

7.0 Seedling Harvesting

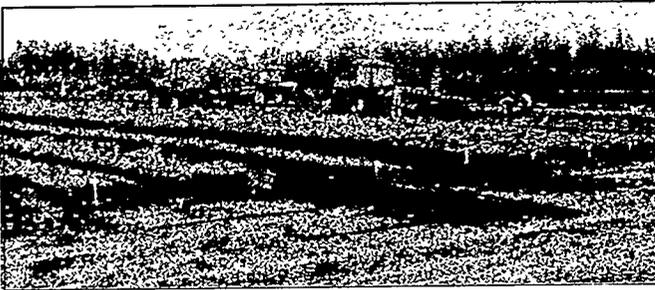


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Bareroot seedlings are harvested (lifted) during the dormancy period when physiological activity is at a minimum and resistance to stress is greatest. The lifting window is the period of time when seedlings are at maximum dormancy and typically occurs during mid-winter. The exact timing of the lifting window for a particular crop can be determined by seedling quality tests (See *Section 6.4*) but is often operationally determined by weather conditions.

Seedling harvesting consists of lifting the seedlings from the seedbed, shaking the soil from the roots, and then placing the seedlings in moisture-retarding boxes for transporting to the processing building. In some nurseries the harvested seedlings are temporarily stored under refrigeration to maintain dormancy and minimize stress until they can be processed. In the South, some nurseries lift and process seedlings directly in the field on specially designed harvesters (See *Chapter 8*).

7.1 Lifting Seedlings



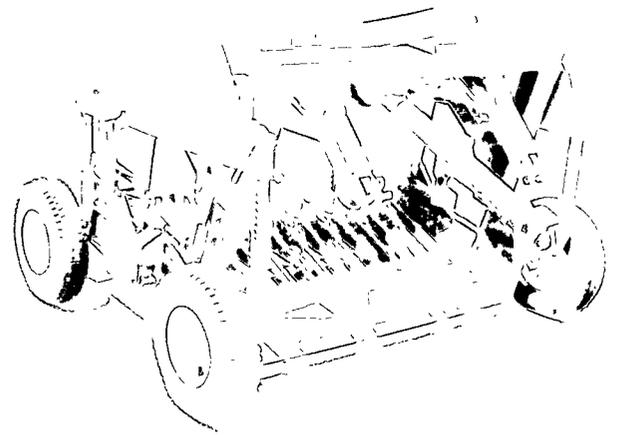
The lifting process consists of varying amounts of hand and machine labor. All bareroot nurseries use some sort of lifter to undercut the seedbed and loosen the soil from the root system. Hand lifting consists of following the lifter, removing bunches of the seedlings from the seedbed, shaking the soil from the root system, and placing the seedlings in a container for shipment to the processing building.

A number of seedling harvesters are available that lift the undercut seedlings onto a vibrating chain belt that shakes the soil from the roots. With some lifters, the seedlings are removed from the belt by hand and placed into the containers. With the most sophisticated models, the seedlings are placed into the storage containers by other conveyors. These specialized lifters use only a few operators to complete the lifting process.

Seedling harvesters must be matched to the type of tractor because some types require more horsepower, special hydraulics, and four-wheel drive capability. The best type of lifter for a particular nursery will depend on soil type, seedbed conditions, and type of crop. Proper operation of lifters in conjunction with visual inspection of seedlings during lifting must be performed to prevent excessive damage.

