

COFFEE ESTABLISHMENT AND MANAGEMENT

1.2 Preparing site for coffee farm

Prepare the land during the dry season and remove any tree stumps and roots to minimize fungal diseases.

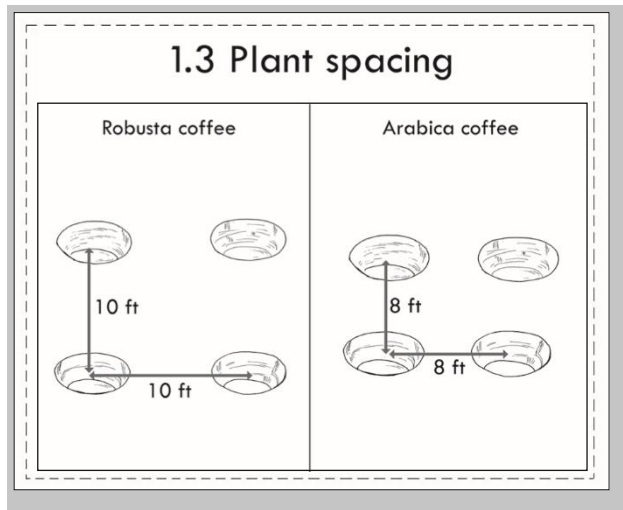
Kill excess trees one year in advance by ring barking. Leave some mature trees for shade. Aim for a spacing of 20m x 20m. This gives a good shade cover, while not creating competition for water and nutrients.

Remove perennial weeds such as couch grass by using herbicides, or digging and handpicking them from the ground.

Don't till the soil unless intercropping coffee with other annual crops.

For sloped terrain, apply soil and water conservation measures like contour trenches, contour terraces, vegetative barriers, bands, grass strips and cut-off drains to avoid soil and nutrient loss.

Plant banana trees for extra shade if required.



1.3 Plant spacing

- **Robusta coffee**

All Robusta coffee varieties are planted at a spacing of 3m x 3m (10ft x 10ft). This should result in about 450 plants per acre.

- **Arabica coffee**

Arabica coffee varieties SL28, SL14 and KP423 are planted at a spacing of 2.5m x 2.5m (8ft x 8ft). This should result in about 680 trees per acre.

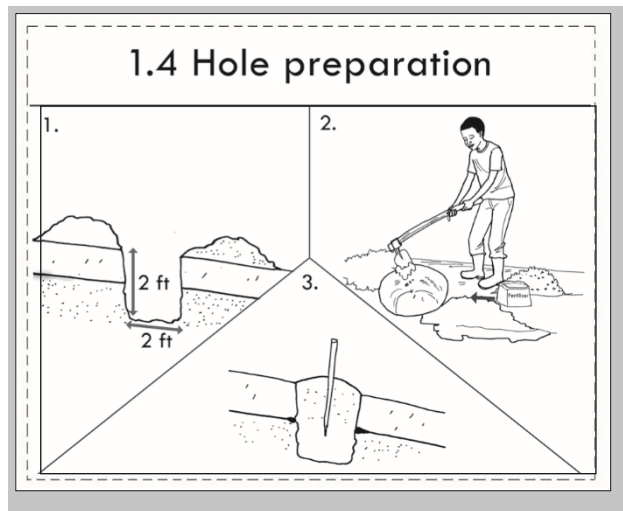


CHART 1.4: Hole preparation

- Mark positions where the coffee will be planted with pegs, arranged in regular patterns to facilitate management.
- Dig circular holes of 60cm (2ft) in diameter and 60cm (2ft) in depth at the marked points at least 3 months before planting. This allows for better water and root penetration through the soil because it has had time to loosen.
- Preparing holes before the planting season helps you to be ready for planting at the first rains.
- When digging the holes, keep the fertile topsoil separate from the subsoil.
- Refill the holes with topsoil about a month before planting. Where possible, mix the top soil with a 20-litre basin of well decomposed manure before refilling each planting hole.
- If available, also mix in one handful of TSP, SSP or DAP. Phosphorus stimulates root growth.
- Heap the soil above the ground level to allow for sinking when the soil settles.
- Mark positions where the coffee plants will be planted with pegs.

1.5 Selecting planting materials

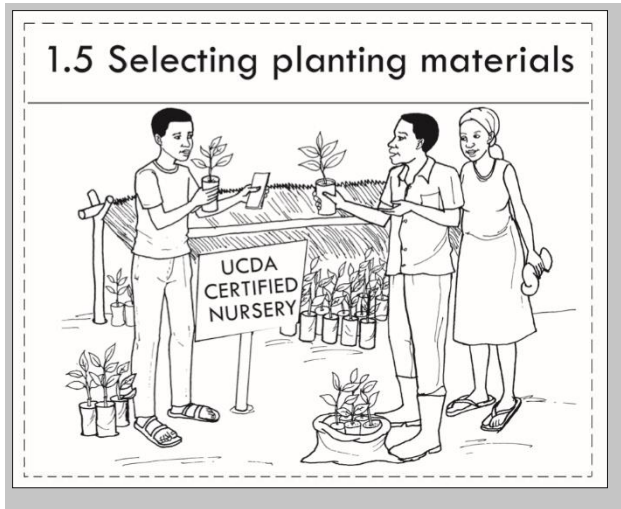


CHART 1.5: Selecting planting materials

- Get coffee plants with between 6-8 leaves from UCDA-certified nurseries one month before the onset of the rainy season.
- Seek guidance from UCDA or your DAO if you want to grow your own seedlings.
- Always use seeds or cuttings from a certified source.
- Check all seedlings for signs of pests and diseases; especially root mealy bugs, aphids and other sucking insects. This prevents introducing pests and diseases into your garden.
- Do not buy seedlings if the roots protrude far beyond the polythene pots because the taproot may be damaged.

