

The Auger Bit Oil Press – by Tim Tanner (2012)



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Introduction to the Auger Bit Oil Press

Emily & I are working among an underdeveloped tribe along the coast of Tanzania. In 2006 we first visited ECHO and among the many things we learned about was the Moringa tree. Upon our return to Tanzania later that year we started planting lots of Moringa trees and teaching people how to use the leaf for a dietary supplement. In my own yard, I would let the trees in the back yard grow to full maturity, but the trees in the front yard I would keep them topped at about 3 feet for better leaf production.

As we convinced locals to grow and use the trees, many seem to just let the trees grow to full maturity, and just use the lower leaves. Therefore the trees end up producing a lot of seed throughout the year. This got me wondering about various possible uses for the seed, of which there are many.

As I studied more about Moringa seed, I learned of its valuable edible oil and this led me to start researching ways of extracting the oil. There are commercial chemical extractions, but these are too costly for the tribal people we work with. There are also cold and warm commercial presses, but these also are too costly for the people we work with. I read about boiled water extraction, and practiced some, with some success, but frankly it's a lot of seed for only a little oil, and too easy to mess it all up and end up with nothing or little oil at best, not to mention the fuel expense in boiling the lot.

Lastly I decided to research pressing the seeds. I wanted to see if there was a way to invent a simple press from locally available parts (in Tanzania). There were a number of sources I researched. But here in short is what I learned. Moringa seeds have about 38-40% oil content. The seed however, loves its oil and will only give it up under high pressure. But if the pressure is released the seed cake will reabsorb some of the oil. So oil needs to be extracted while under pressure. There is another problem, the seed cake is very dense and can actually trap small bubbles of oil preventing extraction. So it was determined by the Bunda College of Agriculture in Malawi that the seed should only be 50% hulled. In this way the hull provides crevices for the oil to run out through the seed cake. But leaving all the hull on would reduce the oil output as the hull would then absorb some of the oil and cause it to pass with the seed cake. Thus, in all my testing discussed in this report, I hulled Moringa seed about 50% before testing but after weighting. With further research I learned that the press cage should be 1" in diameter or smaller. Any bigger would cause



some oil to be trapped in the seed cake and thus exit with the seed cake. I also learned that the speed at which the pressure was applied to the seed did not matter, it only needs a certain amount of pressure and the seed would begin to give up its oil. In other words, it didn't matter if you smash the seed, or slowly squeeze the seed, so long as the pressure is enough to extract oil.

Here are some of the web sites & documents I researched:

pdf.usaid.gov/pdf_docs/PNABC965.pdf
http://archive.idrc.ca/Nayudamma/oilseed_12e.html
pdf.usaid.gov/pdf_docs/PNACS056.pdf
<http://dspace.mit.edu/handle/1721.1/32783>
http://journeytoforever.org/biofuel_library/oilpress.html
www.jatropha.de/malawi/Agroforestry-conf-paper.htm

The latter site at www.jatropha.de is unfortunately no longer available. The document compared Moringa and Jatropha seed pressing in three different types of hand operated presses. The results were very valuable.

So with all these facts in my mind I went about trying to design and build my own press. The goal was simple, to develop a press that would extract oil from oil seeds (any, including Moringa), by using parts that were available in developing countries, could be built by local crafts men, could be operated by an average village person and could produce enough oil to make it worthwhile in local economies.

The first press I built (Figure 1) was a simple hydraulic press using a small car bottle jack. I used a 1" pipe and 1mm holes in the press cage. I put a smaller plugged pipe inside it, filled the press cage with seed, pressed, and was able



Figure 2

to extract a good amount of oil. I was so excited! But I soon realized that retracting my piston was very hard work, not to mention

cleaning and reloading. Results were slow and laborious.

I then modified my press cage to expel the seed cake after oil separation had happened by simply increasing the pressure and pushing the seed cake on out the bottom (Figure 2). The bottom of the cage was plugged with a spear point (idea from Carl Bielenberg's ram press). This idea worked much better and gave about 16% oil by weight. The piston was still hard to extract. I later did some improvements on the piston by adding an expanding pvc ring that sort of prevents seed cake from getting pushed in between the piston and the press cage and makes retracting the piston a bit easier. But still fairly slow production. I would like still to try to reproduce this press, but

