Cultivation and Sustainable Bark Collection of *Prunus africana*

Technical Note
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Cover photo: Traditional healer Aaron Ngong harvesting Prunus bark in Kikfuini, Boyo Division, Northwest Province of Cameroon [ICRAF 2008]

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WHAT IS PRUNUS AND WHERE IS IT FOUND?

- Scientific name: *Prunus africana*
- Common names: Prunus, pygeum, bitter almond, kanda stick and red stink wood
- Local names: alumty (*Nkwen*), Watango (*Bakweri*), ebla (*Oku*), Kira (*Lamnso*) and Mueri (*Ken*)
- Prunus grows in the mountain regions of West, Central, East and Southern Africa, including Madagascar. In Cameroon, it is present in Centre, West, South-West, Littoral, North-West and Adamawa provinces.

WHY PROTECT THE PRUNUS TREE?

a) **For income generation**

- In the South West of Cameroon, 1 kg of Prunus bark is sold at 260 FCFA (USD 0.68) and in the North West of Cameroon, 1 kg is sold at between 35 - 60 FCFA (USD 0.1 – 0.15) at farm gate.
- A well-managed tree can generate between 4000 – 14.000 FCFA (USD 10 – 35)
- In Oku, a third of the population uses prunus bark as main source of income.
- The number of farmers planting prunus trees on their farms has been increasing over the years. Between 1991 and 2003, ONADEF has produced and distributed about 504 000 prunus plants in the Northwest Province of Cameroon. Since then, more community and group nurseries have been created and many of them propagate prunus through seeds and rooting of cuttings.
b) For medicinal use

- Bark extracts are used in pharmaceutical industries for the manufacture of medicine that cures prostate enlargement and other urinary infections. More than 19 medicinal products made from bark extracts exist, among which *Tadenan* (Laboratory of Debat and Fournier), *Proscar* (Merck and Dohme LTD), *Pygenil* (Indena Spa) are the most popular.

- Leaves are used as an inhalant to treat fever.

- Leaves are drunk as an infusion to improve appetite.

- Infusion of bark is used to treat chest infections.

- Water is added to pounded bark, and the red liquid is used as a remedy for stomach-ache.

- Bark extract may be used as a purgative for cattle.

- In Cameroon more than thirty human and animal ailments are reported to be treated with *P. africana*.

c. For other uses

The wood of prunus is hard and strong and it is used in making tools like axe and handles of hoe and also as poles for building of houses.
HOW TO PROTECT THE SPECIES

- Propagate and plant Prunus trees
- Adopt appropriate methods for sustainable bark harvesting

A. PROPAGATION TECHNIQUES

Prunus can be propagated by two techniques, namely:
- Propagation by seeds
- Propagation through rooting of cuttings.

For both, the construction of a shade house is required.

CONSTRUCTION OF A SHADE HOUSE

- **Materials:** sticks, planks, nails, zinc/mats for roofing, bamboo,…

- **Procedure**

Construct a shade house to protect plants from direct sun and heavy rain. Surround the shed with a fence made of bamboos or other local material to keep animals away. The dimensions depend on the objective of the nursery and the space available. For example, the number of plants to produce will determine the number of propagators, the size of the production area and storage place.

The roof can be made of zinc (aluminium sheets) or thatches. The shed should be high enough to facilitate the entry of sunlight (for example, a shed of 4 m X 6 m with 2 slopes should be at least 3m high in the middle and 2m on each side like shown in figure 2.)

![Fig. 2: Nursery](image)
MULTIPLICATION BY SEED
Multiplication by seed is the technique most commonly used by farmers for the propagation of Prunus.

- **Materials:** Cutlass, harvesting bag, polythene bag, watering can, sprayer, pesticide, sand, black soil
- **Steps:**
  a) Tree selection
  Collect seeds from at least 50 mother trees and take about 50 – 100 seeds per tree. If possible, make sure that the trees from which you collect seeds are at least 100m apart to maintain the genetic diversity.

  b) Fruit collection
  Fruiting of Prunus in Cameroon generally occurs from February to May. Before the fruits start to fall:
  - clean under the tree crown;
  - protect the site against rats, primates and some birds which are highly attracted by Prunus fruits;
  - every morning for as long as the fruits fall, collect fallen mature fruits (purple colour) and store in a disease and pest-free bucket, bag or fruit container.

  c) Seed extraction
  - Store fruits for a few days just to allow them to rot.
  - Use sand to remove pulp and extract the seed.

  d) Seed conservation
  - Dry seeds in the sun for 3 days.
  - Conserve them in a dry and well aerated container and keep in ambient temperature.
  - Seeds can not be stored for more than 3 weeks at ambient temperature. After that period they will no longer germinate.
e) Seed germination

- Prepare seed bed of max 1m large.
- Use sand, sawdust or a mixture of sand and sawdust, as substrate.

