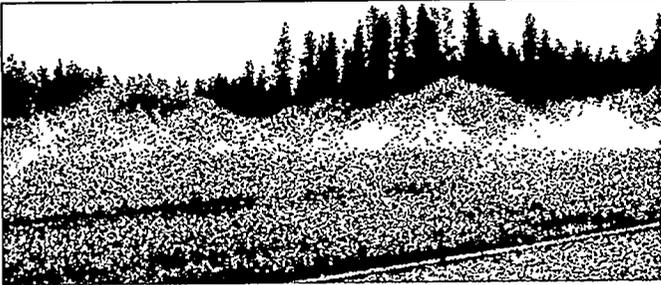


5.4 Cultivation and Mechanical Weed Control



Weeds competing for soil nutrients and moisture restrict the growth of tree seedlings and other crops. Cultivators and weeders are commonly used by nurseries to temporarily eradicate weeds. Crops usually require several cultivations during a growing season.

Row and path cultivators are used by most nurseries. Row cultivators cultivate between the rows of the crop or seedlings. They are widely distributed and readily available in a variety of designs.

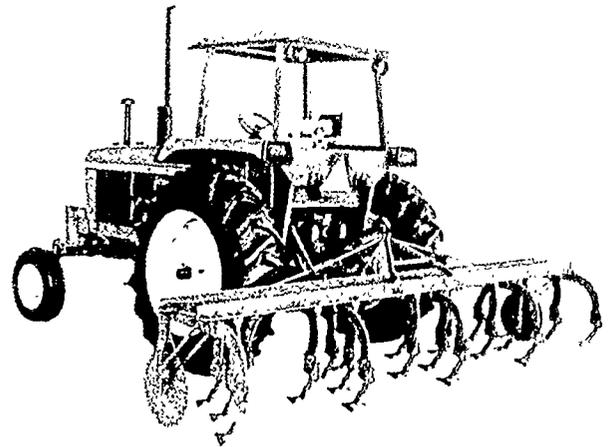
Path cultivators cultivate the paths between seedbeds. Modified row cultivators, garden rototillers, or custom-built path cultivators are used by most nurseries for path cultivation. Some row cultivators with shanks or blades removed may suffice as path cultivators.

Seedbed Cultivators

Weed control and soil surface preparations are considered the primary purposes for cultivation on tree nurseries. Cultivation helps to control weeds as well as break up the soil crust to improve aeration and moisture absorption. A variety of implements are used at bareroot tree nurseries for cultivation. They include shovel, rotary, rotary hoe, and sweep cultivators as well as specific weeding implements.

Shank Shovel Row Cultivators

Shank shovel row cultivators penetrate the soil up to 5 inches to uproot and bury weeds. They are manufactured in widths ranging from 5-1/2 to 10 feet and are tractor-mounted on a 3-point hitch. Row width is adjustable.



Egedal Bed Cleanser

The Egedal Bed Cleanser removes weeds with vibrating spring tines that end at duck-foot shares. The tines may be spaced for any row width. An operator rides on the cultivator and manually guides the cultivator teeth between the rows. Spraying and fertilizing equipment may be attached. The cultivator is available in 2- to 6-row models with variable row widths. Many other attachments are available, such as triple shares and bed rollers.



Shank Cultivators

Ace Supply, Inc.
P.O. Box 1098
Caldwell, ID 83606-1098
(208) 459-0731

Agrico Machinery (Pty), Ltd.
P.O. Box 211
Lichtenburg 2740
Republic of South Africa
01441-26068

Alloway Mfg. & Distributors Co.
P.O. Box 2825
Fargo, ND 58108
(701) 282-7014

Argis, Ltd.
P.O. Box 154
Listowel, Ontario
Canada N4W 3H2
(519) 291-4205

BEFCO, Inc.
P.O. Box 6036
Rocky Mount, NC 27801
(919) 977-9920

Ber-Vac, Inc.
2835 Chemin Del'Aeroport
Thetford Mines, Quebec
Canada G6G 5R7
(418) 338-4290

Bigham Brothers, Inc.
P.O. Box 3338
Lubbock, TX 79452
(806) 765-8201

Blessent Mfg. Co.
5 Triumph Dr.
Urbana, IL 61801
(217) 367-3636

Brillion Iron Works, Inc.
220 Park Ave.
Brillion, WI 54110
(414) 756-2121

Brown Mfg. Corp.
P.O. Box 339
Rt. 3
Highway 27E
Ozark, AL 36360
(205) 795-6603

Bryan Co.
Salinas Farm Implements
P.O. Box 1196
Salinas, CA 93902
(408) 754-6674

Buckeye Tractor Co.
P.O. Box 123
Columbus Grove, OH 45830
(419) 659-2162

Bush Hog Division
Allied Products Corp.
P.O. Box 1039
Selma, AL 36702-1039
(205) 872-6261

J.I. Case
A Tenneco Co.
700 State St.
Racine, WI 53404
(414) 636-5399

Deere & Co.
John Deere Rd.
Moline, IL 61265
(309) 765-5678

Dickey Machine Works
P.O. Box 5610
Pine Bluff, AR 71611
(501) 536-1300

Miller-St. Nazianz, Inc.
511 E Main St.
St. Nazianz, WI 54232
(414) 773-2121

The Murray Ohio Mfg. Co.
P.O. Box 268
Brentwood, TN 37027
(615) 373-6500

Noble
P.O. Box 1030
Wahpeton, ND 58074
(701) 642-2621

Norcan Farm Equipment, Ltd.
P.O. Box 1237
Cambridge, Ontario
Canada N1R 6C9
(519) 623-8261

Northwest-Tillers, Inc.
P.O. Box 10932
Yakima, WA 98909
(509) 575-1950

Orthman Mfg., Inc.
P.O. Drawer B
Lexington, NE 68850
(308) 324-4654

Pepin Farm Implements
P.O. Box 158
610 Pine St.
Pepin, WI 54759
(715) 442-2111

Portable Elevator Div.
920 E Grove St.
Bloomington, IL 61701
(309) 329-1235

Remlinger Mfg. Co., Inc.
P.O. Box 299
Kalida, OH 45853
(419) 532-3647

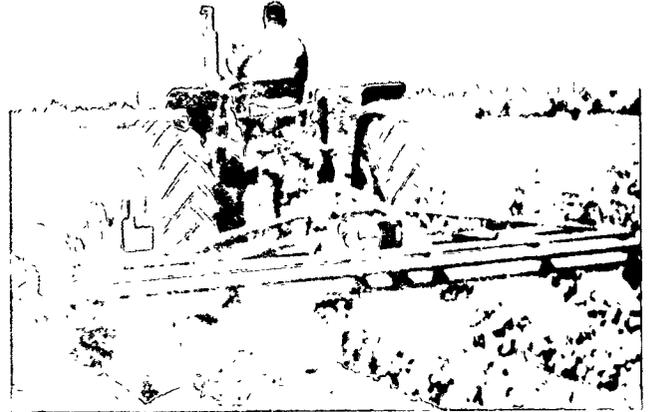
Rome Industries
P.O. Box 48
Cedartown, GA 30125
(404) 748-4450

Sprayrite Mfg. Co.
P.O. Box 3289
West Helena, AR 72390
(501) 572-6737

Standen Engineering, Ltd.
Station Rd.
Ely Combs
England CB7 4BP
(035) 361111

Rotary Powered Cultivators

Rotary power row cultivators are commonly used and are available in widths of 12 to 60 inches. Row shields are usually attached to protect the seedlings.



