

Modifications Improve Seed Harvest with the Woodward Flail-Vac Seed Stripper

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ABSTRACT

Replacing the standard brush on a Woodward Flail-Vac Seed Stripper with a cartridge-wafer configured brush appears to improve seed harvesting efficiency of a grass and forb. The new brush has convoluted openings and stiffer bristles, and costs much less than the standard brush. Information for obtaining mechanical drawings is provided.

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KEY WORDS

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NOMENCLATURE

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Figure 1. Harvesting wild geranium seeds at Lucky Peak Nursery using the 6 ft wide Woodward Flail-Vac Seed Stripper.

Photos by Gary Kees



Figure 2. The original brush with tightly spaced spiral wound bristles.



Figure 3. The modified design uses a cartridge system where convoluted wafers stack together to form the brush. Open voids and the wedging pattern of the bristles help pull seeds from the seed heads of grass and forb plants.



Figure 4. The modified seed stripper harvesting Arizona fescue at Lucky Peak Nursery.

The USDA Forest Service Lucky Peak Nursery near Boise, Idaho, produces seeds of several grass and forb species. Nursery employees asked the USDA Forest Service, Missoula Technology & Development Center (MTDC) to improve the harvesting efficiency on their 6-ft-wide (2-m) Woodward Flail-Vac Seed Stripper (Ag-Renewal Inc, Weatherford, Oklahoma; 800.658.1446; URL: <http://www.ag-renewal.com>; Figure 1). Attached to the front of a tractor, this harvester uses a spinning brush to strip seeds from grasses and forbs into a catch pan. Nursery employees felt that the brush was pushing the plant seed head away from the harvester, causing too many seeds to fall to the ground.

The original brush (53 cm in diameter [21 in]) has polyethylene bristles (1.9 mm in diameter [0.075 in]) wound in a spiral pattern (Figure 2). These bristles are somewhat flexible and tightly spaced. Spiral-wound brushes must be assembled at the factory and are not easy to modify afterwards. An original replacement brush costs about US\$ 2000.

MTDC looked into various brush configurations that might improve the harvester's performance, and chose to try a cartridge-wafer configuration with stiffer bristles (2 mm in diameter [0.080 in]) and a more open brush pattern (Old Dominion Brush Company, Richmond, Virginia; 800.821.7301; URL: <http://www.theodbco.com>). The cartridge design incorporates a 2-m-long (6-ft) metal tube with a drive and idle shaft. Individual brush wafers, which look like doughnuts, stack on the cartridge to form the brush. These wafers are convoluted or wavy, leaving alternating voids between the bristles when the wafers are stacked onto the cartridge properly (Figure 3). This approach allows brush configurations to be changed in the field.

A set of wafer brushes costs US\$ 310, much less than the cost of an original replacement brush. The cartridge was constructed at the MTDC shop with materials costing around US\$ 225, plus

24 h of machine shop and assembly labor. MTDC has prepared a mechanical drawing (MTDC-1052; see below) and a materials list for the harvester modification.

The new brush design was evaluated at Lucky Peak Nursery in July 2005, harvesting wild geranium (*Geranium maculatum* L. [Geraniaceae]; Figure 1) and Arizona fescue (*Festuca arizonica* Vasey [Poaceae]; Figure 4). Convoluted wafers create openings in the bristles for seed heads to enter. As the cartridge spins, the bristles then converge in a wedge, pulling seeds from the heads. There was concern that the vacuum action of the brush might be less effective because of the open gaps in the bristles, but this did not seem to be a problem. Seed losses appeared minimal for both species. Stiffer bristles seemed to do a better job of knocking seeds from the head, but did not appear to pull excessive trash into the catch pan. The Arizona fescue required a second pass in the opposite direction to fully harvest the seeds.

The evaluation at the Lucky Peak Nursery was very limited, but the results were encouraging. Only 2 species were harvested, so this design's effectiveness with other species is unknown. The nursery staff, however, is confident that the new design does a better job of stripping and capturing seeds than the original brush. If another nursery is having trouble pulling plants into a harvester brush, this new convoluted brush design may be worth considering.

OBTAINING THE MECHANICAL DRAWING

The mechanical drawing, MTDC-1052 Forb/Grass Seed Brush Harvester Modification, can be downloaded at URL: <http://www.fs.fed.us/t-d/dwf/nurseries/> using the same text for username and password: t-d. USDA Forest Service employees can access this site through the Agency Intranet. If you lack an Internet connection, please contact Deb Mucci at MTDC at 406.329.3999.

[USDA NRCS] USDA Natural Resources Conservation Service. 2006. The PLANTS database, version 3.5. URL: <http://plants.usda.gov> (accessed 17 May 2006). Baton Rouge (LA): National Plant Data Center.

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