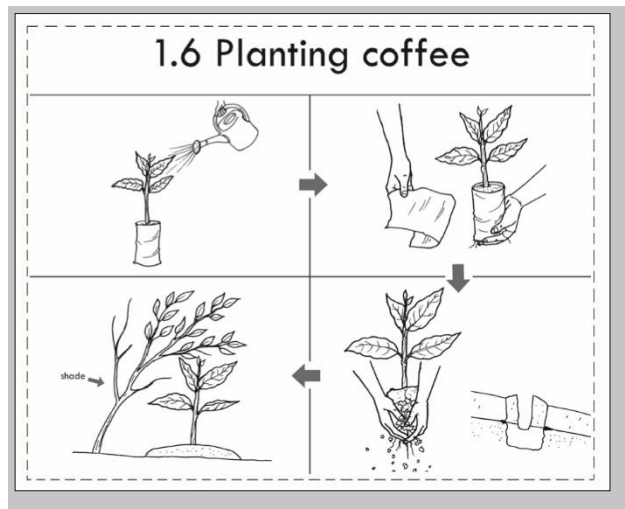
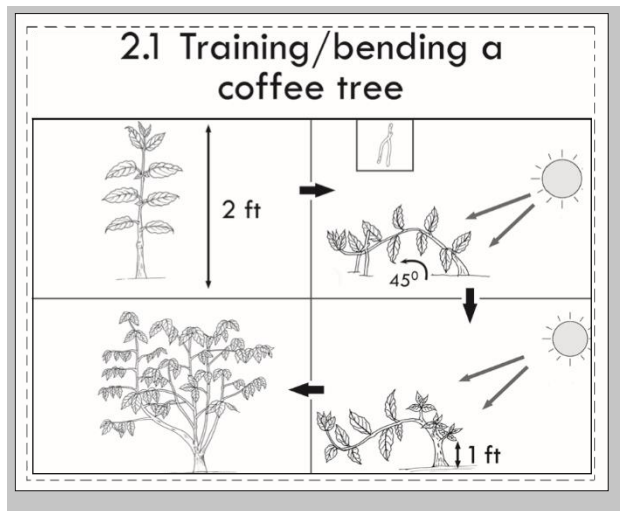


CHART 1.6: Planting coffee

- Plant coffee plants 2 to 4 weeks after the onset of the rainy season.
- Roots protruding beyond the polythene pots should be trimmed before planting.
- Open up the centre of the filled holes sufficiently to fit the size of the potted plant.
- Remove polythene pots.
- Carefully loosen caked soil around the roots to ease water uptake and root development.
- Place the plant in the hole with the collar at level with the surrounding soil or slightly higher to allow for some sinking when soil settles.
- Water the seedling before and immediately after planting.
- Regularly inspect the planted field to identify dead plants and replace them as soon as possible.
- Protect each seedling from sunshine by providing shade (tree branch).

2.0 Management of a Robusta and Arabica Coffee Farm



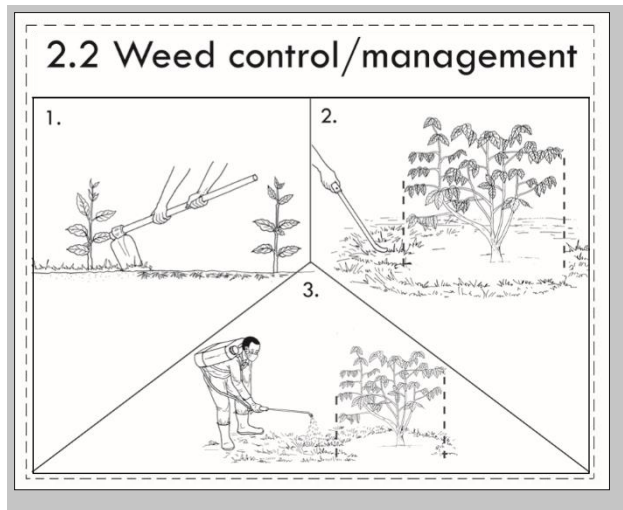
2.1: Training / bending a coffee tree

Coffee is trained in a multiple system by bending and pegging down 6-month-old plants at about 45 degrees to stimulate sucker production. To do this, the farmer should:

- Bend the coffee plants so that they all bend in the same direction along the row.
- Select 3 suckers to form the future bearing stems from the base of the trained plant. The first selected sucker should be at about 20cm (6 inches - 1 foot) from ground level and the others at the next nodes.
- Remove the peg when the selected suckers are about 30cm (1 foot) tall.
- This allows the bent stem to develop upwards.

Alternatively, newly planted coffee plants of 4-6 months are capped at a height of 15 – 40cm (6 – 16 inches) above the ground. This is done by removing the stem tips to encourage development of multiple stems which are then selected as described above.

Note: Capping is less effective than bending for inducing suckers.