The indicated planting depth is 2 cm. Germination starts after 2 weeks, and may continue to up to 2 months.

f) Potting and weaning seedlings

- Remove the seedlings from the seed bed when they have 2 or more leaves.
- Transplant them into a 1 litre polythene bag and water them. The substrate is composed of 3 parts of soil and 1 part of sand or 2 parts of soil, 1 part of sand and 1 part of compost.
- If the roots are too long (more than 5 cm), reduce them to about 3 cm with a scissor or a sharp knife.
- Store plants under a shed to protect them from sun and heavy rainfall.
MULTIPLICATION BY ROOTING OF CUTTINGS

Rooting of cuttings is a vegetative propagation technique that consists in inducing the rooting of a uni-nodal cutting, collected from a selected tree and placed in a propagator. The rooted cutting will then grow into an independent plant.

Fig. 3: Leafy stem cutting process

Rooting of stem cuttings allows for mass propagation (a propagator of 3 m by 1 m can produce about 700 cuttings per year), a better planning of the production (rooting can take place at any time, you do not have to wait for seed production) and selection (you can produce a large number of cuttings of superior trees).

The different steps involved in rooting of leafy stem cuttings include: propagator building and establishment, collection and pre-treatment of cuttings, setting of cuttings into the propagator, maintenance, evaluation of rooting and weaning.

- **Materials:** Non-mist propagator, harvesting bag, pruning shears, bucket, surgery blade or any other sharp knife, sprayer, watering can, polythene bags and pesticide.
**Steps:**

**a) Establishment of a stock plant area**

Establish a stock plant area with seedlings from diverse mother trees and provenances. The recommended number of seeds from each tree is at least 50 (to preserve the genetic diversity).

**b) Construction and establishment of a rooting propagator**

**What is a non-mist propagator?**

A propagation frame or non-mist propagator is a simple wooden box covered with a transparent plastic sheet. The frame contains a water reserve under a rooting substrate. The propagator allows for maximum satisfaction of the conditions for rooting of cuttings, such as:

- constant high moisture,
- moderate light intensity,
- constant temperatures, and
- protection against wind, heavy rain, diseases and insects.

**How to construct and install the propagator?**

- Assemble planks (8/4 and 30/3) to form a woody box of 3 m length, 60 cm height in front and 80 cm height behind and 1 m width, divided in 3 compartments.
- Level the ground properly.
- Place the frame horizontally in the direction East - West and fix its feet.
- Add a thin layer of fine sand on the bottom of the frame to prevent the plastic from tearing.
- Fix strong plastic (transparent or not) to the frame with nails or drawing pins as to form a waterproof basin; double or triple layers if necessary.
- Carefully fill the frame as follows:
  - Put a thin layer (5 mm) of fine sand,
  - Fill with 10 cm of stones and 10 cm of gravel,
  - Add water until these layers are completely covered,
- In one of the corners, place a tube of 20 cm length (beforehand, mark the inside of the tube with white paint at 10 cm) on the stone layer to enable checking of the water level,
- Put 10 cm of rooting substrate composed of sawdust, sand or a mixture of half sand and half sawdust,
- Cover the rest of the box with transparent plastic.
c) Selection of the best tree
The selection criteria to be used at farmer level are the health of the tree and the thickness of the bark. Unfortunately, so far there is no straightforward way to be able to choose prunus trees which have high concentration of active ingredient in the bark. This aspect is still under investigation.

d) Collect cuttings
- Early in the morning, go to the stock plant area or parent tree (managed to produce healthy and vigorous shoots),
- Spray the leaves of the shoots with water to minimize water stress after collection,
- Identify the non attacked,
  soft and vertical branches,
  and cut them with a pruning shears,
- Reduce the leaf area at 25 cm² (or cut each of the leaves by half).
- Keep the cuttings in a wet bag to transport them from the place of collection to the nursery.

c) Prepare and set cuttings in the propagator
- Keep the cuttings in an unused compartment of the propagator,
- Before you start preparing the cuttings, open the propagator, wet the substrate with a sprayer, check the water level and adjust if necessary.
- With a surgery knife or other sharp knife, cut cuttings of 3 cm length from the collected branches, make sure the cut at the base is circular, and slanted at the top.
- Keep the prepared cuttings in a bucket of water.
- When you have prepared about 5 or 10 cuttings, make small holes in the substrate and place the cuttings by fixing them firmly. Always start at the back of the propagator and avoid that the leaves touch each other.
- Spray the cuttings with water and close the propagator.

