Equipment Modifications for Harvesting Fluffy Seeds

JENNIFER KUJAWSKI, JOHN ENGLERT, DAN DUSTY, AND R JAY UGIANSKY

ABSTRACT

Fluffy seeds of native wildflowers are difficult to harvest using traditional equipment and methods. We modified intake and storage on a tractor-drawn leaf vacuum machine to better harvest fluffy seeded species such as aster (Aster L. [Asteraceae]) and narrowleaf silkgrass (Pityopsis graminifolia (Michx.) Nutt. [Asteraceae]). By inserting collection bags inside the vacuum and creating a vacuum hood to ride over the rows of plants, only 1 person is needed for the harvest process. The modified equipment allows us to make repeated harvests over the several-week ripening period and it removes only ripe seeds from the plants.

Our previous method for harvesting these types of seeds was to cut the stems of nearly ripe seeds with a sickle bar, spread out stems on a tarp to let seeds mature, and then release seeds by tossing the stems in the air with a pitchfork or rubbing the stems over wire screens. This seed harvest and extraction process required several steps, a large space for spreading out stems, and still resulted in the harvest of some immature seeds. Other harvest equipment options we considered included variations of a vacuum-brush seed stripper, but these machines were expensive, tended to strip the whole seed head instead of just pulling off the ripe seeds, and resulted in some stems, leaves, and other chaff.

Figure 1 • Left: The pull-behind leaf vacuum and the plywood hood sized to fit over a row of native seeds. Right: Harvesting fluffy seeds.

KEY WORDS: Trac Vac, seed production, wildflowers

NOMENCLATURE: USDA NRCS (2001)
being harvested with the seeds. We needed a piece of equipment that would allow us, with a minimum number of people, to maximize the harvest of ripe seeds only while minimizing chaff.

In 1994, based on trials with a portable leaf vacuum, we decided to purchase a larger leaf vacuum (1.8-m³-capacity [50-bushel] leaf and grass Trac Vac vacuum, Model 880, Palmor Products Inc, Thorntown, Indiana) designed to be pulled by a riding mower (we use an 18-horsepower tractor). The unit appeared to meet our needs: with its intake hose we would be able to vacuum off mostly ripe seeds (easily dislodged) and make several passes over a field during the seed ripening period. In addition, very little chaff would end up with the harvested seeds since the hose would be riding over the tops of rows, only in contact with seedheads.

The Trac Vac unit required a series of modifications before it could be used for tiny wildflower seeds. To minimize the number of people handling the hose during harvest, we wanted the hose to pull seeds from an approximately 1-m-wide (36-in) row while floating over plants of variable heights. We built a 123-cm-wide (48-in) triangular hood from 3 pieces of plywood (Figure 1). The front piece of the hood is 28 cm (11 in) high and angled forward. It connects to a 10-cm (4-in) by 123-cm (48-in) top piece from which the hood is supported. The back section is 44 cm (17.5 in) long and angled away at the base. A 20-cm (8-in) diameter hole was cut in the back for inserting the hose. Next, we welded a frame from angle-iron that fits around the front of the storage box with a top piece that extends 106 cm (43 in) and a middle arm that extends 123 cm (48 in) out to 1 side. The hood with hose attached sits under this extension and is held in place by angle-iron brackets, which the hood is supported. The back section is 44 cm (17.5 in) long and angled away at the base. A 20-cm (8-in) diameter hole was cut in the back for inserting the hose.

A 20-cm (8-in) diameter hole was cut in the side of the bag. Two 28 X 28 cm (11 X 11 in) pieces of 1.25-cm-thick (0.5-in) plywood had a 20-cm (8-in) diameter circle cut out of each piece. The wood pieces were aligned with the hole on the side of the bag, one inside, one outside; caulking was used to form a tight seal between the bag and each piece of plywood (Figure 2). This plywood-bag- plywood “sandwich” was secured with 4 small bolts. Four additional 9.5-mm (3/8-in) bolts were inserted through the plywood facing toward the outside of the bag, to be used for keeping the bag in place over the vacuum hose. All seams on the bag were stitched closed, and the side opening was fitted over the small section of intake hose protruding into the storage box. The outward facing bolts were driven through the side of the storage unit and held in place with wing nuts. This modification allowed vacuumed seeds to go directly into the bag, which could then be unscrewed from the unit and seeds emptied out. A separate collection bag for each species avoids the necessity of having to thoroughly clean out a small bag between harvesting different species; we only have to screw on the appropriate bag.

All of the modifications to the original Trac Vac unit were inexpensive—amounting to less than US $400. The Trac Vac itself cost about US $1750 in 1994. At this point, the machine is performing acceptably: operated by 1 person, sucking ripe seeds off plants with few to no extraneous plant parts, and useful for repeated harvests over the ripening period of a species. Future improvements that we would like to implement include: 1) better distribution of the vacuum across the row width (right now suction occurs at the one point at which the hose protrudes through the hood); and 2) modification of the hood shape to knock off more seeds.

REFERENCE


AUTHOR INFORMATION

Jennifer Kujawski  
Resource Conservationist  
jenennifer.kujawski@md.usda.gov

John Englert  
Manager and Horticulturist  
john.englert@md.usda.gov

Dan Dusty  
Farm Manager  
dan.dusty@md.usda.gov

R Jay Ugiansky  
Resource Conservationist  
rjay.ugiansky@md.usda.gov

USDA NRCS  
National Plant Materials Center  
BARC-East, Building 509  
Beltsville, MD 20705