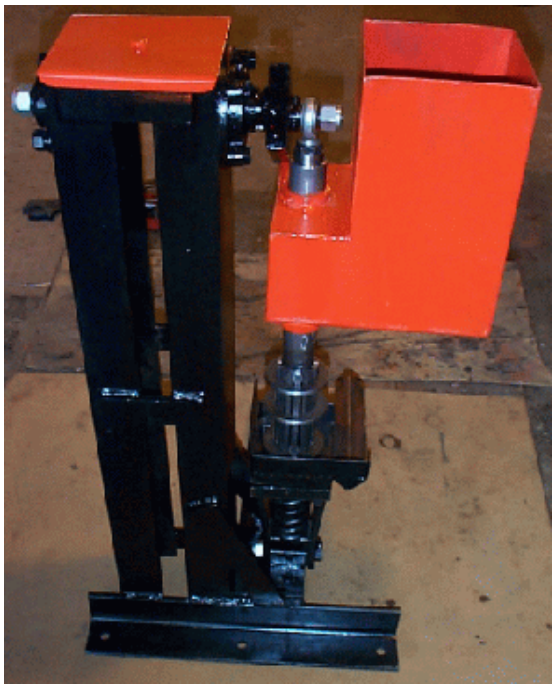
COOKING OIL PRESS

Manufactured by

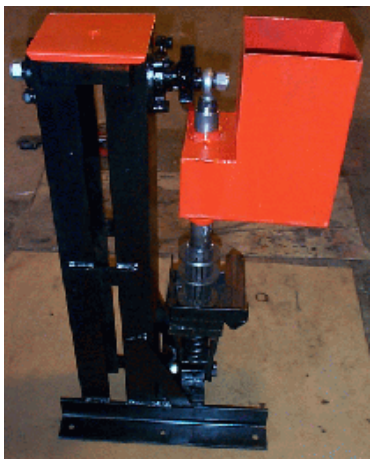
New Dawn Engineering
P. 0. Box 3223 Manzini
Swaziland
www.newdawnengineering.com
sales@newdawnengineering.com
TEL (++268) 518-4194 518-5016 + Fax



INSTRUCTION MANUAL

INDEX

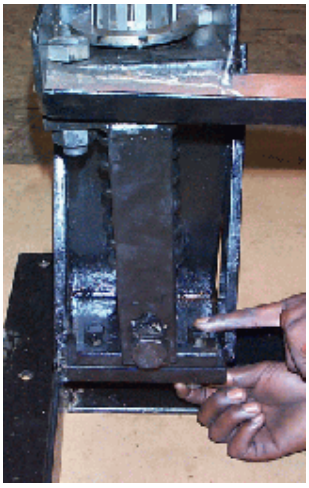
TECHNICAL DESCRIPTION



The New Dawn Engineering Cooking Oil Press (Pat. SA 3857/93) is a lever operated oil seed press with a vertical cylinder, 40mm piston, 2 metre long square tube lever arm bolted down onto a concrete base with 3 x l6mm foundation bolts (not provided). It features an eccentric mechanism mounted on the end of a 40mm shaft with a 25 mm flanged, sealed and mechanically protected ball bearing at the back, a 40mm flanged and boss mounted (inset) sealed and mechanically protected ball bearing at the front, welded to a 20x100x300 crank arm. To this crank arm is bolted the handle and the drive pin. The drive pin can be replaced with either a 22 mm by 160 to 170 mm long high tensile bolt, or a 7/8 x 61/2 inch N.F. bolt filed down by 0,2mm (which we recommend and use as standard as it gives a better fit). It passes through a POS 22 "pillow ball" swivel bearing, secured with a 7/8 inch N.F. Nylock nut. The POS 22 is a standard tie rod end and you can buy them from bearing suppliers if you have to replace it. The stub of this bearing is threaded M22 x 1,5 mm and is screwed onto the top of the piston, the overall length of which can be adjusted and held in place with a lock nut.

At the top of the piston stroke, the underside of the piston can flush with the top of the seed intake hole in the cylinder. Usually the piston is set as much as 3mm below the top of the intake hole as this does not affect the intake of seeds and presses them further down the cylinder on each stroke.

The vertical piston is made from fully hardened carbon steel, having a small clearance between it and the cylinder. The steel hopper holds 7,5 kg of sunflower seeds, and feeds the seed into the cylinder about 75mm from the top of the cage section. Below the bottom of the piston's travel is a patented (PAT S.A. 3857/93) and fully hardened choke ring which restricts the flow of seed, shatters it under high pressure and generates heat just as the seed enters the cage. This choke fitting can be changed to vary the ratio between the pressure immediately below the piston, and the pressure inside the cage. The cage is made from 15 vertical bars which are hooked onto the cylinder and a fitting at the bottom. The bars are held together with three rings. The bottom fitting of the cage is threaded into the oil collection tray.



The type of seed that should be used with the top and bottom fittings of the cage is stamped onto the face of one end. It may read SIM for Sim-sim (Sesame) and SUN for sunflower or some other seed depending on what you ordered. There is a different pair of fittings for Sim-sim (sesame) and Sunflower. Make sure the pair you are using or the cage retaining rings will not match the taper.