Shank Cultivators:

Sukup Mfg. Co.
P.O. Box 677
Sheffield, IA 50475
(515) 892-4222

Taylor/Pittsburgh Implements
P.O. Box 769
Athens, TN 37303
(615) 745-3110

Tebben Mfg.
P.O. Box 140
Rt. 2
Clara City, MN 56222
(612) 847-2200

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

United Farm Tools, Inc.
P.O. Box 4026
Glasgow, KY 42142
(502) 651-7121

The Vassar Co.
P.O. Box 609
207 N Main
Perkins, OK 74059
(405) 547-2454

Vicom Farm Machinery, Inc.
2885 Charlestown Rd.
Lancaster, PA 17603
(717) 872-8661

White Farm Equipment
123 W Sycamore St.
Coldwater, OH 45828
(419) 678-5311

Wil-Rich
P.O. Box 1030
Wahpeton, ND 58074
(701) 642-2621

Worksaver, Inc.
P.O. Box 1000
S State St.
Litchfield, IL 62056
(217) 324-5973

Yetter Mfg. Co., Inc.
P.O. Box 358
Cochester, IL 62326
(309) 776-4111

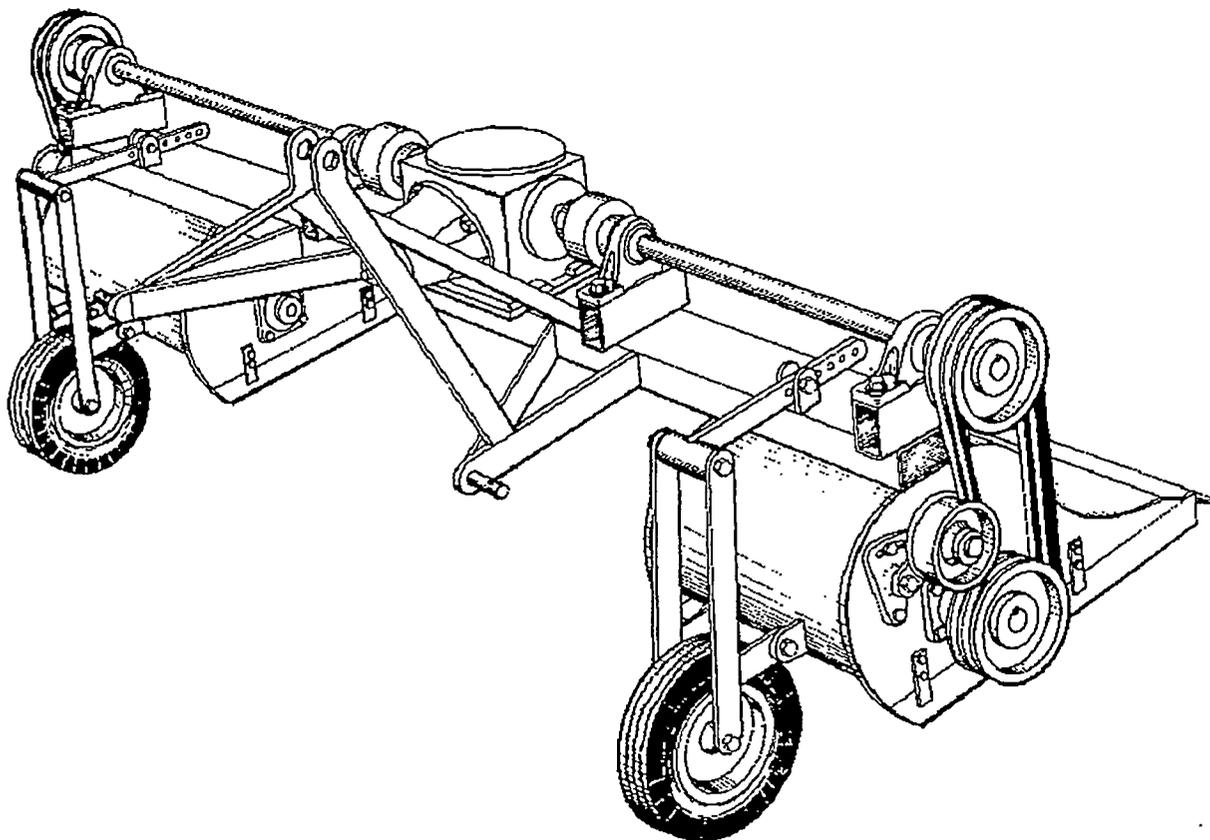
Coeur d'Alene Path Cultivator

This cultivator cultivates paths between seedbeds. It consists of rototillers mounted on a frame. The rototillers are power-takeoff driven and attach to a tractor by a 3-point hitch. Plans are available from:

USDA Forest Service
Coeur d'Alene Nursery
3600 Nursery Rd.
Coeur d'Alene, ID 38314
(208) 765-6365

or

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

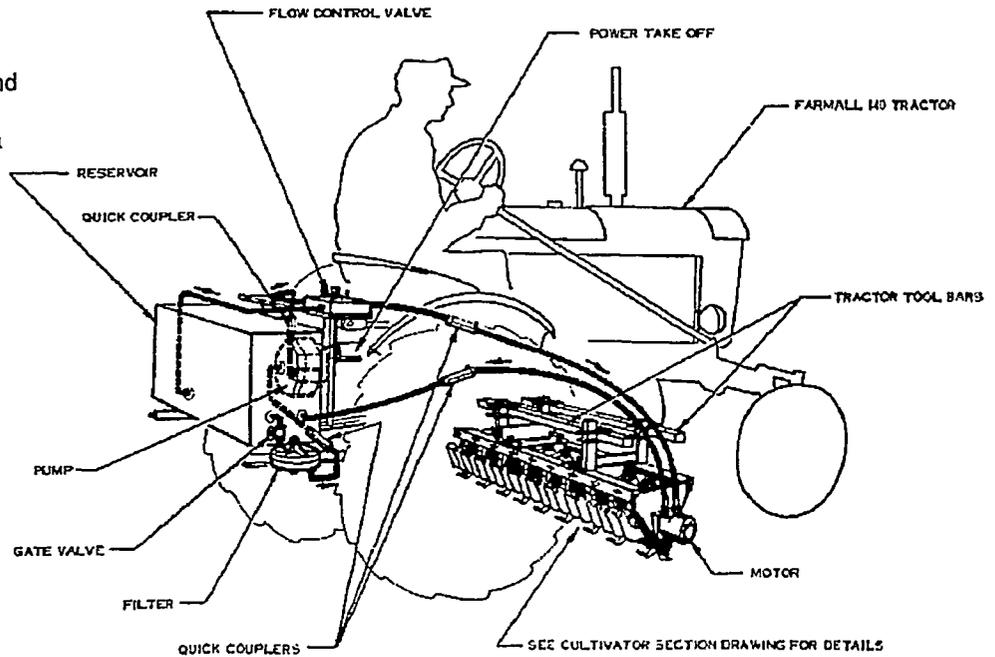


MTDC Nursery Bed Cultivator

The nursery bed cultivator was designed in the late 1960's to cultivate between the rows of nursery stock. The cultivator consists of rototiller-type blades and metal shields that protect the rows of seedlings. It is tractor-mounted and may be used with a hydraulic motor and a power-takeoff pump. The cultivator is effective in hard soils with excessive weeds.