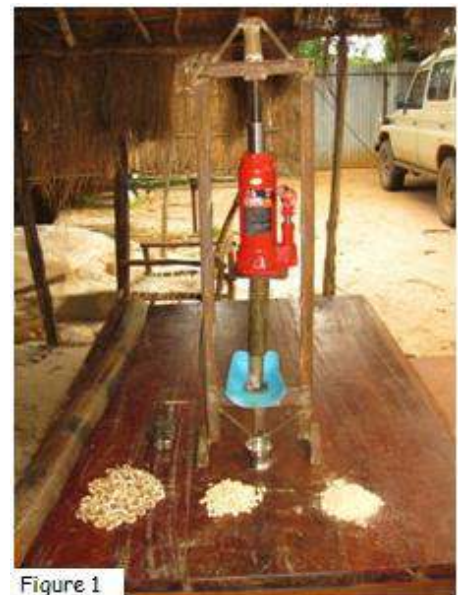


Figure 1

with the piston attached to a large screw. This way you would have the same leverage available to retract the piston as was used to press the piston in the cage. But I have not as of yet found time to try that.

I later ordered a hand operated press from the PITEBA company (Figure 3). The cost was about \$150 USD with shipping. I also paid about \$45 USD in importation duties (I live in Tanzania). The PITEBA press is nice because it is a continuous feed expeller. The only real problem with the PITEBA press was that it costs way too much for a local farmer in Tanzania to ever think of affording. But I really liked the tapered auger that drives the seed and slowly pressurizes the seed as you turn. You can adjust the pressure by turning the plug in on the reducer at the end of the press cage, and this closes the seed cake extruder holes providing more pressure and more work to turn, and slower processing of the seed, but does increase your oil by weight output. The PITEBA press works fairly well, and can do a large variety of seeds. Another feature I liked about this press is that the press cage was simple, just a 1" pipe with a slit for the oil to drain from behind the point where the seeds are pressurized. The seeds are forced through the pipe as the auger turns,



Figure 3

but the oil runs the other way and drains from the slit. This works sort of like the old Maytag Ringer washer that you put your clothes in the ringer, and the clothes are forced through, but the water runs away from the rollers. I tested the PITEBA press with Moringa seed and found I could get about 13% oil by weight. Considering the University of Agroforestry in Mawawi's published results, this is pretty good.

About this time, we began a residency at ECHO for 4 months and ECHO let me use their shop to continue my oil press development.

The next thing I did was build my own press that was a continuous feed expeller (Figure 4). I used a ½" auger bit (from any hardware store) inside a ½" water pipe. I used a standard reducer with a plug and drilled my extruder holes in the side of the plug. I also cut a slit for the oil to run out near the seed input, but between the seed input and the seed cake exit.



Figure 4

I learned a very important lesson. Since the auger bit is not tapered, once the seed cake pressurizes in the press cage oil separation happens right at the point where the seed is dropped into the pipe. So I needed to move my oil slit behind the seed insertion point (Figure 5).

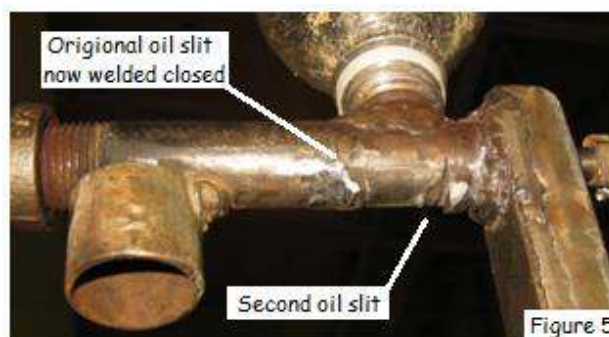


Figure 5



Figure 6

With the oil slit moved behind the seed input, it meant the distance between the seed input and the extruder holes was just causing friction and no real pressing going on. So the next thing was to make a bigger press to process more seed at one time from a 1" pipe and 1" auger bit and move the seed input much closer to the seed cake extruder end (Figure 6).

This idea worked fairly well. If you look carefully at figure 6 you will see two oil extractions slits, one just behind the seed input

and a second one about 1" back. Nearly all the oil came out the slit just behind the seed input, but at times when that slit clogged it was nice to have the second slit. At this point I was getting what looked like good oil production so I performed a measured test and found I was getting 14% oil by weight. However, I noticed I still had a fair bit of resistance turning the handle and frankly was quite tired after my test. Who would want to run this thing all day long? Not me, I thought.

My last oil press to date is the one I want to spend the most time in this article on. I liked the 1" pipe auger bit idea, but realized that the distance between the seed input and the reducer and the big space in the reducer is all just superfluous friction.

Additionally, I noticed with the 1" 'T' for the seed input, it was too easy to clog things up by shoving too much seed in at one time. So I reduced the seed input to a 1/2" pipe. I used the spear point idea from my earlier hydraulic jack press as the extruder for the seed cake to avoid having to use the reducer pipe fitting and all its wasted space and unnecessary friction. (Figure 7).