Lifters

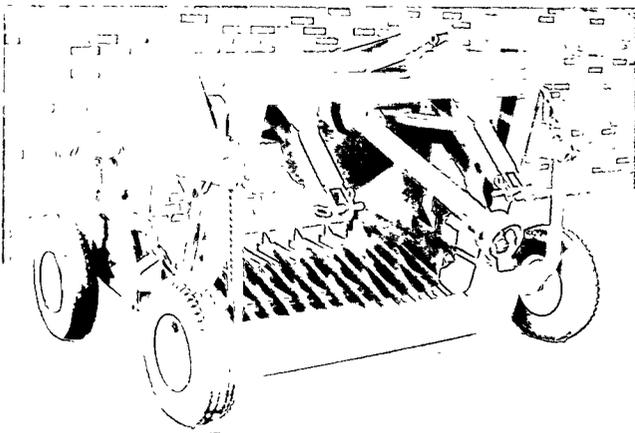
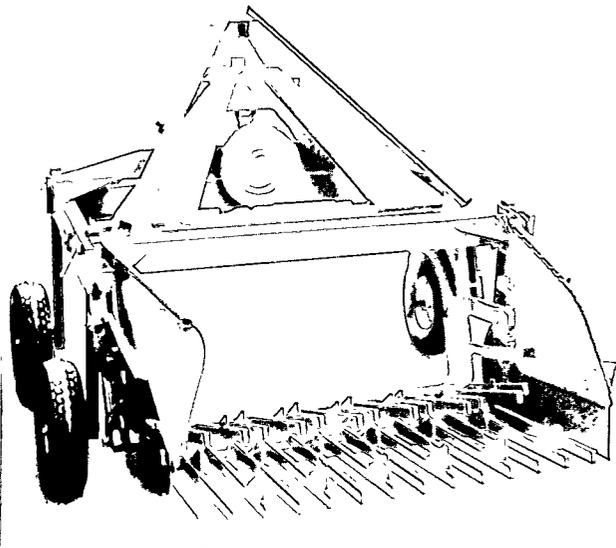
The simplest types of seedling lifters consist of rigid or vibrating undercutting blades that are tractor-mounted and are as wide as the seedbed. Some models have special spring-steel fingers on the back to create a vibrating motion that helps loosen the soil around the seedling roots. Others are mechanically-designed to vibrate. Seedlings are manually removed from the ground after they have been lifted. Some nurseries, such as the USDA Forest Service J. Herbert Stone Nursery, have modified Mann Lifters to accommodate tall seedlings. Lifters are commercially available, but some nurseries have built their own.



Frobro Lifters

Baertschi manufactures two models of Frobro lifters, one is heavier duty than the other. Both feature a fore and aft oscillating undercutter blade with lifting and shaking bars.

The standard machine is designed for a minimum 30 to 45 hp farm tractor and has a maximum working depth of 12 inches. The Super HD Lifter/Shaker is designed to be powered by tractors with a minimum of 65 hp and has a maximum working depth of 14 inches.

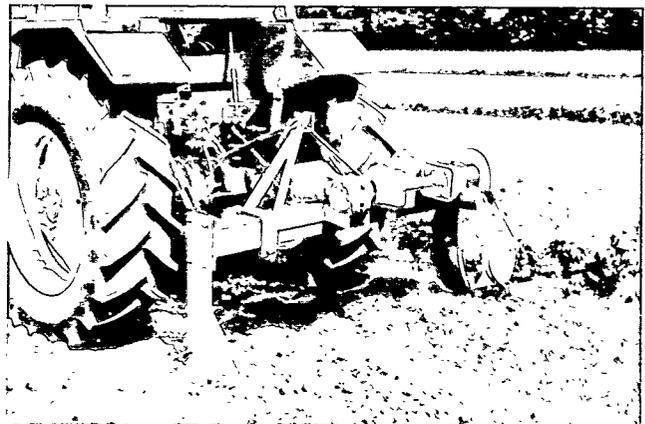


Frobro Lifters:

Baertschi of America, Inc.
P.O. Box 5139
Savierville, TN 37864
615-428-3961

Egedal Side Digger

For very tall seedlings Egedal makes a three-point attachment that allows lifting from the side. On the other side of the lifting fork is a stabilizing leg to compensate for the implement's side-shifting.



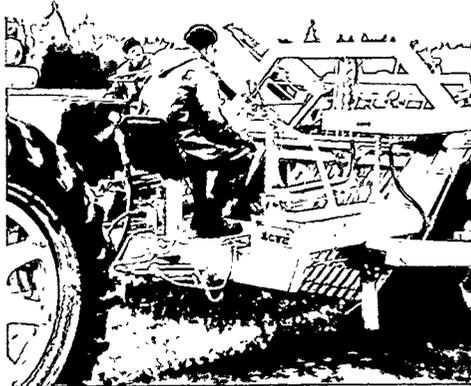
Egedal Side Digger:

Timm Enterprises, Ltd.
P.O. Box 157
5204 Trafalgar Rd.
Oakville, Ontario,
Canada L6J 4Z5
(416) 878-4244

Love Tree Seedling Harvester

This harvester consists of an oscillating, undercutting blade, pickup belts, and conveyors and may be able to harvest 175,000 seedlings an hour under optimum conditions. Custom design is possible. The undercutting blade loosens and lifts seedlings and is adjustable for any depth. Eight pickup belts transfer the seedlings to oscillating beaters that remove soil from the roots. The seedlings are then manually transferred to a side conveyor where they are loaded onto trailers.

