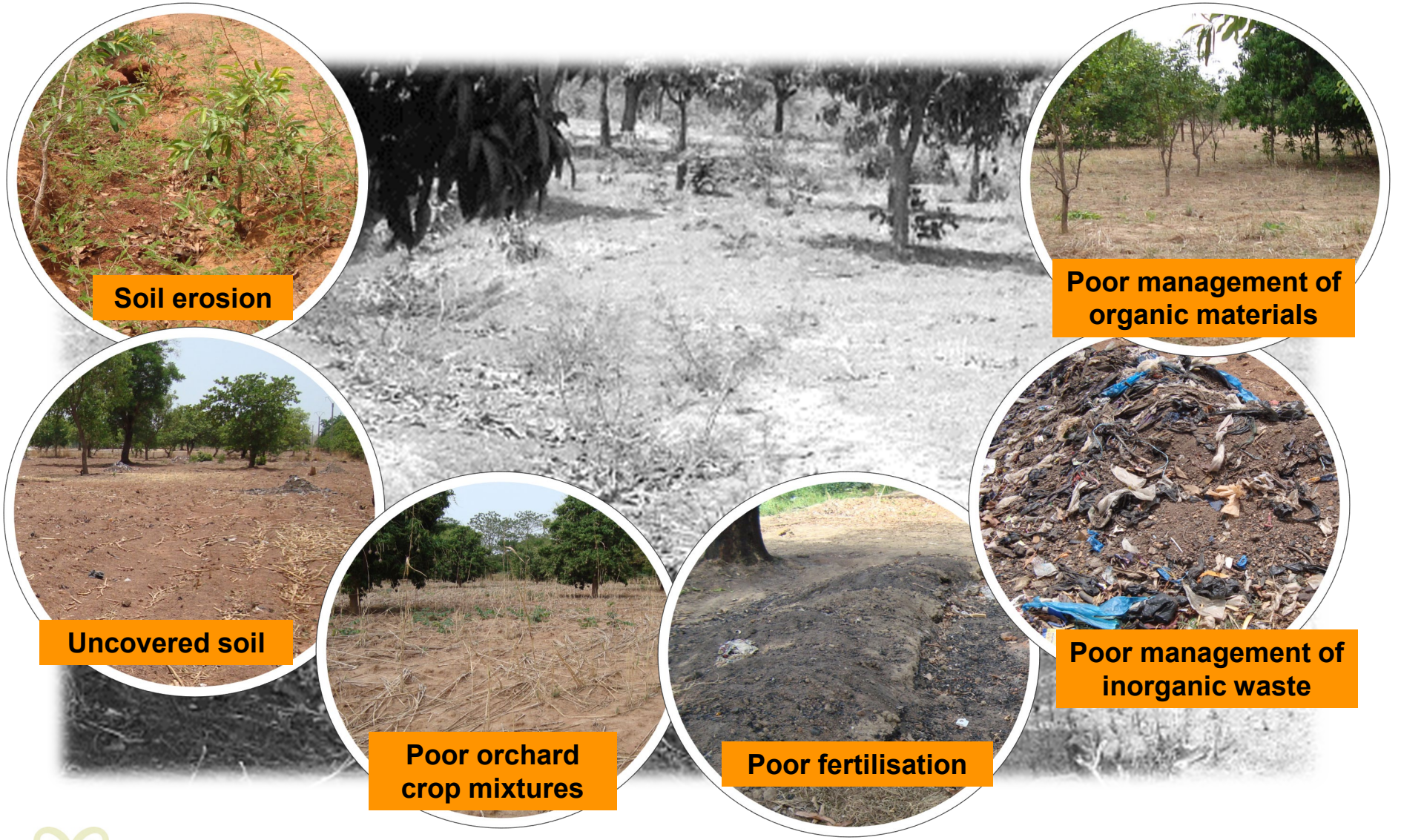
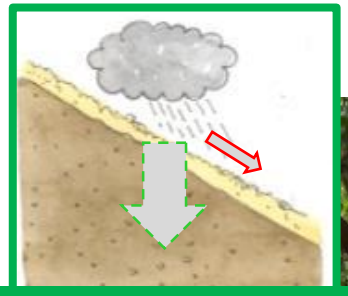
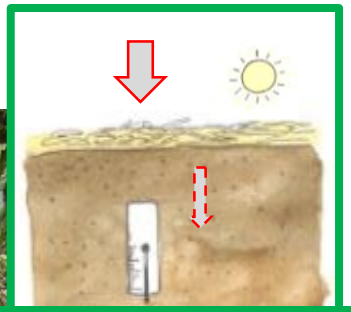
Soil fertility management challenges in mango orchards



