

# RIPPLE Africa Step by Step Fruit Tree planting Guide







## NOTES ON FRUIT PRODUCTION

### ***Aim and Objective***

The aim and objective of RIPPLE Africa as an organisation is to make Nkhata Bay District one of the leading producers of fruits in Malawi, giving an improved income through fruit sales and seedlings (budded) and alleviating malnutritional problems through the consumption of fruit.

### ***Orchard Establishment***

#### **Nursery Site**

When choosing a site for the establishment of a nursery, the following factors should be considered:

- **Soil type** (should be well drained).
- **Near owner's home** (for easy management).
- **Near market** (where orchard products could be sold).
- **Near water source** (for ease of watering).
- **Need sunny position** (to avoid competition for food and sunlight).
- **Accessibility to roads** (for ease of transport).

### ***Nursery Establishment***

Set up the nursery as for the normal trees ie 10m x 10m and fill the large tubes in March/April for mangoes and Lemons and May/June for Guavas and Avocados and August for Papaya.

- **Soil mixture for tubes** = 2 parts dambo soil, 1 part manure, 1 part sand for all fruit trees

#### ***Mango Rootstock (Local mangoes only)***

- **Collect seeds in Dec-March** – Remove the skin and edible part of the mango and dry the nut
- **Sow:** March/April. **Plant one seed per tube**
- **Seed:** Polyembryonic. (The seed has two embryos and can produce two shoots. If this happens remove one shoot and replant in another tube)
- **Seed preparation:**
  - **Recommended method - Peeling:** 1 to 2 weeks to germination. (Break the hard nut with a knife and split open and remove the seed inside and then plant in the tube)
  - **Other methods of seed preparation - Chipping:** 2 to 3 weeks to germination. (Cutting off the top part of the nut and planting with the chipped end facing upwards). **Untreated:** 3 months to germination. (Plant the nut directly into the tube)
- **Sowing depth:** Sow in the tubes 5 cm deep. If the seed is sown too shallow, e.g. 2 cm, the covering soil may dry. If the seed is sown too deep, the plumule (shoot) will die before germination.
- **Watering:** Morning and afternoon each day
- **Ready for grafting with improved mango scion** when the seedling reaches the size of a pencil, normally after 3 months - July

#### ***Lemon Rootstock (Local Lemons only)***

- **Collect seeds in March/April** – Use local lemons and remove seeds and dry in the shade on a mat or black polythene
- **Sow:** April/May since they are slow growers. **Plant one seed per tube**
- **Seed:** Polyembryonic. (The seed has two embryos and can produce two shoots. If this happens remove one shoot and replant in another tube)
- **Sowing depth:** Sow in the tubes and cover with a thin layer of the soil mixture (maximum of half cm).
- **Watering:** Morning and afternoon each day
- **Ready for Budding** when the seedling reaches the size of a pencil normally after 5 months - October



### ***Avocado Pear (Improved Avocados only)***

- **Collect seeds in March/April** – Use improved avocados which will not need grafting but will produce fruit 1-2 years later than grafted local avocados and collect the seeds. Local avocados can be used if there are improved mother trees near the club (these can be grafted when seedlings reach the size of a pencil after 3 months)
- **Sow:** April/May **Plant one seed per tube**
- **Sowing depth:** Sow in the tubes 5 cm deep. If the seed is sown too shallow, e.g. 2 cm, the covering soil may dry. If the seed is sown too deep, the plumule (shoot) will die before germination
- **Watering:** Morning and afternoon each day

### ***Guava (Improved guava only)***

- **Collect seeds in May/June** – Each guava will produce about 30 seeds (which will produce 10 trees)
- **Sow:** July/August. **Plant three seeds per tube**
- **Sowing depth:** Sow in the tubes and cover with a thin layer of the soil mixture (maximum of half cm).
- **Watering:** Morning and afternoon each day

### ***Papaya – Paw Paw***

- **Collect seeds in June/July** – Select good quality fruits and remove the seeds (normally 150-200 seeds per fruit) – remove the seeds and dry in the shade on a mat or black polythene
- **Sow:** October
- **Sowing depth:** Sow in the tubes and cover with a thin layer of the soil mixture (maximum of half cm).
- **Watering:** Morning and afternoon each day

