

SHEA NUT PROCESSING

PRACTICAL ACTION
Technology challenging poverty



Introduction

The shea tree (*Butyrospermum parkii* or *Vitellaria Paradoxa*) - commonly known as karité in the Wolof and French languages, grows wild in the equatorial belt of central Africa between Gambia and Sudan and also in Uganda.

The oil extracted has a relatively high melting point and is used in rural areas in the making of foods, soap manufacture and cosmetics. Shea is mainly exported as kernels and can be used as an extender in chocolate as its properties are similar to cocoa butter.

Most small-scale processing to extract the oil is carried out by women and provides an important source of income.

Cultivation

Shea trees are not cultivated but grow as wild plants. A shea-tree will bear fruit at between 8 and 15 years but reaches full capacity for several decades after this. A tree can yield of 15 to 20 kg of fresh fruit that will produce 3 to 4 kg of dry kernels. The kernels contain 42 to 48% oil (butter).

Harvesting

Women and children collect the fallen fruit and take them back to their villages for processing into shea butter, an edible fat.

Processing

The green pulp exterior is removed. One method is to bury the fruit in the ground so that the pulp ferments and falls off. This takes 12 days or more. The nuts are parboiled or sun dried and then dried by smoking over an open fire for 3 to 4 days. The dried nuts can then be stored for long periods without significant losses. Decortication is done by crushing the outer shell to remove kernels. Shea nuts are mainly exported as smoked kernels. The kernels will be further dried before any additional processing is carried out.

Shea nut butter

Traditionally wet processing by hand is a slow and laborious process that uses large quantities of wood as fuel for roasting. Nuts are shelled by hand by being pounded individually using the end of a pestle. The resulting kernel particles are aggregated and roasted on a metal sheet over a fire. The kernels are then pounded in a mortar to produce a coarse paste and then ground between two stones to produce a smooth paste. A small amount of water is added to the paste and the mixture agitated by hand using a "paddling" motion. The quantity of water added is not measured but judged by experience. The mixture is continuously stirred for anything up to 4 hours. The length of time depends on the quality of the nuts. At the end of this time the mixture becomes lighter in colour and more water is then added. The white shea butter then floats to the top of the mixture. At this point the stirring action is carried out much less vigorously. The resulting oil is decanted off the dark brown residue using a spoon and is washed repeatedly with warm water until clean. The remaining water is removed by heating. Impurities settle out and the butter can be left to cool and solidify. The butter is

Practical Action, The Schumacher Centre, Bourton on Dunsmore, Rugby, Warwickshire, CV23 9QZ, UK
T +44 (0)1926 634400 | F +44 (0)1926 634401 | E infoserv@practicalaction.org.uk | W www.practicalaction.org

Practical Action is a registered charity and company limited by guarantee.
Company Reg. No. 871954, England | Reg. Charity No.247257 | VAT No. 880 9924 76 |
Patron HRH The Prince of Wales, KG, KT, GCB

technical brief

then boiled over an open fire until clear. The oil is left overnight and the next day is stirred with small sticks when it becomes solid. The resulting shea butter is then ready to be used. Using this traditional technique, the fat obtained is between 25 and 40 % of the dry kernel weight.

The introduction of equipment may improve upon traditional methods of production by reducing the effort and time involved and by increasing the yield. Instead of pounding by hand, a motorised mill can be used. Oil can be extracted using a mechanical or hydraulic press. An important consideration is that any introduced technology must be at least as technically efficient in terms of yield as well as being a financially-viable operation.

Shea butter extraction

Attempts have been made to introduce small-scale technology to extract shea butter, especially the use of a bridge press with marginal yield increases over the manual method. The resulting press cake provides a useful fuelwood substitute. A fully-motorised method mimicking the steps involved in the manual rural butter extraction methods was developed by the Technology Consultancy Centre of Kumasi University of Technology, Ghana but the equipment is costly and, depending on the shea butter value, may not cover capital and operating costs. Commercial expellers are used to extract the butter from shea nuts due to economies of scale. See Technical brief on Oil Extraction for more details on oilseed expelling.

Food

Used as baking fat and to substitute cocoa butter in chocolate manufacture and chocolate confectionery products.

Cosmetics

Shea butter is used as a base for cosmetics including skincare products and moisturising cream.