General soil requirements for good mango growth



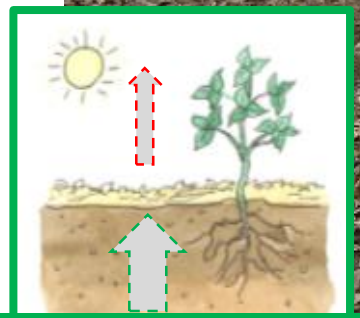
Good water infiltration



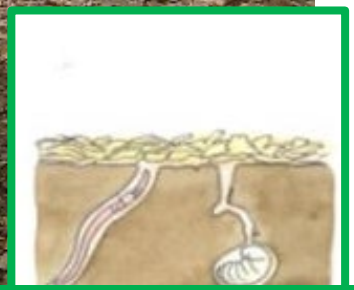
Protection from overheating

Good soil aeration

No competition with weeds



Enough soil moisture

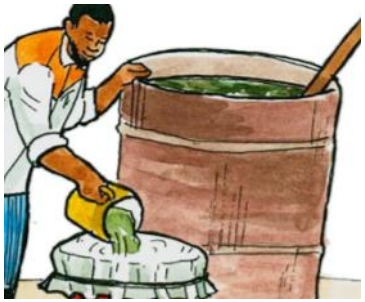


Good soil biological activity

Three steps of organic soil fertility management

3rd step: Application of supplements

Enhancing and balancing plant nutrition through application of fertilizers, soil amendments and irrigation