Plans can be requested from:

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



Rotary Powered Cultivators:

Alloway Mfg. and Distributing Co.
P.O. Box 2825
Fargo, ND 58108
(701) 282-7014

Ariens Co.
655 W Ryan St.
Brillion, WI 54110
(414) 756-2141

Bomford & Evershed, Ltd.
P.O. Box 18
Salford Priors
Evesham, Worcester
England WR11 5SW
0789-773383

The Ferguson Mfg. Co., Inc.
P.O. Box 1098
Suffolk, VA 23434
(804) 539-3409

Geest Overseas
Mechanisation, Ltd.
White House Chambers
Spalding Lines
England PE11 2AL
(0775) 761111

General Irrigation Co.
P.O. Box 776
Carthage, MO 64836
(417) 358-8171

The Green Hoe Co., Inc.
W Main Rd.
Portland, NY 14769
(716) 792-9433

Haffco, Inc.
358 NW F St.
Richmond, IN 47374
(317) 966-8161

HCC, Inc.
1501 First Ave.
Mendota, IL 61342
(815) 539-9371

Hester Plow Co., Inc.
P.O. Box 340
Lake City, FL 32056-0340
(904) 755-0960

Kelley Mfg. Co.
P.O. Drawer 1467
Tifton, GA 31793-1467
(912) 382-9393

KMN Modern Farm Equipment, Inc.
P.O. Box 1896
West Memphis, AR 72301
(501) 732-4270

Marvin Landplane
P.O. Box 1880
Woodland, CA 95695
(916) 662-2871

Nichols Tillage Tools, Inc.
312 Hereford Ave.
Sterling, CO 80751
(303) 522-8676

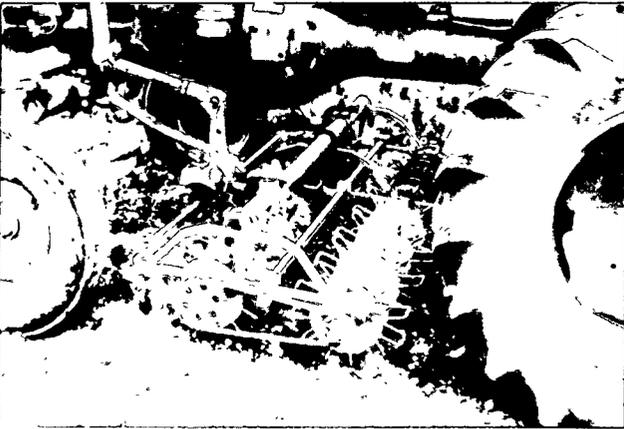
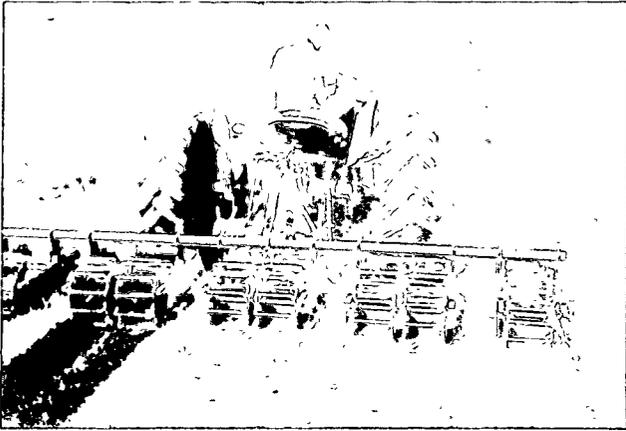
Northwest-Tillers, Inc.
P.O. Box 10932
Yakima, WA 98909
(509) 575-1950

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

Utility Tool & Body Co., Inc.
P.O. Box 360
Clintonville, WI 54929
(715) 823-3167

Budding Wheel Hoe

The Budding Wheel Hoe uses mounted rows of wire wheels to uproot weeds without throwing dirt on plants. It is most suited for narrow rows of 6 to 18 inches, but also works for wider rows. The cultivator comes in 1 to 8 row models, and the wire wheels can be made in a wide variety of sizes.



Budding In-Row Weeders

These in-row weeders are designed for cultivating wide rows. The rotating wire-teeth wheels rotate on a bias from 1/2-inch to 3/4-inch deep to loosen the soil and remove weeds. The open wheels keep the soil even between rows. The wheels may be spaced 2 to 5 inches apart. This weeder is most commonly used in hardwood nurseries.

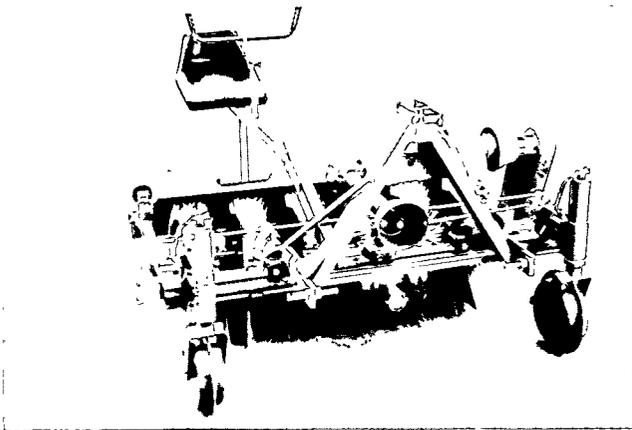


Budding Weeder Co.
7015 Hammond Ave.
Dutton, MI 49316
(616) 698-8613

Budding Weeder Co.
7015 Hammond Ave.
Dutton, MI 49316
(616) 698-8613

Frobro Brush Hoe

The Frobro Brush Hoe is useful for close-set, delicate crops. It operates without damage in rows less than 5 inches apart. The cultivator doesn't mix or move soil. Instead, the bristles rub the surface and lift out weeds. Plants are protected by adjustable barriers. Tension springs allow the brush hoe to hug the earth. A fertilizer applicator may be added. Row widths are adjustable.



Frobro Brush Hoe

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

Egedal Row Master

The Egedal Row Master cultivates between rows to a depth of about 4 inches. Each section is independently spring-mounted. Each pruning head is equipped with three teeth that rotate from side-to-side. The width of the rotation can be adjusted to prevent root damage. Vertical and horizontal root pruners may be attached to the cultivator. The cultivator is equipped for 4 to 6 rows, which can be spaced 9 to 12 inches apart.