2.2: Weed control / management

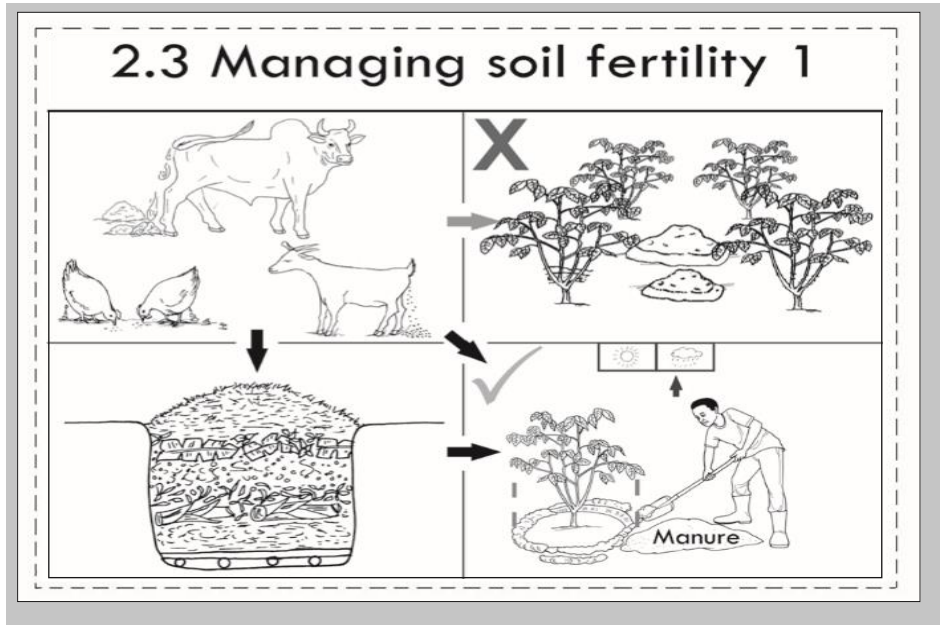
Weeds compete with plants for water and nutrients and can lead to reduced crop growth, low yields and poor quality coffee beans if allowed to grow. Weeds in young coffee gardens (up to a year old) should be controlled by mechanical methods such as digging with a hand hoe and slashing with a machete or slasher, or by cultural methods such as mulching.

Weeds in old coffee gardens are controlled by mulching or alternating mechanical methods with chemical/herbicide spraying. When using herbicides, follow the manufacturers' instructions on the label or get help from an extension officer or a more knowledgeable farmer colleague.

Ring weed below the canopy to avoid damage to the plant during slashing or spraying.

Avoid spraying the coffee leaves as this may kill or cause retarded growth.

2.3 Managing soil fertility 1



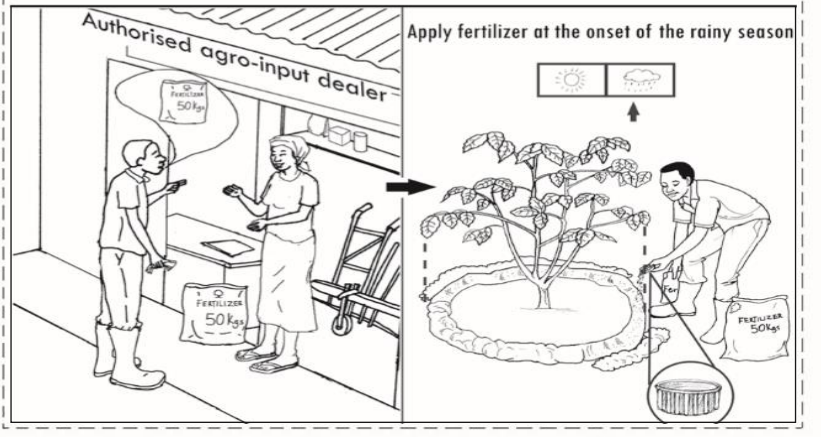
2.3: Managing soil fertility 1

Coffee requires fertile soils with high levels of nitrogen, phosphorus and potassium. The fertilizer requirements are dependent on the inherent soil fertility status, soil pH, level of production and usage of cultural farming practices like mulching, using manure and irrigation.

One 20-litre basin of decomposed manure (cow dung, chicken litter, household waste, compost) should be added to the soil when planting to improve soil fertility.

For existing coffee trees, 3-5kg of manure should be added around each tree once a year. Do not heap manure between the trees.

2.4 Managing soil fertility 2



2.4: Managing soil fertility 2

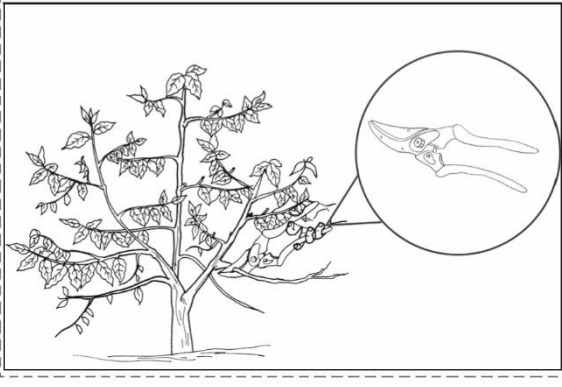
At the beginning of the rainy season, apply inorganic fertilizer around the tree within the rootingzone but do not allow it to touch any part of the coffee plant, especially the leaves.

For trees that are up to two years old, apply 75g of fertilizer per tree per rainy season. Apply 250g per tree per rainy season for Robusta coffee trees that are more than 2 years old and 200g per tree per rainy season for mature Arabica coffee trees.

