

Threshing by Hand – Around and Around and Back to the Beginning

The friction thresher demonstrated in the [YouTube video](#) represents the evolution of nearly 30 years of processing grain grown in our home garden. Here is the story of how we got to this point, which ended up being very near to where we started.

In the mid 1980's, we began growing grain amaranth, which is a beautiful and productive crop for the garden. Our early attempts at harvesting and processing the grain were dictated by a lack of financial resources. We dried the seed heads in our solar greenhouse, and the threshing was accomplished by rubbing the heads with an old tennis shoe over a very coarsely woven piece of hardware cloth we found in a salvage yard (the screen is apparently stainless steel and is $\frac{1}{2}$ " mesh). This worked OK, but was tiring on the hands and body and very slow.

Around this time, there was a commercially available thresher for homestead use that used the friction concept with a swinging paddle that rubbed the plant material against a concave piece of hardware cloth. We attempted to duplicate the idea, using recycled tire tread for the paddle, but found it hard to adjust the spacing of the paddle above the hardware cloth. Back to the shoe.

A few years later we got involved with the prairie seed business and acquired a hammer mill (chipper/shredder) which we powered with a "pedal-power unit" using a belt drive. We had several sizes of screen for the mill to accommodate seed heads of all types including our garden grains (amaranth, barley, rye, sorghum, and buckwheat). The hammer mill threshes by impacting the crop with free-swinging, steel bars – think multiple flails rotating at high speed in a chamber, with the ground-up material falling out the bottom through the holes in the screens. This definitely gets the seed threshed from the plant material but it also grinds up everything else, which means that there is more sifting and winnowing required to get down to clean seed. I tried to remedy this by removing as much of the stem material by hand as possible before threshing. This adds tremendously to the hand labor, which means that the labor saving mechanization is actually taking more time. We also tried threshing beans with the mill but they were too broken up by the hammers. We could have switched to plastic hammers and geared down the speed more to accommodate the more fragile seeds, but we prefer to hand shell our beans so there is no need to mechanize that task.

Later we added an electric motor to the unit so threshing could be done by one person instead of two (one person pedaling, the other feeding material into the hopper of the mill) which increased the noise element and the risk for accident with a dangerous piece of machinery. Although the task was mechanized and fairly easy to accomplish, I personally dreaded threshing each year. The set-up time, the noise, the danger, and the dust! The only device that was worse was a stationary, bundle thresher we used one year. That gas-powered monstrosity was nightmarish to operate. So I put up with the hammer mill thinking it wasn't that bad.

We had also used the hammer mill as a grinder for apples for our big apple press, which we decided to sell this fall. When the opportunity came to sell the mill with the press, it didn't take long for me to say "yes". But then came the need to replace it with something more size appropriate and workable. By now, our garden grains included

sorghum along with the amaranth. Our finances are still restricted, and you can't just go to the thresher store anyway, unless you buy a commercial unit for many thousands of \$ \$. So back to the drawing board, aided by internet searches of what others were doing.

Basically, the two ways of getting seed threshed free from the plant material involve either impact (flailing) or friction (rubbing). Based on the design for a drill driven flail consisting of steel threaded rod with chains attached on the working end and used like an immersion blender in a plastic 5 gallon bucket, we tried this concept with a mud mixing paddle (used for mixing stucco). This kind of worked – some seed threshed out but mostly the plant material just whirled around and around. We also experimented with an electric string trimmer. Very dusty and noisy, with material sprayed all over the place. You can imagine how delightful that was! Then I ran across a reference about using an old reel-type lawnmower, no detail, just the idea. We had an old lawnmower in our scrap stash, but didn't see an easy way to make this functional. Once again, all the impact methods seemed to require sufficient velocity to break the plant material, and that would necessitate a motor or power device. These were all unattractive options to my way of thinking. I wanted something simpler, less expensive, quiet, and easy to use/clean up.

I kept envisioning the friction method we had used so many years ago. Commercial combines use friction in a rotary cylinder to thresh grain. Really big \$\$\$ and not geared to the homesteader. Traditional methods of working with sorghum in Africa use a wood mortar and pestle, not in my tool kit. Other low-tech methods involved using a box wrench to pull the sorghum heads through to strip the seed panicles off the stems. This didn't work at all for me – maybe I had the wrong size wrench? All I really wanted/needed was the tennis shoe on a screen but a more deluxe version. Fortunately, over 25 years later, we still had the piece of hardware cloth we had used originally. We scrounged up the rest, including the rubber welcome mat from around the homestead. Here's some detail pictures of how it went together.



Left photo shows the 1/2" hardware cloth.



Right photo shows the 1/10" screen.

Screen: $\frac{1}{2}$ " woven hardware cloth was used that is made from very large, stiff wire. This gives a texture that works well as an abrasive surface – think washboard with holes in it. I think that expanded metal, especially the type that is used for stair treads, may work equally well. We considered the idea of making a "washboard" of many pieces of

key stock welded “on point” with about 1/8” between them, but this would have cost more than the screen we already had. In the video, we use the ½” hardware cloth to thresh sorghum heads. When we did the amaranth, we attached the 10 mesh, coarse stainless steel screen on top of the hardware cloth, which worked well with the tiny amaranth seeds. This combination threshed the seed and did an initial screening, requiring only winnowing to get to a final product. Whatever you use, it should be rigid enough to stand up to the pressure, otherwise you will have to add some reinforcement under it.

Paddle: A rubber welcome mat was wrapped around a scrap of cedar 1-by-8-inch deck board, secured with a chunk of 2-by-2 which serves as the handle. The rubber mat made use of the ribs on its underside, which run crosswise to the direction of rubbing. Alternatively, another chunk of hardware cloth or expanded metal could be mounted on a wood block, or perhaps a piece of hard wood could be grooved with a router? More ideas to explore depending on materials in your homestead stash.



Container: We used a stainless steel drawer that we got many years ago from a salvage yard because the screens that we had fit it. A wood box would be another option. The screen could be mounted on legs so the pan or box could be slid out from under more easily. We set our pan inside a black plastic, multipurpose tub, used for mixing cement, etc. This helped to catch any seeds flying around or dropped plant material. The tub was set up on a table with a piece of wood clamped to the surface to act as a stop so that it wouldn’t slide off when the paddle is pushed away from the body. The operator’s body keeps the tub from sliding backwards on the back strokes.



Sorghum head before threshing and after.

Here are photos of the threshed plant material before and after winnowing. The sorghum is from 200 plants, which yielded about 7 quarts of clean grain. It took about an hour to thresh including taking breaks and making the video. This was less time than setting up the hammer mill, cleaning up the mess, and all the extra screening/winnowing. The amaranth, which yielded about 2.25 gallons of clean seed from 150 row-feet, took longer, mostly because I began threshing while experimenting with the design of this thresher. Once the details were all worked out and incorporated, it took about twice as long as the sorghum.



To get the seed as clean as possible I did multiple winnowing passes with a fan, along with screening with seed-sized screen, to remove unhulled grains. I also did a bit of extra threshing on the sorghum once it was off the stems, rubbing it on the 10-mesh stainless steel screen to break the hulls from unhulled grains, and air-winnowing again.



Clean sorghum and amaranth, ready for the pantry

Next year I plan on using this device for threshing lettuce, mustard, etc. I'd love to hear feedback from others to find out if this works for your needs, especially if you make improvements or scrounge interesting materials.