Figure 7

I performed 2 tests with this press. However, as I was clarifying the oils the next day, I dropped one of the jars and lost it. The two jars on the shelf looked like they had similar amounts of oil. But I never was able to measure the second one due to my slip up. The measured test showed 15% oil by weight. The press was very easy to turn. So easy, in fact, that while under pressure when the crank handle is just past top dead center, it will fall slowly on its own down pressing oil.

All three of these latter auger presses I developed while serving a residency at ECHO in N. Ft Myers, FL. Understandably the ECHO seed bank had only a very limited supply of fresh Moninga seeds that they could let me press. Therefore, the EHCO seed bank gave me one more kilo of 4 year old low germination seed to perform one last test. With this seed I found that I was able to get 12% oil by weight. I assume the reduction in oil is due to the fact that the seeds were so much older. Having run

ECHO out of sacrificial Moringa seed, further testing will have to be done back in Tanzania where I have a ready supply of Moringa seed.

In any case, this last design proves good on many counts: 1) It is a continuous feed. 2) The pressurized area of the cage is very small and thus easy to bring up to pressure. 3) Very easy to clean even if it cools off because there is never more than a spoon full of seed cake in the cage at any one time. 4) For the same reason as #3, you can start and stop pressing very easily, i.e. take a rest. 5) With the oil slit behind the seed input, you get a lot less dust and chaff in your oil than with the PITEBA and other such auger presses, as the seeds and chaff are being pushed away from the oil extraction slit. 6) It is all made from parts that are locally available in the developing world. 7) The construction is simple and could be built and repaired by anyone who knows how to weld, grind and drill – even the local welders on the street given direction. 8) It takes less energy to operate than other auger presses. 9) It is harder to clog up than other auger presses. 10) It produces more oil by weight (although to be fair it would need further testing to prove it's consistency). 11) and best of all, it is cheap, real cheap!

Here is how to build your own Auger Bit Oil Press.

Things needed in order to build the Auger Bit Oil Press:

Tools you will need:

- Welder
- Angle grinder
- Drill & drill bits
- A round file
- A hacksaw

Things you need to collect before you start:

- 1" auger bit, single fluted.
- 1" water pipe, about 6" long.
- 1" water pipe, 1" long.
- ½" water pipe, 1" long.
- 1.5" angle iron at least 6" long or longer.
- 2" angle iron about 6" long.
- 1 large bolt and 3 nuts to fit it (~5/8" x 2" ore larger).
- 4 machine bolts with short or no shank and 4 nuts and lock washers (~3/8" x 1").
- 2 more bolts for fixing press to table or bench. (Could be machine of lag bolts depending on where you want to mount it.)
- Some scrap flat steel or flat bar pieces.
- 1 wire coat hanger, or similar wire.

Building the Auger Bit Oil Press:

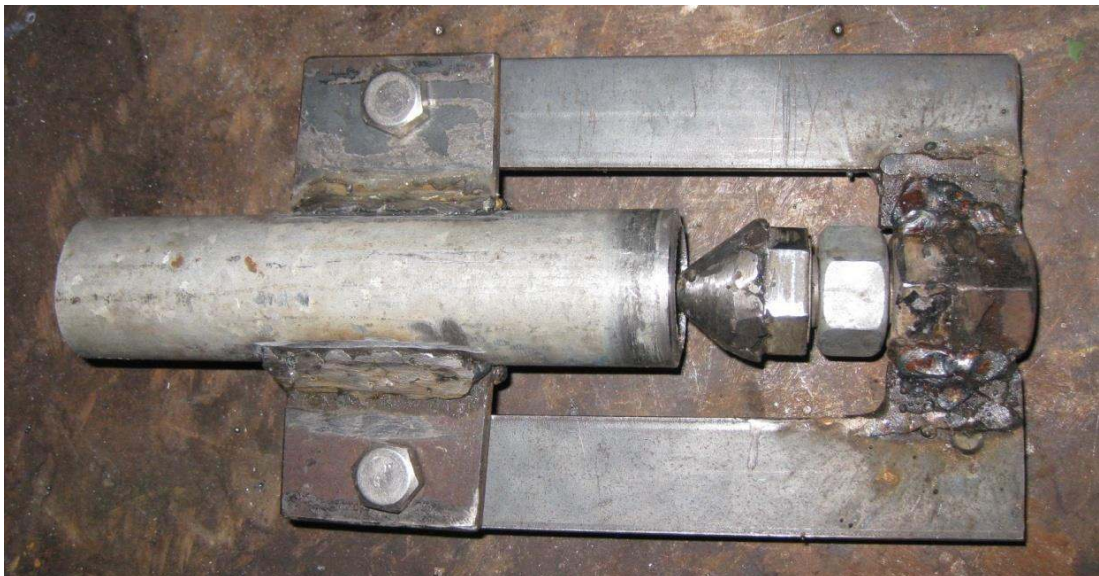
1. Put 2 of the 3 large nuts on the large bolt and weld the 2 bolts together to give a long threaded shaft.