**d) Maintenance of cuttings inside the propagator**
- Every day before 9 h in the morning, open the propagator and remove dead leaves.
- Check the water level and adjust if necessary (remove water with a sponge if the level is too high or add water in the tube if the level is too low, i.e. under the white mark)
- Use a dirt-free sponge to clean the plastic cover on the inside (overnight evaporation may have formed which limits penetration of sunlight) and outside.
- Spray the leaves with water and close the propagator.

**e) Evaluate rooting, pot and wean rooted cuttings**
- After 3 weeks, remove cuttings one after the other with a stick.
- Check the base of the cutting for roots and if there is at least one root with a length of about 1 cm, proceed to potting of the cutting.
- Place unrooted cuttings back in the propagator and manage them as explained early.
- Put the rooted cutting in a polythene bag containing a substrate composed
of a mixture of soil and sand (3/1) or soil, sand and compost (2/1/1).
- Place the pot in a weaning propagator.
- Water when necessary, but at least 2 - 3 times per week.
- When new shoots appear, remove the plant from the propagator and keep under a shed for about 2 weeks.
- After that period, progressively reduce the shade to acclimatise the plants before transferring them to the field.
- While in the nursery, apply fungicides and insecticides once a month.
- Apply 2 – 3 g (a bottle cap) of fertilizer per plant (NPK 20-10-10) every 3 months. The fertiliser should be applied on the soil around the plant, not on the plant.
- Weed regularly.
- Change the position of the pot every 3 months to avoid that roots pierce the bottom of the bag and penetrate in the soil.

Fig. 9: Application of fertilizer
**B. INTEGRATION AND MANAGEMENT**

**a. Planting**

When the Prunus plant attains 30 cm in height (about 6 months after sowing or rooting), remove the shade completely and leave the plants for about 2 weeks before transplanting. Transplanting should ideally take place at the beginning of the rainy season.

In the field, early in the morning or late in the afternoon:
- Dig a hole of 30cm x 30cm x 30cm
- Put 5 to 10 cm of black top soil (or compost) in the hole,
- Remove the poly bag and place the plant with the soil in the hole
- Fill with the black top soil

![Fig. 10: Transplantation](image)

The recommended planting density is 5 m by 5 m in pure stands and about 10 m by 10 m in associated cropping. For monocropping, it is recommended to associate with annual crops during the first years to ease management. Prunus can also be planted on the boundaries of farm plots or in hedges to minimise competition with food crops.

**b. Fertilisation**
- After 1 month, apply fertilizer (50g per plant, which is the equivalent of a small tin of tomato concentrate) (e.g. NPK 20-10-10)
- Repeat this operation at the interval of 3 months.
- Follow the instructions on the labels of all chemical products you use
- During the first year, mulch with dry grass during the dry season to avoid excess of evaporation and water loss.
c. pest and disease control

<table>
<thead>
<tr>
<th>Causal agent</th>
<th>Damage</th>
<th>Appropriate treatment proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caterpillars</td>
<td>Consume leaves</td>
<td>Curative treatment: Apply cyperdim or other appropriated insecticide just at the beginning of the attack</td>
</tr>
<tr>
<td>Snail</td>
<td>Consume leave and cut plant at snare point</td>
<td></td>
</tr>
<tr>
<td>Borers</td>
<td>Bore adult stems and branches</td>
<td></td>
</tr>
<tr>
<td>Aphids</td>
<td>Bite and suck serf</td>
<td>Preventive treatment: 2 weeks after planting. apply appropriated insecticide like cyperdim and repeat the operation every month</td>
</tr>
<tr>
<td>Cochineal</td>
<td>Agglutinate on internal and external face of leaves which wither and fell down</td>
<td></td>
</tr>
<tr>
<td>Ant</td>
<td>Form galleries on the stem</td>
<td></td>
</tr>
<tr>
<td>Gommose</td>
<td>Sticky exudation flow out from armpit of stem or some branches</td>
<td>It is recommended to plant at higher altitudes</td>
</tr>
</tbody>
</table>

d. Origin of planting material

It is possible to take prunus cuttings and seedlings from one place to another. For example, material collected from Southwest province of Cameroon can be planted in Northwest province without affecting the growth of the tree. The effect on the concentration of active ingredient however is not yet known.

e. pruning of branches

In general, the branching of cuttings occurs at the lower part of the trunk. As it is the bark of prunus that is exploited, pruning of the lower branches is recommended for maximum bark production.
C. HARVEST PRUNUS, NO KILL’AM: SUSTAINABLE HARVESTING TECHNIQUES

To sustainably harvest prunus and get good quality products, there are operations that occur before, during and after harvesting.

