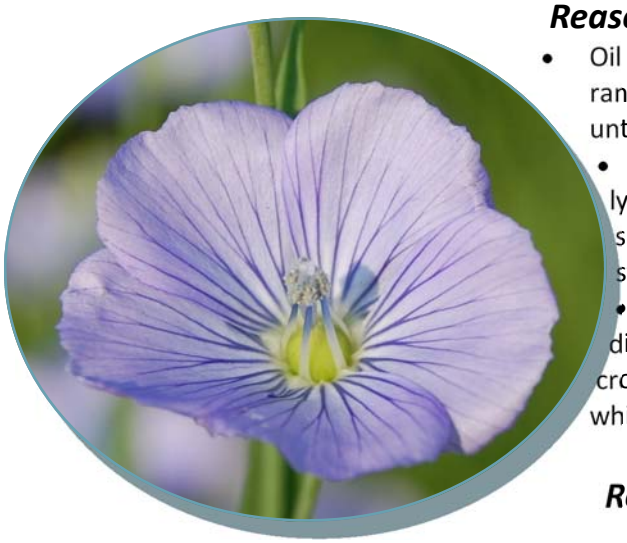
Oilseed Fact Sheet: Cleaning and Storage



Introduction

An oilseed press may be the heart of an oilseed pressing operation, but the quality and cleanliness of the seed available for pressing plays a large part in the ability of the press to perform its job. This fact sheet focuses on the storage and cleaning of oilseeds that will be pressed for edible oil or fuel. Oilseeds include seeds like canola, sunflower, soybeans, pennycress or other seeds that contain a large enough quantity of oil to warrant the oil extraction.

Oilseeds are stored for a short or long period of time before finding their way to the oilseed press. To assure quality oil from the press the seeds going into the press need to be free from foreign objects, weed seed, molds, and other contaminants. Cleaning and storing the oilseeds correctly following harvest will preserve the quality of the seed and preserve that quality through to the finished oil.

Reasons for storing oilseeds

- Oil stored as seed does not turn rancid, so seed is not pressed until oil is needed
  - Oilseed presses are relatively slow compared to harvest speed; seeds need to be stored until pressed
  - Different crops come in at different harvest times; one crop may need to be stored while a previous crop is pressed

Reasons for cleaning oilseeds

- Weed seeds present at harvest may interfere with the extraction of oil in the press
- Weed seeds may add unwanted taste or chemicals to the pressed oil
- Dirty seed will wear press & handling components more quickly than clean seed
- Stones or other objects picked up at harvest or during handling will damage pressing equipment

Oilseed Cleaning

Oilseeds should be cleaned either before or following storage and before reaching the press. If a large quantity of foreign material (weed seeds, seed pods, chaff) is present, seeds should be cleaned before storage as the trash contained in the stored pile may be a starting point for molds and heating. Usually time does not permit cleaning all of the seeds before storage, as harvesting and drying equipment commonly can process more volume than cleaning equipment. The seed harvesting operation plays a large part in the effort needed following harvest. Taking the time to be certain the combine is harvesting the cleanest seed possible is time well spent.

Seed cleaning is often combined with filling bins directly before pressing. As seed is moved from the storage bin to the pressing bin a step in between can include cleaning.

Seed cleaners can be purchased new or used. Seed cleaners have not changed dramatically over the years, and the cleaners of the 1930's look remarkably similar to cleaners built today. A typical seed cleaner is shown in Figure 1.

Seed cleaners use gravity separation

Fig. 1: Typical seed cleaner

(screens) and air separation (fans) to separate seeds and unwanted material by size and density. Seed screens, sized correctly, can eliminate seed both larger and smaller than the desired seed. Running seed first over a screen sized correctly for the desired seed allows seed the correct size and

smaller to fall through the screen, keeping gravel and larger seed out of the desired mixture.

Flowing and shaking this mixture over a screen sized slightly smaller than the desired seed size screens out the smaller seeds, typically weed seeds. Seeds remaining are the desired size, but may still contain weed seeds that are approximately the same size as the desired seed.

A last cleaning step blows air through the sized seed and separates the lighter particles, typically weed seed, from the heavier, desired seed. Winnowing such as this is commonly used to separate the wheat from the chaff during grain harvest.

Farmers have purchased both new and used seed cleaners through dealers or at private sales and auctions. Though the method of cleaning seed has not changed enormously over the years, the enclosure of belt and chain drives and other components has greatly increased the safety of newer machines. If an older machine is purchased time and money should be allocated to enclose belt and chain drives, moving components, and other hazards before using the equipment. Rewiring of an older cleaner will probably be required.

A USDA publication, "Mechanical Seed Cleaning and Handling" describes seed cleaning equipment and recommended seed screen sizes. Although an older publication (1968), many useful tables and descriptions can be found in this manual. Resources such as this are listed at the end of the fact sheet.

A seed cleaner will remove off size and density seeds and materials, but will not remove all dust and dirt from seeds. Another component called a dust remover will remove unwanted dust from seeds. This is a component used by only a few oilseed press operators. Those who use it believe that the life of presses, augers and other components will be extended because of the lower abrasiveness of the cleaned seed passing through the press.

Moisture Content of Stored Oilseeds

Oilseeds that will be stored (Fig. 2) need to be kept at a moisture content that does not encourage heating within the seed pile or the growth of molds, bacteria or fungi. Growth of mold or bacteria may make the oil pressed from these seeds unfit for human consumption. The oil may still be tolerable for processing into biofuel, but the handling of moldy or dusty seed presents an airborne respiratory hazard. If the seed is to be sold, contaminated seed will have a lower economic value than good seed.