The choke plate under the oil collection tray houses a 50 mm choke plug. This hardened plug slides up and down on a case-hardened choke plug pin. When the choke plug is forced down, it allows the cake to exit the choke plate hole. The choke plug is held upwards against the cake by a coil spring which regulates the internal pressure of the expeller cage section. The expected spring life is 10 years or more. There are 3 springs to give different pressures. The strongest is the Red spring, the weakest is the White one and the middle one is the Black spring. There are 3 shims (rings) for raising the choke plug in increments of 3mm. Only experience will show which combination of spring and shim will give the best oil yield. Increasing the cage pressure by adding shims or putting in a stronger spring increases the seed crushing pressure a lot. The cage pressure is typically ½ to 1/4 of the pressure above the choke ring just below the piston.

The choke plug frame is mounted by a M20 x l60 mm mild steel bolt onto the bottom floor of the frame. The bolt and steel block through which it passes allow the whole mechanism to oscillate

back and forth as the crank arm moves from side to side. **Grease this bolt!** The bottom housing is fitted with a grease nipple. The bottom housing is fastened down with two l2mm bolts through slots in the foot. These bolts allow the entire mechanism to be moved towards or away from the frame so that the assembly can be lined up with the crank arm. Gross misalignment may result in the shearing of the 20mm x l60mm bolt or cause the piston to hit the bottom of the seed entry slot. It is not normally adjusted but may be necessary if the cylinder/cage is changed or if it is necessary to accommodatd off-centre or slightly angled threads or bent components.

GENERAL INSTRUCTIONS

UNPACKING THE CRATE

If your press has come packed in a wooden crate, it is important to inspect the crate for signs of damage caused by mishandling during shipment. It is advised that if the crate looks damaged, you should call the transporter and ask them to come to your site. Open the crate together so you can see what damage has been done, if any, to the machine. It is very wise to photograph the crate before it is opened, showing damaged sections. This may help you later when making an insurance claim. Remove the top of the crate with a claw hammer or other suitable tool.

When the crate is open, make sure the items listed on the packing slip are actually inside. If you don't know what the parts are called or what they look like, try counting the number of pieces or bundles and report any shortages to the transporter.

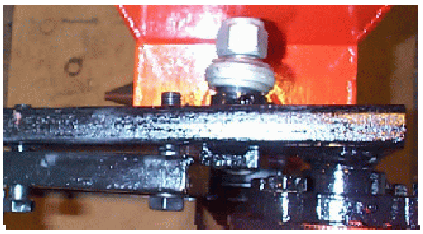
Looking into the crate you will see that at one end the press has a heavy angle iron base which is bolted to one end of the crate. You can remove three of the sides of the crate leaving the 4th side bolted onto the base. A number of parts and tools are wired to the frame of the press. Place these aside. Some are for making adjustments and some are to be put onto the machine.

Stand the machine up on its base with the crate still bolted to it. You will now find it easier to remove some of the bolts holding the wood onto the machine. Eventually all the wood must be removed and the press should be standing on its iron base.

If the hopper has been shipped as a separate part, it is necessary to put it on first. You will need one shifting spanner which can open to 30mm and a 5mm Allen key.

If crated, the press is shipped with grease on the piston and in the cylinder, on the choke plug and the lower spring assembly. If uncrated, it is shipped assembled and ready to use. If you are setting up a new, unused, crated machine, you must clean the grease off the cylinder and the piston otherwise it will contaminate the oil when you start pressing.

ATTACHING THE HANDLE



The handle is attached with two l6mm or 5/8" bolts. The unthreaded portion of the bolt must pass through most of the thickness of BOTH the crank arm and the handle's mounting plate. If you substitute a shorter bolt, the threads will have to take the load and before long the handle will become loose.

The handle is heavy. When it is raised, you are storing energy, and when it comes down, the weight helps you press the oil out of the seeds. The handle can hold about 6 litres of cement. To increase the weight of the handle, fill it with wet cement through its open end. It will gain about 14 kg when filled. The whole handle weighs nearly 30 kg when it is ready to start work.

The red hand grip is welded to the shaft off-centre. There is a good reason for this so be careful in which direction the “long” side of the handle points. If you are standing facing the hopper, the

long side of the handle points towards you and the short side points away from you.

Place the red hand grip on the ground and lift up the other end, with the thick flat plate, moving it towards the crank arm. The flat plate on the handle goes on the rear side of the crank arm; that is, it goes on the side of the crank nearest the ball bearing that has 4 bolts. Press one bolt (M16 x 60mm) through the hole at the extreme end of the crank arm, entering the hole from the front (the hopper side) with the threaded end pointing towards the back of the press. Put on the nut and spring washer but do not tighten it.

Raise the crank arm slightly and put in the other bolt passing from the back of the plate on the handle, through the crank arm, ending up with the threaded end pointing towards the hopper. When you have finished, the two bolts are pointing in opposite directions.

The first bolt points backwards to avoid trapping fingers between the bolt and the back of the hopper (a possible "pinch point"). The second bolt points forwards to avoid the protruding threads hitting the front ball bearing (the one with 4 bolts). Pinch points are not completely eliminated so do not let people casually lean their arms on top of the press while it is working. In general, keep people's fingers away from an operating press - after all, there is no need to have “little hands” poking around in that area while it is being used. “Moving” parts are also “Removing” parts - removing fingers, that is.

