

Oilseed Processing for Small-Scale Producers

Value Added and Processing Guide

***Abstract:** Oils for food, nutraceuticals, skin care, aromatherapy, and industrial lubricants can be produced from many kinds of seeds and nuts. This publication profiles the evolution of a cold-pressing and consulting business in the U.S. It also describes the basic processes involved in oil processing: seed cleaning, extraction, clarification, packaging and storage. Sources for more information and equipment are included.*

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Related ATTRA Publications

Adding Value to Farm Products: An Overview
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Introduction

The culinary oils listed in a recent natural foods catalog include – in addition to olive oil – sesame, safflower, sunflower, grape seed, canola, apricot kernel, coconut, hazelnut, peanut, pumpkin, and walnut oils. Advertisements for these culinary oils tout their health benefits and unique flavors. Some of these plant-derived oils can be used to make soap, body and hair oils, detergents, and paints. Some can also be used to make industrial lubricants. Oilseed processing expands the use of crops such as sunflowers and brings value to grape seeds, which are usually waste products.

Farmers and small-business owners are asking whether it is possible and profitable to add value to their seeds and nuts by extracting the oil. This is not an easy question to answer because there are so many variables. Some of the variables are noted in the first section of this publication.

Most oil processing in the U.S. is done on a large industrial scale, and the processes use proprietary information. Small-scale oil extraction is more commonplace in other parts of the world, thus many of the useful resource materials and much of the appropriate-scale machinery come from other countries. This publication describes the basic process, with additional details on producing oil from sunflower seeds and sources for additional information.

Getting Started

Consultant E. Peter Matthies has been involved with pressing oil from seeds and nuts for more than a decade. Matthies now lives in Germany but makes frequent trips to the U.S. He continues to represent Monforts and provides free consultation for people who purchase KOMET oilseed presses. Matthies notes that every circumstance requires a different approach. He suggests asking yourself the following questions.

- Why do I want to get into oil processing? Will it be a hobby or a new economic enterprise?
- How big will the operation be?
- How many different products will be made, including both oil and the press cake left after the oil has

been pressed out of the raw seeds or nuts?

- Do I want to target mass markets or specialty markets?
- What geographical area do I want to cover?

Matthies described how he got into this new “oil business” after retiring from the petroleum business.

Upon my retirement I started to ranch/raise cattle in Western Colorado. A professor at Colorado State University suggested that I plant alfalfa and rotate it with canola rather than other small grains. With a press I would get some oil and the by-product (press cake) would also have economic value.

When I found the special “cold press” equipment in Germany I purchased a couple of presses and got started. I learned from the equipment company representatives about other oils from hazelnuts, peanuts, walnuts, macadamia nuts, to sesame, sunflower, hemp, Saw Palmetto, and others and started to make oils. I also tried some very special oils, like coffee oil and oil from dried orange peels. I went to some of the big shows and met marketing and distributing people. I furnished them with samples and received substantial orders. I shipped anywhere from one gallon containers to 55 gallon drums. A local cattle feed lot sent their truck twice a month to pick up any press cake that I didn’t use for my own horses and cattle.

Slowly my name became known by word-of-mouth. People sent me different seeds or nuts to test for oil content and for the taste and value of such oils. Through a Web page I attracted universities and other companies.

Some people who bought the special Komet presses from me concentrated on special markets, such as hemp seed oil in Canada, or grape seed oils from wineries, or certain immigrant groups who like special oils they were used to from their home country.

Later I became known for the special quality of the truly cold pressed oil (less than 90° F) and I was asked to test various varieties of certain products, such as grape seed oil from different grapes, like an oil “a la Merlot” or “a la Pinot Noir.” I produced oil on contract

for several companies until they had established their own markets, at which point they acquired their own production plants.

Small scale operators, who consider oils as a sideline, might be able to sell to local shops and restaurants. Health spas are always in need of special oils. Make sure you have a good name for your product and present the oils in appealing containers.