The harvester is mounted on a two-wheeled trailer chassis that is 72 to 76 inches wide. The hydraulic system aids in steering by directing movement of the trailer's wheels and tongue. The tractor driver controls all operations. Tractors must be 60 hp or larger with a power takeoff. They must be able to travel 0.17 to 0.34 mph at full engine speed. The number of people required for operation of the harvester depends on the harvesting techniques of the nursery.



Love Tree Seedling Harvester:

J.E. Love Co.
309 California St.
Garfield, WA 99130
(509) 635-1321

Whitfield Super Lift Seedling Harvester

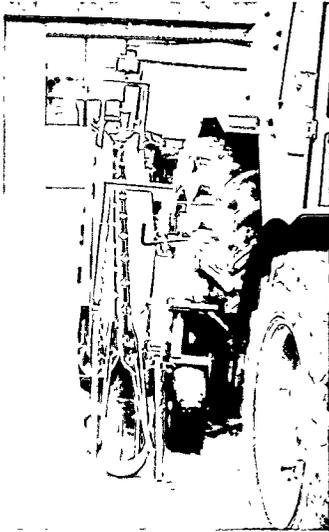
The Whitfield lifter is similar in basic design to the Love Harvester. An oscillating undercutting blade lifts seedlings. The seedlings are transferred by 16 lifting belts to adjustable pulleys that loosen the soil around the roots. After a shaver trims the roots, the seedlings are then transferred onto a mesh screen where soil falls away from the roots. A side-mounted conveyor moves the seedlings to a tub where operators put them onto a cart.

Whitfield Seedling Harvester:

R.A. Whitfield Mfg. Co.
Whitfield Forestry Equipment
P.O. Box 188
6431 Gordon Circle SW
Mableton, GA 30059
(404) 948-1212

Egedal Liftmaster Seedling Harvester

The Egedal model adds bundle tying to the process of harvesting. The harvester uses a vibrating blade to lift seedlings. Because of separate hydraulic systems, it may lift one row of seedlings while leaving the other row undisturbed. The lifted seedlings pass over seven rotary rollers that remove dirt from the roots. The speed of the rollers is adjustable to prevent damage to the roots. Two rubber conveyors then carry the seedlings to the tying chamber. An electric sensor activates the tying mechanism when enough seedlings have filled the chamber. Tied bundles are carried to the lift side of the machine, where they are placed in a trailer.

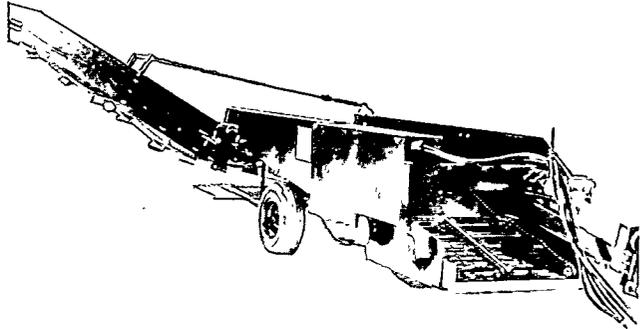


Egedal Liftmaster Seedling Harvester:

Timm Enterprises, Ltd.
P.O. Box 157
5204 Trafalgar Rd.
Oakville, Ontario
Canada L6J 4Z5
(416) 878-4244

Grayco Seedling Harvester

This harvester consists of an undercutting blade and chain conveyors mounted on a rubber tire chassis. The blade lifts seedlings onto the conveyor. The conveyor shakes soil loose as the seedlings are carried to the rear of the harvester. The seedlings are then manually placed into containers or loaded onto wagons by a side-loading attachment. The depth of the undercutting blade and the speed of the conveyors are controlled hydraulically.



Grayco Seedling Harvester:

Grayco Potato Harvesters, Ltd.
Heidelberg, Ontario
Canada N0B 1Y0
(519) 699-5372

Frobro Seedling Harvesting Equipment

Frobro's harvesting technique combines use of the Frobro lifter-shaker and the Frobro combine/harvester. The lifter shaker drops the seedlings gently onto the sloping side of the combine. The seedlings are caught and carried upward by tines powered by a rotating belt. At the top of the combine the tines retract and the seedlings drop onto a discharge conveyor. The conveyor drops the seedlings into bins on a trailer, where they are covered and transported to the processing facility. Hydraulic controls on the working platform regulate the speed of the pickup tines and belts and the angle of conveyors and combine wall. The combine is easily linked hydraulically to the harvester.