For Robusta, apply: NPK 25:5:5"

For Arabica, apply: CAN N=26% or CAN N=27%

2.5 Pruning and de-suckering



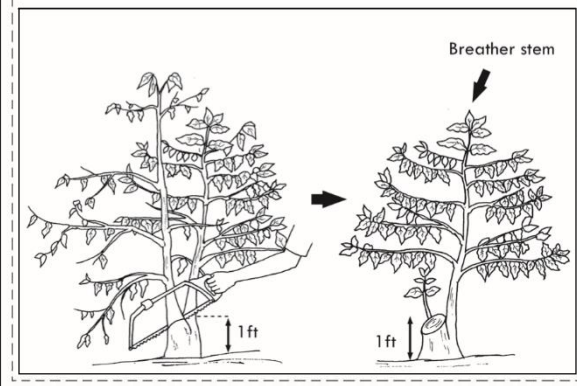
2.5: Pruning and de-suckering

Use secateurs (or a pruning saw) to remove dead, weak or unproductive branches and small suckers.

Also remove tertiary branches, dead primary branches and the skirt of lower primary branches that touch the soil surface to avoid infestation from the soil.

Pruning encourages new growth and improves productivity.

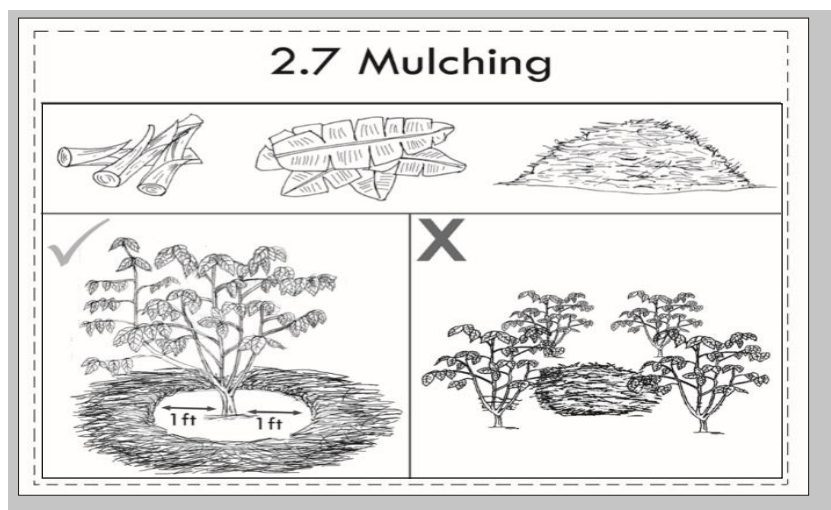
2.6 Stumping



2.6: Stumping

Stump coffee to renew the stem cycle either by clean or staggered stumping.

- Staggered stumping involves cutting down non-productive stems at the end of every season.
- Clean stumping involves cutting down all coffee stems after 7-9 years, starting by leaving one breather stem which should be removed after about 6 months, soon after suckers have sprouted from the stumped stems.
- Clean stumping can be carried out at once in an entire coffee garden if the farmer has alternative income. Stumped coffee fields can be intercropped with cover crops like beans, groundnuts, and peas to earn some income, to add nitrogen to the soil and to improve productivity.
- Staggered stumping involves cutting down part of the coffee garden. If a farmer needs to harvest a crop every year, part of the coffee garden can be stumped every year. In this case, 1 in 3 coffee trees should be stumped.
- Stumping should be at least 45° and sloping away from the breather stem.



2.7: Mulching

Mulch a coffee garden with maize straw, bean trash, banana leaves, coffee pulp, grasses or any other dead plant material. Form a loose layer of mulch on top of the soil that is no more than 6 inches deep.

Place the mulch 1 foot from the coffee stem to prevent infection with collar rot or attack from ants and termites. Do not heap the mulch between the trees.

The benefits of mulching are many. It conserves moisture, keeps the weeds away, adds nutrients to the soil, controls soil erosion and improves the soil structure and water retaining ability.

2.8: Soil and water conservation

Apply soil and water conservation practices to minimize loss of soil fertility through erosion and retain moisture for the coffee, especially in the dry periods. The following techniques can be very valuable to the coffee farmer:

- Terracing along contours reduces soil erosion by minimizing rainwater runoff.
- Digging pits/troughs at some points of the terrace preserves rain water. The water drips through slowly to the neighboring coffee trees and can preserve trees during the dry period. Add a small amount of oil to the trapped water to prevent breeding of mosquitoes.
- Planting cover crops such as mucuna, phaseolus beans, lablab and groundnuts, as well as mulching, prevents soil erosion and retains soil moisture.
- Planting grass such as *tithoria diversitalia* at the edges of the gardens and ridges of terraces/contour bunds reduces soil erosion.
- Shade from shade trees also reduces soil erosion and leakage of minerals/soil nutrients to a deeper ground level beyond the reach of coffee roots.

PEST AND DISEASE

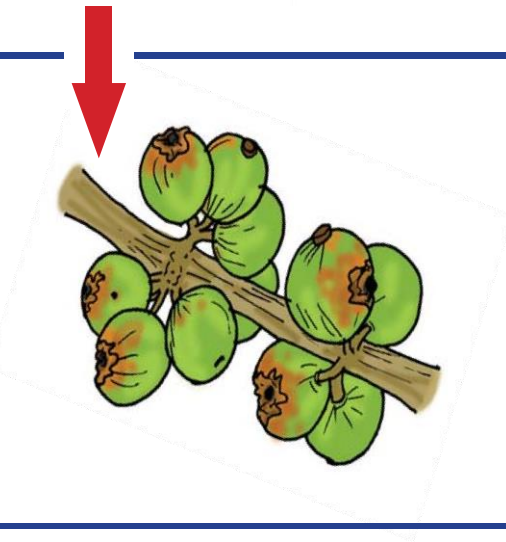
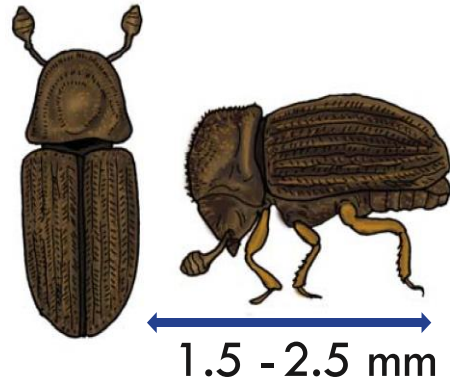
3.3 White stem borer (mainly Arabica)