In regard to pricing, find out what other people charge and see if you can live with that. Or concentrate on high price markets like certified organic stores or Kosher. Prices for the same oil are different in different parts of the country. Can you be competitive at those rates? Can you sell just under those rates and still be economical? Certified organic and Kosher cost extra for inspection in addition to the installation and operation of the plant. Is the market large enough to pay for the higher costs?

I believe there is no sure fire way in all parts of the country. But one thing is necessary wherever you are: You got to go out and toot your horn!(Matthies, 2004)

Note that Matthies mentions contract processing as a way to get started without setting up your own processing facility. Badger Oil in Spooner, Wisconsin, is one company that will do this, and also provide consulting services if you decide to invest in your own plant. Contact information is in **Further Resources**.

Basic Processing Steps

Raw Material Preparation

Preparation of the raw material often includes removing husks or seed coats from the seeds and separating the seeds from the chaff. Information about seed cleaners designed for small-scale operations is often available from agricultural research stations doing small plot research with various crops. For instance, USDA researchers working with flax in North Dakota buy some of their equipment from Seedburo, which will supply a catalog upon request. Almaco is another company that specializes in equipment for research, such as one- and two-row test plot combines and various types of stationary threshers. See **Further Resources** for contact information and additional sources of equipment.

Extraction

Oil can be extracted mechanically with an oil press, an expeller, or even with a wooden mortar and pestle – a traditional method that originated in India. Presses range from small, hand-driven models that an individual can build to power-driven commercial presses. Expellers have a rotating screw inside a horizontal cylinder that is capped at one end. The screw forces the seeds or nuts through the cylinder, gradually increasing the pressure. The material is heated by friction and/or electric heaters. The oil escapes from the cylinder through small holes or slots, and the press cake emerges from the end of the cylinder, once the cap is removed. Both the pressure and temperature can be adjusted for different kinds of feedstock. The ram press uses a piston inside a cage to crush the seed and force out the oil.

Oils can also be extracted with solvents, but solvent extraction is a complex operation. The enclosed Intermediate Technology Development Group Technical Brief, *Principles of Oil Extraction*, describes several methods of extraction. It cautions that “solvent extraction is not suitable for small-scale processing because of high capital and operating costs, the risk of fire and explosions from solvents, and the complexity of the operation.” Waste management would probably be a problem, also.

Clarification

Clarification removes contaminants, such as fine pulp, water, and resins. You can clarify oil by allowing it to stand undisturbed for a few days and then removing the upper layer. If it needs further clarification, filter the oil through a fine filter cloth. Finally, you can heat the oil to drive off traces of water and destroy any bacteria.

Packaging and Storage

Use clean, dry containers to package and store oils and help prevent rancidity. Sealed glass or plastic bottles are adequate. Colored containers in a dark box help to increase shelf life. The shelf life of oil is usually 6 to 12 months, if it is properly packaged and kept away from heat and sunlight.(Fellows and Hampton, 1992)

Sunflower Seed Oil Using the Ram Press

Enterprise Works Worldwide (EWW – formerly Appropriate Technology International) has supported a number of projects in Africa that process oilseeds using the ram press. (See **Further Resources** for contact information.) The presses weigh about 45 pounds and can process 100 to 120 pounds of sunflower seeds per day. The extraction rate is 20 to 25% using the softer-shelled, high-oil-content sunflower varieties. The ram press can also be used for sesame, mustard, safflower seeds, and peanuts. Details on the use of the press are given in EWW's manual *Using and Maintaining the Ram Press*. The information on pressing sunflower seed that follows is from that manual.



Choose seed that has a soft shell and high oil content (40–45% oil). Most high-oil-content sunflower seeds are all black. Many striped seeds have little oil. To get some idea of how the seed will work in the press, try to crack it open with your fingers. This will not be difficult with soft seed. With hard seed, you may need to use your teeth. Now look at the kernel inside the shell. It should fill the shell completely. If the seed is much smaller than the inside of the shell, it was probably harvested too early. You will not get much oil from it.