2nd step: Soil organic matter management

Enhancing soil organic matter content through application of organic material

1st step: Soil and water conservation

Stabilizing and protecting the soil and harvesting and conserving water

Mulching around young trees

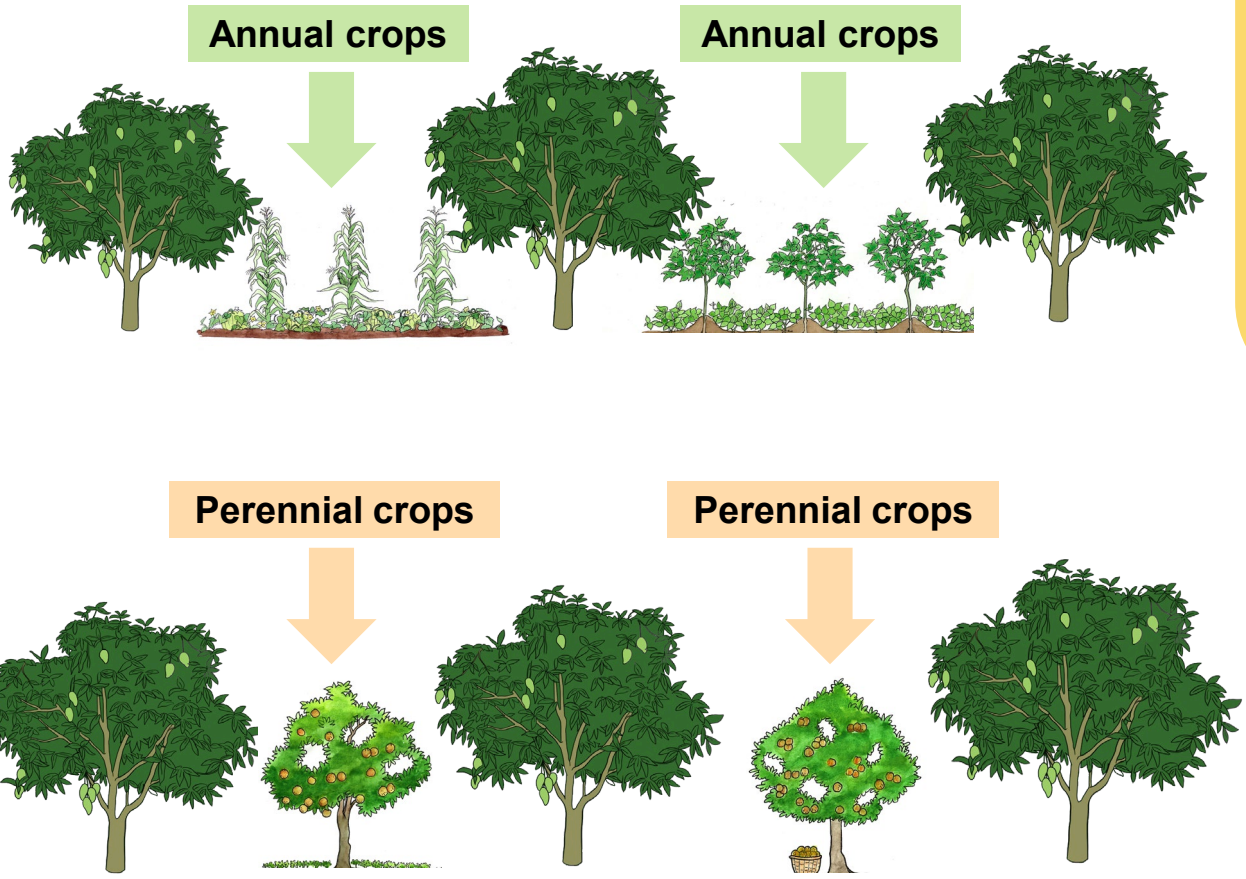
1

- Add composted manure in the planting hole before mulching.

2

- Immediately after planting, cover the area around the seedling with a layer of leaves, grass, twigs, crop residues or straw.
- Leave some open soil between the mulch and the plant to avoid damages by insects, rodents and fungus.