To control:

1. Band tree stems with Dursban using brush from collar level to height of 0.5 metres.
2. Push a bicycle spoke/any wire into the tunnel to kill larvae.
3. Stuff the insect hole with cotton wool or paper soaked with Dursban or Super Sumithion to kill the larvae.
4. Smoothen tree bark up to 0.5 metres using a maize cob or cloth to prevent laying of eggs.

3.4 Coffee berry borer

Coffee berry borer (CBB) is a small beetle that bores into coffee berries, damaging beans and reducing yield and quality.

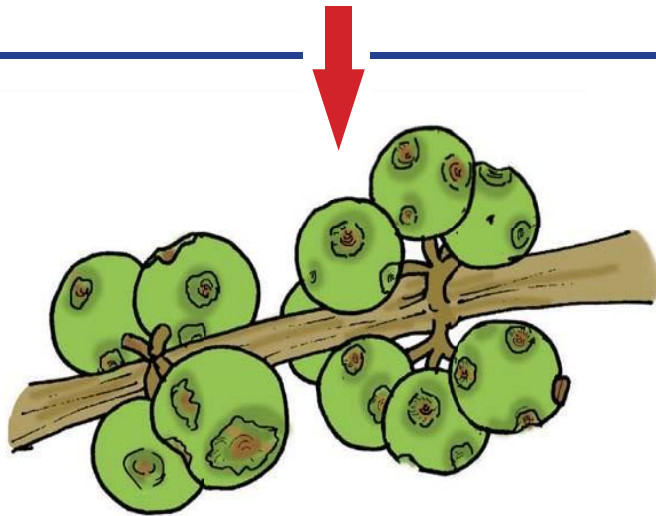
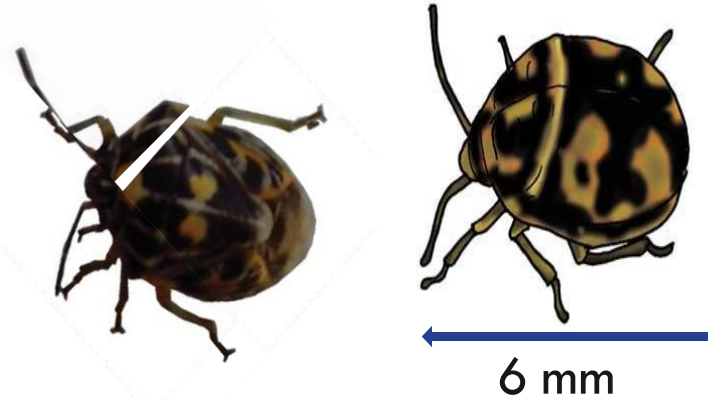


To control:

- . Pick all ripe cherries frequently and regularly.
- . Remove and burn cherries that have fallen on the ground to prevent crossover to new harvest.
- . If more than 2-3% of cherries are infected, spray with Super Sumithion.
- . Get help from the extension staff or a knowledgeable farmer when the situation becomes unmanageable.

3.5 Antestia bug (Arabica only)

Cause damage through sucking sap from flower buds, flowers, berries, leaves and soft stems which cause flower and berry abortion, cracking (Zebra marks) and rotting of beans, multiple branching (witches broom), and shortening of internodes.



To control:

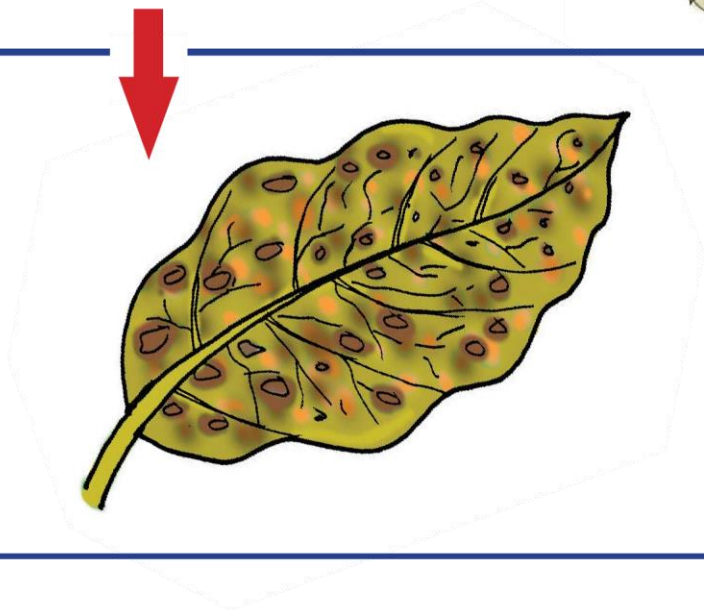
- Prune coffee and shade trees to promote natural control by birds.
- Monitor and spray with Super Sumithion when 2 bugs per tree are observed.