Put the kernel (without the shell) between your two thumbnails and squeeze. Did the kernel fall apart? Are there little smudges of oil on your thumbnails? If not, there may not be much oil in the kernel. (This is a very rough way of assessing seed. The manual also presents a more precise way to determine the percent of oil, but still encourages the practice of checking seeds with your fingers.) Check the different batches of seed you come across. In time you will get a feel for the differences.

For successful pressing, the seed must be:

- Dry. Moist seed will lead to low yields and clog the cage (a part of the press). Moist seed may also get moldy.
- Clean. Fine dust in the seed may clog the cage. Chaff left in the seed will absorb some of the oil and keep it from getting squeezed out of the cage. Sand in the seed will wear the press out. Stones badly damage the piston.
- Warm. Warm seed will yield the most oil for the least effort.

Seed should be dry before it is bagged and stored. Very damp seed will feel humid when you bury your hand in it, especially if the seed is warm. If you heat your seed in the sun under a sheet of clear plastic, you may see moisture collecting beneath the plastic if the seed is too wet.

Seed that is slightly too damp may feel dry but will not press well. If it is too damp, but not yet moldy, it can be dried in the sun. (Never press moldy seed. It is not safe for human consumption.) Spread the seed out thinly on the ground, on plastic, or on roofing tin. At the end of the day, pile the seed up to keep it from absorbing moisture in the cool night air, and spread it out again in the morning. If there is any chance of rain, or if the morning dew is heavy, you will need to bag all the seed in the evening and put it back out the following morning. After two or more sunny days, the husks will be dry. Now bag the seed and store it for a week. In that time, the moisture in the seed will be drawn into the dry husk, and the entire seed will become evenly dry.

Winnowing is a low-cost way to clean the seed. On a day when there is a steady breeze, spread a cloth on the ground. Drop the seeds from a container to the cloth. The chaff and dirt will blow away. The seeds will collect on the cloth. Any stones must be picked out by hand.

If the sun is shining, the seed can be heated on a piece of roofing tin or some black plastic. Spread the seed thinly and evenly on the sheet. On a sunny day, it will be hot to the touch in 15 minutes. The seed should be at least 104°F, which is pleasantly warm to the touch. The yield will improve as the seed gets hotter, all the way up to 150°F, uncomfortably hot to the touch. The seed will heat faster on a black surface than on a light-colored surface. Some people also cover the seed with a sheet of clear plastic. This helps to hold heat in and make the seed hotter.

If the sun is not shining, you can also heat the seeds on a stove. Put the seeds in a shallow pan over low heat for five minutes. You will need to stir the seeds often and be careful not to scorch them. Charred seeds will give the oil a bad taste.

You can use a double boiler to make sure that the seeds do not burn. You will need two pots, one large and one smaller. Set the larger pot on the heat, with enough water to keep it from boiling dry. Set the smaller pot inside the big pot. The bottom of the small pot does not need to touch the water below. Put the seed in the smaller pot, stir it occasionally, and the steam from the boiling water will heat the seed without burning it. The seed should be ready in 15 minutes.

The boiler works best if the smaller pot is almost the same size as the big pot. Then there is not too much room for the steam to escape from between them. This method does not require as much attention and stirring, and you will not spoil any seed from accidental charring, but it uses more fuel.

The seed is now ready to be pressed. The pressing operation is described in detail in the manual, complete with diagrams. Dr. Rita Laker-Ojok, a former EWW staffer who worked in Africa, cautions that knowing how to use the press is important, especially regarding pressure adjustments. Correct adjustment allows the “cake,” or

meal, to come out; too much pressure may cause a jam. (Laker-Ojok, 2000)

According to Dr. Laker-Ojok, the sunflower oil produced is very high quality. It can be further processed, or clarified, in one of three ways. The simplest is to let it settle for a week. The oil can also be mixed with a little water and salt and boiled for 10 minutes. This changes the taste slightly. Or the oil can be filtered through paper or cloth.