MOUNTING THE PRESS ON A CONCRETE BASE

Three foundation bolts are require to mount the press. There are four bolt holes in the base of the press so which will you use? The three farthest from the frame are the holes used to mount the machine onto concrete. The fourth hole is in the centre next to the frame and is only used when mounting the press on a portable wooden base.

Choose a suitable workplace, preferably where there is shade, and where the handle can go high overhead. The total height of the handle as it goes over the top is a little more than 3 metres (10 feet). Make sure you have enough clearance to swing the handle freely overhead.

Dig a hole into the ground approximately 0,75 metres wide (30 inches) about 1,2 metres long (48 inches) and 0,3 metre deep (12 inches). The long dimension must be in line with the handle. It will be filled with concrete and large stones.

Next put a wooden plank across the hole and balance the press on it. This can be tricky so be careful. The idea is to hold the press above the hole so that the foundation bolts can be put through the holes at the three ends of the angle iron base. A scaffold plank is perfect for this operation. Place the plank across the 0,75m dimension of the hole and stand the press on top of it. Balance it carefully so that it does not move around or tend to fall over. Insert three foundation bolts into their holes from below and put the nut on top Screw the nut down until the threaded end comes flush with the top of the nut. The bolt will then hang down into the hole at the correct position and height.

CONCRETE MIX

You can use a mix of cement, sand, pebbles and large stones 100 to 200 mm across. The more stones you use in the mix, the less cement you will require. If you use no large stones at all, it will take 4 wheelbarrows of concrete (260 litres) (9 cubic feet) to fill the hole. It is possible to use only half this amount by putting in large, clean stones. Using stones as filler, it is possible to make the base using only one 50 Kg bag of cement. Use 2 wheelbarrows of big stones, 2 wheelbarrows of sand, 1/2 a wheelbarrow of small pebbles and 1 bag of cement (or 50 Kg if your bags are of a different weight). This mix is not perfect or even ideal, but if you have no idea about cement, it serves as a guide. Otherwise, it is better to consult a builder on how to make a 1:3:6 mix.

MOUNTING THE PRESS ON A WOODEN BASE (PORTABLE)

In order to make the press portable so that it can be set up in a few minutes, demonstrated, and then packed away again, it is possible to use two wooden planks that bolts onto all 4 holes on the base.

Use one plank measuring at least 1.5 metres by 230mm (5 feet by 9 inches) and a second one 3.6 metres long by 230mm wide (12 feet by 9 inches). The thickness of both planks should be 50mm or more (2 inches).

The first plank goes under the back of the press pointing away from the hopper. That is, one end is placed about under the middle of the machine and the other end points directly away from the machine on the opposite side of the hopper. It should be placed so that two bolts can pass through the two holes on the rear part of the base and secure it firmly. It is a good idea to put washers on the underside of the plank to stop the bolt pulling through.

The second plank goes approximately under the path traveled by the handle. That is, the press stands on the centre of the plank so that one half is on the left of the hopper, the other half is on the right. When the handle is pushed down, it tries to pull the press over, and this pull is resisted by the plank which is resting against the ground. When the handle is thrown over to the other side, it presses against the other half of the plank.

A base made in this way can be removed and replaced in a few minutes as it has only four bolts.

OPERATION

Seed is fed into the hopper. Raise the handle vertical and let the cage fill up. Gently lower the handle to the one side and down to the ground. Repeat this 2 or 3 times until the handle stops at about waist high. Leap/sit/press on the handle and ride it right to the ground. You can even use your feet to press if you wish.

The pressing down of the handle should be in a certain fashion or else oil will build up at the entrance to the cylinder from the hopper. If the handle is pressed down slowly and uniformly, the oil will bubble up the cylinder and exit through the entrance hole. This is bad. The will stick the seeds together and they will not flow in properly. If you get this situation, press the seeds towards the opening each time the handle is vertical. This will sweep the oil into the cylinder and clean off the problem. Also, you should change the handle operation as described in the next paragraph.

When the seed has fallen into the cylinder, the handle can be dropped by gravity from the vertical position. Letting it down slowly by hand wastes your energy. The handle should stop at about waist level if the seed filled the cylinder. From this position the handle should be shoved downwards hard and fast in a single movement until it is about 300mm above the ground. Then relax the pressure slightly on the handle so that it stops going down rapidly, and lean onto it hard without jerking downwards. The first part of this jerk-squeeze motion crushes the seed into the cage and expels dry cake past the choke plug. The part presses out the oil from the new seeds. The first motion should be fast, and the second one should last about 1 to 1-1/2 seconds. With this two-stage motion the oil will not accumulate at the seed entrance and the amount of total work required is reduced, and you get more oil per hour.

You can operate the press alone however you may find it tiring.

OPERATION WITH TWO PEOPLE

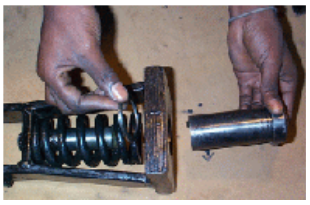
Pick up the handle and passing the vertical position, and instead of bringing it back down out your side, drop it over to the other operator (watch your head). If necessary, plunge your hand into the seed hopper and press the seed towards the rear of the hopper while the handle is vertical. Remove your hand from the hopper before dropping the handle. The second operator repeats the motions for pressing and returns the handle to you. In this way you get a rest every 4 seconds.

