

# A COMPACT LABORATORY SEED EXTRACTOR

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Each fall we collect and process small lots of tree seed for experimental use. The species include black spruce (*Picea mariana* (Mill.) B.S.P.), Sitka spruce (*Picea sitchensis* (Bong.) Carr.), western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), lodgepole pine (*Pinus contorta* Dougl.), and other small-seeded species.

We needed a compact seed extractor that could be stowed away when not in use. Finding none on the market, we designed and built one, described and shown here. This seed extractor has a capacity of one-half bushel of dry cones. It is simple, sturdy, and it can be built in a few hours.<sup>2</sup> The hardware was bought locally or from a large mail-order house. The total cost of materials was about \$75. Others may find the design useful.

In essence, the extractor consists of a plywood box (fig. 1), cut in two and hinged to provide a deep lid and fitted with a revolving drum and a removable drawer. It is powered by a 1/4-horsepower electric motor, belted through two pairs of pulleys and an idler shaft to provide a drum speed of 60 r.p.m. At

greater speeds, centrifugal force prevents cones from tumbling properly.

The 20-inch-diameter drum is mounted on lathe faceplates and a 5/8-inch axle (fig. 2). The drum sides are fastened together with spacers, which add rigidity and help to tumble cones. The periphery of the drum is covered with 3/8-inch hardware cloth, fastened in place with wire staples. A hatch, held in place by four small screen-door buttons, allows adding and removing cones. A hardwood block is bolted to each side of the box to support pillow blocks in which the drum axle shaft rotates.

The plywood box is built with enough space around the drum for thorough cleaning with a shop vacuum cleaner between seed lots. Wooden baffles set at a 60° angle are fastened to the inside of the box below the drum to funnel seed into the drawer below. All inside surfaces are primed and painted with white gloss enamel. A safety switch (fig. 3), activated by the lid, is mounted on the side of the box so that the machine will not run while the lid is open. To simplify construction and for stiffening, we bolted the motor and idler shaft to a piece of 3/4-inch plywood which, in turn, is screwed to the box.

The extractor is simple to operate. To load : Raise the lid, rotate the drum by hand until the hatch is uppermost, remove the hatch cover, and dump in the

<sup>1</sup> USDA Forest Service Pacific Northwest Forest and Range Exp. Sta., Institute of Northern Forestry, Juneau, Alaska.

<sup>2</sup> Detailed plans are available from the Author.

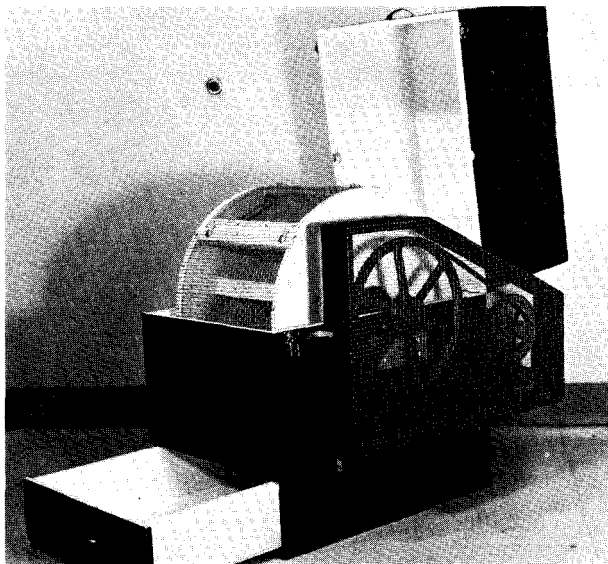


Figure 1.—The seed extractor with lid and drawer open. Note pulley arrangement and belt guard.

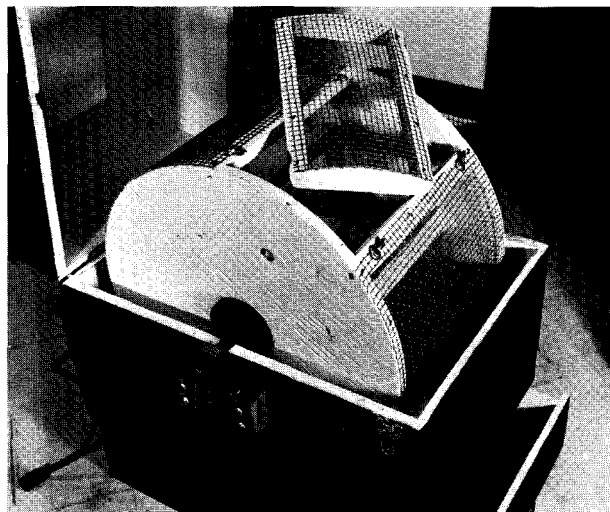


Figure 2.—Seed extractor with hatch open ready to receive cones.