2. Weld a lump on the top of the large nut's head and then grind it to a point. Try to make the point as close to center as you can. To do this, you can use the "poor man's lathe" by putting your bolt in the drill and clamp it somehow, and wire the on switch to stay on. Then use the angle grinder to shape it.



3. Use a round file and smooth out the inside of the 1" pipe. Most cheap water pipes are rolled and have a welded seam. You will want to file this smooth. You do not have to file the seam completely away. Actually having some bumps inside the pipe encourages the seed cake to follow the bit's path and not get turned with the bit and clog.
4. The 1" bit should fit in the 1" pipe. If not you will need to grind the front end of the bit a little. The tips of drilling bits are slightly wider than the rest of the shaft to reduce friction when boring a hole. But we want it all the same size, so grind around the bit so that it fits and spins nicely in the 1" pipe.
5. Now build the frame to hold the spear point so that at full extension it will plug the end of the 1" pipe. To do this, weld some scrap flat steel wings on the 1" pipe. Then weld some flat bar on to either side of the 2 big bolts you welded together so that you can drill holes in the flat bar and drill holes in the wings on the pipe to match (to bolt it all together) so that the big bolt with the spear point will plug the pipe a full extension.



The third big nut goes on the big bolt first and will serve as a lock so that your spear point plug does not slip under pressure.

6. Now grind the tip of the bit so that the spear point you made on the bolt head will fit up into the bit somewhat. You want the bit, when it is turning, to press the seed cake out around the spear point.



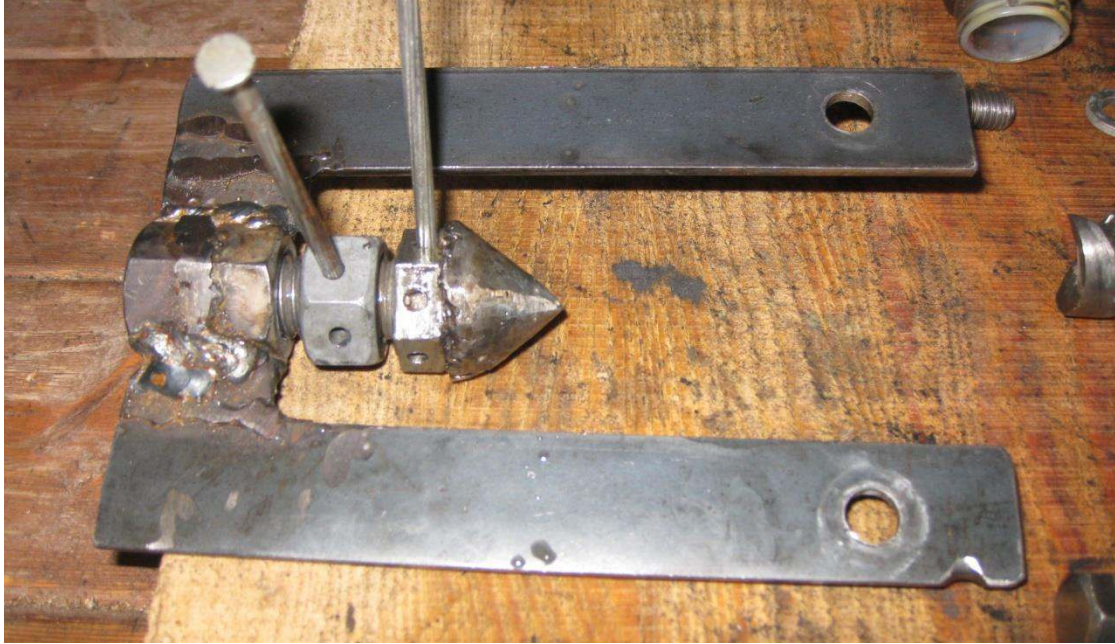
7. Now it's time to build the seed input. Put your press together and turn your spear point to full extension so that it plugs the end of the pipe. You want the seed to be dropped in just behind the tip, so make your mark now and drill a $\frac{1}{2}$ " hole. This side of the pipe will not be called the top. Cut a short piece (~1.5") of $\frac{1}{2}$ " pipe to weld on top of your hole to make a 'T' in the press cage pipe. Grind a saddle shape in the $\frac{1}{2}$ " pipe so that it fits nicely over the $\frac{1}{2}$ " hole in the press cage and then weld it in place.