Frobro Seedling Harvesting Equipment:

Baertschi of America, Inc.
P.O. Box 5139
Sevierville, TN 37864
615-428-3961

Seedling Lifters:

Baertschi of America, Inc.
P.O. Box 5139
Sevierville, TN 37864
(615) 428-3961

Lundeby MFG
P.O. Box 136
Rt. 1
Tolna, ND 58380
(701) 262-4721

FESCO
Forestry Equipment Specialists
P.O. Box 1277
Highway 82 E
Starkville, MS 39759
(601) 323-5600

Sauze Technical Products Corp.
212 Oak St. Ext.
Plattsburgh, NY 12901
(518) 561-6440

Grayco Potato Harvesters, Ltd.
Heidelberg, Ontario
Canada N0B 1Y0
(519) 699-5372

Timm Enterprises, Ltd.
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5204 Trafalgar Rd.
Oakville, Ontario
Canada L6J 4Z5
(416) 878-4244

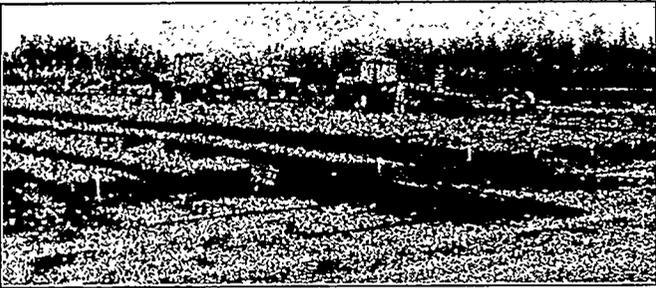
The Green Hoe Co., Inc.
West Main Rd.
Portland, N.Y. 14769
(716) 792-9433

R.A. Whitfield Mfg.Co.
Whitfield Forestry Equipment
P.O. Box 188
6431 Gordon Circle SW
Mableton, GA 30059
(404) 948-1212

HMS Soil Fumigation
7610 Highway 41 N
Palmetto, FL 33561
(813) 722-5587

J.E. Love Co.
309 California St.
Garfield, WA 99130
(509) 635-1321

7.2 Seedling Handling and Transportation



Depending on the type of lifter used, the seedlings are placed into tubs or bins for transportation to the processing building. Because it is important to keep the seedlings moist and cool, the tubs are usually lined with wet burlap that can be tucked over the tops of the seedlings. Some models have folding lids that serve the same purpose. Field containers are either hand-lifted onto trucks or trailers or some nurseries use special machinery that picks up the tubs from the ground.

Field Tubs

Nurseries use tubs extensively for loading seedlings in the field. Tub racks are sold for mechanical harvesters. Tubs are generally constructed of plastic, although specially treated cardboard or wooden containers are also used. They are available in a variety of sizes, shapes, and styles. Some manufacturers will custom-design tubs. One desirable feature is the ability to nest the tubs for post-season storage, which greatly reduces the amount of required storage space. Size and type of tubs are based on individual nursery operations and preference. Many use tubs with the following dimensions: 10 1/2 inches deep—Top dimensions are 26 1/2 inches by 18 3/4 inches; Bottom dimensions are 23 inches by 16 1/4 inches.



Field Tubs:

Acro Plastics
Div. Lowry Mfg., Inc.
8630 Airport Highway
Holland, OH 43528
(419) 865-0258

Equipto
225 S Highland Ave.
Aurora, IL 60507
(708) 859-1000

InterMetro Industries Corp.
653 N Washington St.
Wilkes-Barre, PA 18705
(717) 825-2741

Lewis Systems
426 Montgomery St.
Watertown, WI 53094
(414) 261-3162

Nasco
901 Janesville Ave.
Ft. Atkinson, WI 58538
(414) 563-2446

NVF Co.
Primary Products Div.
P.O. Box 68-T
Haley Dr.
Yorklyn, DE 19736
(302) 239-5281

Plastech International, Inc.
John Fitch Industrial Park
P.O. Box C5050
Warminster, PA 18974
(215) 441-5200