Egedal Row Master:

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

Clements All-Around Weeder

This cultivator consists of tines in the rear and two long flails in the front that pass under the soil to slash weed roots. The flails are equipped with a sensing bar. The flails rotate out of the way when the sensors encounter a tree trunk. The unit may be mounted to the front, side, or rear of a tractor. A tiller or chopper may be mounted to the rear of the unit.

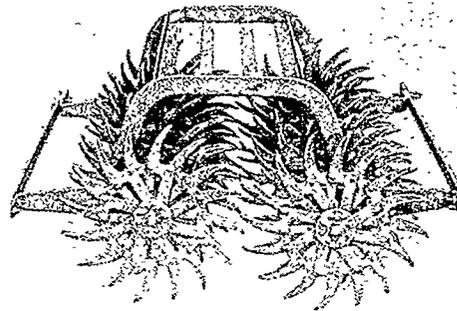


Clements All-Around Weeder:

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

Rotary Hoes

A rotary hoe is a tractor-drawn secondary tillage and/or cultivation implement. It may be used to weed new seedbeds and/or to break up crusty surface soil. It consists of tandem multiteeth wheels that penetrate the soil to a maximum depth of 2 inches. Rotary hoes are available in widths from 4 to 20 feet for all categories of tractors.



Rotary Hoes:

Beaver Valley Supply
Atwood, KS 67730
(913) 626-3251

J.I. Case
A Tenneco Co.
700 State St.
Racine, WI 53404
(414) 636-5399

Crust Buster/Speed King, Inc.
P.O. Box 1438
Fort Dodge Rd.
Dodge City, KS 67801
(316) 227-7106

Deere and Co.
John Deere Rd.
Moline, IL 61265
(309) 765-5678

The Green Hoe Co., Inc.
W Main Rd.
Portland, NY 14769
(716) 792-9433

Hester Plow Co., Inc.
P.O. Box 340
Lake City, FL 32056-0340
(904) 755-0960

M & W Gear Co.
Route 47 S
Gibson City, IL 60936
(217) 784-4261

Nichols Tillage Tools, Inc.
312 Hereford Ave.
Sterling, CO 80751
(303) 522-8676

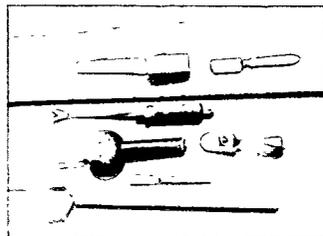
Northwest-Tillers, Inc.
P.O. Box 10932
Yakima, WA 98909
(509) 575-1950

Orto Lan
Via Lungochiampo, 90
Montebellow (Vicenza)
Italy 36054
(0444) 649565

J.T. Parkes & Sons, Ltd.
Northfield Rd.
Netherton, Dudley
West Midland
England DY29JQ
0384-237387

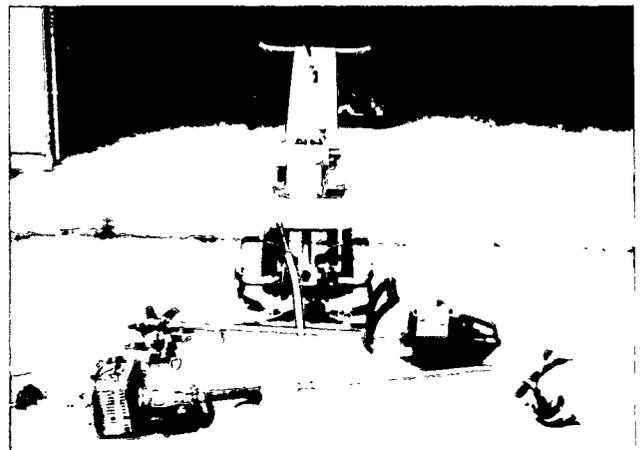
Hand Weeding Equipment

Bareroot nurseries use both commercial and homemade implements and equipment to hand weed seedbeds. The weeds are generally uprooted, placed in buckets or tubs and removed from the seedbeds because some species will continue to distribute seed after they have been removed. Unwanted vegetation in non-crop areas is usually trimmed close to the ground, because digging it up exposes new soil and stimulates dormant weed seeds to germinate. Commercial equipment can be found at your local lawn and garden stores.



Weed Eaters

Grass and weeds around fences and trees can be trimmed with portable weed eaters. These consist of a gas engine attached by a long shaft to a rotary wheel. Nylon string attaches to the wheel. Saw attachments generally are available to allow the weed eater to cut small trees and brush.



Weed Eaters:

Ben Meadows Co.
P.O. Box 80549
3589 Broad St.
Chamblee, GA 30366
(800) 241-6401

Forestry Suppliers, Inc.
P.O. Box 8397
205 W Rankin St.
Jackson, MS 39284-8397
(800) 647-5368

General Supply Corp.
P.O. Box 9347
303 Commerce Park Dr.
Jackson, MS 39286-9347
(601) 981-3382

Homelite
Div. of Textron, Inc.
P.O. Box 7047
14401 Carowinde Blvd.
Charlotte, NC 28217
(704) 588-3200

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

Seymour Mfg. Co.
500 N Broadway
Seymour, IN 47272
(812) 522-2900

Shindaiwa, Inc.
P.O. Box 1090
11975 SW Herman Rd.
Tualatin, OR 97062
(503) 692-3070

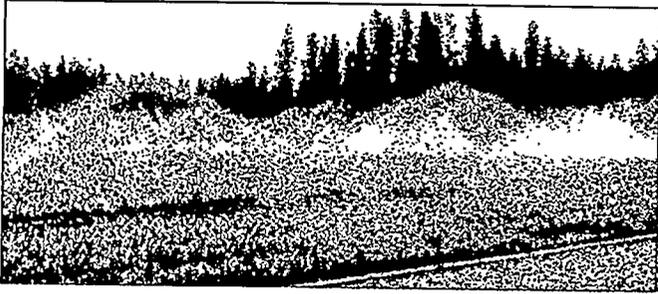
Snapper Power Equipment
P.O. Box 777
Dept. B
McDonough, GA 30253
(402) 957-9141

Stanley Hydraulic Tools
Div. of the Stanley Works
3810 SE Naef Rd.
Milwaukee, OR 97222
(505) 659-5660

Stihl, Inc.
536 Viking Dr.
Virginia Beach, VA 23452
(804) 486-8444

Zip-Penn
P.O. Box 1779
2008 E 33rd St.
Erie, PA 16512
(814) 898-2008

5.5 Root Culturing



Root culturing is extensively used for checking top growth and developing more fibrous roots of nursery stock. The timing and frequency of root culturing depends on factors like the species of the stock, the size and type of stock desired, and the stage of development of the stock. Most root culturing equipment is tractor-mounted and adjustable for depth. A limited number of horizontal and lateral root pruner manufacturers are available. Some nurseries use custom-built pruners.

Undercutting Equipment

Undercutting, also called horizontal root pruning, consists of severing the tap root and other vertically oriented roots several inches below the ground surface. Undercutting is usually accomplished by a tractor-mounted horizontal blade adjustable to a maximum depth of 10 inches. Some equipment is designed to move the blade back and forth through the soil which aids in the cutting action and reduces soil drag. Most undercutters mount directly to the 3-point hitch. Although several types of undercutters are commercially available, many nurseries use custom-built equipment.