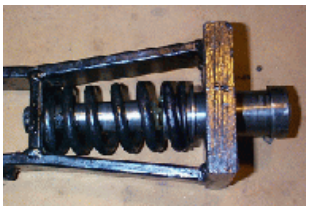
OPERATION WITH THREE PEOPLE

In order to reduce the effort required to operate the press, a third person can stand next to the vertical frame on the opposite side from the hopper. They can assist in lifting up the handle at the end of the stroke and pass it over to the second operator, and back again. This means a significant reduction in the amount of walking the two operators have to do back and forth. The third person can also supervise the seed feeding.

CHOKE PRESSURE

The choke pressure is automatically controlled by the spring. It can be varied buy changing the height of the choke plug by adding or subtracting shims, or by changing the spring from black to red to white. There are three different springs available for different seed types, moisture content and hardnesses. The spring thickness is 10.0, 10.5 and11.0mm whereas the shims are 3 and 6mm thick.





OIL COLLECTION

The oil collects in the tray and runs down the spout when the handle is on the right side of the machine (as viewed from the hopper side). Place a bucket or large container under the spout.

CAPACITY

The capacity of the machine is 100 to 130 Kg of seed pressed per day depending on the number of operators, cycle time and other variables. Working with a 4 second cycle, two operators will press about 12 Kg of sunflower per hour. Oil output varies with temperature, seed variety, seed age, and operating pressure. In standard trim (27mm choke ring, 3mm choke plug shim washer, you should get 35% recovery of oil from Sofala SO 323 seed grown in 700mm of rain in the Lesotho highlands. Recovery of over 30% is usually considered reasonable. For comparison, commercial hot-pressing plants using motorized screw expellers can get 42% recovery. Black Record open pollinated seed gives 27 to 30% oil thought there seem to be different type of that seed.

CUSTOMIZING THE PRESS

The diameter of the choke ring set into the cylinder can be changed. It comes fitted with a 27mm choke which is part of the top of the expeller cage. If the operators are under 50 Kg, or if too much cake extrusion is encountered (esp. from wet seed) larger choke rings can be supplied. The smaller the choke hole, the higher the pressure will be between in the piston and the choke ring. There are two adjustments working together: the choke ring which holds back the seed from entering the cage (thus breaking it up) and the choke plug which holds the seed inside the cage (thus pressing out the oil).

As mentioned above, the pressure from the choke plug against which the cake must be extruded can be changed by varying the thickness of a washer that sits between the choke plug and the spring (spare parts). The washer is normally 3mm thick and can be reduced to 0 mm by removing it or increased to 6, 9 or 12mm by adding washers. The piston pressure varies at a rate of about 50 Kg per mm change in the washer thickness. The handle has a mechanical advantage of 28,5:1. Changing the choke ring changes the Kg/mm spring rate as the pressure ratio changes. The best combination of spring size, choke ring and choke plug setting varies with the seed type and moisture content and will be the subject of many a late night conversation.

DISASSEMBLING THE CAGE

The cage can be opened (disassembled) without first removing the cylinder assembly from the

machine however you may find it more difficult to put it back together. Once you are used to the cage assembly procedure on the floor you can try doing it on the fully assembled machine.

The three rings holding the cage bars together can be tapped upwards towards the hopper. If the cage is full of seed cake and the press is still fully assembled, the handle can be used to open the cage bars.

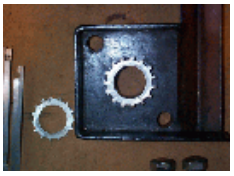
This assumes you have an expeller cage full of seed and you want to take the cage apart. First operate the press with a little seed and stop the handle about half-way down. Place a support like a forked stick under the handle to hold it up. Tap the cage rings upwards until they are clear of the bars. Remove the support from the handle and lower it gently. The pressure inside the cage will push the bars outwards. As soon as the cake is broken, the hopper will fall downwards so it should be supported with your hands as the handle is lowered. The Hopper and Cylinder can then be dropped down and away from the piston and everything can be cleaned out.

The bars are identical and but they have a 'top' and a 'bottom'. The longer hook goes at the top.

The pressing of some medicinal and homeopathic oils such as linseed must be done in the dark and special provision can be made for this, including pressing seeds in a nitrogen atmosphere.

ASSEMBLING THE CAGE

The first time you assemble the cage, it will be helpful to have someone assist you until you see how to hold the cage bars. The hooks at the ends of the bars slide into one of the slots and grip the cylinder on the top and the fitting at the bottom. Put two on opposite sides and



then four, and fill in the rest.

When complete, the rings slide over the top to hold it together. When the cage is still empty, it is possible to rotate the cylinder and hopper with respect to the oil tray.

