

GROUNDNUT PROCESSING

Introduction

Groundnuts are a high value crop that can be marketed with little processing but are extremely versatile and can be used in a wide range of products. The oil can be used for cooking, they can be used as a shortening or as a base for confectioneries and they can be used to make peanut butter.



Figure 1: Peanut Butter Production, Fadzavanhu Enterprises established by four housewives. One of them, Memory, is pictured here seen with samples of the final product.

There are two types of groundnut, a bush and a runner. Hybrids of the two varieties have been developed and are commercially available. The pods of the bush variety contain one or two kernels in a thin shell. The runner variety has one to three kernels in a thicker shelled pod. Irrigation techniques consisting of regular watering up to ripening stage and then reduced to avoid wrinkling. Nitrogen fixing nodules are found on the roots although nitrogen and potassium fertilisers are often added to the soil to improve yields.

Harvesting

The groundnut plants are annually harvested by being pulled or dug up. This is usually called 'lifting'. There are various designs of equipment available to assist in lifting groundnuts. The Industrial Development Centre (IDC) originally developed a groundnut lifter at Maidururi for the savannah area of Northern Nigeria and later adapted for local manufacture for the ITDG project in Magoye in Zambia.

The IDC lifter is an attachment for an EMCOT plow. It is pulled by a draft animal, with two depth wheels and a plow-like bar for lifting up the groundnuts. The ITDG groundnut lifter is a complete piece of equipment in itself. "A lightweight lifter suitable for groundnuts grown on 75 cm spaced ridges in sandy soils. Suitable for manufacture by village blacksmiths." The minimum equipment required would be a forge, anvil, hammer, tongs, chisel, and punch.

Stripping

This is the process of removing groundnuts in-shell from the haulm after lifting and, usually, drying. This is normally done by hand and is a tedious and time consuming operation. The pods are removed by picking or flailing.

Pests and Disease

Groundnuts are attacked by; the Bean leaf roller (*Lamprosema indicata*), Leafminer (*Stenopteryx subsecivella*), Long-horned grasshopper (*Phaneroptera furcifera*), Cotton leafhopper (*Empoasca biguttula*), Slant-fac

grasshopper (*Atractomorpha psittacina*), June beetles (*Leucopholis irrorala*), and Tiger moth caterpillar (*Dasychira mendosa*) amongst others.

Mould (*Aspergillus flavus*) can attack groundnut, leading to aflatoxin contamination, if the nuts are not dried sufficiently. Aflatoxin in peanuts is a serious problem. The peanuts can become infected either before or after harvest. Once they are infected, there is no way that the aflatoxin can be removed and the peanut becomes dangerous for consumption. If the peanut is free from the disease at harvest, correct drying can prevent later infection. Some aflatoxin infection can be visible to the eye as mould, but in other cases it cannot be seen. Laboratory tests need to be carried out to confirm the presence of aflatoxin. The recommended moisture level should be less than 10 percent.

Blanching is a process that destroys enzymes (biological compounds that are responsible for deterioration and off-flavours in foods after harvest), while retaining the colour and most of the nutritional value. It is a very simple process and basically involves the immersion of the foodstuff in boiling water or steam for a very short time, followed by rapid cooling by plunging in very cold water. To carry out this process at the small scale all that is required is a large tank in which water can be boiled. At a slightly higher level, there is specific blanching equipment available- both water and steam blanchers.

Oil Extraction

Oil contains high amounts of energy and fat-soluble vitamins (A, D, E, and K) and essential fatty acids. The oil content of the kernels is between 45% and 55%.

The peanuts are prepared for the oil extraction process by being shelled and cleaned. Oil production requires some type of press with which to extract the oil from the groundnuts and filtering equipment.

ITDG has developed a simple manual screw press that would be suitable for extracting oil from peanuts, as well as many other agricultural crops. There are quite a number of presses of very similar design, they are simple to make, except for the screw which would have to be machined.

For more information see the ITDG South Asia Technical Brief *Principles of Oil Extraction*.

Peanut Butter

The peanuts are first shelled and cleaned. They are then roasted at 425°F (218°C) for 40-60 minutes either a) on trays in an oven, the nuts being turned by hand from time to time or b) in equipment similar to that used for roasting coffee. This small rotary roaster (Figure 1) allows each nut to become uniformly roasted.