Seed Cake or Meal, a Valuable By-product

Seed cake is a valuable by-product of pressing. Sesame seed cake is valuable as a human food. Sunflower seed cake is not suitable for people, but it makes a good addition to chicken, pig, or cattle feed. Since sunflower seed cake has all the seed hulls in it, it is very fibrous. The ram press does not get all the oil out of the cake; it is oilier than most feed additives. It is quite high in crude protein, but contains very few carbohydrates. It should be used as a feed additive, not a feed by itself. The EWW manual describes feed rations for commercial broiler chickens, cows, and pigs that include sunflower seed cake.

Proper storage of both seed and seed cake is extremely important. Seed must be protected from moisture, rodents, and insects. Very moist seed will rot. Even if your seed is not moist enough to rot, it may be moist enough to grow mold. This is a problem for two reasons. First, moldy seed cake does not taste good to animals. They may not be willing to eat moldy feed. Worse, some kinds of mold make mycotoxins such as aflatoxin. These poisons can make people and animals sick. Some of the poisons from moldy seed will end up in the oil, but most remain in the seed cake. They can also get into the meat, eggs, and especially the milk of the animals that eat the cake.

Mold spores (seeds) are present in all crops. Molds grow best in warm, humid weather. To prevent the growth of mold, dry the seeds shortly after harvest. Even dry seed can quickly get damp by being in contact with damp earth. Once the seed is dried and bagged, it must be stored carefully to keep it from taking up moisture. The moisture content of the seed should be no higher than 10%. To test for moisture, weigh a sample of seed or cake, and then heat the sample in an oven

at 300°F for one hour. Reweigh the sample. The weight lost in the oven is equal to the moisture content of the original sample, and the percentage can be calculated: divide the weight lost by the original weight and multiply by 100.

Other Oil Presses

Several types of small-scale extractors are commercially available, both imported and manufactured in the U.S. Two that are commercially available in the U.S. are described here. (See **Further Resources** for contact information.)

Komet Oil Expellers

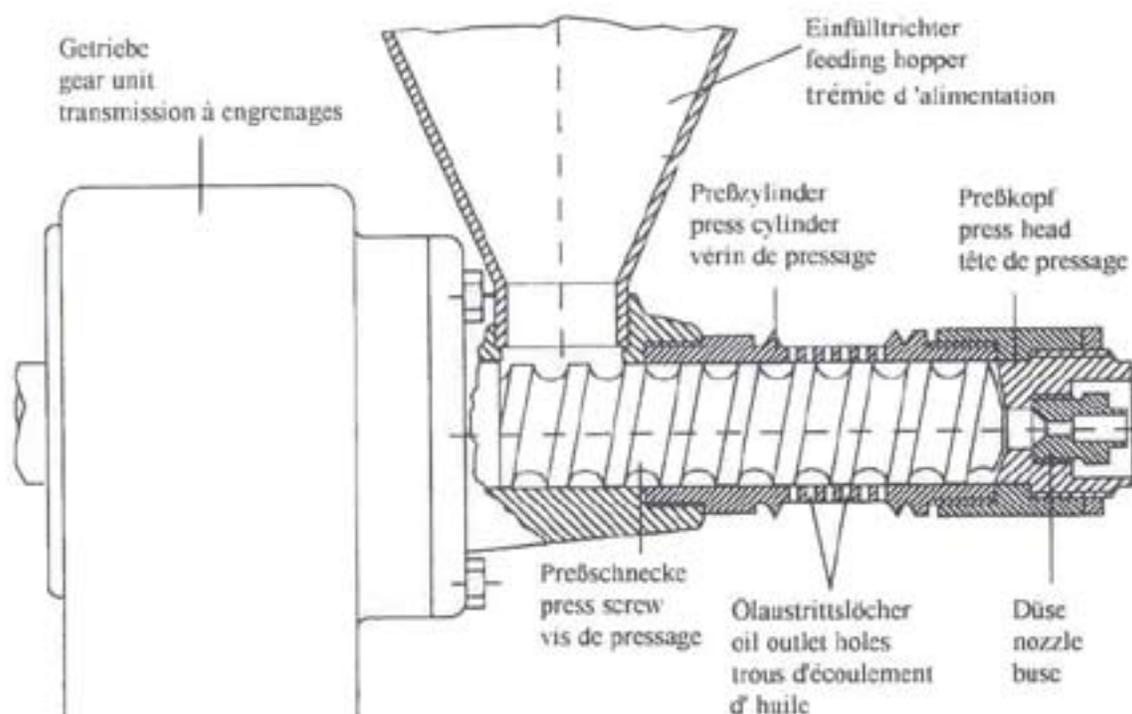
Komet Vegetable Oil Expellers are manufactured by IBG Monforts in Germany, whose range of products covers small hand-operated as well as industrial machines. According to the product literature, Komet oil expellers feature a special cold pressing system with a single conveying screw to squeeze the oils from various oil-bearing seeds. The machines operate on a gentle mechanical press principle that does not involve

