Small Scale Oil Seed Press Evaluation

Six presses

- AgOil M70
- Keller KEK P0020
- KernKraft 40
- Komet CA59G3
- Oil Prince (KernKraft 20)
- Täby 70
Small-Scale Oilseed Presses: 
An Evaluation of Six Commercially-Available Designs 
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and Hannah Harwood1 
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What is Cold Pressing?
Cold Pressing

120 Degrees \hspace{1cm} \text{(Oil Temperature)} \hspace{1cm} 210 Degrees

Expeller Press (Screw Press) \hspace{0.5cm} \text{Cold pressing}

As apposed to Chemical extraction
Standard Components of small-scale oilseed press

- Screw
- Barrel
- Press Head
- Nozzle
- Oil Canals
Expeller Screws

Agoil M70

KernKraft 40

4 Ton Chinese Press
Nozzles vary on different press designs
AgOil Screw Press
Table 1. Specifications for six presses evaluated during the course of this study.

<table>
<thead>
<tr>
<th>PRESS</th>
<th>Estimated capacity (lbs seed/24 hrs)</th>
<th>Purchase cost + year</th>
<th>Approximate power source</th>
<th>Rated load</th>
<th>Adjustable speed</th>
<th>Heated barrel / head</th>
<th>Multiple screws available</th>
<th>Adjustable nozzle diameter</th>
<th>Adjustable gap between head and screw</th>
<th>Ease of set-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgOil M70</td>
<td>700</td>
<td>$8,500 (2012)</td>
<td>240v</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>Simple</td>
</tr>
<tr>
<td>Keller KEK P0020</td>
<td>1056</td>
<td>$8,300 (2010)</td>
<td>230v</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>Simple</td>
</tr>
<tr>
<td>KernKraft 40</td>
<td>1200</td>
<td>$15,000 (2010)</td>
<td>220v</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Finicky</td>
</tr>
<tr>
<td>Komet CA59G3</td>
<td>260</td>
<td>$8,000 (2008)</td>
<td>115v AC</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>Simple</td>
</tr>
<tr>
<td>Oil Prince</td>
<td>1800</td>
<td>$6,000 (2012)</td>
<td>220v</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Finicky</td>
</tr>
<tr>
<td>(KernKraft 20F)</td>
<td>1500</td>
<td>$7,000 (2005)</td>
<td>220-240v</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Moderate</td>
</tr>
</tbody>
</table>
Lloyd Byers - Liverpool, Pa
$8300.00-2010

Flake

2019 Cost App. the same
Elwyn Beck

Figure 6. The Keller press has a single barrel and drive.
Kern Kraft 40
seed2oil.com
2019 App. cost $10,500.00

Distributor in the U.S.:
Circle Energy
Dodgeville, Wisconsin
Eric Hamilton, (608) 574-7449
info@circle-energy.com

Manufacturer’s Rated Capacity: 1200 lbs/24 hours
Cost: $15000 (2010)

Several set nozzle sizes

Figure 9. Scuffed screws (left) need to be polished (right) to increase press efficacy.
Komet CA59G3
2019 $6,000.00
Nebraska Screw Press

Manufacturer's Rated Capacity: 260 lbs/24 hours
Cost: $8000 (2008)

DISTRIBUTOR CONTACT INFORMATION
[made in Germany]
www.oekotec.ihg-monforts.de/

Distributor in the U.S.:
Nebraska Screw Press
Lyons, Nebraska
(402) 307-0280
rbyrnes@nebraskascrewpress.com

Pellet
**KernKraft 20F**

2019 App. Cost $7800.00

[Seed2Oil.com](http:// Seed2Oil.com)

**Oil Prince (KernKraft 20F)**

Coppal House Farm, Lee, NH

Manufacturer's Rated Capacity: 1800 lbs/24 hours

Cost: $6000 (2012)

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**DISTRIBUTOR CONTACT INFORMATION**

[made in Germany]

_Distributor in the U.S._:

Circle Energy

Dodgeville, Wisconsin

Eric Hamilton, (608) 574-7449

[info@circle-energy.com](mailto:info@circle-energy.com)

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**Pellet**
State Line Farm
2019 Cost $12,200.00

Magic Mill

Täby 70
State Line Farm Biofuels, Shaftsbury, VT

Manufacturer’s Rated Capacity: 1500 lbs/24 hours
Cost: $6500 (2005)

Distributor Contact Information

[made in Sweden]
www.oilpress.com

Distributor in the U.S.: Magic Mill
Upper Saddle River, NJ
(201) 785-8840
contact@magicmillusa.com

Pellet

Figure 14. Side-mounted control panel.
Chinese oil press - 15 HP motor - Vacuum pump - 8000 pounds in 24 hours
2007-$3,900.00

 Flake
Protocol

3 CROPS
• Canola
• Soybeans
• Sunflower

3 METHODS (RPM settings)
• Method 1: Operator’s preferred tuning
• Method 2: Faster processing
• Method 3: More oil
Press setup