Portage Industries Corp.
1325 Adams St.
Portage, WI 53901
(608) 742-7123

Regal Plastics Co.
4401 E 11th St.
Kansas City, MO 64127
(816) 483-3040

Rubbermaid Commercial
Products, Inc.
3124 Valley Ave.
Winchester, VA 22601
(703) 667-8700

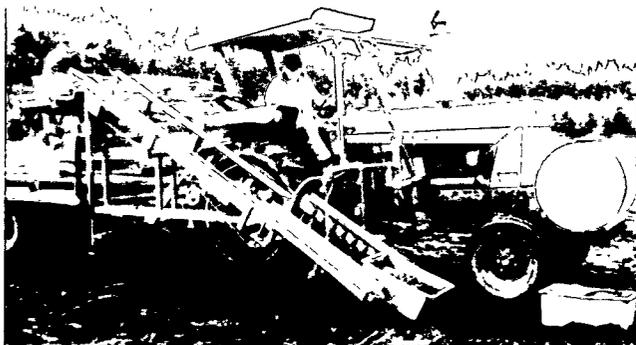
Toteline
Molded Fiberglass Tray Co.
1000 E Erie St.
Linesville, PA 16424-0376
(814) 683-4500

Tri-State, Inc.
P.O. Box 337
505 Fourth St.
Henderson, KY 42420-0337
(502) 826-8361

Seedling Box Lifter

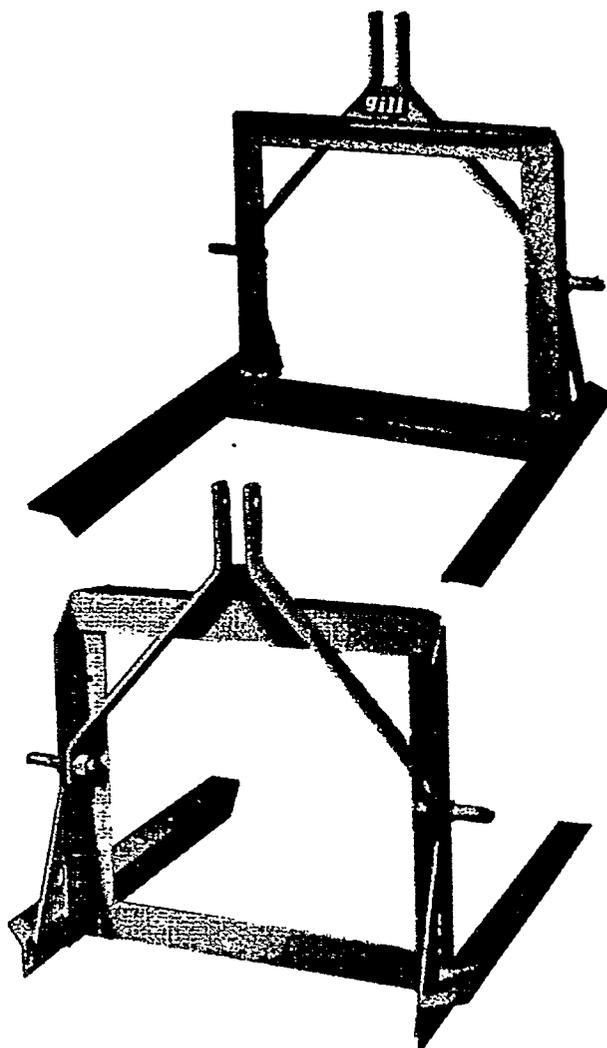
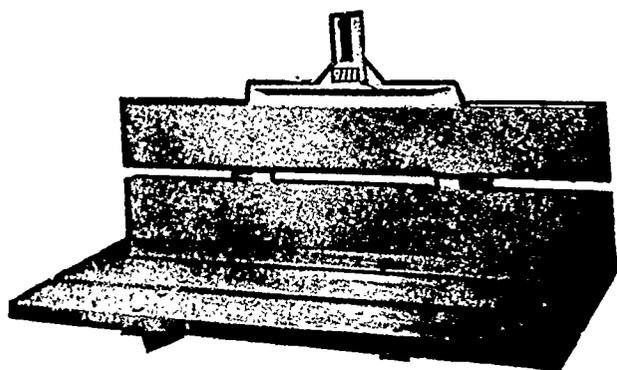
MTDC engineers developed a system to lift and deliver boxes from the ground to a transport trailer. It is mounted to the side of a farm tractor and is designed to minimize manual box handling by personnel. For more information or drawings, contact:

USDA Forest Service
Missoula Technology and
Development Center
Building 1, Fort Missoula
Missoula, MT 59801
(406) 329-3900



Tractor Platforms

Three-point hitch platforms may be used for field transportation. They consist of a wood flatbed on a steel frame. Some manufacturers make frames specifically for attaching platforms, while others make carriers that suffice as frames.



