

Small-Scale Bean Thresher and Seed Cleaner

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At Washington State University Vancouver Research and Extension Center, we have developed some small-scale technologies to thresh and clean dry bean seeds and grains. Our program provides small-scale growers with cost effective and appropriate technologies that enable them to produce and market dry beans. For a full description of the bean thresher and seed cleaner, see our web page, <http://sustainableseedsystems.wsu.edu/nicheMarket/smallScaleThreshing.html>.

Bean Thresher. To make a small-scale bean thresher, we followed and slightly modified the design of Allen Dong and Roger Edberg, I-Tech, PO Box 413, Veneta OR 97487, which is posted on the U.C. Davis website, <http://agronomy.ucdavis.edu/LTRAS/itech/thresh.html#shred>. This design is public domain and has no copyright. The thresher is a modified chipper-mulcher and some of the key elements include: thresher hammers that are bolted together so they beat plant material but do not shred or grind it; 3/4 to 3/8-inch mesh in the bottom that keeps the plant material within the thresher until beans have been threshed from pods; a 1.5 HP/1725 RPM motor that operates the thresher and needs to have its own cooling fan; 9-inch and 2-inch pulleys that generate a thresher speed of about 500 RPM.

To use the thresher, harvest beans from the field before pods begin to shatter, however, plants must be sufficiently dry to thresh. Plants that are too moist will bind-up the thresher mechanism. Dry plants outside for 3 days if weather is sunny and dry. Turn the plants 1-2 times each day to increase drying. If weather is cool or moist, dry beans inside using a box fan. Beans are sufficiently dry if the pods begin to shatter, but are too dry if beans split. Place either whole plants or pods only, as you choose, into the thresher chute, located at the top of the machine. Beans, crushed pods, stems and leaves will fall out the bottom of the thresher into the collection box. Beans tend to fall to the bottom of the collection box while plant debris tends to be on top. Scoop off the plant debris and discard. It takes approximately 5 minutes to thresh 100 plants with this technique.

Seed Cleaner. Our bean cleaner design is based on a Clipper Seed Cleaner, which was commonly used throughout North America in the late 1800s and early 1900s. This cleaner removes chaff, light seeds and other light debris. In our design, a large squirrel cage type fan (ours is from a greenhouse blower) provides the airflow, powered by a light duty electric motor with 1750-rpm CCW rotation. The motor pulley is 8-inches while the opposing pulley is 2-inches. The rotation direction of the motor needs to be set to blow debris out the back of the cleaner. Airflow is very high, and is excellent for beans, although there would be a need to slow down the fan or block its flow for other seeds. The chute is 36-inches in height, and sides are cut from 3/4-inch plywood using an elongated version of the Clipper air chute as the template. The top and bottom of the chute are made with Luan, a thin pressboard material with a smooth coating on one side, but a thin flexible material such as sheet metal or plastic may be used. The Luan is stapled to the top and bottom of the air chute and facilitates the movement of beans and debris. We constructed a slanted shelf at the top of the cleaner where beans are poured into the cleaner. The opening into the cleaner is 1.5-inches and is small enough that debris is not blown

back. Beans fall down the chute into a collection box located under the motor while debris is blown out the back at the top.

To use the seed cleaner, place the beans along with the fine plant debris into the top chute of the cleaner. The beans quickly fall into a collection box at the bottom, while the remnants are blown out the back of the cleaner. Remove by hand small rocks and dirt clods that fall into the collection box with the beans.

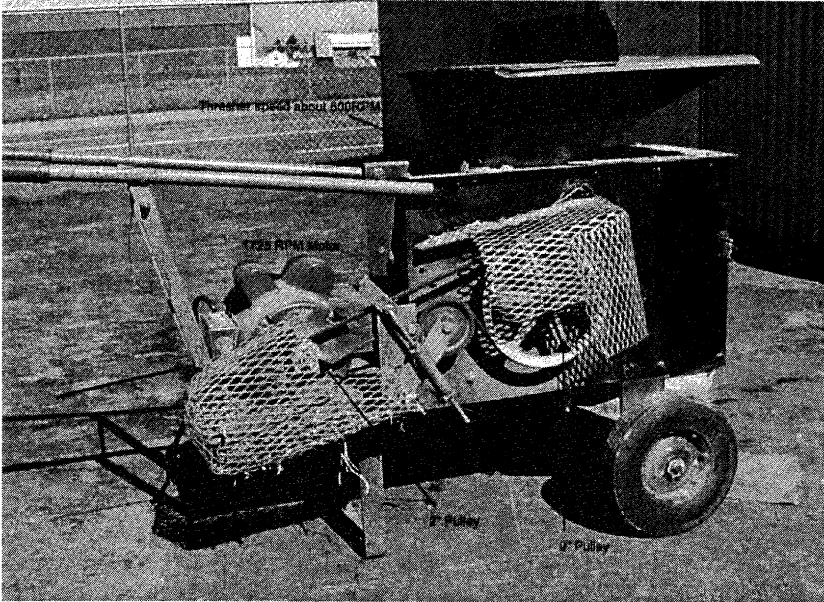


Figure 1. Bean thresher made from a modified chipper-mulcher at WSU Vancouver REU.

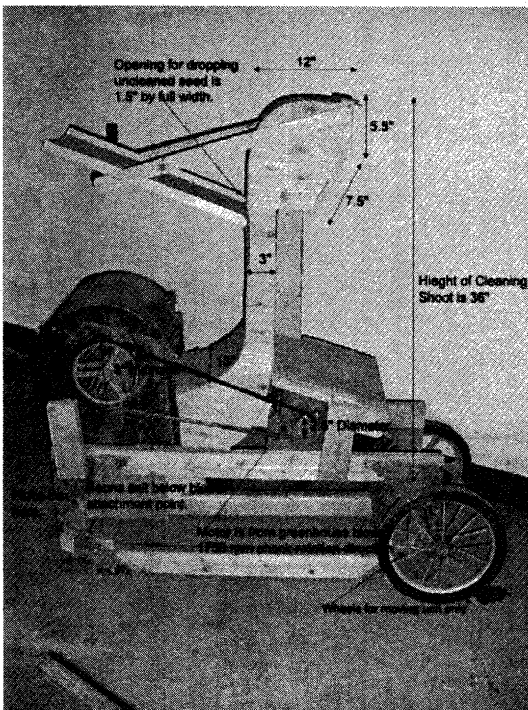


Figure 2. Seed cleaner constructed at WSU Vancouver REU.