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A Device for Threshing Mesquite Seed[1]

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Abstract. We modified a cereal huller to thresh seed of honey mesquite [*Prosopis juliflora* (Swartz) DC. var. *glandulosa* (Torr.) Cockerell]. The device threshes seed of other mesquite varieties, huisache [*Acacia farnesiana* (L.) Willd.], and other leguminous species.

Introduction

The need for large quantities of honey mesquite [*Prosopis juliflora* (Swartz) DC. var. *glandulosa* (Torr.) Cockerell] seed for our nursery and laboratory studies prompted us to develop a rapid, efficient method of removing the seed from the pods. Pods of mesquite are easily gathered from trees; however, removing the individual seed from the pods is difficult and time consuming because of the morphology of the mesquite fruit. The fruit is an indehiscent pod from 4 to 9 inches long, with constrictions between the seeds (Figure 1A). The pod

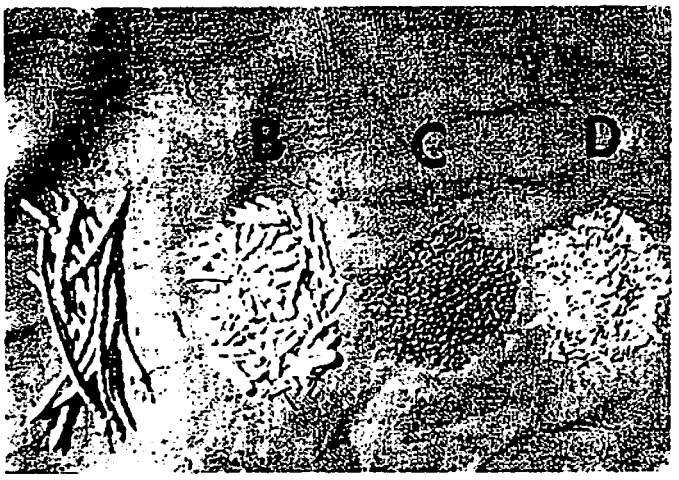

Figure 1. Mesquite fruits at different stages of processing. A. Mesquite pods as harvested; B. Broken pods ready for threshing; C. Cleaned seed; D. Endocarp tissues.

is easily broken at the constrictions but it is extremely difficult to remove the seed from the enclosing coriaceous endocarp. Severe agitation in a feed chopper or blender will remove the pericarp from the seed, but these machines crack the seed. Cutting the seed from the pod with a scalpel is effective but slow.

Construction Details

The basic unit of the thresher is a cereal huller powered with a ¼-hp electric motor (Figure 2). The abrasive

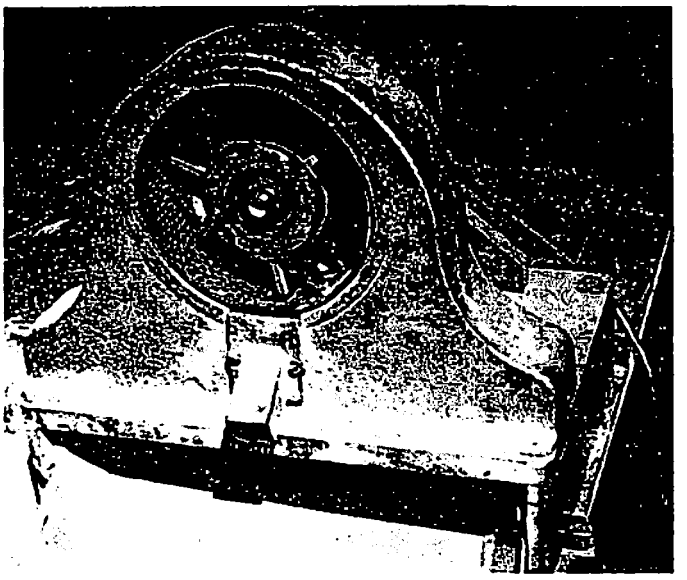

Figure 2. Cereal huller with cover removed showing discs with attached steel bars and threshing screen.

cylinder and brushes used for hulling cereals were removed. The brushes were replaced with two discs and spacers. Three ¼-inch square steel bars, 1½ inches long, were welded to each disc. These discs are rotated within the threshing chamber at 1750 rpm.