mixing and tearing of the seeds. Virtually all oil-bearing seeds, nuts, and kernels can be pressed with the standard equipment without adjusting the screws or oil outlet holes.

The vegetable oil produced needs no refining, bleaching, or deodorizing, as long as the natural taste, smell, and color are acceptable. Generally, any sediment in the oil will settle to the bottom of the collecting vessel after approximately 24 hours and form a hard cake. You can then pour the oil through a paper or textile filter to remove any remaining impurities.

Since the vegetable oil will not reach temperatures higher than approximately 100 to 120°F, all its vital components will be preserved. Therefore, it is excellently suited for natural nutrition. As long as the oil is stored in a dark, cool place, it will have a long shelf life.

You must precondition the seeds before extraction. Big nuts, kernels, and copra (dried coconut meat) have to be crushed to the size of peas on the Komet Cutting Machine "System Crusher."



Sectional view of a KOMET oil expeller.

The Täby Press is a screw press manufactured in Sweden. Various models are available for cold-pressing rapeseed, linseed, flaxseed, sunflower seed, sesame seed, peanut, groundnuts, mustard seed, poppy seed, cotton seed, jojoba, etc. Bengt Jonsson is the designer, manufacturer, and seller of the oil press, and is also a farmer. The Type 20 screw press is distributed in the U.S. by Magic Mill International. (See **Further Resources**.)

Adding Value Adds Costs

Although value-added processing can be a way to increase a farmer's share of the farm product dollar, adding value doesn't come free. At each step, the farmer is adding more work, buying additional equipment and supplies, and using more energy. Information needs increase. And depending upon the situation, liability insurance may become a must.

A key point to remember is that adding value to any foods by processing increases safety risks, due to the increased handling. Therefore, rules and regulations are established by each state to protect the public health. In addition, the FDA regulates products going out of state. Farmers considering processed foods as a value-added business should contact their state health department before proceeding.

References

Fellows, Peter, and Ann Hampton (eds.). 1992. *Small-Scale Food Processing: A Guide to Appropriate Equipment*. Intermediate Technology Development Group. 158 p. (A second edition was published in 2003. See **Further Resources** for ordering information.)

Herz, Jonathan. 1997. *Using and Maintaining the Ram Press*. Enterprise Works Worldwide. Washington, DC. 42 p.

Laker-Ojok, Rita. 2000. Personal communication.

Matthies, E. Peter. 2004. Personal communication. See **Further Resources** for contact information.

Enclosures

Anon. No date. *Principles of Oil Extraction*. ITDG Publishing. 11 p. On-line at www.itdg-publishing.org.uk.

Cox, Jeff. 1979. *The sunflower seed huller and oil press*. *Organic Gardening*. April. 13 p. On-line at http://journeytoforever.org/biofuel_library/oilpress.html.

Further Resources

ATTRA Publications

Adding Value to Farm Products: An Overview. ATTRA Information Packet. 2001. By Janet Bachmann. NCAT, Fayetteville, AR. 46 p.