Note: I used a threaded piece of $\frac{1}{2}$ " pipe, but that is not necessary, there is no advantage.

Note 2: You could also use a larger (like $\frac{3}{4}$ ") pipe for the seed input, just make the hole match it. This allows for more seed in at one time for faster processing times. Friction is also increased, but only minimally.

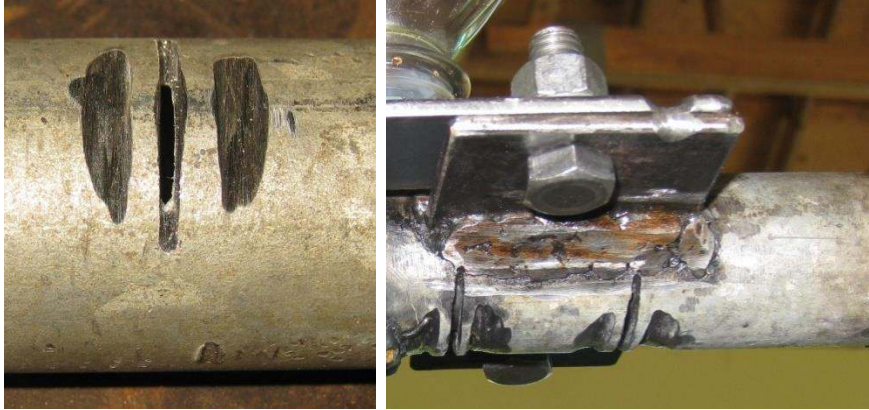
8. It was about at this point I realized that there was not enough space to fit a wrench in between my spear point frame to turn the nut and bolt. So I drilled holes in each flat surface of the lock nut and spear point bolt. Then I took two nails and filed off the tips to use as small wrenches. It worked great. Alternatively allow the wings on the longer so there is enough space to just use a normal wrench. I did this on later presses I built and it worked great.



9. Since I'm not that great of a welder (the pictures tell the truth) and my press is not symmetrical (a better welder could have made it work either way), I marked the frame and wings as to make sure I always put it together the way they fit the best and were the straightest.

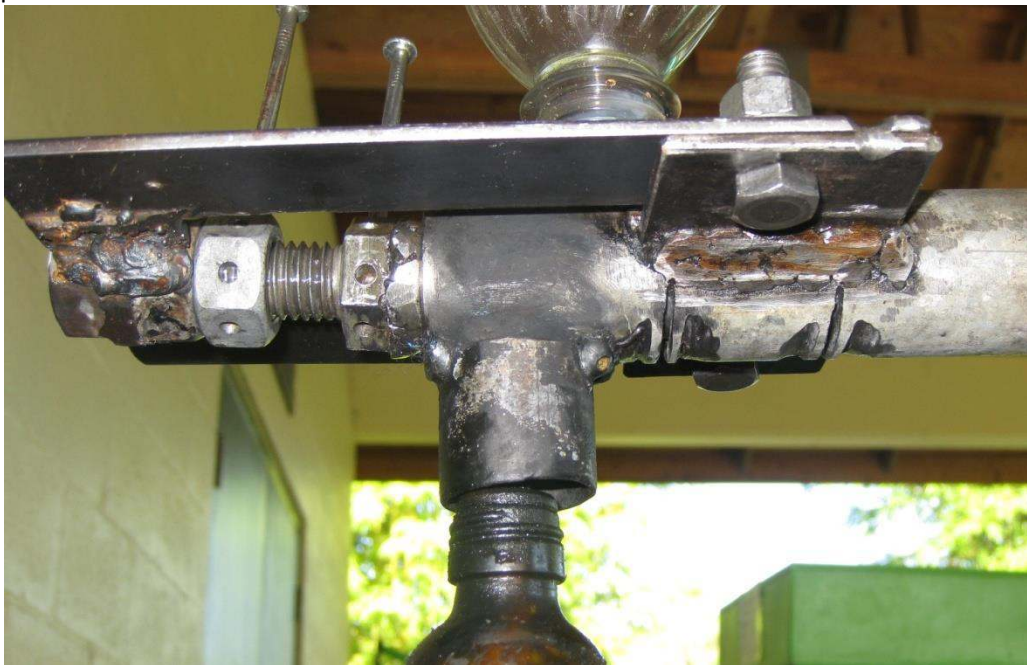


10. Make a mark on the bottom of the press cage pipe just behind the $\frac{1}{2}$ " seed input. Then make another mark about 1" or 1.5" further behind the first mark. Take your hacksaw and cut a deep cut in the press cage pipe on your marks, as if to cut the pipe in two, but only go about $\frac{1}{3}$ the way through the pipe on each mark. Then grind or file away some of the pipe on either side of each of the cuts so that there is a raised part of steel on either side of both cuts you made. These cuts are the oil extraction slit. The raised steel on either side of the slit prevents oil drips from running down the length of the pipe and causes the drips to drip off the pipe into your jar.