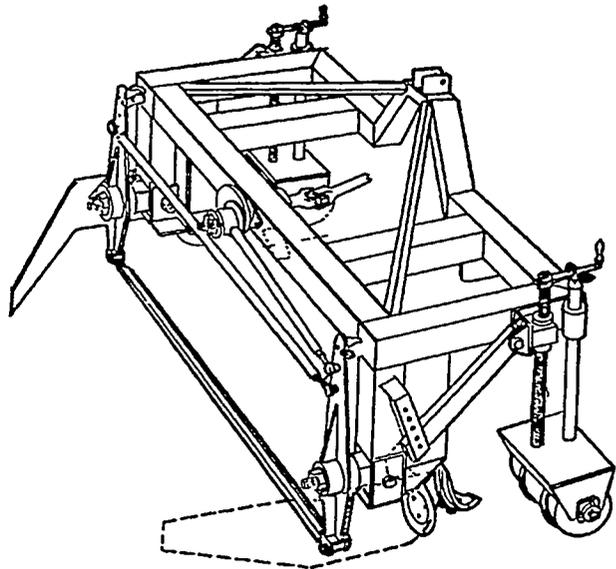


MTDC Reciprocating Root Pruner

The Technology and Development Center at Missoula redesigned a reciprocating root pruner for category II 3-point hitch tractors in 1972. The pruner is power takeoff-driven and adjustable to a maximum depth of 10 inches. An optional reciprocating speed increase is allowed by the design. A soil-penetrating chisel point and coulter remove rocks and soil from the path of the rocker arms. For more information, see MTDC Report, *Redesign of Horizontal Root Pruner* (7424-2205), July 1973.

Drawings are available from:

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

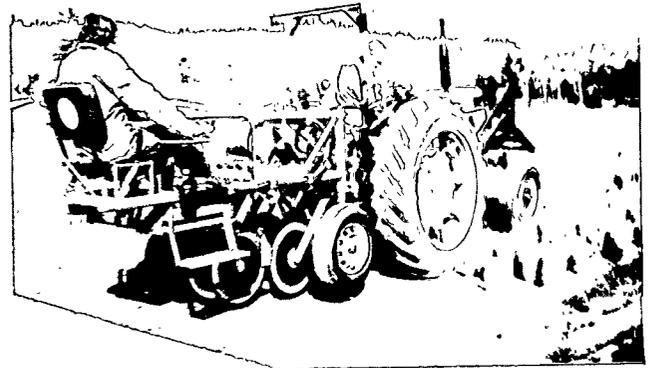


Wrenching Equipment

The terms wrenching and undercutting are often used interchangeably, but they are distinctively different operations with different objectives. Wrenching is primarily employed to fracture the soil profile and the blade is set much deeper than for undercutting, often at 10 to 12 inches. Nurseries wrench their seedbeds when surface soil crusts inhibit water infiltration or to generate better air exchange or leaching within the root zone. Wrenching is commonly done late in the growing season to induce seedling moisture stress that arrests terminal height growth and helps wet a dormant bud. Although some nurseries use undercutting equipment, wrenching blades are generally thicker and are drawn through the soil at a slight angle which produces the desired soil disturbance.

Lateral Pruning

Lateral pruning cuts the horizontal roots of the seedling several inches from the stem. Pruning is usually accomplished with tractor-mounted vertical blades or coulters. These are adjustable to a maximum depth of 12 inches. Lateral pruning and root pruning are often done together. Vertical and horizontal root pruners may be attached to the Egedal Row Master Cultivator (see *Seedbed Cultivation*). Few commercial lateral pruners are available and so most nurseries build their own.



Undercutting/Wrenching Equipment:

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

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

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

Silver Mountain Equipment, Inc.
4672 Drift Creek Rd. SE
Sublimity, OR 97385
(503) 769-7127

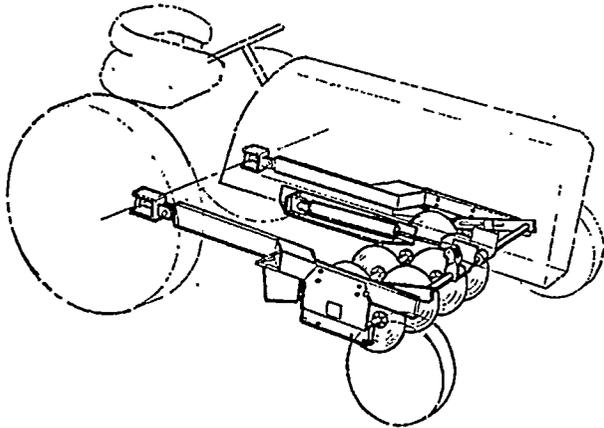
Timm Enterprises, Ltd.
P.O. Box 157
5204 Trafalgar Rd
Oakville, Ontario
Canada L6J 4Z5
(416) 878-4244

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

Lucky Peak Lateral Pruner

Lucky Peak has plans available for a lateral pruner attached to the underside of a tractor. It consists of coulters alternated on tandem axles. The pruning depth is adjustable hydraulically. Plans may be obtained from:

USDA Forest Service
Lucky Peak Forest Tree Nursery
P.O. Box 1085
HC 33
Boise, ID 83706
(206) 343-1977



Lateral Pruners:

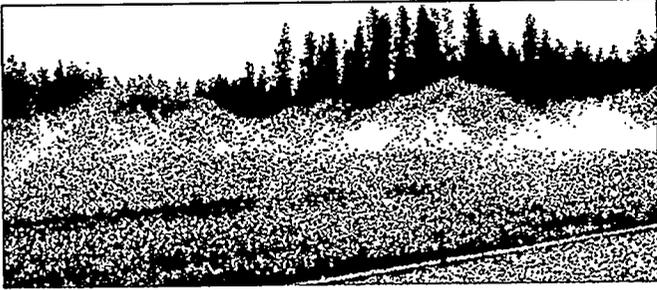
Timm Enterprises, Ltd.
P.O. Box 157
5204 Trafalgar Rd.
Oakville, Ontario
Canada L6J 4Z5
(416) 878-4244

Silver Mountain Equipment, Inc.
4672 Drift Creek Rd. SE
Sublimity, OR 97385
(503) 769-7127

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

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

5.6 Top Pruning



Top pruning involves clipping off the upper portion of the shoot and is usually done to help control top height and produce a better shoot-to-root ratio. The time of top pruning is extremely critical and should only be done when the shoot is still expanding and before it has become too woody. If the pruning blade cuts into woody tissue, the stem often splits and a good terminal bud is never developed. Some species respond better to top pruning than others.