• **Before harvesting**
  
  * Get your permit:

  Because *Prunus africana* is a threatened species, by law you must have a special permit to be able to harvest prunus bark from the wild. A permit is not required when you exploit prunus trees that have been planted on your farm. To avoid possible problems in the future, farmers are advised to register the trees they plant with the Chief of Post of the Ministry of Forestry and Wildlife (MINFOF). A short letter containing the location, the number of trees and the date of planting, stamped by the chief of post will be enough. To obtain a permit to harvest prunus, you need to have an organised group and apply through the Provincial Delegate of MINFOF. Presently the quota of exploitation in the mount Cameroon area is 300 tons per year.

  * Prepare the harvesting equipment:

    - cutlass,
    - safety belt,
    - ladder or pole,
    - measuring tape,
    - peeling stick or stake,
    - foam.

• **During harvesting**

  a) **Period:** the indicated period is the rainy season in order to reduce the risk of stress to the tree after harvesting and to ease bark removal.

  b) **Measurement and marking:**

    - Take measurement with the tape along the trunk of the tree and mark the point at 1.30 m above the ground.
- Run the tape around the tree at that point and if the circumference is less than 1 m, **DO NOT HARVEST**.
- If the circumference is comprised between 1 and 1.5 m, divide the trunk into 4 parts and mark to harvest 2 opposite parts (2 and 4 or 1 and 3).
- If the circumference is more than 1.5 m, divide the trunk into 8 parts and mark to harvest 4 opposite parts.

![Fig. 11: Measurement of the trunk circumference](image)

![Fig. 12: Divided tree into collected and kept parts](image)

c) **Harvesting**

- Use the safety belt, ladder or pole to climb.
- Use your peeling stick or stake to harvest at the limit indicated above, but without hurting the woody part of the stem so as to accelerate the regeneration.
- Repeat the harvesting on the opposite parts that you reserved after at least 5 years’ interval when the exploited parts have recovered.
- Harvesting starts from above to the first big branch
- Collect fallen debris to increase the quantity of bark.
- Using the appropriate method, you can harvest between 15 -100kg from a tree at each harvest depending on the size of the tree.

d) Packaging
- Properly tie the harvested bark into bundles to avoid losses.
- Foam and belt firmly for easy carrying.
- Avoid carrying in containers infected by toxic products.

For buyers: Avoid buying bark collected from young trees or very thin bark to avoid destruction of the species and low quality products.

Some useful contacts if you need plants

While national and provincial nursery networks are establishing, you can get Prunus seedlings and cuttings from the farmer groups listed below.

<table>
<thead>
<tr>
<th>Farmer Group name</th>
<th>Province Division</th>
<th>Sub-division</th>
<th>Village</th>
<th>Name of contact person</th>
<th>Phone / Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIFACIG</td>
<td>North-West</td>
<td>Boyo Belo</td>
<td>Njinikejem</td>
<td>Kuh Emmanuel</td>
<td>75 46 51 64 <a href="mailto:mifacig@yahoo.com">mifacig@yahoo.com</a></td>
</tr>
<tr>
<td>Goodwill</td>
<td>North-West</td>
<td>Boyo Belo</td>
<td>Kikfuini</td>
<td>Ngong Aaron</td>
<td>75 10 31 67</td>
</tr>
<tr>
<td>Riba</td>
<td>North-West</td>
<td>Bui Kumbo</td>
<td>Kishi Riba</td>
<td>Georges Kangong</td>
<td>77 94 99 90 <a href="mailto:gkangong@yahoo.com">gkangong@yahoo.com</a></td>
</tr>
<tr>
<td>PROAGRO</td>
<td>West Nkoung-khi</td>
<td>Bayangam</td>
<td>Bayangam</td>
<td>Blaise Kom</td>
<td>77 02 16 38 / 96 16 98 26 <a href="mailto:gicproagro@yahoo.fr">gicproagro@yahoo.fr</a></td>
</tr>
<tr>
<td>APADER</td>
<td>West Nde</td>
<td>Bangangte</td>
<td>Feutap</td>
<td>Roger Kwidja</td>
<td>99 76 77 71 <a href="mailto:apader@yahoo.fr">apader@yahoo.fr</a></td>
</tr>
</tbody>
</table>

Further Reading