The reason for a second oil extraction slit is just a backup. It is possible that you could work the machine too hard and some seed cake could be forced backwards in the press cage and blocks the oil slit. A second slit will allow the oil out during the time it takes you to notice that you have clogged up the first hole and clean it. If the oil is not allowed out, it backs up in the pipe and comes out at the handle where you are cranking and is unrecoverable.

11. Take your 1" long piece of 1" water pipe and weld it on the underside of the press case as close to the end as you can. Do not grind a saddle shape in it. Only weld the two sides that touch. Do not weld all the way around. This is to direct the candle flames heat to warm the end of the press cage, and to protect your flame from wind, and keep the soot way from the oil extraction point.



12. Now you need to weld the press on to the 1.5" angle iron. But first you need to make sure that your press cage pipe is the right length. Put your machine together as far as you have built it so far. Make sure your spear point is plugging the hole fully extended. Press the auger bit against the spear point inside the pipe. Make sure the shaft of the auger bit is sufficiently sticking out the end of the pipe to allow room for at least 2 washers, the 1.5" angle iron to be welded on and the handle to attach, and still have room enough to play a bit (like 1/2" of play or so). Once

welded all together you will reduce the play to a minimal amount by just adding more washers on the shaft of the auger bit. If your pipe is too long then cut or grind some off the back end.

13. Now drill a hole in the end of the angle iron the same size as the shaft on the auger bit. Put the bit in the press cage and put the bit's shaft through the hole in the angle iron. This will help you line it up better. Hold the press cage tight against the angle iron and just tack weld it in one spot. Now push/shove it in to the right place. You want the angle of the press cage to the angle iron to be just over 90 degrees. Doing this will cause the press cage to face slightly uphill as you are cranking and help the oil flow downhill better towards the oil slits.



14. Now that it's welded to the stand, you need to reduce the play of the auger bit to a minimal amount. This is simply done by adding more washers. Make sure you use washers with a hole that fits the shaft of the auger bit nicely, with little play. You need to have a minimum of 2 washers. The first washer I recommend you taper the hole a bit, but using a drill bit much bigger than the hole in the washer and drill it out about half way (not all the way through). The last washer is the wearing washer up against the back of your press cage. Add as many more washers in between as you need to take up any play of the auger bit in the press cage. You want as little play as possible, but you do not want the auger bit to actually touch the spear point.



Above left to right: tapered washer (first on shaft), spacing washers, wearing washer (last on).



15. You can craft the rest of the stand any way you like. But for simplicity I drilled holes in the 1.5" angle iron and in the 2" angle iron to match so I could bolt it to the 2" angle iron and in turn bolt the 2" angle iron to the table. The extra length on the 1.5" upright angle iron allows room for more holes so that the height of your machine can be adjustable to accommodate difference jars, candles, or height of the operator.



16. Now it's time to make the crank handle. The first thing you need to do is grind the drive end of the bit in to a square shape, instead of the hexagonal shape that it normally comes in. You are trying to get it to fit in to a $\frac{1}{4}$ " drive socket. A socket is usually made of good hardened steel and works well to connect your bit to the handle. But you could also use a six point socket that fits the bit's shaft naturally. Or you could use a tight fitting small pipe and drill a hole for a small bolt to hold it in place. I did what I did because it is what I had.



The distance from the socket to the handle should be about 18" or whatever you find comfortable to turn.

17. Now you need a candle or a small oil burner to place under your press cage to keep it warm. You can make one with a narrow jar or tin can (anything that will not burn). The wick holder needs to be a flat piece of metal like a washer with a really small hole or a metal bottle cap. The best is if you can find a glass spice bottle with a metal cap. Put a small hole in the cap and put any cotton string slightly larger than the hole into the cap as a wick. Fill the bottle with any nonvolatile liquid fuel or oil (not petrol, use kerosene or lamp oil).
18. Now you need a seed hopper or funnel. Find some old bottle with a spout the size that fits your seed input, and cut the bottom of the bottle away. Slip your new funnel over the seed input and now you are ready to use your machine.

19. Next is a stomper. This could be a stick or bar or bamboo. I make mine from a chunk of re-bar. Notice I made it with two ends, one to stomp with (shove the seed in the hole), and one to clear the clogs in the seed input hole (looks like a flat screw driver-left end in picture). I think you will find that your stomper tool will work better if it is about 2/3rds the size of the seed input hole. But you can play around with that.