DON'T REMOVE PARTS UNNECESSARILY

The New Dawn Oil Press has been designed to be opened and cleaned or adjusted without having to make realignments of the whole mechanism. At the top of the press there is a heavy






rectangular steel bar called the crank arm that can be lifted up and down. This raises and lowers the piston. It swings around on a shaft that goes through the top of the machine from front to back. It is NOT necessary to remove any bolts attached to this crank arm in order to do any of the following:

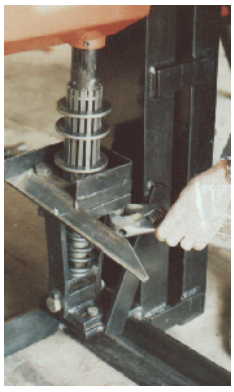
- open the press,
- put on, or remove the hopper,
- make adjustments to the choke assembly.

- clean out the seed cake
- change the spring shims
- change the spring

Do not remove the lock nut at the top of the piston. There is no need to remove the top bearing just to open and clean the machine. Leave the piston attached to the crank arm.

SPLITTING THE CYLINDER ASSEMBLY FROM THE CHOKE ASSEMBLY

This is the NORMAL way to open the press for cleaning and making pressure adjustments. The cylinder can be removed by taking out the two 20 x 75mm bolts holding the oil collection tray and choke plate together. Undo the two 27mm nuts under the oil collection tray. They do not have to be very tight. When the nuts have been removed, raise the Crank Arm, at the same time lifting on the spout. The oil collection tray will lift up off the choke plate. Lift it together with the whole cylinder, cage and hopper assembly. When the two bolts are clear of the Choke Plate, swing the whole assembly to one side and gently allow the Oil Collection Tray to drop down. The Cylinder Assembly will slide off the piston. The piston can swing away from the frame so this is easy to do.



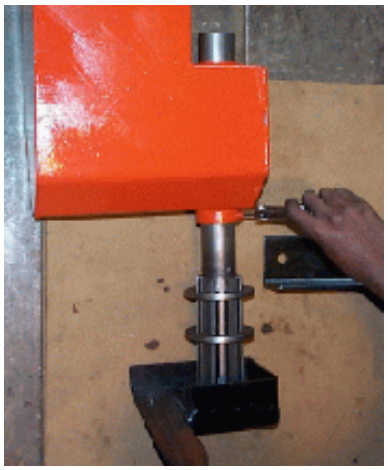
The piston should remain attached to the Crank Arm. Do not remove it. Normally, there is never any reason to remove the piston or the crank arm.

REMOVING THE HOPPER

Four grub screws (5mm Allen Key) hold the hopper to the cylinder. Removing it is not normally required for cleaning purposes. Stand the cylinder assembly on the floor with the oil collection tray at the bottom. Loosen the 4 grub screws on the two collars of the hopper. Slide the Hopper over the top of the cylinder.

There is a rectangular hole machined into the side of the cylinder. This hole is open when the piston is up allowing seeds to enter the press. The bottom of this rectangular hole should be aligned with the bottom surface of the Hopper. This makes it easier to brush the last of the seed into the hole.

REPLACING THE HOPPER



The hopper attaches to one side of the cylinder so that the top opening is away from the crank arm and the frame of the press. Hold the hopper so that the hopper floor is level with the bottom of the rectangular seed hole in the cylinder. Tighten the 4 grub screws with a 5mm Allen Key. When it is finished, you should be able to look into the opening of the hopper and see directly into the rectangular hole in the side wall of the cylinder.

REPLACING THE CYLINDER ASSEMBLY

Clean the upper surface of the choke plate and the lower surface of the oil collection tray. Cradle the cylinder assembly in your arms with the hopper towards you and the cylinder at the back. Pull the piston away from the frame and carefully put the bottom of the piston into the top of the cylinder. Slide the cylinder assembly up until the piston completely enters the cylinder. Swing the assembly towards the frame so that the oil collection tray in directly over the choke plate. Lower it onto until they meet. Put in the two large bolts that hold the tray section and choke section together. Move the plates around a little until the two bolts drop into their holes. If you find that the oil collection plate is too low to clear the bottom assembly, lift the crank arm to raise the top of the piston. The whole assembly can then be lifted higher. It is difficult to do this without help

from another person, especially the first time, or if the handle is already attached to the crank arm.

Press the two bolts down through the choke plate. You may have to turn the heads a little to get them to slide down next to the lip of the collection tray. The bolt hole is placed close to the lip so that the head of the bolt cannot turn once it is pressed down. The nuts can be tightened with only one spanner. Tighten the two nuts with a 27mm or a large shifting spanner. The nuts do not have to be very tight. When the press is in use the assembly becomes rigid on its own.

If there is foreign matter between the two plates they will not bolt together properly and the press will not operate properly because to puts the cylinder and piston out of alignment. If you have opened the assembly in order to make a spring adjustment or to clean out the cylinder, make sure you remove some of the seed cake from the choke plate hole to ensure that the two plates bolt back together cleanly and firmly.

MOVING THE PRESS

First, remove the handle with the spanners. When moving the press in a pick-up truck or trailer, it is important not to knock the hopper around unnecessarily. The machine should be placed on its side for transporting, but it should not lean or rest on the hopper. If you are standing in front of the hopper, lift the crank arm up and drop it to the right, that is, towards the leg of the steel frame that points to the right. This will shift the hopper to the right. You can tie the crank arm in that position with some string.