## ***Orchard Establishment***

### ***Mango Grafting Process: A Scion (stem) of the improved fruit is fixed to the local rootstock.***

- **Attach Grafting** – (This can only be done if mother trees are available) When the root stock is the thickness of a pencil. Make a diagonal cut of about one cm on the stem of the root stock at 15cm above the height of the tube and then cut off the top of the plant and remove all leaves. Then cut a slice out of a stem from the mother tree about one cm long and not more than half the width of the stem and then attach the two together and bind with a budding bandage/tape. These remain together for 6 weeks and then the bandage is removed and the stem that is connected to the mother tree is cut. From this attachment the tree will be the improved mango.
- **Watering:** Morning and afternoon each day – Remove the head of the watering can and water below the bandage and don't get the bandage wet as this will cause the attached bud to rot.
- **Orchard Preparation**
  - Well drained soil – sunny position
  - For Grafting orchard - Mark planting stations at 5 metre x 5 metre intervals.
  - For fruit orchard - Mark planting stations at 9 metre x 9 metre intervals.
  - Pit holes in September at 90 cm x 90 cm x 90 cm. The first 45 cm topsoil to be separated from the subsoil. When the hole is filled, the topsoil should be put in first after mixing it with manure in the ratio of 2 parts soil and 1 part manure then fill with the subsoil
- **Planting:**
  - Plant in December when the soil is wet and the tube must also be wet. (see tree planting and management step by step)
  - Create a small basin around the tree 60cm x 60cm
  - Apply 20 grams of S/A fertiliser (one matchbox full) per tree. Bury 3cm deep and 10 cm away from the tree. This will provide valuable nutrients for healthy growth.
- **Mulching** – In March/April weed around the trees and create one metre x one metre basins and apply a mulch keeping the mulch 15cm away from the stem to avoid termite attacks.



- **General Management** – The same as for normal trees including site slashing, fire breaks, weeding etc during the second year apply CAN fertiliser at the rate of 50 grams per tree (two matchbox full) during December in the same way as for the S/A fertiliser.
- **Watering** – From May after the rains water the trees once every 2 weeks through the mulch (1 watering can for 2 trees) being careful not to water the leaves as this will remove any pesticide
- **Pruning:**
  - **Cut Back** - After one year (the second December) Select the 3 or 4 best stems and cut these back to a length of 45 cm to produce a spreading framework of 3 to 4 well spaced branches remove other branches completely.
  - **Deflowering** For the first three years remove all flowers at an early stage to encourage the tree to grow. Early fruiting will slow growth.
- **Harvesting:** Normally, fruits are borne at 4 to 5 years, and trees are fully grown at 20 years.
- **Pests** – Regularly check (fortnightly) the trees for any damage to the leaves. If they are being eaten spray with cypermethrine at the rate of 10 ml per 15 litres water. Check after 14 days and if problem is still present spray again. Pest problems are rare and trees rarely need to be sprayed
  - **Mango seed weevil:** The larva enters the fruit and attacks the seed. It is a fleshy white grub up to 3 cm long. **Symptoms:** Hard white area in the fruit, and the fruits drop before maturation. **Control:** Pick the affected fruit and bury them, Keep orchard clear of weeds.
  - **Fruit fly:** Lays eggs in the immature fruits. **Symptoms:** The fruits change colour. **Control:** Pick the affected fruit and bury them, Keep orchard clear of weeds, and spray cypermethrine at the rate of 10 ml per 15 litres water.
  - **Note:** All other pests should be sprayed with cypermethrine.
- **Diseases:**
  - **Anthraxnose:** Fungal disease. **Symptoms:** Brown or black spots on the fruit and leaves. **Control:** Field hygiene, and spray with Dithane M45 (30 gm per 10 litres water), or Daconil or Ridomil (20 gm per 10 litres water).
  - **Powdery mildew:** Fungal disease. **Symptoms:** A white powdery substance appears on the flowers and leaves. **Control:** Spray with Dithane or Daconil (see above).

### Citrus

- **Lemon rootstock budded with scions from improved varieties of tangerines and oranges.**
- **Budding process: Chipping method (recommended):** A chipped bud of an improved variety is fixed to a chipped local rootstock by applying a budding bandage.
- **How long** - The budded seedling takes four weeks in a green house or 6 weeks if outside to establish and grow. When the bud has taken the bandage can be removed
- **Watering:** Morning and afternoon each day – Remove the head of the watering can and water below the bandage and don't get the bandage wet as this will cause the attached bud to rot.
- **Orchard:**
  - Flat or a gentle slope with well drained soils.
  - Mark planting stations at 4 metre x 4 metre intervals.
  - Pit holes in September at 90 cm x 90 cm x 90 cm. The first 45 cm topsoil to be separated from the subsoil. When the hole is filled, the topsoil should be put in first after mixing it with manure in the ratio of 2 parts soil and 1 part manure then fill with the subsoil
- **Planting:**
  - Plant in December when the soil is wet and the tube must also be wet. (see tree planting and management step by step)
  - Create a small basin around the tree 60cm x 60cm
  - Apply 20 grams of S/A fertiliser (one matchbox full) per tree. Bury 3cm deep and 10 cm away from the tree. This will provide valuable nutrients for healthy growth.
- **Mulching** – In March/April weed around the trees and create one metre x one metre basins and apply a mulch keeping the mulch 15cm away from the stem to avoid termite attacks.
- **General Management** – The same as for normal trees including site slashing, fire breaks, weeding etc during the second year apply CAN fertiliser at the rate of 50 grams per tree (two matchbox full) during December in the same way as for the S/A fertiliser