20. The last tool you need is something to occasionally clear any clogs in the oil extraction points. A small stiff wire or sliver of bamboo or whatever. You can use the cloths hanger that you collected for this.



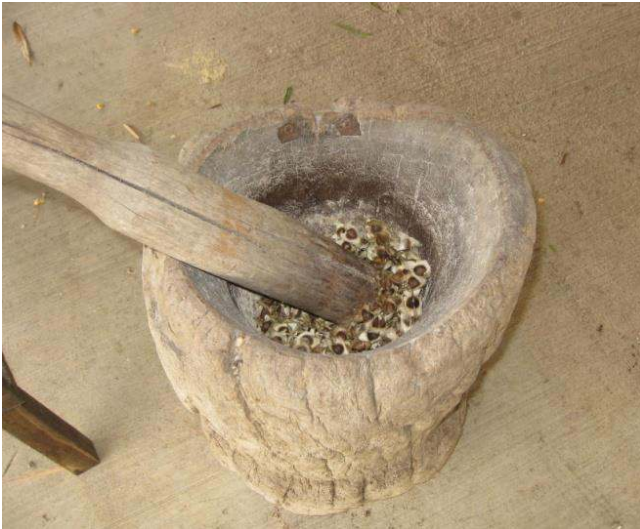
Preparing the Seed for pressing:

Note: Different seeds would need different specific preparations. So what I will say here about seed preparation is particular to Moringa seeds.

1. Sieve or winnow or pick through your seed to make sure stones and sticks and stems are out.
2. Weigh out your seed, so that you can measure your resulting oil, and insure that you are getting the correct results. If you don't weigh them out ahead of time, you have no idea if your resulting oil is as much as you should be getting and will not know if your machine is working optimally. For beginners I would recommend doing ¼ Kg batches. As you get used to it and get

faster at operating your machine, you can do 1 Kg batches or whatever you want. But try not to prepare more seed than you will press in one day. Seed keeps better in the hull.

3. Using a mortar and pestle pound the seed lightly to just crack the hulls.



4. Winnow the seed to remove about 50% of the hulls. Don't try to count the seeds hulled and unshelled. Just look at it and estimate it so that about half of the seed hulls have been winnowed away. Until you get good at winnowing, do this over some sort of clean surface so you can recover your mistakes.



Operating the Auger Bit Oil Press:

Now with seed prepared for pressing you are ready to press them.

1. With your machine completely dismantled, lubricate all the moving parts with some sort of oil. If you will be pressing eatable oil, then use an eatable oil to do this. The most important part to lubricate is the washers. But lubricating the inside of the press cage and the auger bit will help the initial seed cake to move down the pipe, bringing the press cage up to pressure easily.



2. After lubricating, assemble the press. If you haven't yet, bolt the press cage to the stand first. Put the oiled tapered washer on the bit first with the wide side of the hole facing forward so that it is a nice fit. Then add the spacing washers, and then the last wearing washer. (See pictures in step 14 of Building the Auger Bit Oil Press) Remember, as the wearing washer wears, you will need to replace it eventually. With all the washers on the auger bit's shaft, insert the auger bit in the press cage so the shaft extends out the back side. Thread the spear point's bolt in to its holder and then bolt the spear point frame to the press cage. Make sure you are lining up your marks (See step 9 in Building the Auger Bit Oil Press) so that the spear point is lined up correctly plugging the press cage. Lastly attach the crank handle.
3. Now make sure your burner/candle is ready to go. Light it and put it in place under the flame protector so it can warm the press cage.



4. While the cage is warming you can close the spear point to almost fully closed.
5. When the press cage is hot (when you cannot keep your hand on it), you are ready to put your funnel on and add some seeds. Note: I learned that my flame kept going out because I was standing over the press, and my breath from my nose was blowing out the candle more than the wind. Secondly I noted the heat from the flame would slowly shrink my fancy funnel. Thirdly I noticed that my unsteady hand would not drop all the seeds and chaff into funnel and inadvertently I would drop some in my oil collection jar below. So the simple solution was a piece of aluminum foil to fix all three.



The better long term solution would be to cut a small piece of tin to the correct shape and have it bolt right on with the spear point frame, permanently solving all three problems.