References and further reading

- [*The Butter Tree*](#). Jean-Marc Fleury. 2000. IDRC, Canada
- [*Going for gold in Burkina Faso*](#). The New Agriculturist edition 2008-01
- [*The Shea Project: rebuilding lives and livelihoods in northern Uganda*](#)
- [*Extracting profits with a shea butter press*](#). Denis Marchand 1988. IDRC Canada,
- [*Shea nut processing – possibilities and problems in the choice of technology for women*](#) Food Chain Issue 22 pages 3-6.
- [*Vitellaria Paradoxa and the Feasibility of a Shea Butter Project in the North of Cameroon*](#). Karin L. Vermilye B.A. State University of New York at Geneseo presented in partial fulfilment of the requirements for the degree of Master of Science, The University of Montana, 2004.
- *Shea Butter Extraction in Mali, Appropriate Technology Bulletin No 6* Appropriate Technology International, 1985
- [*The Manual Screw Press for Small-scale Oil Extraction*](#), This book describes the Practical Action oil press manufacture and use,
- [*Oil Processing: Food Cycle Technology Source Book*](#) by UNIFEM, This book has a broader coverage.
- [*Principles of Oil Extraction*](#) Technical Brief, Practical Action.

Contacts

GRATIS (Ghana Regional Appropriate Technology Industrial Service)
P.O. Box 151
Tema
Ghana
Tel: 010 233 221 4243
Fax: 010 233 221 6251
E-mail: gratis@ighmail.com
GRATIS manage a network of Intermediate Technology Transfer Units in Ghana

Kwame Nkruma University of Science and Technology (KNUST)
Technology Consultancy Centre (TCC),
Private Mail Bag
Kumasi
Ghana
Tel: +233-51-60334
Tel: +233-51-60137
Fax: +233-51-60137
E-mail: info@knust.edu.gh
TCC has carried out extensive field research into shea processing technology.

Equipment suppliers

Mention of a supplier does not imply endorsement by Practical Action.

[Oilseed processing equipment mostly from India](#)

De Smet Rosedowns
Cannon St
Hull
East Yorkshire
HU2 0AD
United Kingdom
Tel: +44 (0)1482 329864
Fax: +44 (0)1482 325887
E-mail: info@rosedowns.co.uk
Medium- to large-scale expellers and solvent extraction

Alvan Blanch
Chelworth, Malmesbury Wiltshire, SN16 9SG, United Kingdom
Tel + 44 (0) 1666 577333
Fax + 44 (0) 1666 577339
E-mail: info@alvanblanch.co.uk
Website: www.alvanblanch.co.uk
Oil expellers and ancillary equipment

TinyTech Plants
Tagore Road
Rajkot - 360 002
India
Tel: +91 281 2480166, 2468485, 2431086
Fax: +91 281 2467552
Email: tinytech@tinytechindia.com
Website: <http://www.tinytechindia.com/>
Oil expellers and ancillary equipment

[Oil press machinery – China](#)

SIS Engineering Ltd.
P.O. Box 45
KNUST Kumasi
Ghana
Produces motorised churning and washing equipment and a manual screw press.

Azad Engineering Company
C-83, B.S.Road, Industrial Area Ghaziabad - 201 009 Ghaziabad, Uttar Pradesh, INDIA PIN-201 009
Tel: +91 (0)120 470 0708
Fax: +91 (0)120 470 2816
Website: <http://snsvo1.seekandsource.com/azad>
Oil expellers and filters

Hander Oil Machinery Corporation
(Handa Yuki K.K.)
C.P.O. Box 293
Osaka 530-8692
Japan
Tel: +81 6 6328 4693
Fax: +81 6 6326 9620
Email: hander-taka@occn.zaq.ne.jp

- Oil expellers
- Filter press
- Seed scorcher
- Patented fresh coconut oil extraction plants

technical brief

Practical Action
The Schumacher Centre
Bourton-on-Dunsmore
Rugby, Warwickshire, CV23 9QZ
United Kingdom
Tel: +44 (0)1926 634400
Fax: +44 (0)1926 634401
E-mail: inforserv@practicalaction.org.uk
Website: <http://practicalaction.org/practicalanswers/>

This document was updated by Tony Swetman for Practical Action in March 2008.

Practical Action is a development charity with a difference. We know the simplest ideas can have the most profound, life-changing effect on poor people across the world. For over 40 years, we have been working closely with some of the world's poorest people - using simple technology to fight poverty and transform their lives for the better. We currently work in 15 countries in Africa, South Asia and Latin America.

technical brief