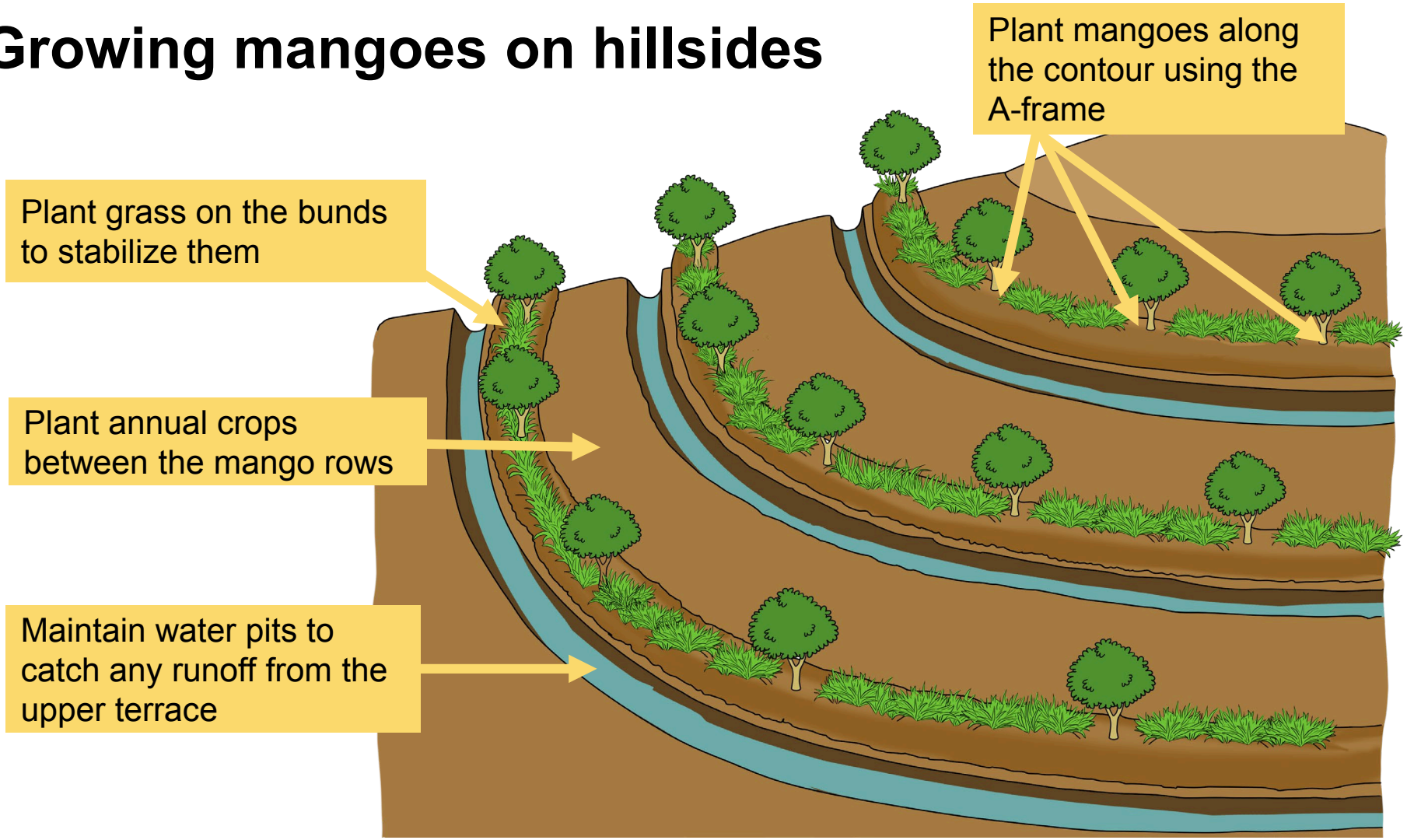
Intercropping in mango orchards



Intercropping has several **advantages**:

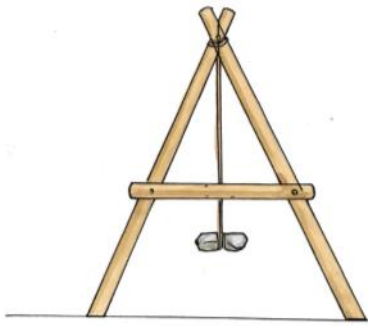
- Better use of the land
- Diversification of the cropping system
- Spreading the risk of crop failure
- Increased income from additional harvests

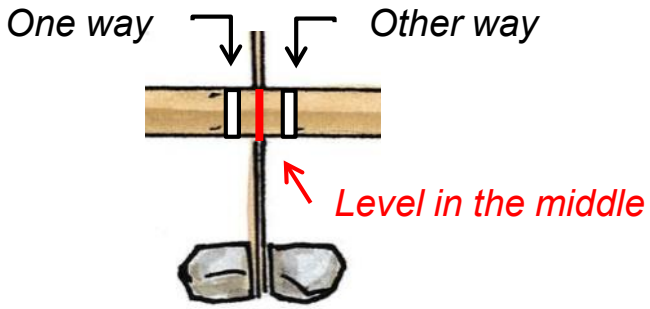
Growing mangoes on hillsides



How to make and use the A-frame

Stone

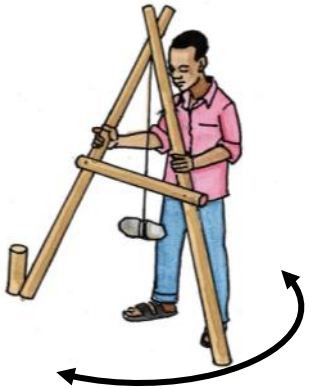




1. Tie two 6-feet poles and a 4-feet pole together to form an “A”.

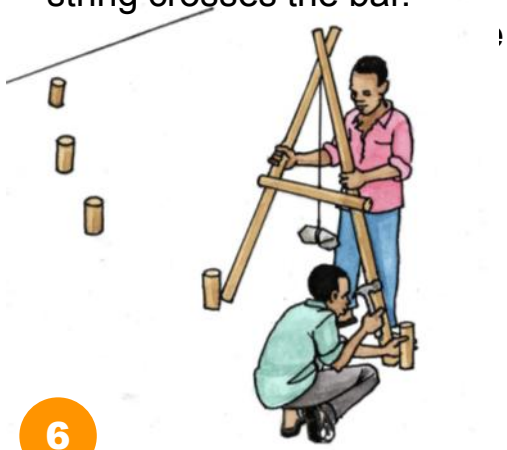
2. Tie a string to the top of the frame and attach a weight to it.