The Press can now be leaned over to the left and placed on the ground. It will rest on the left side of the frame only, with the hopper lifted away from the ground and its leg sticking into the air..

When you pick up the press to load it into the vehicle, do not lift it by the hopper as it is likely to twist on the cylinder, or to twist the cylinder in the oil tray. There are plenty of handholds available on the frame and on the base.

CLEANING THE PRESS

It is very important that you clean the press thoroughly from time to time. Usually once per week is sufficient, though if you use it every day it might not be necessary. While this may sound odd, the press need more cleaning if it is left standing without use. The reason for this is that cooking oil ‘drys out’ and gets sticky, eventually getting hard. A very stiff black coating rather like paint that hasn't finished setting yet coats everything on the press. It can be removed with hot water and soap. Many parts of the press will rust if left standing in water so dry off the parts when you are finished washing them.

There are two ways to open the press for cleaning: disassembling the cage completely, or splitting the oil collection tray from the choke plate. They have both already been described in this text. Your can clean out the hardened cake in the choke unit with a hard sharp tool. You will have to remove this cake if you are going to leave the press unused for a long period of time such as between pressing seasons.

It is not normally necessary to clean the cake out of the cylinder, but should be done if you are changing the cylinder/cage, for example, from a sunflower cage to a sesame seed cage. The one being put away should be cleaned thoroughly and greased, wrapped up in plastic or heavy paper and put away somewhere dry. It is also quite difficult to get it out by digging at it from the bottom, but it can be done if you want to. You may prefer to remove the hopper from the cylinder when you are doing this. The section of seed cake between the entrance hole of the cylinder and the top of the choke ring can become very hard if left for a long time and must be removed before using the press again. It is very unlikely that such a hard plug can be forced through the choke ring and the main shaft can even be damaged (bent) in such an effort. It is far easier to remove cake when it is fresh than after a week of drying.

ADJUSTING THE CHOKE PLUG

The resistance you feel when you sit on the handle is governed by several things: The temperature of the seed (warm seed is feels softer) the hardness of the seed itself (hard seeds

usually gives less oil), the speed at which you have been pressing (if you go faster, it is slightly easier to operate the press because less oil is removed), the spring chosen for the choke plug (higher had lower force) and the setting of the choke plug height (more shims means more pressure).

Choosing the right seed gives you the best potential yield. Warming it up in the sun (50-60 degrees C) gives you 20 to 25% more oil yield. This is economically significant. Pressing slowly (about 5 seconds per pressing cycle instead of 3 to 4) gives more oil from a given quantity of seed, but at a reduced daily production rate. To efficiently press 100 Kg is seed per day the rate of operation is rather modest and unhurried.

The choke plug height is the first thing you might adjust. It is done with the shim washers provided with the machine. The press is shipped with one shim installed. When you first start pressing, you will discover that it there is some skill required to get everything just right to press with a steady rhythm. After some time, you will find it easier and easier to keep up a good rate of work. lf you feel that the pressure in the machine against which you are working is too low, you can increase it by adding a shim between the choke plug and the spring. This raises the choke plug and forces you to press the spring down farther in order to get the seed cake to extrude past the choke plate opening.

To change the number of shims, remove the two 27mm nuts from the bolts that hold the oil collection tray and the choke plate together. Pull the cylinder assembly up off the choke assembly, swing it away from the frame and carefully lower it until the cylinder slips off the piston. Place it on the ground, making sure you don't get dirt in the cylinder.

Clean the seed cake out of the choke plate hole until you can see the top of the choke plug. You must now remove the choke plug. Lift it up towards you with your fingers (or a stiff piece of wire placed under the very bottom) until you can grab it from above. You can also poke a screwdriver through the spring and lift the choke plug from below. It comes right up through the choke plate.

When you pull it up the shim washer will remain behind, sitting on top of the spring. The spring does not come out as it is held in by a big steel pin that guides the choke plug. You can slide in more shims or take some out. The choke plug can then be re-inserted: first through the hole in the choke plate, then the into shim(s), then into the spring, and lastly over the big steel pin. There is supposed to be grease on the pin. Now is a good time to put some more on it.

The Cylinder Assembly can then be slid back onto the piston and bolted down onto the choke plate.

The addition of one 3 mm shim to the press means an additional 6 to 8 kilogrammes of body mass is required to operate the handle. Sometimes two people will to work together as a pair on the handle (or two people on each side). Raising the choke plug and consequently the operating pressure, does get more oil out of the seed.

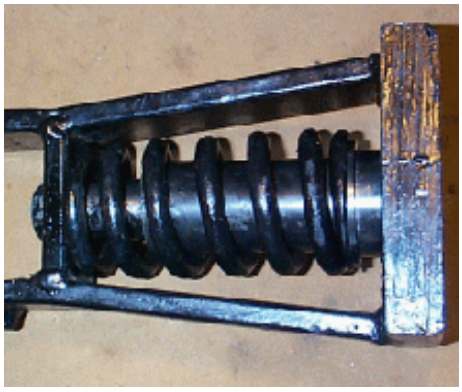
REMOVING THE CHOKE RING

By changing the choke plug setting height and choke ring diameter, it is possible to vary the pressure at which the oil is expelled from the cage, and, separately, to vary the ratio between the pressure in the cage and the pressure directly under the piston where the seed is crushed.