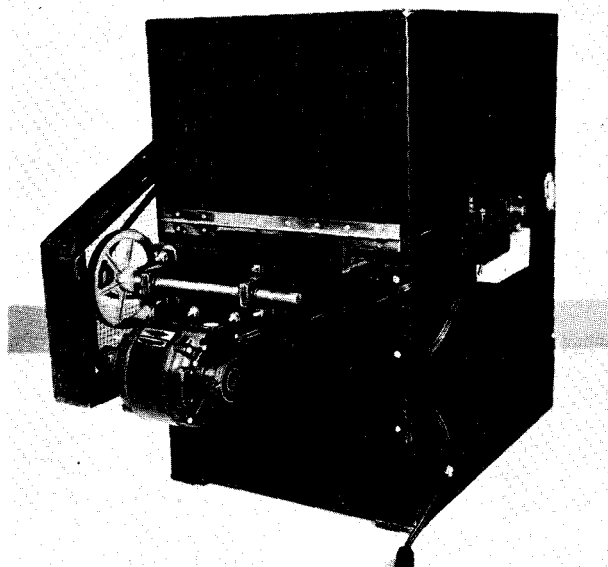


Figure 3.—The seed extractor showing motor drive assembly. The lid support bracket also serves as a safety shield for the idler shaft assembly.

open cones. Replace hatch cover, close the lid, and switch on the machine to tumble cones until seed is extracted. To remove extracted seed : Remove the drawer and pour the seeds from a corner. To remove cones : Remove the hatch cover, close the box lid, and turn on the machine for a few seconds. Cones fall into the drawer, which is removed and the cones discarded.

Extracting seed from fragile cones, such as Sitka spruce and western hemlock, requires only air drying and a few revolutions of the drum. More refractory cones, such as black spruce or lodgepole pine, may require extensive pretreatment and several minutes of tumbling to give up all their seed.

### List of Materials

Item	Number of pieces	Size
<b>LUMBER (for box):</b>		
Plywood, 3/4-in. (for sides)	2	23 by 28 in.
Plywood, 1/2-in. (for front and back; includes drawer front)	2	17 1/2 by 28 in.
Plywood, 1/2-in. (for top)	1	17 1/2 by 24 in.
Plywood, 1/2-in. (for bottom)	1	17 1/2 by 21 1/2 in.
Plywood, 3/4-in. (for seed deflectors)	2	3 by 23 in.
Plywood, 3/4-in. (for seed deflectors)	2	3 by 16 in.

Plywood, 3/4-in. (for motor mount)	1	10 by 17 1/2 in.
Hardwood (for shaft hanger mounts)	2	1 1/2 by 2 1/2 by 6 in.
Hardwood (for lid support)	1	3/4 by 1 1/2 by 8 in.
Plywood, 3/4-in. (for belt guard)	1	2 1/2 by 9 in.
Plywood, 3/4-in. (for belt guard)	1	2 1/2 by 17 in.
Plywood, 3/4-in. (for belt guard)	1	2 1/2 by 20 3/4 in.
Plywood, 3/4-in. (for belt guard)	2	2 1/2 by 24 3/4 in.

#### LUMBER (for drum):

Plywood, 3/4-in. (for ends)	2	20 in. diam.
Hardwood (for spacers)	4	1 1/2 by 1 1/2 by 12 in.
Hardwood (for hatch cover)	2	3/4 by 1 by 11 1/4 in.
Plywood, 1/4-in. (for hatch cover)	2	8 by 2 in.
Hardwood (for hatch frame)	2	3/4 by 1 1/4 by 12 in.

#### HARDWARE:

Drum shaft	1	5/8 by 21 3/4 in.
Idler shaft	1	5/8 by 14 in.
Pillow blocks	4	5/8 in.
V-pulley	1	12 1/4 by 5/8 in.
V-pulley	1	6 by 5/8 in.
V-pulley	1	1 1/2 by 5/8 in.
V-pulley (motor)	1	1 1/2 by 1/2 in.
V-belt	1	23 in.
V-belt	1	54 in.
Hardware cloth (3/8-in. mesh)	1	7 by 2 ft.
Lathe faceplates	2	3-in. diam. by 5/8-in. arbor hole
Continuous hinge	1	1 1/2 by 16 in.
Drawer pulls	2	—
Shelf brackets (for lid support)	2	5 in.
Angle braces (for belt guard support)	3	1 1/2 in.
Suitcase latches	2	—
Carriage bolts	8	1/4 by 2 1/2 in.
Carriage bolts	4	1/4 by 4 in.
Flathead bolts	8	1/4 by 1 1/2 in.
Screen-door buttons	4	—
Carriage bolts (idler shaft mount)	4	1/4 by 2 3/4 in.
Flathead bolts (motor mount)	4	1/4 by 1 1/2 in.
Miscellaneous nails, screws, staples, paint, glue, surfacing putty		

#### ELECTRICAL:

Motor, split-phase, general purpose	1	1/4 hp.
Switchbox	1	—
Switchbox cover	1	—
Toggle switch, on-off	1	120 v. 16 a.
Safety switch, on-off, (Micro BA-2RVT or equivalent)	1	120 v. 20 a.
Angle brace	1	1 1/2 in.
Pin (safety-switch actuator)	1	1/8 in.