Fig. 2: Typical grain bin

Fig. 3: Grain moisture tester

A general rule of thumb recognizes 10% m.c. (moisture content) as being the high end for long term storage. Storing seeds with lower than 10% m.c. should produce good results.

How is Moisture Content Measured?

Moisture content may be measured with the use of a handheld or bench mounted moisture meter (Fig. 3), or calculated using the following method. If available, the use of the moisture meter is much quicker. When no moisture meter is available, following these steps will provide an accurate moisture content of the seed stock.

- Weigh out an amount of seed and record the weight (call this weight W1)
- Place in an open container in an

oven at 100 C (212 F) for about 1 hour, stirring occasionally

- Remove from oven and let cool
- Weigh seed again (W2). The difference in the weight between W1 and W2 is the weight of the water that has been removed.
- To find the moisture content in percent (%):

$$MC(\%) = \frac{W1 - W2}{W1} \times 100$$

- Example: Weigh out 140 grams (5.0 oz.) of seed (W1). After removal from oven seed weighs 120 grams (4.2 oz.)(W2).

$$MC(\%) = \frac{140 - 120}{140} \times 100 = 14.3\%$$

This seed will need to be dried if it is to be stored and will not press well at this moisture content.

Drying Seed

Table 1: Ideal oilseed moisture content for pressing

Crop	Moisture Content (%)
Camelina	7-9%
Canola	7-9%
Soybean	9-11%
Sunflower	7-9%

Most oilseeds harvested will need to be dried to some extent for both storage and pressing. Even when moisture content of the seed is acceptable for storage, most seeds do not press well in the oilseed press unless their moisture content is about 7 – 9 %. Table 1 shows ideal moisture contents for pressing of various oilseeds.

Often this drying is done before storage so handling of the seed is minimized. When dried before storage, seed may be moved directly from the storage bin, through a cleaning process, into the oilseed press.

As with grain, seeds may be dried with ambient air or with heated air. The choice is dependent on the quantity of seed to be dried and the equipment available. Ambient air is the more economical choice if the quantity to be dried is not too great and the time is available to do the drying. If harvesting a large quantity, hot air drying may be necessary because the seed must be moved through the drying apparatus more quickly to make room for more of the harvest.

Air drying consists of allowing the grain to be in contact with outside air. For a small amount of seed, this can be accomplished by placing the seed in a thin layer outside on a dry day. Larger quantities require a blower mechanism to force air through the seed. This can be done in either a grain bin or with grain aerators (Fig. 4) screwed into the grain stored in a large tote, small bin or small wagon.

Bin and dryer sizing, either forced ambient air or forced heated air, should be done in conjunction with knowledgeable grain bin distributors. Cooperative extension service offices have publications on these systems that can provide information in advance of contacting a distributor so that you know what questions to ask for the crops you are interested in storing and drying.

Fig. 4: Grain aerator showing (left) the aerator head and screw-in air tube and (right) the aerator head

There are many variables that affect bin drying, such as depth of seed in the bin, diameter and motor size of drying fan, diameter (size) of seeds, initial moisture content and desired moisture content. Bin floor perforation diameter can make a difference in how a given bin will perform with different seeds. Oilseeds are often small in size, and will fall through the floor perforations of a typical grain bin. Canola, for example, will fall through a grain bin floor used for drying corn, soybeans or wheat. Farmers have used weed blocking cloth or burlap fastened over the floor so that these larger diameter perforated floors may still be used to

dry the smaller grains. Replacing the grain bin floor with a floor specifically made for small seeds is another option.

Fig. 5: Mold in canola resulting from condensate formed as temperature lowered

Storage

Long term storage of oilseeds allows seeds to be harvested, stored and pressed for oil as the oil is needed. Stored grains that are at proper moisture content for storage need to be monitored as temperatures and outside moisture affect the storage conditions and quality of the grain. Not paying attention to storage can result in seeds that are not fit for pressing into good quality oil (Fig. 5).

After seeds have been dried to the proper moisture content for storage, they continue to respire and respond to temperature and moisture conditions in the storage container. As temperatures cool, condensation may form on bin or container surfaces or within the grain itself. These moist areas are prime locations for molds to start growth. For this reason, as outside temperatures cool in the fall the grain and container should be checked each week for condensation, and when moisture is found the grain should be aerated to reduce the temperature of the grain and remove the moisture so no more condensation occurs. When the grain has cooled to winter temperatures the periods between checks may be lengthened. Problems with moisture occur when outside temperatures are dropping in the fall and winter, not as temperatures increase in the spring.

Summary

Proper seed storage and cleaning of seed before pressing are two of the steps affecting the final product. Care throughout the entire process of growing, harvesting, storing, and pressing is necessary to ensure a satisfactory product.

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Resources

Note: This is not an exhaustive resource list nor do any of the oilseed project partners endorse any of the products or companies on this list. It is intended as a resource and starting point for those interested in small-scale oilseed processing.

A.T. Ferrell, Clipper Cleaners
785 South Decker Drive
Bluffton, IN 46714
phone: 800-248-8318
http://atferrell.com/clipper
(Oilseed cleaner company)

Mechanical Seed Cleaning and Handling, Agriculture Handbook No. 354: http://naldc.nal.usda.gov/download/CAT87208718/PDF

Selecting Fans and Determining Airflow for Crop Drying, Cooling, and Storage. University of Minnesota. 1999. http://www.extension.umn.edu/distribution/cropsystems/dc5716.html

Storage of Canola, Alberta Agriculture and Rural Development. Revised 2011. http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/crop1301

Northeast Oilseed Information
University of Vermont:
www.uvm.edu/extension/cropsoil/oilseeds

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