Urea (40% N)	- 4 parts by weight
Saphos phosphate (28 P <sub>2</sub> O <sub>5</sub> )	- 5 parts by weight
Muriate of Potash (60% K <sub>2</sub> O)	- 3 parts by weight
Keiserite (24% MgO)	- 1 part by weight

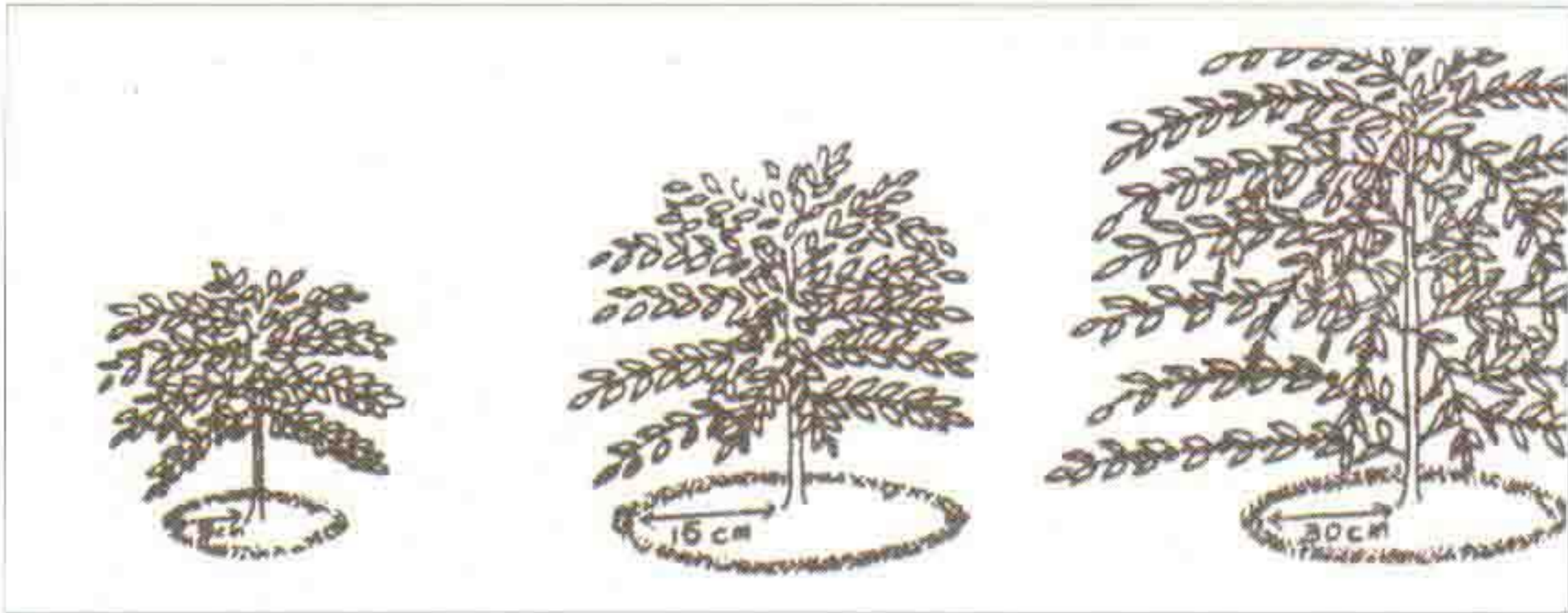
The rate and time of application is as follows

The rate and time of application			
Season	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year and onwards
Yala	Application 1 - 40 g	125 g	200 g
	Application 2 - 40 g		
Maha	Application 1 - 40 g	125 g	200 g
	Application 2 - 40 g		

Apply fertilizer when the soil is wet and more rain is expected. Since coffee readily responds to fertilizer, split application is recommended whenever possible. In the first year fertilizer should be broadcast in a circular band 5 cm wide and 15 cm from the stem. From second year onwards, it should be broadcast in a 30 cm circular band extending from the stem upto half the radius of the canopy. (Picture 5) Fertilizer should be forked in and the area should be mulched.

If leaves become yellow in spite of adequate shade, it is due to nitrogen deficiency. To correct this a foliar application of 1% Urea is recommended. Also, if leaves become small and sickle-shaped due to zinc deficiency, a foliar spray of 0.5% Zinc Sulphate solution should be applied to the plants in the affected area.