3.6 Coffee lace bug (Arabica only)

1. They suck on the underside of the leaves.
2. Heavy infestation causes general yellowing of leaves.
3. In severe cases, defoliation, berry abortion and dieback may occur.



4 mm

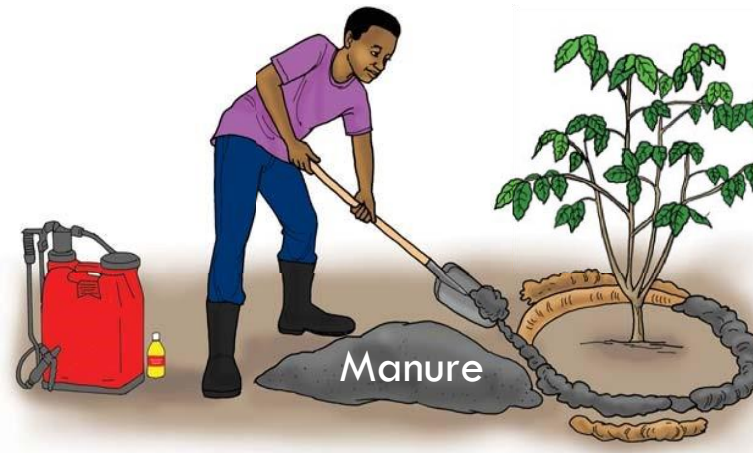


To control:

1. Infestation disappears with onset of rain.
2. Apply manure/fertilizer regularly.
3. Only spray when infestation is heavy, using Super Sumithion.

4.0 Coffee berry disease (Arabica only)

- Coffee berry disease is caused by a fungus.
- Affects only Arabica coffee grown at altitudes above 1,600 metres above sea level (masl), temperatures of 17-22 °C and humidity.
- It attacks flowers and fruits at all stages of growth, but especially the green stage.



To control:

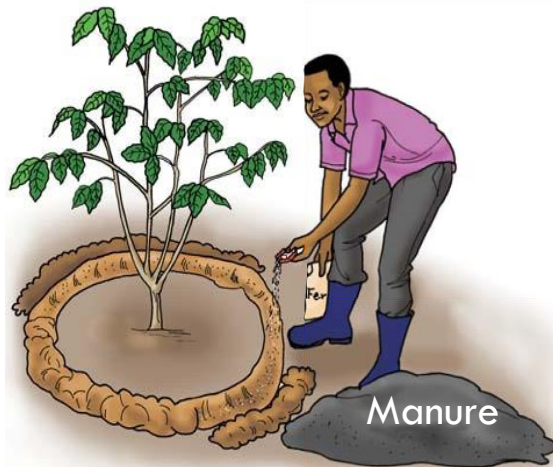
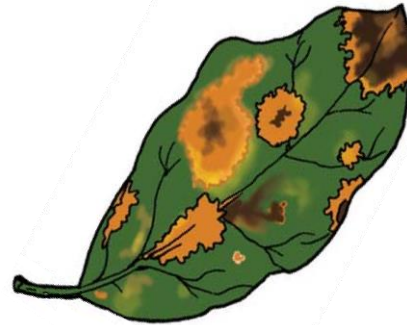
- Plant tolerant varieties (SL 14).
- 5. Spray with copper-based fungicides such as Copper Nordox
- Good field hygiene: 75%
 - a. Regularly harvest all ripe cherries.
 6. Get help from the extension staff or a knowledgeable farmer

- b. At the end of the harvest, remove all remaining dried or ripe cherries from the tree and the ground.
 - Prune coffee and shade trees to reduce humidity levels.
 - more money.

when

4.1 Leaf rust (mainly Arabica)

- . Caused by a fungus.
- . Manifests as orange spots or areas on the underside of leaves.
- . Affects mainly Arabica coffee grown in low to medium altitude.
- . Severe attack results in premature leaf-fall and dieback