3. Calibrate on leveled ground turning the A-frame in both directions, marking where the string crosses the bar.



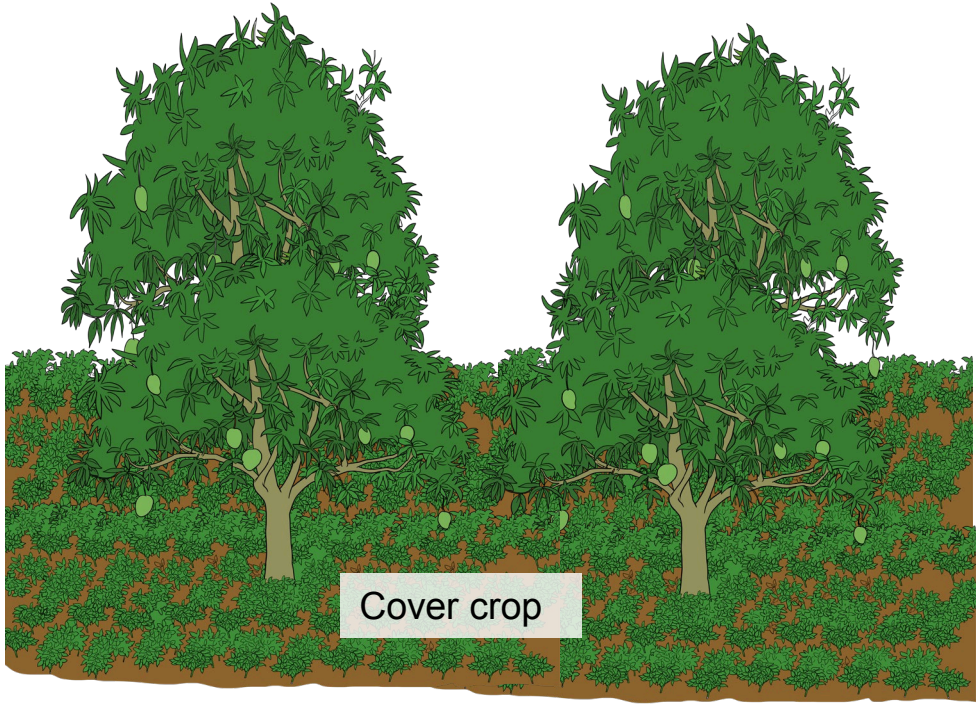
4. Swing one leg up or down the slope so that the string crosses the crossbar exactly where the mark is.