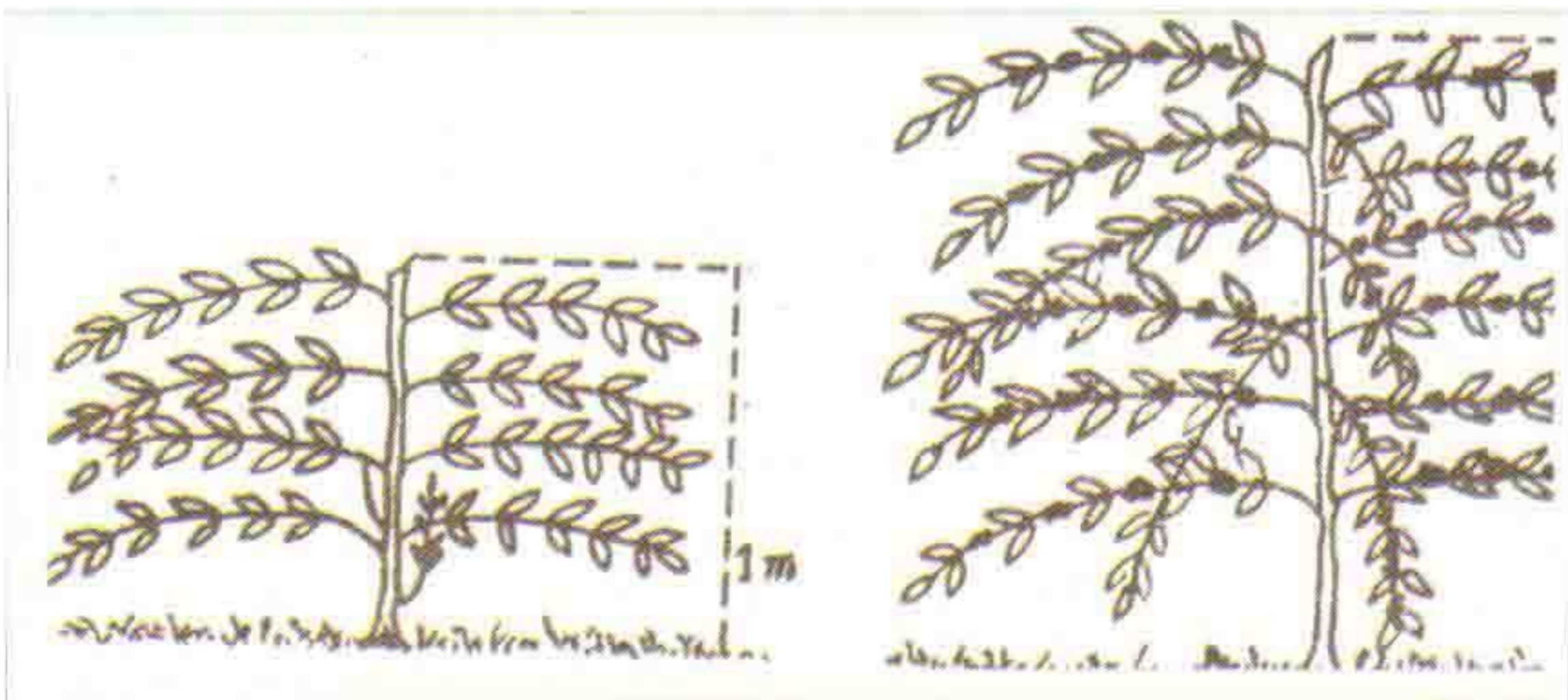
Picture 5: Preparing of manure circle

## 7. Training and pruning

Training plants according to the single stem system is recommended. When the main stem reaches 1 m, the apical bud is removed to encourage branching. These branches will yield satisfactorily for several seasons. The main stem may then be allowed to grow a further 1/2 m and then apical bud removed. It is best to restrict the height of the stem to 1.5 m (Picture 6).

When fruiting branches are 3-4 years old they become weakened and the yield is reduced considerably. These branches should be pruned at the beginning of rainy season leaving one node.

When the main stem is weakened or damaged it must be cut at about 5 cm to 10 cm above the ground level to stimulate the growth of new shoots. The vigorous new shoot should be trained into the new main stem. The other shoots should be removed.



Picture 6: Training and pruning of coffee



## 8. Weed control

All bushy weeds in the coconut plantation should be removed. An area of 100 cm around the coffee plant should be clean weeded and mulched. Weeds in the other areas should be slashed. During the first few years from planting, 3 to 4 weeding rounds per year are necessary. As the plants grow older, 2 weeding rounds per year would be adequate since the shade will suppress weed growth.

## 9. Diseases

### 9.1 Coffee rust

Prevalent during the rainy season. Rust coloured pustules appear on the leaf surface causing yield reduction (Picture 7). Spraying Bordeaux mixture or any other commonly available copper fungicide can control this.



Picture 7: Close view of leaves with coffee rust

### 9.2 Sooty mould

Sooty mould appears on leaves and stem. As this is associated with mealy bugs.

## 10. Pests

### 10.1 Berry borer

Although the coffee borer is an important pest, heavy damage has not been reported from the coconut areas. Spraying of systemic insecticides is recommended for its control. Removal of fallen ripe berries and picking berries as soon as they are mature reduce the pest damage.

### 10.2 Stem borer

Coffee stem borer causes considerable damage in the coconut areas. Removal and burning have affected branches and application of a systemic insecticide is recommended.



## 11. Harvesting and processing

Coffee flowers two years after planting and gives substantial yields by the third year. Ripe berries could be harvested several times during the two harvesting seasons in May-June and December-January (Picture 8). The berries are then sundered and the pulp is removed by pounding in a mortar. A coffee bush will yield about 700 g of processed coffee per year.

Picture 8: Ripe berries



Bordeaux mixture is prepared as follows (use earthenware or plastic vessels)

Copper Sulphate	- 200 g
Quick lime	- 200 g
Water	- 25 litres

Dissolve copper sulphate overnight in 5 litres of water and strain. Suspend lime in 20 litres of water separately and strain through a fine cloth. Add copper sulphate to the lime, stirring vigorously. This gives the best preparation but if more convenient the materials can be added to equal quantities of water. Use immediately after preparation.