Keys to Success in Value-added Agriculture. ATTRA Information Packet. 2001. By Holly Born. NCAT, Fayetteville, AR. 19 p.

Grain Processing. ATTRA Information Packet. 2003. By Lance Gegner and Janet Bachmann. NCAT, Fayetteville, AR. 12 p.

Soyfoods. ATTRA Current Topic. 2001. By Janet Bachmann. NCAT, Fayetteville, AR. 8 p.

Options for Food Dehydration. ATTRA Information Packet. 2002. By Katherine L. Adam. NCAT, Fayetteville, AR. 12 p.

Biodiesel: A Brief Overview. ATTRA Current Topic. 2002. By Karen Faupel and Al Kurki. NCAT, Fayetteville, AR. 30 p.

Alternative Agronomic Crops. 2000. By Preston Sullivan and Patricia Sauer. NCAT, Fayetteville, AR. 12 p.

Evaluating a Rural Enterprise. 2002. By Preston Sullivan and Lane Greer. NCAT, Fayetteville, AR. 12 p.

Get a free printed copy of any of the above by calling 800-346-9140, or download from the ATTRA National Sustainable Agriculture Information Service Web site, <http://attra.ncat.org>.

Publications from Organizations

Several private, non-profit organizations involved with development work around the world have publications that provide information on technologies appropriate for smaller-scale farms and business. Publications related to small-scale oilseed processing are followed by contact information for the organizations that distribute them.

Herz, Jonathan. 1997. Using and Maintaining the Ram Press. EWW. 42 p.

Herz, Jonathan. 1995. Construction of the CAMARTEC BP-30 Press: A Workshop Manual. EWW.

Herz, Jonathan. 1995. How to Use Your Ram Press. EWW.

Enterprise Works Worldwide
1828 L Street, NW, Suite 1000
Washington, DC 20005
202-293-4600
info@enterpriseworks.org
www.enterpriseworks.org

Anon. No date. Principles of Oil Extraction. ITDG Publishing. 11 p. On-line at www.itdg.org/.

Anon. No date. Food Processing Building Design. ITDG Publishing. 3 p. On-line at www.itdg.org/.

Potts, K.H., and K. Machell. 1993. The Manual Screw Press for Small-scale Oil Extraction. ITDG Publishing. 72 p.

This book describes a small-scale process of oil-extraction for use in rural areas, as well as ways to market and distribute the oilcake.

Intermediate Technology Development Group
ITDG Publishing
103-105 Southampton Row
London WC1B 4HH
UK
orders@itpubs.org.uk
www.itdgpublishing.org.uk

Anon. 1993. Oil Processing. ITDG. 48 p.

This book is aimed at volunteers training for food processing projects and their trainers, and for the non-specialist already involved in projects and seeking specific information on technology choice. Contents cover raw materials from which oil can be extracted, methods of oil extraction and processing, descriptions of types of improved technologies, case studies, a checklist of questions to ask when planning a project/enterprise, facts and figures on a range of preprocessing and extraction equipment, references, further reading, and contacts.

Azam-Ali, Sue, Emma Judge, Peter Fellows, and Mike Battcock. 2003. Small-Scale Food Processing, 2nd Ed. ITDG. 255 p.

The food processing section of the book describes the stages and equipment needed to process a wide range of food commodities, from fruit and vegetables to dairy products, meat, and fish. The directory section catalogs all the food processing equipment a small industry might need and provides contact information for manufacturers.

Anon. 1983. Small Scale Oil Extraction from Groundnuts and Copra. ILO Technica Memorandum No. 5, MF 06-274. 111 p.

This book looks at the steps involved in removing oil from peanuts (groundnuts) and dried coconut (copra) using small-scale mechanized equipment. It should be helpful in either starting a business or in identifying where in the process technical improvements may be made. "It provides detailed technical and economic information on small-scale oil extraction mills using either small expellers or power ghanis, and processing between 100 tons and 220 tons of materials per year. An economic comparison between these small-scale plants and medium- to large-scale plants is provided."

