For more information contact:

SASAKAWA GLOBAL 2000 (MoA)
P. O. Box 62347, Addis Ababa, Ethiopia
Tel: +251-115-518040; Fax: +251-115-512984
E-mail: moa@telecom.net.et

Kenyan Industrial Research & Development Institute (KIRDI)
P. O. Box 30650, Nairobi, Kenya
Tel: +254-20-535966/84/90
E-mail: dir@kirdi.go.ke, Website: www.kirdi.go.ke

National Agricultural Research Organisation (NARO)
P. O. Box 295, Entebbe Uganda
Tel: +256-41-320512 or 320341/2
Fax +256-41-321070
E-mail: dgnaro@infocom.co.ug; Website: www.naro.go.ug

International Institute of Tropical Agriculture (IITA) - Tanzania
c/o Mikocheni Agriculture Research Institute
P. O. Box 6226, Dar es Salaam, Tanzania
Tel: +255-22-2700092, Fax: +255-22-2775021
E-mail: iita-tanzania@cgiar.org, Website: www.iita.org

CTA
partageons les connaissances au profit des communautés rurales
sharing knowledge, improving rural livelihoods

The ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA)
P. O. Box 380, 6700 AJ Wageningen, The Netherlands
Tel: +31(0)317-467100, Fax: +31(0)317-460067
Email: cta@cta.int, Website: www.cta.int

CTA is financed by the European Union

CTA Practical Guide Series, No. 11

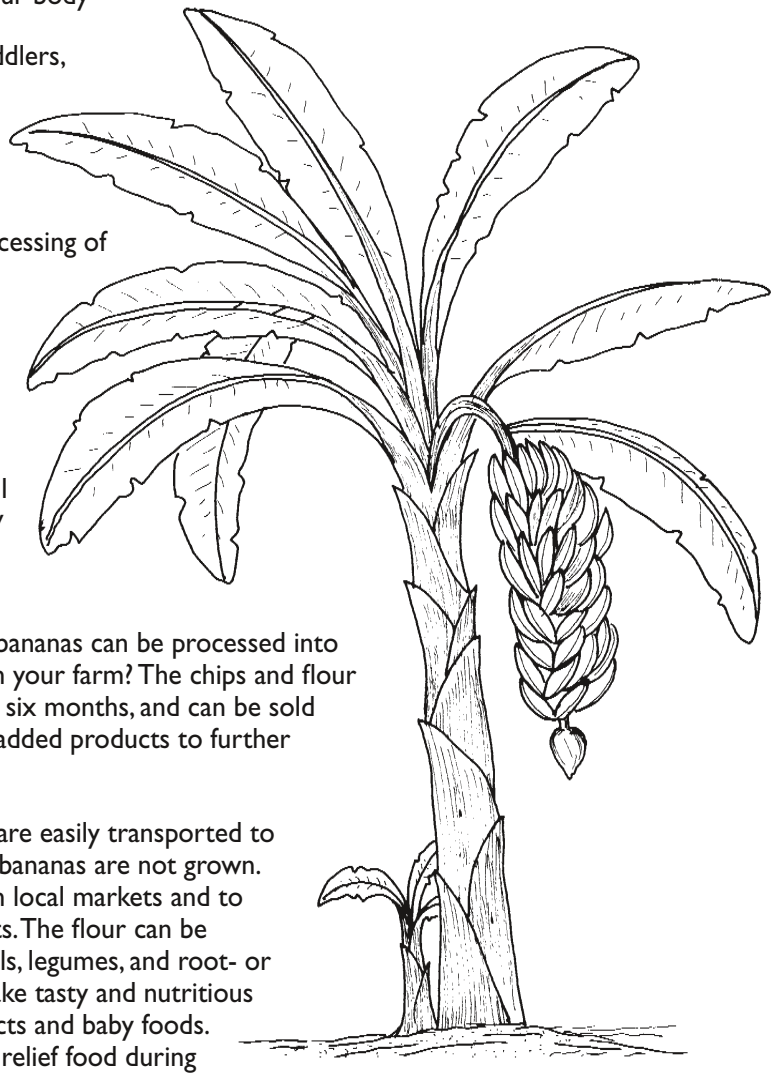
Making Banana Chips and Flour

Making Banana Chips and Flour

Importance and benefits of bananas

Bananas are a staple food in many parts of Eastern Africa. They are:

- a good source of potassium, which helps keep your body fluids in balance.
- an ideal food for toddlers, invalids and people living with HIV/AIDS.