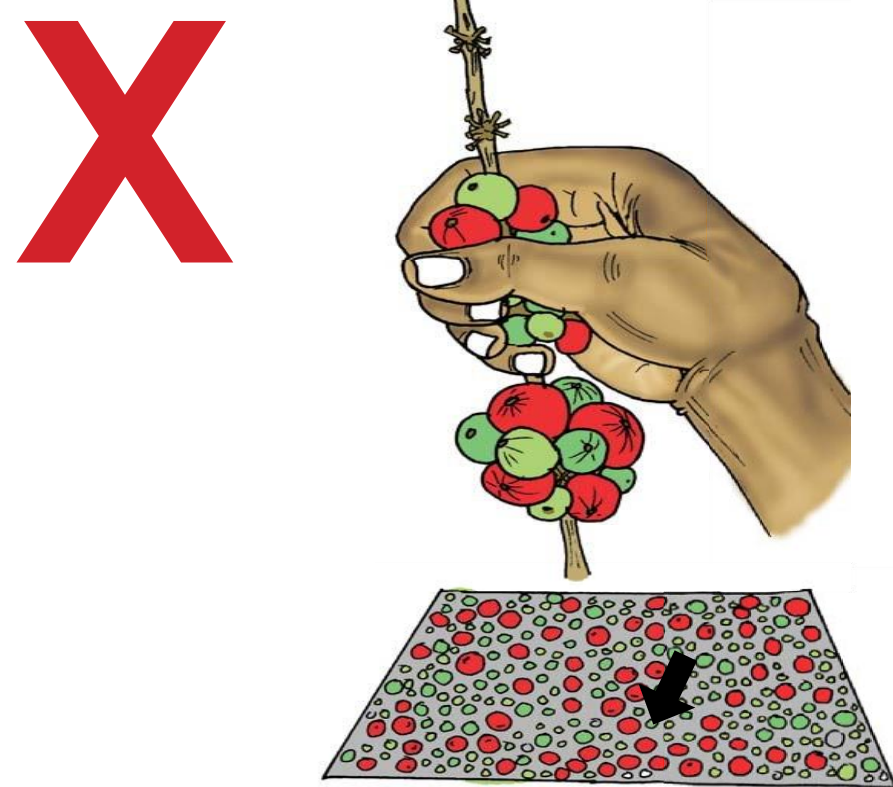
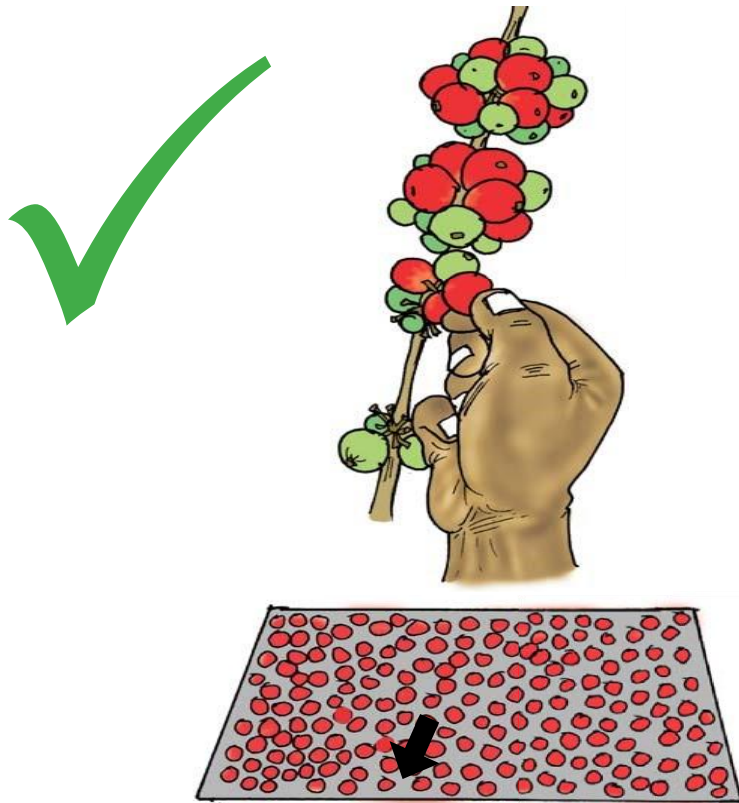


To control:

- . Timely spraying on underside of leaves with copper-based fungicides or curative systemic fungicides.
- . Improve soil fertility management.
- . Plant tolerant varieties (SL 14).

- . Spray with copper-based fungicides such as Copper Nordox

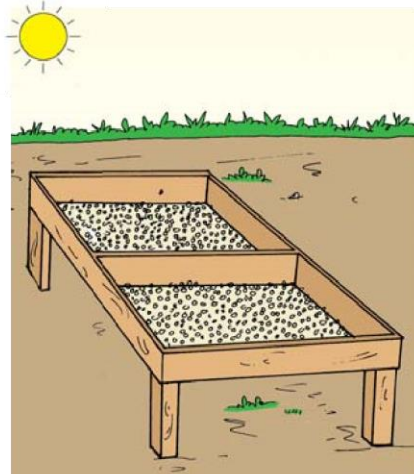
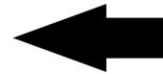
5.1 Harvesting



- . Keep harvested coffee cherries in containers such as baskets.
- . Do not dry the coffee on bare earth as this results in earthy smells and soil microbial contamination.
- . Sort out immature, diseased, pest infested, over ripe cherries and process them separately.
- . Remove all extraneous materials such as twigs, leaves, stems and stones.
- . Put freshly harvested cherries into sufficient water to float unfilled fruits and extraneous materials.

- . Remove the floats and pulp the clean cherries.
- . Pulp cherries within 12 hours after harvesting using pulpers, to separate pulp from parchment.