Boyd, John. 1995. Tools for Agriculture, 3rd edition. VITA. 200 p.

This new, enlarged edition of a well-known catalog lists more than 1,000 manufacturers and suppliers of low-cost agricultural implements. Guidance is provided for selection of 3,000 products, from hand tools to animal- and small-engine-powered equipment.

Casten, James, and Harry E. Snyder. No date. Understanding Pressure Extractions of Vegetable Oils. 15 p.

This technical brief outlines the procedures and equipment required to extract vegetable oil using presses.

Kessler, Nathan. No date. Understanding Solvent Extraction of Vegetable Oils. VITA. 12 p.

This technical brief outlines the procedures and equipment required to extract vegetable oil using solvents.

PACT Publications
1200 18th Street, NW
Washington, DC 20036
202-466-5666
books@pacthg.org
www.pactpublications.com

Richards, Keith, and Deborah S. Wechsler. 1996. Making It On the Farm: Increasing Sustainability Through Value-added Processing and Marketing. Southern Sustainable Agriculture Working Group. 40 p.

This booklet is written for farmers who want to take a bite out of the middlemen by bringing the dollars for processing, packaging, labeling, and marketing home to their farms, and for local community leaders who want to encourage farm-based, value-added businesses in their communities. Compiled from interviews with southern farmers and ranchers who are adding value to their products, it describes some of their practices, discusses 10 keys to success, and includes a list of resources. Although some of the resources listed are in the southern region, most have counterparts in other states and regions. Cost is \$10, payable to SSAWG, and includes shipping and handling. Order from:

Southern SAWG Publications
P.O. Box 324
Elkins, AR 72727
ssfarm@lynks.com

Calo, Muriel. 2001. The olive and its oil. Part IV of IV: Pressing and oil separation. The Garlic Press. Fall-Winter. p. 8-9.

Machinery and Equipment Sources

Seedburo Equipment Company
1022 W. Jackson Blvd.
Chicago, IL 60607
312-738-3700
800-284-5779 (toll-free)
312-738-5329 FAX
sales@seedburo.com
www.seedburo.com

ALMACO
P. O. Box 296
99 M Avenue
Nevada, IA 50201
515-382-3506
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sales@almaco.com
www.almaco.com

IBG Monforts Oekotec
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www.Oekotec.ibg-monforts.de

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+46 19 228005
sales@oilpress.com
www.oilpress.com/

Magic Mill International Headquarters
382 Rt. 59, Sect. 338
Monsey, NY 10952
845-368-2532
contact@magicmillusa.com
www.magicmillusa.com

Huntsman, Inc
2362 Warren Ave.
Twin Falls, ID 83301
888-812-3377
208-733-2214
208-733-2240 FAX
mail@huntsmaninc.com
www.huntsmaninc.com

Huntsman, Inc. supplies used and reconditioned food-processing equipment, including seed cleaners and packaging.

Food Processing Machinery & Supplies Association
200 Daingerfield Road
Alexandria, VA 22314-2800
703-684-1080
703-684-1080 FAX
info@processfood.com
www.processfood.com

FPM&SA is a non-profit trade association founded in 1885 to provide a business link between food and beverage processors and suppliers. The Association is made up of several hundred industry members. It can provide information about sources of all kinds equipment and supplies. Processfood.com is the association's electronic marketplace.

Individual and Organization Contacts

Mark Muller
Badger Oil
1400 South River Street
Spooner, WI 54801
715-635-2197
715-635-7262 FAX
badgeroil@badgeroil.biz
www.badgeroil.biz

Badger Oil uses Komet equipment for oil seed processing. The company can do contract pressing or provide consulting services for anyone who wants to do on-farm processing.