The screen, which forms the periphery of the threshing chamber, was made from sheet metal 1/16-inch thick, 18 inches long, and 2½ inches wide (Figure 3). It was curved in a circle and the ends were welded together so that it would fit into the space provided for the conventional screen.

Approximately one-half of the screen was perforated with 5/16-inch holes (Figures 2 and 3A). These holes permit the seed to leave the threshing chamber as soon as they are released from the endocarp, but are not large enough to permit the intact endocarp containing seed to pass. Five slots, 3½ inches long and ⅛ inch wide, were cut parallel to the length of the screen so that the broken endocarp tissues could leave the threshing chamber (Figure 3B). A 2 by 2½-inch piece of Number 30 grit sand paper was attached to the non-perforated portion of the screen (Figure 3C). This abrasive surface wears away the spongy mesocarp and the edges of the endocarp tissues surrounding the seed. Three ¼-inch square steel bars, ½ inch long (Figure 3D), were welded to the screen between the 5/16-inch holes and the sandpaper; and three additional bars 1½ inch long were welded to the screen between the holes and the slots (Figure 3E). A slot, ¾ by 1½ inch, was cut in the screen to permit the pods to be released in case of over feeding.

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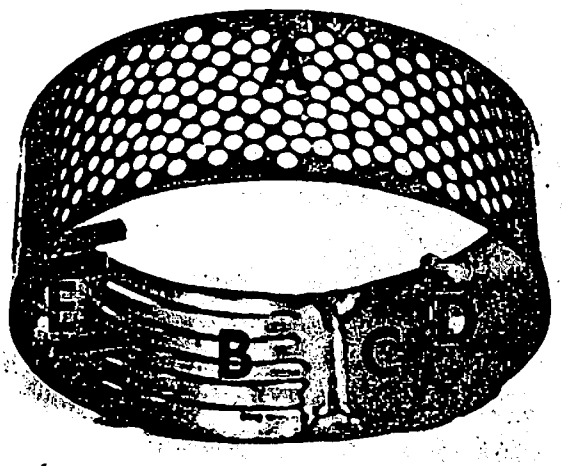

Figure 3. Threshing screen. A. 5/16-inch holes; B. ⅛ by 3½-inch slots; C. Number 30 grit sandpaper; D. ¼-inch square steel bars ½-inch long; E. ¼-inch square steel bars 1½ inches long.

Operation of Thresher

Mesquite pods are dried in an oven at not over 44 C for 24 hr, and broken into 1-inch segments. The segments then are placed in a hopper from which they are uniformly fed into the threshing chamber. The pods are further broken by the rotating and stationary bars, and the pericarp tissue is eroded by the sandpaper. When the endocarp is broken, the seed is released from the threshing chamber through the 5/16-inch holes and the endocarp through the ⅛-inch wide slots. All seed and the pericarp tissues pass into a small two-screen, wind cleaner where most of the seed is separated from the unwanted pericarp tissue. A small gravity separator removes the endocarp tissues which are of the same size as the seed.

Mesquite pods should be dry for maximum efficiency. When the pods are wet, the hygroscopic pericarp tissue is deposited on the interior of the device. With this device, 1 bu of mesquite pods can be threshed in 1½ hr, which would require approximately 160 hr to thresh by hand.

Seed Scarification

Mesquite has a hard seed coat, and it is necessary to scarify the seed to obtain maximum germination. Although soaking the seeds in concentrated sulfuric acid for 15 to 30 min or placing them in boiling water and allowing them to cool as they soak for 24 hr is recommended (1), mechanical scarification is equally effective. We scarify the seed by replacing the threshing screen with solid sheet metal covered with Number 60 grit, adhesive-back sandpaper and a slot, 1½ by ¾ inch, through which the seed is released after scarification. Fifty ml of seed are placed in the chamber for 5 min while the discs are rotated at 1750 rpm. Germination of seed scarified in this manner was about 95%; and scarified seed stored in closed containers at 4 C has retained high germinability for over 1 year.

This device has been used to thresh huisache [*Acacia farnesiana* (L.) Willd.] seed and could be adapted for threshing seed of other leguminous species.

Literature Cited

1. U. S. Department of Agriculture. Forest Service. 1948. Woody-Plant Seed Manual. Misc. Publ. 654. 416 p.