Below the bottom of the piston's bottom dead centre position is a restriction. This choking area causes the seed to be crushed by restricting its movement into the expeller cage. When the seed reaches top of the cage, it is forced to move laterally while under pressure in order to get through the hole, breaking it up most effectively. In addition, it heats the seed up with friction just as it enters the cage area. This patented device increases the output of oil. The older-fashioned tapered cages with a fixed (not sprung) choke plug tend to require the same amount of effort as the New Dawn press but they create heat as the dry cake leaves the cage, which is of course, useless. The New Dawn Engineering system generates heat at the very point where it yields more oil, rather than yielding heated cake.

The pressure required to break up the seed is much higher than the pressure that squeezes the oil

out of the seed cake. That is why the choking is so important. The pressure above the choke area where the seed is broken is higher than the pressure in the expeller cage.



Raising the choke plug increases the cage pressure, and in addition, raises the pressure under the piston. The ratio between these pressures is about 2:1 to 4:1 depending on the seed hardness and choke hole diameter. This ratio can be changed by altering the diameter of the hole in the choke ring. The press usually comes fitted with a 27 mm choke hole. You can drop a machined washer into the cylinder in order to create a higher pressure. It must be thin and hard. Light operators, using hard and dry seed, might have trouble pressing the handle down. The choke hole can be between 23 and 34mm.

CHANGING THE CHOKE HOLE SIZE

The hole is drilled through the top fitting to which the cage bars attach. To change the choke hole sizes means changing the top fitting for the cage. The fitting unscrews from the cylinder (use a C-spanner).

LUBRICATION

Whenever you have the cage apart see if there is some grease on the bolt at the bottom of the press and also check the choke plug which slides up and down on a fat pin. It should be opened and greased about once a year. If you cannot not get grease, oil can be used for lubrication, but it is not as good.

If you can't get oil or grease you can use cooking oil. If you are using cooking oil, it would be best if you put some oil on the exposed lower part of the big steel pin every day. It should be opened and cleaned out, and re-lubricated every 2 weeks or so. In that way it will not get caked up with hard dried out oil. Cold pressed sunflower oil is a good lubricant but it dries to a hard, thin, black scale.

The top two ball bearings supporting the main horizontal shaft are to be greased about once every 6 to 12 months. They do not require much attention.

The swivel ball bearing at the top of the piston is to be greased and it requires a special type of grease gun that one gets from bearing suppliers. Motorcycle shops sometimes have it as well.

If, after a long time, the swivel ball bearing gets really worn and a new one cannot be found easily (it's type is a POS 22) then you should try to keep it greased as best you can. If you cannot get grease, use oil, especially the thick oil such as the old engine oil you get from a bus. If there is nothing else available, use some of the cooking oil. Sunflower oil is a good lubricant. The piston is lubricated by cooking oil, but it is constantly being bled off and replenished by fresh oil as the machine operates.

CHANGING THE SPRING

The spring can only be removed by taking the big steel pin out from under the choke plug. To do this, remove the choke assembly from the press but do it without removing the foot. Leave the foot in position and rather take out the large 20mm bolt that passes through the bottom of the choke assembly frame. This require a shifting spanner set to 27mm. Split the oil tray-choke plate joint by removing the two big bolts. Then take out the choke plug and shims. Using two 24mm spanners, remove the bolt that holds the big steel pin in place. Put in the spring you want to use and replace the steel pin. Make very sure the bottom of the pin is completely clean or else it will not stand exactly straight. If it tips to one side the choke plug may not go up and down smoothly. That problem will be obvious when you try to replace the choke plug.

There are three springs made from round material that is 10.0 mm (White), 10.5 mm (Black) or 11.0 mm in diameter (Red). The correct combination of spring power and shim height will give

the best oil yield from the seeds, however we are not able to say exactly which combination suits your seed variety. Only systematic testing will show how spring pressure, shim height, operator speed and the pressing pattern (fast-slow handle) are set for your crop. Our experience shows that it takes about 4 months for someone to learn how to optimize the yield.

SEED TYPES

There are more than 100 types of sunflower, many of them hybrids with oil contents over 45% by weight. Some are large seeds but have only 15% oil content. Some have hard shells, some soft shells, and there are some like PNR 7225 that grow well in very dry places. Some require more water to get a good oil content.

We have some recommended varieties which are available in Swaziland, but they might not be available in your country. Our favourites, based on our own experience and the CARE project REP-2 in Maseru are Sofala's very short season SO 323, and Pannar's PNR 7225 (for dry climates less than 600mm rainfall) and PNR 7204 and 7965 (for 900 mm and up). Every year the varieties are improved. This is by no means a comprehensive selection. You must talk to the seed representative in your area for information on what grows best in your soils.

Most sunflower oil pressing projects in Africa are using a single variety called Black Record which might be a Russian variety coming by way of Romania. It is an open pollinated variety and can be replanted year after year. The oil content is normally above 42%. It usually yields 25-28% oil by weight in a manual press. People usually talk about 'four kilos per litre' with that seed.