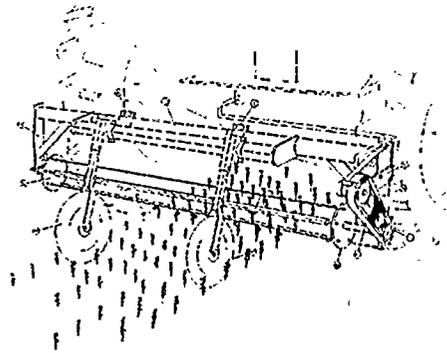
Top Pruners

Nurseries use a variety of equipment that is modified for top pruning tree seedlings. Most common equipment includes rotary mowers, flail mowers or sickle bar mowers. Custom-built top pruners and silage cutters are also being used. Rotary and flail mowers are not ideal because they do not cut seedling tops as cleanly as desired. Also, the tops are scattered within the seedbed. Many nurseries catch the cut tops and remove this material from their seedbeds.

Hammermill Paper Company Top Pruner

Hammermill Paper Company designed and fabricated a unique seedling top pruner for their nursery in Alabama. Drawings are available upon request from:

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



Whitfield Top Pruner

Whitfield top pruner consists of a 50-inch cutter-bar driven by a hydraulic motor similar to the Hammermill Paper Company top pruner. The seedling tops drop into a receiver bin, which can be emptied after use. The height of the cutting bar is regulated by a hydraulic cylinder. The machine itself is 7.3 feet wide.

Whitfield Top Pruner:

R. A. Whitfield Forestry Equipment
6431 Gordon Circle SW
Mableton, GA 30059
(404) 948-1212

Rotary Mowers

Rotary mowers are widely used for top pruning. Tree seedlings are pruned by one or more power takeoff-driven steel blades that rotate horizontally above the ground. Most rotary mowers are tractor-mounted and adjustable to cut 1 to 18 inches above the ground. For every foot of width to be cut, 5 plus hp is recommended.

Heavy-duty rotary mowers may be used to cut brush or weeds. Smaller mowers are able to handle tangled grass. Mowers are available in a wide range of sizes for all categories of tractors.



Rotary Mowers:

Agridisc & Implements Corp.
5502 NW 72nd Ave.
Miami, FL 33166
(305) 884-6100

Alamo Group
P.O. Box 549
Sequin, TX 78156-0549
(512) 379-1480

Arts-Way Mfg. Co.
P.O. Box 288
Armstrong, IA 50514
(712) 864-3131

Auburn Constructions Industries, Inc.
P.O. Box 350
Auburn, NE 68305
(402) 274-4911

BEFCO, Inc.
P.O. Box 6036
Rocky Mount, NC 27801
(919) 977-9920

BMB Co., Inc.
N Vermont & Ninth
Holton, KS 66436

Brown Mfg., Corp.
P.O. Box 339
Rt. 3
Highway 27 E
Ozark, AL 36360
(205) 795-6603

Bush Hog Div.
Allied Products Corp.
P.O. Box 1039
Selma, AL 36702-1039
(205) 872-6261

J.I. Case
A Tenneco Co.
700 State St.
Racine, WI 53404
(414) 636-5399

Central Tractor Farm & Family
Center
P.O. Box 3330
Des Moines, IA 50316
(515) 266-3101

Chapin Equipment Co.
202 Fulton St.
Fresno, CA 93721
(209) 233-7141

Continental Belton Co.
P.O. Box 660
920 E 6th St.
Belton, TX 76513
(817) 939-3731

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

Crandell-Hicks Co.
P.O. Box 5012
30 Oak St.
Westboro, MA 01581
(508) 898-2808

CrustBuster/Speed King, Inc.
P.O. Box 1438
Fort Dodge Rd.
Dodge City, KS 67801
(316) 227-7106

Cushman, Inc.,
P.O. Box 82409
Lincoln, NE 68501
(402) 475-9581

Rotary Mowers:

Deere & Co.
John Deere Rd.
Moline, IL 61265
(309) 765-5678

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

Farm King Allied, Inc.
P.O. Box 1003
Winnipeg, Manitoba
Canada R3C 2W5
(204) 661-8711

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

Graham-Hoeme
P.O. Box 3779
Amarillo, TX 79106
(214) 475-0405

Gravely International, Inc.
P.O. Box 5000
1 Gravely Lane
Clemmons, NC 27012
(919) 766-4721

Great Bend Mfg. Co., Inc.
P.O. Box 829
Great Bend, KS 67530
(316) 792-1701

Great Plains Mfg., Inc.
P.O. Box 218
Assaria, KS 67416
(913) 667-4755

Haban Mfg. Co.
2100 Northwestern Ave.
Racine, WI 53404
(414) 637-8388

Hardee Mfg., Inc.
P.O. Box 232
Rt. 4
Loris, SC 29569
(803) 756-4051

Hester Plow Co., Inc.
P.O. Box 340
Lake City, FL 32056-0340
(904) 755-0960

Howard Price Turf Equipment
18155 Edison Ave.
Chesterfield, MO 63005
(314) 532-7000

Howse Implement Co., Inc.
P.O. Box 86
Laurel, MS 39441
(601) 428-0841

Impex International, Inc.
115/A Belton Dr.
Spartanburg, SC 29304
(800) 274-4410

Interstate Equipment & Mfg. Corp.
P.O. Box 70296
Bakersfield, CA 93387
(805) 322-6659

Jacobsen
Div. of Textron, Inc.
1721 Packard Ave.
Racine, WI 53402-2561
(414) 637-6711

C.C. Kelley & Son
61501 Bremen NW
Misawaka, IN 46544
(219) 255-4746

King Plow Co.
P.O. Box 93009
Atlanta, GA 30377
(404) 876-4476

Kut-Kwick Corp.
1927 Newcastle St.
Brunswick, GA 31521
(912) 265-1630

Land Pride
P.O. Box 218
Assaria, KS 67416
(913) 667-4755

Long Mfg. N.C., Inc.
P.O. Box 1139
Tarboro, NC 27886
(919) 823-4151

M & W Gear Co.
Rt. 47 S
Gibson City, IL 60936
(217) 784-4261

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

Mitchell, Lewis, & Staver Co.
9925 SW Commerce Circle
Wilsonville, OR 97070
(503) 682-0991

Modern, Inc.
P.O. Box 790
Beaumont, TX 77704
(409) 833-2665

Mohawk Equipment Co.
P.O. Box 3605
Temple, TX 76505
(817) 778-1631

Motrim, Inc.
240 Steubenville Ave.
Cambridge, OH 43725
(614) 439-2725

Nicholls Farm Equipment
Rt. 3
Wainfleet, Ontario
Canada L0S 1V0
(416) 732-2000

The Perry Co.
P.O. Box 7187
Waco, TX 76714
(817) 756-2137

Priefert Mfg. Co., Inc.
P.O. Drawer 2540
Mt. Pleasant, TX 75455
(800) 527-8616

Rotech, Inc.
P.O. Box 31
Olathe, KS 66061
(913) 782-3456

Schulte Industries, Ltd.
P.O. Box 70
Englefeld, Saskatchewan
Canada S0K 1N0
(306) 287-3715

Seppi M.
% Paul Fellin
N 56 W 35700 Lisbon Rd.
Oconomowoc, WI 53066
(414) 546-0473