- **Watering** – From May after the rains water the trees once every 2 weeks through the mulch (1 watering can for 2 trees) being careful not to water the leaves as this will remove any pesticide
- **Pest and disease control** -
  - **White fly** – these will produce a white cotton like material on the underside of the leaves. At the first sign spray with cypermethrine at the rate of 10 ml per 15 litres water. Check after 14 days and if problem is still present spray again. If this problem is not dealt with quickly the leaves will go brown and growth will be stunted.
  - **Check regularly for caterpillars** - these can be identified easily as the leaves will have been eaten
  - **Aphids** – This looks like rice bunched under the leaves the aphids are brown in colour
  - **Treatment** - At the first sign of the above problems spray top and bottom of leaves with cypermethrine at the rate of 10 ml per 15 litres water. Check after 14 days and if problem is still present spray again.

### **Bananas**

Most local Banana plants have been attacked by a virus which either kills the plant or reduces the yield in bananas. The RIPPLE Africa banana project aims to provide farmers with improved banana suckers to grow on a commercial basis to provide future suckers for RIPPLE Africa to use for expanding the project so that improved banana plants can be supplied and sold to many farmers and families in Nkhata Bay District. Selected farmers need to prepare their banana planting sites and manage the plants on a regular basis to achieve good results.

- **Land** – the farmer needs to provide well drained land for twenty banana plants (20m x 10m) or fifty banana plants (20m x 20m) or one hundred banana plants (20m x 50m)
- **Water source** – There must be a water source close by, as each banana plant will require half a watering can of water every week.
- **Manure** – The farmer must have sufficient manure available for planting the bananas
- **Planting stations** should be at 3 metre x 3 metre intervals
- **Dig planting stations** at 60 cm x 60 cm x 60 cm in October / November
- **Mix topsoil with manure** at a ratio of 2:1 and place in the hole with the sub soil on the top and mark with a stick (normally half a pail of manure per hole)
- **Preparation of planting material:**
  - **Choice of suckers:** Choose good suckers which are of a uniform size and which are disease free.
  - **Uprooting suckers:** Uproot suckers with 12 cm diameter corms (base of the stems).
  - **Root trimming:** Cut back the outer sides of the corm. This is a disease prevention measure as some roots may harbour disease.
  - **Aerate the sucker:** Expose the sucker to the air for a day to dry the newly cut back corm to avoid rotting.
  - **When to plant** – Ideally plant the suckers in December but they can be planted at any time during the year
  - **Planting** – Bury the whole corm and firm the soil around. Then make a round basin 60cm diameter
  - **Make square basin** – In April May create a one metre x one metre square basin around each sucker and mulch. Re mulch every year.
- **Banana nursery:**
  - Start with 20 / 50/ 100 mother plants.
  - The mother plant can produce bananas but all other suckers will be removed and given to RIPPLE Africa to develop the program for a period of 3 years. When the mother plant produces bananas another sucker is allowed to grow to maturity. – normally 1-3 suckers are produced by each plant in the first year and 4-5 per year thereafter.
- **Orchard:**
  - **Weeding:** Bananas have shallow roots so hoe weeding is not encouraged – slash and weed by hand
  - **Water** – for the first year from May, water half a watering can per plant per week and in the second year water half a watering can every two weeks.



- **Remove dry leaves** – Cut off dry leaves and chop them up and use as mulch for the plants and suckers.
- **Fertiliser**: Apply when necessary – to be advised
- **Pruning**: Maintain two to three suckers per station to produce bananas.
- **Harvesting**: The colour of the bananas will change from dark green to light green and can then be harvested. The bananas can be produced any time of the year
- **Pests**:
  - **Nematodes**: Use nematocides. (worms eat the roots resulting in stunted growth)
  - **Snails**: Remove by hand.
  - **Aphids**: Use cypermethrine.
- **Diseases**:
  - **Bunchy top**: Caused by a virus and transmitted by aphids. **Symptoms**: Stunted growth in leaves. **Control**: Remove affected plants, and use cypermethrine.
  - **Banana mosaic**: Same as bunchy top.
- **Banana Production**
  - Each banana station should have 3 plants and when a plant has produced a bunch of bananas the stem is cut and another sucker is allowed to grow. Do not allow more suckers to grow as this will reduce the quantity and quality of the bananas.