Currently, there is very limited commercial processing of bananas:

- Most people consume bananas fresh, steamed or boiled.
- During bumper harvests, farmers sell bananas at give-away prices and many go to waste.

But did you know that bananas can be processed into dried chips and flour on your farm? The chips and flour can be stored for up to six months, and can be sold or used to make value-added products to further increase your income.

Banana chips and flour are easily transported to distant markets, where bananas are not grown. They can also be sold in local markets and to hotels and supermarkets. The flour can be mixed with other cereals, legumes, and root- or tuber-crop flours to make tasty and nutritious porridge, bakery products and baby foods. It can also be used as a relief food during droughts, floods and other emergencies.

CTA Practical Guide Series, No. 11

Other banana products, which may be made from the non-edible parts, include compost, animal feed and a wide range of craft items from banana fibre, such as hats, bags and purses.

So, the banana is important for health, food security and wealth creation.

This leaflet shows you how to make banana chips and flour.

What you need to make banana chips and flour

- Unblemished, freshly harvested green bananas
- Gloves (to prevent staining of hands with banana sap)
- Anti-browning agent (powdered sodium metabisulphite – available from specialized food shops and chemists)
- Clean water
- Clean, sharp knives
- Plastic buckets
- Raised open-sun platform, solar dryer or hot-air dryer
- Plastic packaging bags (polyethylene)
- Teaspoon
- Trays and fine plastic mesh.

Making chips and flour from un-cooked green bananas

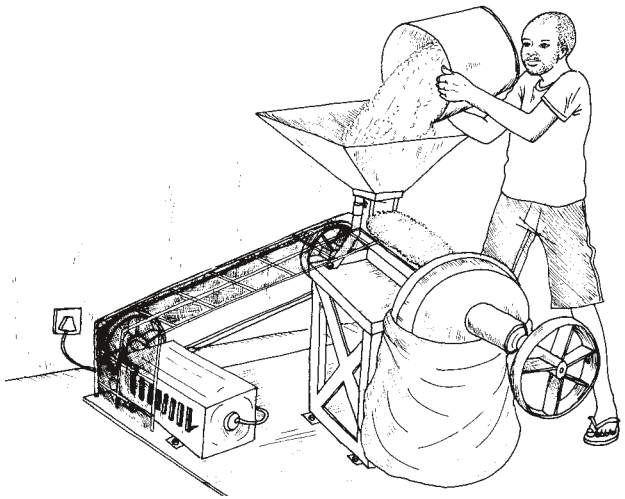
1. Peel the unblemished mature green bananas.
2. Slice the bananas into 0.5-cm thick pieces (about the thickness of a pencil).
3. Soak sliced bananas in a solution of anti-browning agent. To make the solution, add 10 mg (one teaspoon) of the chemical to each litre of water. Soak the slices for 15 minutes.
4. Drain the slices by placing them on trays with plastic mesh and then place them in the dryer.
5. Dry in the sun (open or solar dryer) or in a hot-air dryer until dry and brittle. This will take about two to three days in good sunshine.

Hot-air dryers and solar dryers are more expensive than open sun-drying but reduce contamination from the environment. If drying in open sunshine, protect bananas with netting to keep off flies and birds. Either pack chips or continue to make flour.

6. Grind the dried banana chips in a hammer mill (village *posho* mill).
7. Pack the flour in polyethylene bags and seal them (a burning candle or an electric polysealer may be used).
8. Label your bags (include date of manufacture and expiry date - after six months).
9. Pack the bags of flour in a carton to protect them from light.
10. Store in a cool, dry place.