Servis-Rhino, Inc.
P.O. Box 712
Sequin, TX 78156-0712
(512) 379-1480

Side Winder
P.O. Box 818
Minden, LA 71058-0818
(501) 935-1970

Sukup Mfg. Co.
P.O. Box 677
Sheffield, IA 50475
(515) 892-4222

Taylor/Pittsburgh Implements
P.O. Box 769
Athens, TN 37303
(615) 745-3110

Tiger Corporation
3301 N Louise Ave.
Sioux Falls, SD 57107
(605) 336-7900

G.L. Turner Co.
P.O. Box 5652
North Little Rock, AR 72119
(501) 375-0297

United Farm Tools, Inc.
P.O. Box 4026
Glasgow, KY 42142
(502) 651-7121

White Farm Equipment
123 W Sycamore St.
Coldwater, OH 45828
(419) 678-5311

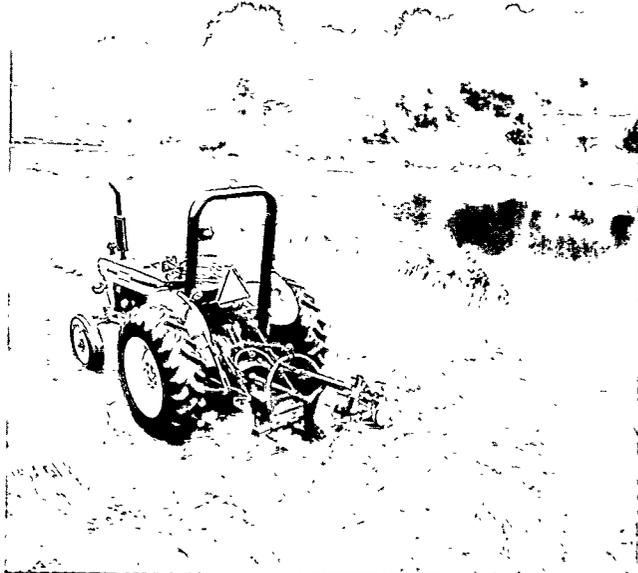
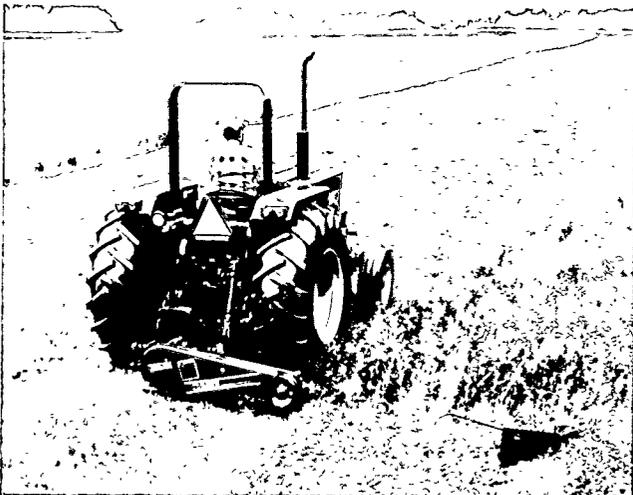
Woods
Div. of Hesston
P.O. Box 1000
Oregon, IL 61061
(815) 732-2141

Yamaha Motor Corp.
6555 Katella Ave.
Cypress, CA 90630
(714) 761-7605

Sickle Bar Mowers

Sickle bar mowers are used by some nurseries for top pruning. They may also be used to mow hay or weeds. They consist of a power takeoff-driven reciprocating sickle within a bar. Most mowers are tractor-mounted, while some are mounted on trailers. Most have mowing bars that may be raised or lowered hydraulically. Some have cutting bars that can operate at angles down to 55 degrees and up to 90 degrees. Cutting bars vary from 5-1/2 feet to 9 feet and require 30 to 45 hp. Top pruning with this mower may be limited by the stability and rigidity of the mowing bar.

Attachments to support the distal end of the sickle bar are available from most manufacturers. They are usually adjustable for various heights and increase the stability of the sickle bar significantly.



Sickle Bar Mowers:

Alamo Group
P.O. Box 549
Sequin, TX 78156-0549
(512) 379-1480

BCS America, Inc.
P.O. Box 1739
Matthews, NC 28105
(704) 846-1040

Busatis Corp.
1813 Linn St.
North Kansas City, MO 64116-3626

Cartner Corp.
P.O. Box 262
Cambridge, OH 43725
(614) 439-2725

J.I. Case
A Tenneco Co.
700 State St.
Racine, WI 53404
(414) 636-5399

Deere & Co.
John Deere Rd.
Moline, IL 61265
(309) 765-5678

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

Haban Mfg. Co.
2100 Northwestern Ave.
Racine, WI 53404
(404) 637-8388

Kosch Co.
P.O. Box 707
Columbus, NE 68602
(402) 564-7161

Kuhn Farm Machinery, Inc.
P.O. Box 224
Vernon, NY 13476
(315) 829-2620

New Idea Farm Equipment
123 W Sycamore St.
Coldwater, OH 45828
(419) 678-5311

Rowse Hydraulic Rakes Co., Inc.
P.O. Box 42
HC 80
Burwell, NE 68823
(308) 348-2276

Side Winder
P.O. Box 818
Minden, LA 71058-0818
(501) 935-1970

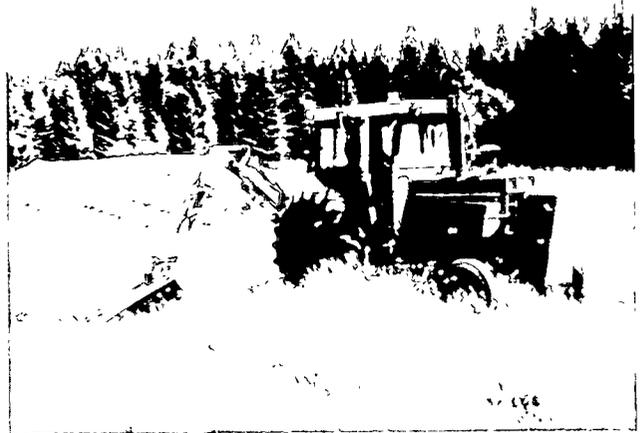
Stocker & Son, Inc.
P.O. Box 749
Bayport, NY 11705
(516) 472-1881

Tarver Sales Corp.
84636 Highway 25
Folsom, LA 70437

Turner International, Ltd.
Div. of Elswick PLC
Dept. M-10
1360 Business Center Dr.
Conyers, GA 30207
(404) 922-1154

Flail Mowers

Flail mowers have swinging pyramid-shaped flail knives mounted on a cylinder. Flail mowers come in various widths. They require a 540k power-takeoff hitch or can be hydraulically driven. Some may be mounted on an extendable boom.