5. Mark the spot where the second leg stands and continue as for the first.



6. The marking points along the contour result in contour lines across the slope.

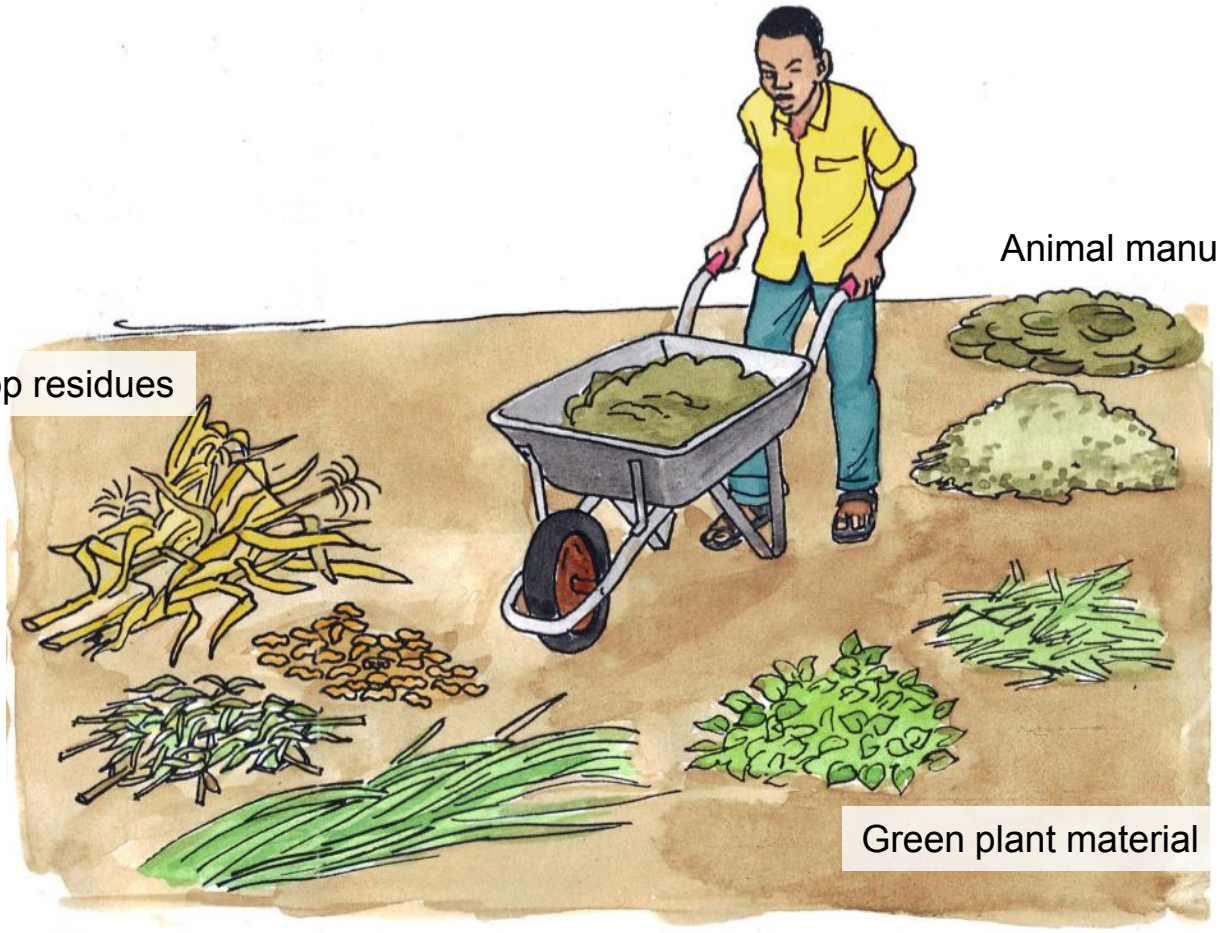
Using cover crops in mango orchards



Cover crops should be …

- Low-growing
- Not climbing
- Fast growing and cover the soil in a short time and throughout the year
- Nitrogen-fixing
- Resistant against common pests and diseases
- Easy to sow and manage (slash and or cut for fodder)

Materials used for composting



In addition, following materials may also be used:

- Ashes
- Saw dust
- Algae
- Some top soil or old compost

How to make good compost – ‘heap’ method

Collect compost materials in a place under shade.

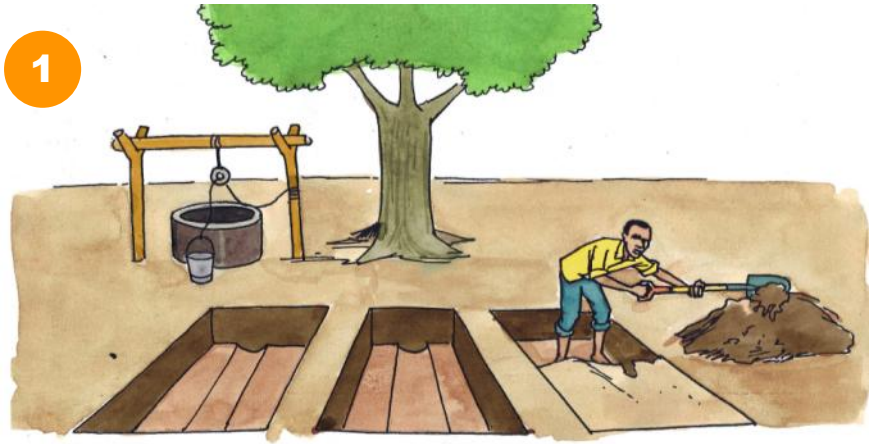
Chop the bulky materials to a length of a finger.

Mix fresh and dried materials in similar proportions.

Cover the heaps with dried materials and water them regularly.

How to make good compost – Pit method (1)

1



Choose a shady place in proximity of water.
Dig shallow pits.

2

Collect compost materials in
a place under shade.

3

Cut the plant material to the size of a finger.

How to make good compost – Pit method (2)

4

- Make two heaps, one with the manure and the green material, one with the dry material.
- Mix dry and fresh compost materials in equal proportions.
- Water well.

5

Fill a layer of dry material at the bottom of a 2 m x 1 m pit, 1 m deep.

6

- Cover the pit with dry materials.
- Water it regularly.