Tractor Platforms:

Corsicana Grader and Machine Co.
P.O. Box 1699
Corsicana, TX 75110
(214) 872-1241

Edwards Equipment Co., Inc.
4312 Main St.
Yakima, WA 98903
(509) 248-1770

Rears Mfg. Co.
2140 Prairie Rd.
Eugene, OR 97402
(503) 688-1002

Reddick Equipment Co., Inc.
P.O. Box 71
Williamston, NC 27892
(919) 792-1191

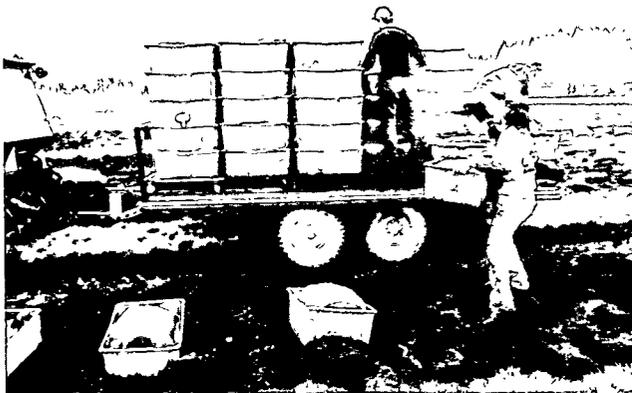
Rivinius, Inc.
925 W Center
Eureka, IL 61530
(309) 467-2303

Tractor Attachments:

Massey-Ferguson, Inc.
1901 Bell Ave.
Des Moines, IA 50315
(515) 247-2011

Field Trailers

Two- and four-wheel rubber-tire trailers are popular for field transportation. Most are drawn by a pickup or a tractor. Many types, sizes, and heights are available. However, many nurseries use custom-built trailers.



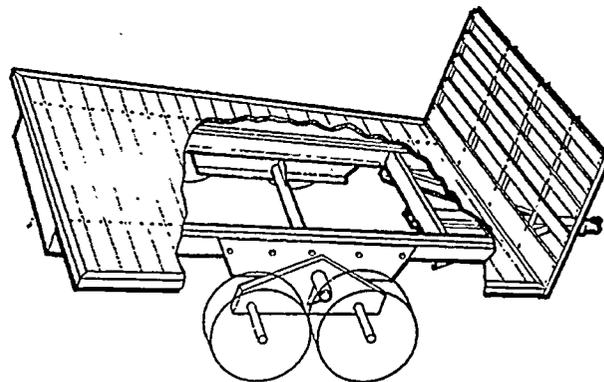
Lucky Peak Trailer

Lucky Peak Nursery has designed a trailer to transport seedling containers from the field. It consists of a flatbed mounted on a tandem wheel chassis. Plans are available from:

USDA Forest Service
Lucky Peak Forest Tree Nursery
%Idaho City Stage
Boise, ID 83701

or

USDA Forest Service
Missoula Technology and
Development Center
Building 1, Fort Missoula
Missoula, MT. 59801
(406) 329-3900.



Field Trailers:

Aeroil Products Co., Inc.
Wesley St.
South Hackensack, NJ 07606
(201) 343-5200

Ford New Holland, Inc.
500 Diller Ave.
New Holland, PA 17557
(717) 355-1121

A.M. Leonard, Inc.
P.O. Box 816
Piqua, OH 45356-0816
(513) 773-2694

United Farm Tools
P.O. Box 4026
Glasgow, KY 42142
(502) 651-7712

Dakota Mfg. Co., Inc.
P.O. Box 1188
Mitchell, South Dakota 57301
(605) 996-5571

The Hamilton Caster & Mfg. Co.
1637 Dixie Highway
Hamilton, OH 45011
(513) 863-3300

Summers Mfg. Co.
338 Railway Ave.
Maddock, ND 58348
(701) 438-2855