6. In step 4 you added seed, now use your stomper tool to push & guide the seeds into the press cage, while turning the crank. **Remember, you have to turn the crank counter clock wise.** The auger bit was made to pull wood from a hole. But we are using it backwards to push seed into a hole, so you need to turn it backwards. At the beginning, seeds may fall in on their own, but as it starts to get oily in the press cage, you will need to stuff them in with your stomper.
7. As you turn the crank and stuff seeds in, seed cake will slowly pack up in the end of the pipe, and as you continue the pressure rises in the press cage and eventually the seed cake in the very end (at the spear point) will give up its oil first. So as soon as you see oil appearing at the mostly closed spear point, stop cranking for a bit and release the pressure a little by turning the spear point bolt in to its holder (away from the press cage). Only move it a little, and then continue cranking. Do this a time or two until the seed cake is coming out the opening like thick goo (like plastic that has been warmed to the point of just starting to melt). Now you are close (maybe right on) to the pressure you want.

8. Keep cranking and stuffing seeds and eventually (within a small handful of seeds or so, depending on the type of seed being pressed) the press cage will back up with oil and start dripping out the oil slit.
9. At this point, you are on your way, just keep it up. You might want to play around with the spear point adjustment some. The basic principle is you want it as closed (more pressure) as possible without slowing your work down too much (whatever is comfortable for you).

Cleaning the Auger Bit Oil Press:

1. When you are done pressing oil, you should clean your machine. Do not blow the fire out yet! The first thing to do is to turn the spear point away from the opening as far as it will go.
2. Turn the crank until the last big chunk of seed cake comes out from around the auger bit. You might need to stick a stick or screwdriver or something in the way (into the glob of seed cake) to force the chunk of seed cake to not spin with the auger bit, but rather be pushed on out.
3. Once the last big chunk of seed cake is out, blow your fire out.
4. Remove the handle.
5. Remove the auger bit. The auger bit might be a bit stiff to get out. It's OK to hit it gently on the back side (cranking side) with a hammer to encourage it to pop out.
6. Dismantle the rest of your machine and put it in a basin of water (warm is preferable, but cold will work with more time). Let the machine soak till the remaining seed cake is soluble.
7. Rinse well.
8. Oil all the parts (to prevent oxidation/rust).
9. Put it away till next time you want to press oil.

Tips on Operating the Auger Bit Oil Press:

- Pressure – The more you close the spear point, the more pressure you apply to the seed cake to force it out the opening. In doing this you will get more oil production by weight. However, keep in mind that you will also have to stuff less seed in the press cage to accommodate less seed cake coming out. If you try to stuff the same amount of seed in, when the opening is more closed, then you risk seed cake being forced backwards in the press cage and clogging the press cage and oil slits.
- Pressure – The more you open the spear point, the less pressure you apply to the seed cake to force it out the opening. In doing this you will get less oil production by weight.
- Pressure – Having said the above two points, also note that the above two principles hold true when all other variables are the same. But since this is a hand press, your cranking and stuffing speeds will vary all the time. So basically the hand crank/stuffing variable will override the more/less oil by weight principle, and you will find that changing the opening size

has very little affect on how much oil by weight you get. However, it does greatly affect how long it will take you to process your seed. So if the increase in oil production is negligible with the seeds you are pressings, I would lean to having it more open then closed.

- As you are stuffing seeds in and cranking, keep in mind that the auger is only single fluted, so there is only one position (in one whole crank around) where your seed can actually enter the press cage.
- There are two ways I have found to avoid wasting the first few oil drops that come out the seed cake exit as you bring the machine up to pressure.
 - Don't close the opening so much, so that the first seed cake that comes out has not been pressed well. Then collect that first seed cake and run it back through the press after you have gotten it up to pressure.
 - Instead of using seed to initially bring the machine up to pressure, take some seed cake from the previous run, smash/grind it up and run it through to bring the machine up to pressure.
- If you need to take a break in the middle of your pressing unexpectedly, stop stuffing seeds and perform steps 1-3 of "Cleaning the Auger Bit Oil Press". Then make sure there are no chunks of seed cake or seeds preventing the auger bit from turning freely. Take your break. When you want to start up again, you can just follow the "Operating the Auger Bit Oil Press" steps again.

Simple glossary of terms:

1. Seed cake – The pressed seed matter.
2. Press cage – The chamber where seeds are pressed (the big pipe).
3. Spear Point – The spear like point that is welded on to the big bolt, used to adjust the seed cake opening.

Last Remarks:

Due to the limited amount of Moringa seed at ECHO, it was not possible to test this press more thoroughly. However, I recognize that more testing is necessary. Ideally I would like to perform 1 Kg or more tests with fresh seeds. I would like to test the extruder pressure more to know the exact relationship between size of opening and amount of oil extracted. In any case, I feel the testing I have done does prove to have accomplished my original goals listed at the top of this document.

It has been my pleasure to share this information. I trust it will bless you and whoever you share it with. If you have any questions, my contacts follow.

Blessings,

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