E. Peter Matthies
EPM Distributing LLC
20 Marshall St.
52066 Aachen
Germany
011 49 241 160 7122
011 49 241 160 7123 FAX
fruitoil@hotmail.com

E. Peter Matthies, who formerly worked for Badger Oil Company, now lives in Germany. Matthies has years of experience with seeds from fruits, vegetables, herbs, and even weeds. He is licensed to represent Monforts worldwide and provides free consultation with the purchase of KOMET oil presses. Contact him by e-mail or phone.

Food Protein R & D Center
MS 2476
Cater-Mattil Hall
Texas A&M University System
College Station, TX 77843-2476
979-845-2741
979-845-2744 FAX
www.tamu.edu/food-protein/

The mission of the Oilseeds Processing Program is to conduct basic and applied research to help add value to oilseeds and to serve as a technical resource to the oilseeds processing industry.

The Oilseeds Processing Program has experience with essentially all row-crop oilseeds as well as a number of industrial crops. Row crop expertise includes familiar edible oilseeds such as soybeans, cottonseed, corn germ, canola, peanuts, sunflower seed, safflower seed, and flax seed. Industrial crop expertise includes castor seed, rape seed, crambe, jojoba, and others in various stages of commercialization. Specific services include practical short courses and customized training.

Producers' Natural Processing Inc.
8197 W 800 S
Brookston, IN 47923
765-563-3437
765-563-6753 FAX
leaderb@pnpi.com (Bob Leader)
www.pnpi.com

Although most of the small-sized oil seed presses seem to be manufactured in Europe, Bob Leader of Producers' Natural Processing Inc. (PNPI) provides connections from around the U.S. on the cold press expeller method of seed oil extraction, which does not use volatile solvents. PNP does not sell equipment but does have information about where to obtain new and used equipment.

ECHO
17391 Durrance Rd.
N. Ft. Myers, FL 33917
239-543-3246
239-543-5317 FAX
echo@echonet.org
www.echotech.org

ECHO – Educational Concerns for Hunger Organization – is a non-profit, Christian organization dedicated to the fight against world hunger. ECHO's Web site provides access to resources and

services for small farm tropical agriculture from around the globe. ECHO's most popular publications are on-line and include several about oilseed crops. A for-sale publication is The Manual Screw Press for Small-Scale Oil Extraction.

Web Sites

Tiny Tech UDYOG
www.oil-refinery.com

Armfield Limited
www.armfield.co.uk/press.html

IRDC National Workshop on Small-Scale Expelling Systems in Pakistan
www.irdc.ca/library/document/

Palm Oil Processing
www.fao.org/

The Sunflower Seed Huller and Oil Press
http://journeytoforever.org/biofuel_library/oilpress.html

Minor Oil Crops – Individual Monographs
www.fao.org/

Commonsense Winemaking Q&A Column from July 2001 issue of Wines and Vines
www.findarticles.com/cf_dls/m3488/7_82/77107740/

Olive Oil Extraction
www.ucm.es/info/improliv/allgem.htm

Specialty Olive Oil Production
www.sfc.ucdavis.edu/research/olive.html

Oil-containing seeds, nuts, kernels (from IBG Monforts product literature.)

Apricot stones	Elderberry	Niger seed
Avocado	Black currant	Palm kernel
Cotton seed	Jjoba	Red pepper
Billberry	Coffee	Brazil nut
Borage	Cocoa	Passion fruit
Stinging nettle	Coriander	Pecan
Beech nut	Caraway seed	Pistachio
Calendula	Pumpkin seed	Rape seed
Cashew nut	Linseed	Castor bean
Copra (dried coconut)	Mace	Sea buckthorn
Safflower	Corn seed	Mustard seed
Groundnut	Macadamia nut	Sesame seed
Spurge	Almonds	Soybean
Rubber seed	Melon seed	Sunflower seed
Rose hip	Poppy	Tropho plant
Hemp	Nutmeg	Tomato seed
Hazelnut	Evening primrose	Grape seed
Raspberry	Neem seed	Walnut
Citrus seed		

Oilseed Processing for Small-Scale Producers

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