Manure application in mango orchards

1

Apply compost or manure at planting.

2

10 t per ha and year

Top dress with compost or manure around growing and mature trees.

3

20 t per ha and year

Top dress with compost or manure around mature trees.

How to make liquid animal manure

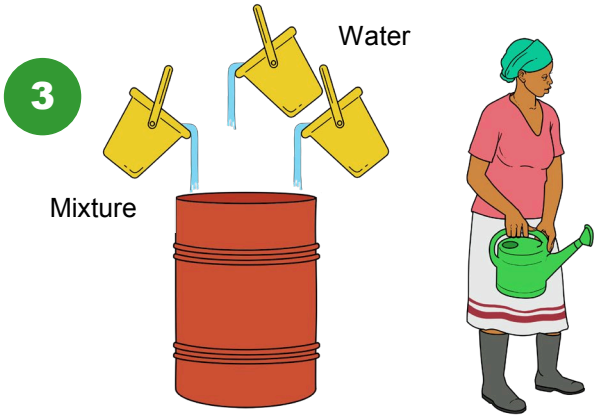
1

Fill a bag with manure.

2

Immerse the bag into a drum with fresh water and cover it. Stir the mixture every 3 to 5 days.

3



After 2 to 3 weeks, dilute the mixture with 2 to 3 parts of water.

4

Apply the manure to the foot of the plants.

Fertilizers of organic origin for organic farming

Fertilizer	Fertilizing effect	Availability of nitrogen	Origin	Comments
Guano	N, P	●●●	Dried dropping of seabirds	› P content higher than the plants' demand
Hoof and horn meal	N, P	●(●)	Slaughterhouse waste	› The finer it is grinded, the faster N is available
Algae	Minerals		Seeweed	› May contain heavy metals depending on the origin
Oil cakes	N, P	●(●)	By-products of oil production	› Examples: castor cake, neem cake, peanut cake, rapeseed cake
Hair, wool, feathers	N	●●(●)	Slaughterhouse waste, animal production	
Agro-industrial by-products	N, P, K	●●	By-products from brewery, distillery, textile processing, husks and peels, food processing	› Must be free of significant contaminants › Best composted before application to the land
Composts	N, P, K	●	Mushroom waste, humus from worms and insects, urban and household wastes	› Must be free of significant contaminants
Plant preparations and extracts	N, P, K	●●●	Extracts of fresh or dried plants	› The effect depends on the original materiel and can vary › Older preparations are better for fertilization of plants

Fertilizers of mineral origin for organic farming (1)

Fertilizer	Origin	Characteristics	Application
Plant ashes	Burned organic material	› Mineral composition similar to plants › Easy uptake of the minerals › Wood ashes rich in K and Ca	› To compost (best) › Around the base of the plants
Limestone	Ground limestone Algae	› Buffers low pH (content of Ca and Mg secondary) › Algae: rich in trace elements	› Every two to three years when soil-pH is low (avoid excessive use, as it reduces availability of P and increases deficiencies in micro-nutrients)
Stone powder	Pulverised rock	› Trace elements (depending on the composition of the source) › The finer the grinding, the better the adsorbance	› To farmyard manure (reduces volatilisation of N and encourages the transformation process)

Fertilizers of mineral origin for organic farming (2)

Fertilizer	Origin	Characteristics	Application
Mineral potassium	Natural potassium salts (e.g. sulfate of potash, muriate of potash, kainite, sylvanite, patenkali)	› Sulphate of potash is easily available › Patentkali: high contents of Mg and S; easily available › In rock form slow reaction	› Only in case of demonstrated deficiency
Rock phosphate	Pulverised rock containing P	› Easiliy adsorbed to soil-minerals › Weakly adsorbed to organic matter › Slow reaction	› To compost › Not to reddish soils (as irreversibly adsorbed) and to soils with high pH
Clay	Natural	› Good nutrient and water binding capacity	› Large amounts required for soil improvement
Sulfur	Volcanic	› Sulphate of potash is easily available, but can be washed out › Elemental sulfur: slow reaction	
Trace elements	Anorganic or complexed salts	› Complexed salts are more easiliy available to plants than anorganic salts, but are more expensive	› Spraying onto plants where soil/plant nutrient deficiency is documented by soil or tissue testing or diagnosed