After roasting the nuts will be well browned and the skins loose. After cooling, it is necessary to remove the skins by gentle brushing, an inspection will allow the



ITDG Southern Africa
Example of equipment sold in
the light engineering workshop -
Peanut Grinding Machine.

manual removal of discoloured and other rejected material.

Traditionally women pounded the nuts between stones, a very time consuming activity. Now nuts are often ground in a mill that may be powered by hand or with a motor. The type of mill used will depend on the scale of production, The milling process may have to be repeated to obtain the desired texture.

Salt may be added at this stage; about 2% by weight. A special anti-oxidant chemical may be added to prevent rancidity, which will develop after a few months. However, to start with the product will probably be sold very soon after manufacture. The peanut butter is then packed in jars.

The type of peanut butter produced by this process is of the 'crunchy' variety, and adjustments on the mill can produce varying textures. For the very smooth paste a more sophisticated milling process is required, with the high levels of heat being produced during milling causing difficulties.

To avoid separation of the oil and the settling out of the solids within the peanut butter after few days of storing, the preservative called glycerolmonostearate (GMS) can be added to the at 2-3% by weight. It is suggested that all of the GMS is added to a small amount of the peanut butter and then this is mixed into the main batch of the produce.

References and Further Reading

- *The Manual Screw Press for Small-scale Oil Extraction*, describes the ITDG oil press manufacture and use,
- *Oil Processing: Food Cycle Technology Source Book* by UNIFEM, This book has a broader coverage

Engineering drawings of the ITDG screw press are available from ITDG Peanut Roaster Technical Brief is produced by ITDG South Asia (details shown below)

ITDG Sri Lanka have been involved in the design and development of a peanut roaster for small-scale production, and should be able to supply names and addresses of local equipment suppliers. ITDG Southern Africa has produced peanut butter making equipment.

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Equipment Manufacturers and Suppliers

Penagos Hermanos & CIA LTDA
Apartado Aereo
Bucaramanga
Colombia

A powered mill for 'crunchy' peanut butter, with adjustable milling thickness.

technical brief

Small-scale nut grading equipment suppliers.

Gauthier
Parc Scientific Agropolis
34397 Montpellier
Cedex 5
France
Tel: + 33 (0) 467 61 1156
Fax: + 33 (0) 467 547390

Acufil Machines
SF. 120/2
Kalapatly
Coimbatore - 641 035
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Tel: + 91 422 866108/866205
Fax: + 91 422 5752640
gondalu@yahoo.com

Hand operated peanut shelling machines.

G. North (PVT) Ltd
P.O. Box 111
Southerton
Harare
Zimbabwe

Mekins Agro Products (PVT) Ltd
6-3-866/A Begumpet
Greenlands
Hayderabad 500-016
India

Zimplow Ltd
P.O. Box 1059
Bulawayo
Zimbabwe

Sismar
20 rue Dr.Theze
3214
Dakar
Senegal

Alvin Blanch Development Co. Ltd
Chelworth
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Wilts SN16 9SG
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Kunasin Manufacturing,
107-108 Sri-Satchanalai Road,
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Sukhothai,
Thailand,
Tel.: (055) 642119
Manufactures of a rubber tyre
groundnut sheller

Rajan Universal Exports (MFRS) PVT. Ltd
"Raj Buildings"
Post Bag No. 250
162, Linghi Chetty Street
Chennai-600 001
India
Tel: (044) 5341711, 5340731, 5340751
Fax: (044) 5342323
E-Mail: rajeximp@vsnl.com
AMUDA" Brand Ground Nut
Decorticators are suitable to shell out
the Groundnut Kernels from the shell.
These decorticators are of Rotary type
and equipped with a blower to
separate the dust & husk. Available in
Hand / Pedal / Power driven versions.

Tonnet Enterprises,
Gayaza Road,
just after Kalerwe market,
P.O. Box 3136 Kampala,
Uganda.
Tel: (256) -077- 413754
Manufacturer of a hand cranked rotary
groundnut sheller. It can shell 3-5
bags of unshelled groundnuts
depending on skills of the operator.
Information provided by:
Post-Harvest Handling & Storage
Project,
P.O. Box 7856 Kampala,
Uganda.
Tel: (256) - 41- 234531

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Developed groundnut planter, groundnut thresher, groundnut/caster
decorticator

Organisations and useful contacts

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