- Data represent one configuration of many possible nozzle and screw setups

<table>
<thead>
<tr>
<th>PRESS</th>
<th>CROP</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Canola</td>
<td>Soy</td>
<td>Sunflower</td>
</tr>
<tr>
<td>AgOil M70</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Keller KEK P0020</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>KemKraft 40</td>
<td>6.5</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Shallow, soft shell screw</td>
<td>Deep, hard shell screw</td>
<td>Deep, hard shell screw</td>
</tr>
<tr>
<td>Komet CA59G3</td>
<td>5</td>
<td>Failed test</td>
<td>5</td>
</tr>
<tr>
<td>Oil Prince / KernKraft 20</td>
<td>10</td>
<td>Failed test</td>
<td>10</td>
</tr>
<tr>
<td>Täby 70</td>
<td>5</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>
Oil mass fraction by crop

2013 press evaluation data
Estimated sediment in oil

- Most sediment in sunflower oil
- Very minimal sediment in soy oil
Capacity by speed

- All presses evaluated have variable speed

- Capacity increases with press speed
The AgOil has a simple design, with a single screw and an in-line Variable Frequency Drive (VFD) mounted on the gear box. With relatively few adjustments to be made, the press is simple to get running and with the variable set nozzle it is easy to switch between seed sources. A clear feed hopper allows processors to watch seed flow into the press, observing cleanliness and any potential malfunctions. A “blast gate” stops seed flow when necessary.

Conclusion: Simple
The German-designed Keller KEKP0020, which is approximately 51”x12”x27”, is simple, with very few adjustments. Only the screw speed and the distance or gap between the head and the collar leave room for fine-tuning, making the press streamlined and effective. Byers reports that the Keller is easy to set up for pressing, and requires very little supervision once running. When the press is running for long periods of time, he checks a few times a day to make sure seed flow and press operation are optimal, but can generally leave it unattended with a large quantity of seed to press.
The KK40 is a workhorse design with high capacity and little supervision required. A large hopper built into the press allows for smooth flow of seed into the two screw chambers. There is a slide closure between the hopper and screw to stop seed flow if necessary. Many adjustments are possible with the KK40: operators can modify speed, nozzle/die size, the distance between the screw end a nozzle, and two screw sizes available.

In research trials and with small batches, the dual barrels and multiple possible adjustments sometimes led to frustration. Screws need polishing to operate efficiently.
This is a smaller, single-screw KernKraft model with similar adjustability and operation to the KK40. On the day of the press trial, operators could not press soybeans effectively, despite an all day attempt at data collection. The problem could have been in the moisture level of the soybeans. This press, relatively new to its operators, has a learning curve. During the process of troubleshooting, the team also discovered a fracture in the collar which may have been linked to a prior issue with a ball bearing being passed through the machine; this damage may have been preventing effective pressing of soybeans. While it runs extremely well and is reliable with canola and sunflower, other crops may take some adjustment.
Täby’s seed hopper has a built-in magnet to prevent any metal from flowing into the press. A heater control on the gear housing stops the press from running if the collar temperatures exceed 302°F. Maintenance requirements are minimal with this machine. Approximately every 10,000 operating hours, the gear oil should be changed. The spiral seed screw can become worn over time, and Täby suggests shipping the screw in for repair (re-hardening). One stumbling block with the Täby 70 is the language barrier. Manufactured in Sweden, Toby presses come with an instruction manual (installation instructions, safety warnings, and technical advice on troubleshooting and maintenance) in broken English and customer service can be delayed with minimal domestic support.
The Komet is a small reliable press with a screw bringing seed through the shaft to press oil out of it. While there is no adjustment in the gap between the tip of the nozzle and the screw, there are multiple nozzles, with varying diameters for specific crops. Though Penn State University never received installation and operation manuals from the manufacturer, email response from customer service has been prompt and thorough.
<table>
<thead>
<tr>
<th></th>
<th>Ideal Pressing Moisture (%)</th>
<th>Average Extraction Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola</td>
<td>6-9</td>
<td>25-30</td>
</tr>
<tr>
<td>Soybeans</td>
<td>8-12</td>
<td>8-12</td>
</tr>
<tr>
<td>Sunflower</td>
<td>8-12</td>
<td>35-40</td>
</tr>
</tbody>
</table>

**Very Important**
Help to Prevent This
Rules Of Thumb

- Start with clean seed.
  Screen seed for stones and metal.
  (Nuts, bolts etc.)
  Use of Magnets while screening highly recommended.

- Test and take note of moisture
  (this will vary by crop and press)

- Take note of seed temperature.

- Make small adjustments as you go, rather than big changes.
Excessive Pressure on Oil Press Barrel
Hemp Oil

Sunflower-Canola- Soybean oil

QUESTIONS