Making chips and flour from pre-cooked green bananas

1. Cook unpeeled bananas in a pan of water until tender. Do not overcook.
2. Place cooked bananas in cold water to cool until safe to handle.
3. Peel the bananas.
4. Slice the bananas into pieces about 0.5 cm thick (about the thickness of a pencil).
5. Dry in the sun (open or solar dryer) or in a hot-air dryer until fully dry and brittle. If drying in open sunshine, protect bananas with netting to keep off flies and birds. Either pack chips or continue to make flour.
6. Grind the dried banana chips in a hammer mill (village posho mill).
7. Pack the flour in polyethylene bags and seal them (a burning candle or an electric polysealer may be used).
8. Label your bags (include date of manufacture and expiry date - six months later).
9. Pack the bags of flour in a carton to protect them from light.
10. Store in a cool, dry place.



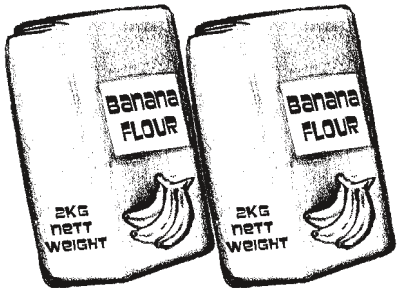
Tip:

The pre-cooked flour is very convenient to use as it does not require further cooking and saves on preparation time. Simply add to hot water, milk or soup and mix well.

What can go wrong?

Problem	Possible Causes	Corrective Action
Poor-quality green bananas	Bruised, blemished and broken bananas due to poor handling Immature bananas Improper storage Delayed processing Delayed harvesting	Handle bananas carefully Store harvested bananas in a cool place Process bananas within a week of harvesting Harvest bananas when fully mature and uniformly green
Discoloured chips and flour	Using mixed banana varieties Using different-sized chips Not using anti-browning agent or not soaking in anti-browning agent for 15 minutes	Use only one variety Ensure chips are 0.5 cm thick Use anti-browning agent as recommended
Decreased shelf life of chips and flour	High moisture content due to: poor drying of chips absorption of moisture by chips or flour during storage	Ensure chips are well dried (to brittleness) before making flour Store in dry conditions Use new, strong polyethylene bags
Mushy bananas that are difficult to peel, slice and dry	Overcooking the bananas Use of near-ripe bananas	Avoid overcooking the bananas Use fully mature and uniformly green bananas

Problem	Possible Causes	Corrective Action
Foul/fermented smell of chips or flour	Contamination due to: microbial growth use of unclean water	Dry chips in clean and hygienic conditions. Use clean (potable) water to avoid contaminating the final product. Use recommended packaging materials.
Loss of chips and flour in storage	Infestation by storage insect pests (e.g. weevils) Rats in storage area Storage in poor-quality packaging materials Storage of product on the ground	Ensure proper packaging (use strong, sealed bags). Put in place measures to control storage pests. Make storage area rat-proof and control rats. Store bagged chips or flour off the ground.



Case study

In 1982, Mr. Robert Nyirenda and his wife Edna started Nyirefami Limited, a business to process sorghum and millet in Arusha, Tanzania. Although they did well, they had another idea to expand the business in 1999. When they were young, they remembered that their parents used to dry bananas in the sun and make flour using a pestle and mortar. The flour was either used plain or mixed with maize flour to make stiff porridge (*ugali* or *sima*) or thin porridge (*uji*). Robert and his wife knew that a lot of their bananas went to waste. These were mainly the small fingers at the ends of the bunch, as well as the broken bananas which were not fit for sale. While selling their sorghum and millet products, and through their social interactions, they established that there was a high demand for banana flour in Tanzania.

In 1999, Robert asked a local metal fabricator to design and make an electric dryer. At that time the price of bananas was quite low and Robert and his wife employed extra workers to assist them to process the bananas. Robert also sought the services of a firm in Nairobi to print packaging materials. Later that year, Robert started selling banana flour to shops and supermarkets in Arusha at US$ 0.50 per kilogramme. They were able to sell at such a low price because the bananas were very cheap. Robert had to buy additional bananas to meet the very high demand for the flour. As a result, Robert and his wife made a good profit which allowed them to invest in more processing machines, further expanding their business.