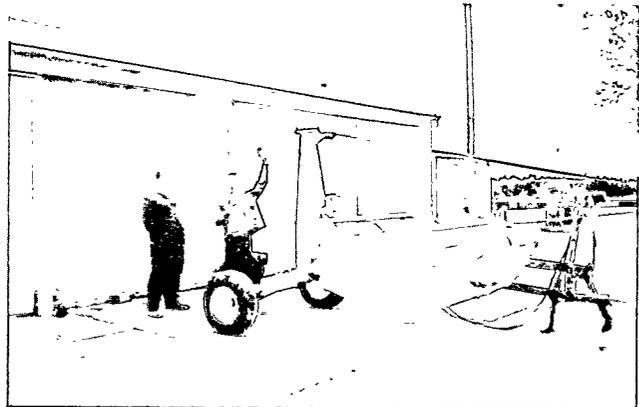
Flail Mowers:			
Alamo Group P.O. Box 549 Sequin, TX 78156-0549 (512) 379-1480	Cartner Corp. P.O. Box 262 Cambridge, OH 43725 (614) 439-2725	Gravely International, Inc. P.O. Box 5000 1 Gravely Lane Clemmons, NC 27012 (919) 766-4721	Kuhn Farm Machinery, Inc. P.O. Box 224 Vernon, NY 13476 (315) 829-2620
Alloway Mfg. & Distributing Co. P.O. Box 2825 Fargo, ND 58108 (701) 282-7014	J.I. Case A Tenneco Co. 700 State St. Racine, WI 53404 (414) 636-5399	Haban Mfg. Co. 2100 Northwestern Ave. Racine, WI 53404 (414) 637-8388	Kut-Kwick Corp. 1927 Newcastle St. Brunswick, GA 31521 (912) 265-1630
Arts-Way Mfg. Co. P.O. Box 288 Armstrong, IA 50514 (712) 864-3131	Dandl Mfg. Corp. P.O. Box 637 Chico, CA 95926 (916) 891-5163	Haven Steel Products, Inc. P.O. Box 430 Haven, KS 67543 (316) 465-2271	Lundell Mfg. Co., Inc. P.O. Box 171 Cherokee, IA 51012 (712) 225-5181
Balzer Mfg. Co. Highway 60 E Mountain Lake, MN 56159 (217) 427-3133	Deere & Co. John Deere Rd. Moline, IL 61265 (309) 765-5678	Hiniker Co. P.O. Box 3407 Mankato, MN 56002 (507) 624-6621	Mathews Co. 500 Industrial Ave. Crystal Lake, IL 60012 (815) 459-2210
BEFCO, Inc. P.O. Box 6036 Rocky Mount, NC 27801 (919) 977-9920	Edwards Equipment Co. 4312 Main St. Yakima, WA 98903 (509) 248-1770	Impex International, Inc. 115/A Belton Dr. Spartanburg, SC 29304 (800) 274-4410	Motrim, Inc. 240 Staubenville Ave. Cambridge, OH 43725 (614) 439-2725
Bomford Center-North P.O. Box 28 West Jefferson, OH 43162-00 (614) 879-7601	Flory Industries P.O. Box 908 4737 Tomes Salida, CA 95368 (209) 545-1167	Jacobsen Div. of Textron Inc. 1721 Packard Ave. Racine, WI 53403-2561 (414) 637-6711	Rear's Mfg. Co. 2140 Prairie Rd. Eugene, OR 97402 (503) 688-1002
Brillion Iron Works, Inc. 200 Park Ave. Brillion, WI 54110 (414) 756-2121	Ford New Holland, Inc. 500 Diller Ave. New Holland, PA 17557-0903 (717) 355-1121	Kelly Ryan Equipment Co. P.O. Box 488 Blair, NE 68008 (402) 426-2151	Rousseau, Inc. 2717 W 5th St. N Unit B Summerville, SC 29483 (803) 875-1850
Bush Hog Div. Allied Products Corp. P.O. Box 1039 Selma, AL 36702-1039 (205) 872-6261	Graham-Hoeme P.O. Box 3779 Amarillo, TX 79106 (214) 475-0405	Kubota Tractor Corp. 550 W Artesia Blvd. Compton, CA 90220 (213) 537-2531	Schulte Industries, Ltd. P.O. Box 70 Englefeld, Saskatchewan Canada S0K 1N0 (306) 287-3715

Miscellaneous

Disc mowers and silage cutters can also be modified to top-prune seedlings. Oklahoma State Nursery modified a John Deere Model 34 silage cutter with a direct-cut head for top pruning seedlings. Bessey Nursery has a similar unit that works very well. For more information, contact them at the following addresses:

Oklahoma State Tree Nursery
P.O. Box 44
Rt. 1
Washington, OK 73093
(405) 288-2385

Bessey Nursery
State Spur 86B
Halsey, NE 69142
(308) 533-2257



Flail Mowers:

Servis-Rhino, Inc.
P.O. Box 712
Sequin, TX 78156-0712
(512) 379-1480

Side Winder
P.O. Box 818
Minden, LA 71058-0818
(501) 935-1970

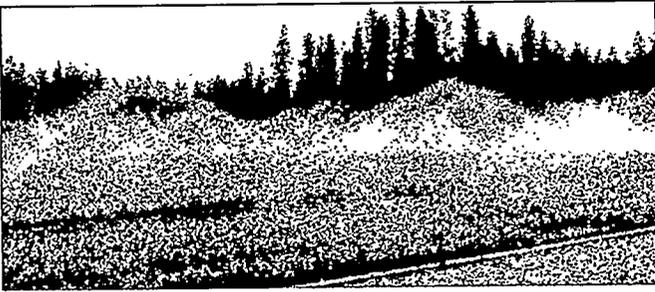
Tiger Corp.
3301 N Louise Ave.
Sioux Falls, SD 57107
(605) 336-7900

Turner International, Ltd.
Div. of Elswick PLC
1360 Business Center Dr.
Conyers, GA 30207
(404) 922-1154

United Farm Tools, Inc.
P.O. Box 4026
Glasgow, KY 42142
(502) 651-7121

White Farm Equipment
123 W Sycamore St.
Coldwater, OH 45828
(419) 678-5311

5.7 Overwinter Mulches



Many nurseries apply mulch over their seedlings during the fall of the year to protect the crop from cold damage or desiccation. Many different types of overwinter mulch have been used, but they must be permeable to water and air. Organic mulches, such as sawdust, pine needles, or excelsior, have been used. Thick layers must be removed the following spring. Permeable white plastic tarps or microfoam sheets are also popular in some locations. In exposed, windy areas, overwinter mulches must be secured to the seedbed.

Mulches can be applied with modified manure spreaders (see Section 3.5 Applying Soil Amendments) or protective tarps can be installed and removed with special equipment (see Section 3.4 Fumigation Tarp Remover).



Overwinter Mulch:

Armin Plastics Corp.
841 S Norbury
Lombard, IL 60148
(312) 916-8277

Forestry Suppliers, Inc.
P.O. Box 8397
205 W Rankin St.
Jackson, MS 39284-8397
(800) 647-5365

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

PPS Pack Co.
P.O. Box 56
204 N Seventh St.
Fowler, CA 93625
(209) 834-1641

Terra Tech, Inc.
2100 W Broadway
P.O. Box 5547
Eugene, OR 97405
(503) 345-0597

Uittokalusto Oy
Fredrikinkatu 61, PL 455
00101 Helsinki, Finland
(90) 694-2400