Please keep in mind that getting a very high yield in Kg per hectare may not be the best variety for you. Pressing by hand also requires a seed that will give up that oil at the temperatures you are able to get in the sun, and at a pressure you can generate. Clarification of the oil is also an important variety-dependent consideration, Some seeds produce oil that clears completely in 6 or 7 days (SO 323 for example) and some are covered in a light dusting of black powder that produces oil that never quite completely clears.

Open pollinated varieties that can be kept and replanted each year have significantly less oil in them and produce lower tonnage per hectare but you may be operating in an area that cannot get good hybrid varieties or where farmers do not traditionally buy seeds at all. You have to press what you can get. The hybrids that press out 40% more oil are certainly worth the investment.

COLD PRESSED OIL

The oil produced by heating the seeds in the sun and putting them through the New Dawn Engineering Cooking Oil Press is classified as "cold pressed". You can test the quality of a cooking oil claiming to cold pressed by putting it a refrigerator and looking at it later. When it is cold, the a true cold pressed oil sort of 'freezes'. Actually, it thickens suddenly at a low temperature. The colder you have to have it before it thickens, the more likely it is that it was pressed at a high temperature. Cold pressed oil keeps much longer than hot pressed oil without going rancid. It is also reported to be 'stronger' (Lesotho experience) meaning that it requires less to cook a meal with, when compared with a hot pressed oil. It also tastes better.

It is reported that cold pressed oil can be kept for up to 2 years without it become rancid. Hot pressed oil, on the other hand, has a shelf life of about 3 months. Cold pressed oil is a very poor medium for growing bacteria, having very little water available for their growth. *Fusarium Roseum,* which produces aflatoxin and zearalanone in peanuts and maize, has great difficulty growing on sunflower so the uncontaminated, 0% cholesterol, cold pressed sunflower product lives up to its name as a first quality salad and cooking oil.

Many varieties of Sesame Seed can also be found growing around the world but so little is grown in Swaziland at present that we have not been able to do meaningful tests. The same traits that are found in sunflower seeds apply: different oil contents, hardness, sizes and so on. Seed merchants and agricultural advisers should be consulted for the best varieties in your area. The output from a manual press is generally held to be about 1-1/2 times higher for sesame than for sunflower.

HOT PRESSED OIL

If you have very poor output from the seed grown in your area and that is all you can get, then you have the option of scorching or roasting or deep-frying the seeds before they are pressed. The usual reason for not doing this is that it is inconvenient, energy consuming and does not give as nice a final product. It will, however, give you more out. When heated to say, 150 degrees Centigrade, the oil starts to break down into shorter molecules, which makes the oil thinner, and reduces its shelf life.

It has been reported that some unmodified diesel engines will run on a mixture of hot pressed sunflower oil mixed with 15% diesel.

GETTING THE MOST

In the end, you will have to press what seed you have available. The most important single consideration to oil yield is heat. Unless it is pressed very slowly, cold seed does not let go of the oil easily. Seed should always be heated in the sun if at all possible, simply because it is cheap, safe, and gives you more oil. If you live in a cold, wet environment, find a way to heat up the seeds a few kilogrammes at a time and press warm seed. We have found solar heaters to be very effective. The extra output makes the effort worth the trouble.

SEDIMENTATION OF OIL CONTAMINANTS

The oil when pressed is dark, being contaminated with bits of shell, extruded nut meat, dust and so on. The oil cannot be used directly without some sort of cleaning process. The cheapest and easiest method to use is to put the oil into a large container and leave it alone. Do nothing at all for a week or two. All the unwanted material will fall to the bottom leaving pure, clear oil. This can be poured off into other containers. Avoid salesmen offering oil filters and pumps and so on. They may work but you may not need them at all.

If you have grown a seed that has a dusty black coating on it (if it your hands get dusty black if you run them through a bag of seed) you probably have problems getting it clean by any method. You should avoid that variety in future. Grow a seed that makes oil that doesn't need to be filtered and your problems will be avoided. If the oil remains grey, it is still useable. Some powdery seeds produce such oil.

SALE OF OIL

It is best if you do not have to bottle the oil, as it requires sterilization of the container, labels, caps and boxes. It is better to sell locally, retail, and in bulk. That is, sell by the litre and let the customer bring their own bottle to be filled at the counter. Paraffin is frequently sold this way at rural shops. Cooking oil can be sold in the same way (and frequently is).

SEED CAKE

This is a very valuable chicken feed, and it is also used for dairy cattle (12% of feed) and for pigs, goats and other domestic animals. It should not be fed to rabbits as finely ground food gives them diarrhoea. Most commonly it is used to feed chickens as they have a high conversion of food into meat. Sample feed mixing formulas for different animals are available from New Dawn Engineering at admin@newdawn.sz Chicken feed is normally made by mixing broken maize, sorghum, sunflower seed cake and then adding vitamins of various kinds. There is a potential for further improvement in the income of a cooking oil project if the mixing of animal feedstock is part of the whole operation. It is this type of agribusiness that should be conducted on the farm, rather than in an urban centre.

For any additional technical information or for customized presses including electric or engine driven versions of this model, contact:

NEW DAWN ENGINEERING (Pty) Ltd.
P.O. Box 3223 Manzini
Swaziland
Africa

Email: sales@newdawn.sz
www.newdawnengineering.com
TEL (++268) 518-4194 / 518-5016 +FAX
Cell (++268) 603-2242