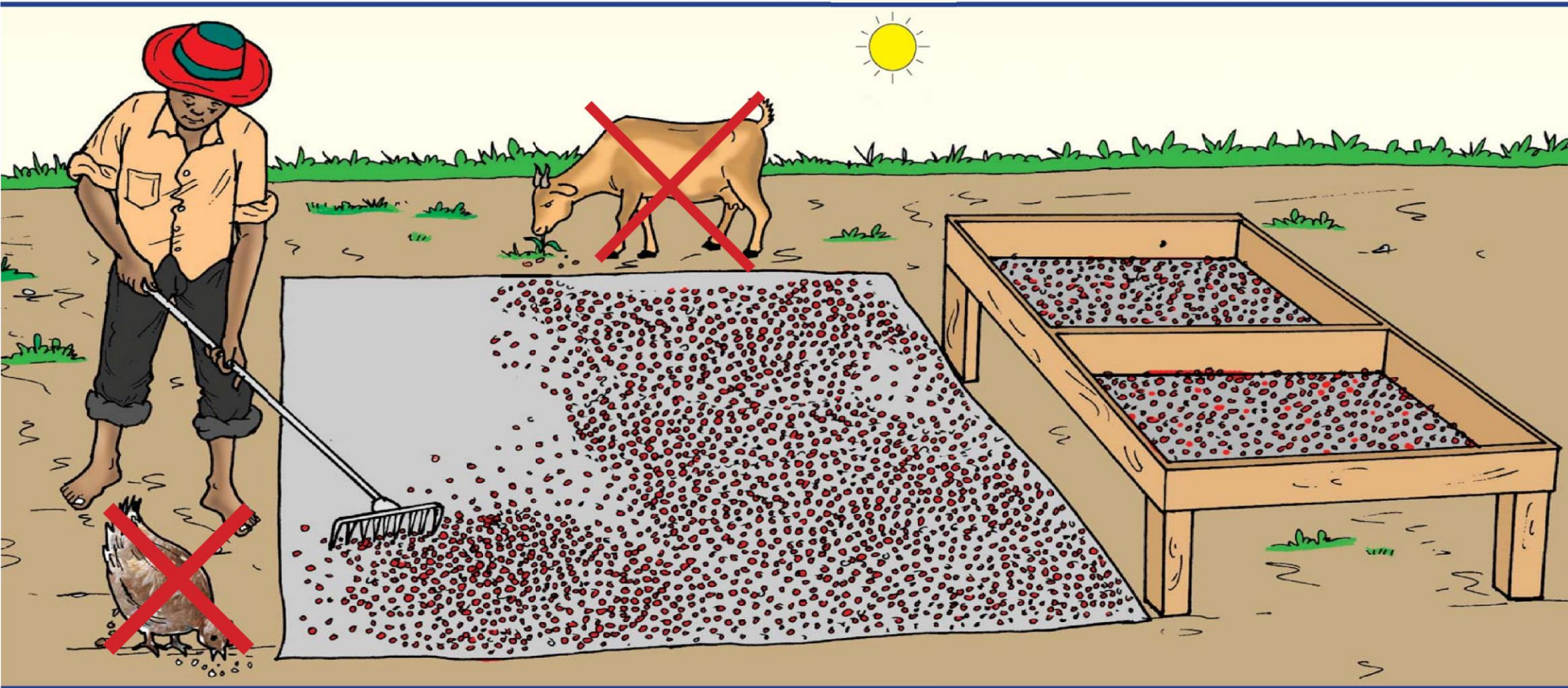
5.2 Wet processing



- . Keep freshly pulped coffee beans in container for 12-24 hours to allow fermentation.
- . Wash the fermented coffee thoroughly to remove mucilage from the parchment.
- . Dry washed parchment on wire trays or tarpaulin.

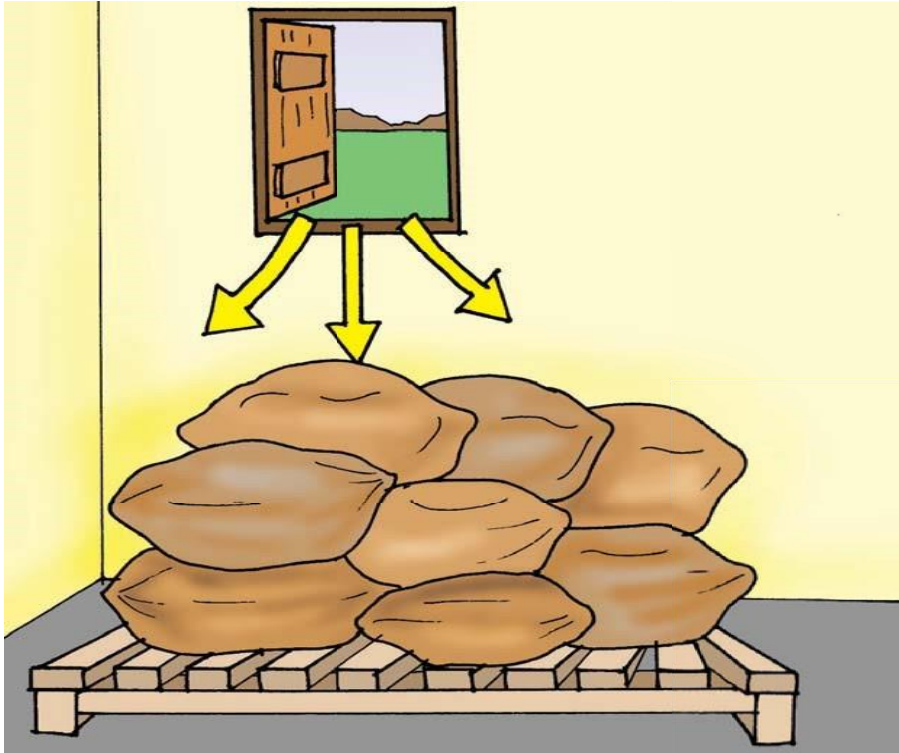
- . This involves drying cherries without removing the pulp.
- . Dry the cherries immediately after harvesting.

5.3 Dry processing



- . Dry cherries on a tarpaulin or concrete floor but not on bare ground.
- . At night, stack trays in a store or house. Do not leave wet coffee heaped or it will develop mould.
- . Dry coffee to 11-13% moisture content.

5.4 Storage



- . Store only dry coffee in bags.
- . Preferably do not store coffee in the same store with other farm produce.
- . Place the coffee bags on pallets raised to at least 15cm to avoid wetting by ground moisture.
- . Do not store coffee in the same store with agro-chemicals and oil products.
- . Keep stacked bags at least 30cm away from the walls and oil products.
- . Do not use fertilizer or fish bags for storage. ceiling.
- . Storage rooms should be well ventilated and leak proof.