

Revegetation Equipment Catalog

Descriptions, applications, pictures, and sources for equipment used on rangelands.

Controlling Plants Mechanically

Equipment covered in this section is designed to mechanically remove invasive weeds, shrubs, and trees that would impede the revegetation of sites to plants that are ecologically adapted. Combinations of different mechanical treatments are often necessary to achieve desired results. Effectiveness of mechanical control depends on:

- 1) selection of proper equipment and its method of application
- 2) targeted plant and its sprouting characteristics
- 3) site potential
- 4) soil type
- 5) topography and terrain

Mechanical treatments are visually apparent and usually effective, but they can be more costly than other methods. They may be the only solution when herbicide or fire cannot be used.

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Chains

Anchor chains are designed for use on large ships and off-shore drilling rigs.



Description

Used anchor chains are commonly utilized in revegetation for tree felling, smoothing of disturbed land (e.g. rootplowing), and/or seedbed preparation. Chains are sized by the diameter of the round stock, and sizes range from 1 to 6 inches. Revegetation projects normally use chain sizes between 2 and 3 inches. Within this range, individual links are 12 to 18 inches in length and weigh between 25 and 86 pounds. The resulting weight per foot of chain is about 37 to 88 pounds, respectively. Anchor chain is usually sold in 90-foot lengths called "shots." Further specifications on weight and link size are listed in [Appendix](#).

Application

Anchor chains are pulled in a "U" shape between two crawler tractors. The distance between the two tractors depends on the force required to pull the chain. An initial distance of 1/3rd the length of the chain is a rule-of-thumb. Size and length of the chain are factors as well as the size of the tractors. The distance between tractors can be greater when preparing a seedbed than when felling trees. Chain length is usually between 200 to 400 feet. Length can be adjusted easily with standard cutting and welding tools. Crawler tractors used for chaining vary from 140 to 350 horsepower. Production rates vary widely between 10 and 70 acres/hour. Chaining a second time in the opposite direction increases the effectiveness of removing tree stumps and can be useful in increasing soil disturbance for seeding (see chapters on [Site Preparation](#)). Chaining is not effective on trees with limber trunks. Chaining is very cost effective especially on large areas. It is more effective when combined with raking, herbicides, or fire to control sprouting shrubs.

Sources

Used anchor chain can be purchased from marine supply or salvage companies located in coastal cities of the United States.

Modified Chains

Modified chains are anchor chains with material added to the chain links for the purpose of increasing soil disturbance and/or uprooting more shrubs.



Description

Railroad rails, rods, blades, or disks have been used. A modification known as an "Ely Chain" uses 18 inch pieces of railroad rail (70 to 90 lb/yard) welded to each or every other chain link. A chain with disk blades welded to every other chain link is known as a "disk chain." The optimum blade diameter is 28 inches. Diking chains use blades (12 x 4 inches) welded to opposite sides of every chain link to form small basins in the soil as the chain rotates. The combination of the disk and diking chain is called a disk-chain-diker. A unit with 20 disk blades is 35-foot wide and requires a 165- to 200-horsepower crawler tractor for pulling. Elevated chaining reduces the force required to fell large trees. A roller ball 4 or 6 feet in diameter fabricated from ½ -inch-steel plate is placed in the center of a chain to support the chain above the ground. For elevated chaining to be effective, tree height should be 20 feet or more.

Application

Modified chains must rotate to achieve the desired results. Swivels fabricated in welding shops or modified from track rollers are attached to each end of the chain to allow chain rotation. Railroad-rail chains are towed in a "J" shape rather than a "U" to achieve maximum soil disturbance. Disk chains are towed on a diagonal to achieve optimum disking action. This type chain was developed to achieve tillage on debris- and shrub-littered rangelands at chaining costs. As the diking chain rolls, basins 4-inches deep are formed to collect rainfall. The combined disking and diking chains provide limited shrub control so they are used mainly in seedbed preparation (see chapters on [Site Preparation](#)). These chains are further discussed in the Seedbed Preparation section.

Additional Information

Cain, D. 1971. The Ely Chain. USDI Bureau of Land Management Handbook. 32 p.

Wiedemann, H.T.; Cross, B.T. 1990. Disk-chain-diker implement selection and construction. Center Technical Report No. 1. Vernon, TX: Chillicothe-Vernon Agri. Res. and Ext. Ctr.

Sources

Used anchor chain and accessories can be purchased from marine supply or salvage companies located in coastal cities of the United States. Used railroad rails can be purchase from local train companies. Disk blades can be purchased from local tractor dealers. Local fabrication shops can modify the chains.

Bush Rakes

Bush rakes are mounted on the front of crawler tractors or front-end loaders to pile or stack trees and shrubs prior to revegetation.



Description

Evenly spaced teeth across the front of the rake trap debris and prepare relatively soil-free piles. Multi-application (MA) rakes can penetrate into the soil to remove roots and stumps. These rakes are about 12-feet wide. Stacker rakes slide on the soil surface for fast shearing and stacking. A shearing plate is often welded to the teeth to improve performance. Widths of stacker rakes vary from 14 to 19 feet. Root rakes are towed behind the tractor and are designed to remove roots and stumps following rootplowing. These rakes vary in width from 18 to 24 feet. Horsepower recommended for both stacker and root rakes varies from 140 to 350.

Application

Rakes are used in land clearing for debris removal to allow follow-up brush control, traversing the landscape, and primary tillage. Piles of debris may be burned or saved for wildlife habitat depending on goals of the project. A skillful operator can build piles relatively free of soil. In some situations, soil disturbance is sufficient for seeding. Root rakes are used to clear land for farming operations.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[Arrow-west Equipment Ltd.](#)

Spruce Grove, Alberta, Canada T7X 3G7

[Holt-Cat Custom Engineered Products](#)

San Antonio, TX 78220-7916

[Rockland Manufacturing Company](#)

Bedford, PA 15522

[Rome Plow Company](#)

Cedartown, GA 30125

Shearing Blades

Shearing blades are designed to sever tree trunks at ground level.



Description

Shearing blades have saw-like teeth along the base of the modified dozer blade for cutting. A sharp stump splitter on the forward part on the blade aids in severing large trunks. The most common unit is called a "KG" blade. It is diagonally mounted on the front of a crawler tractor, and it ranges from 8 to 14 feet in width. The other type, a "V" blade, shears on both sides of the centrally mounted unit. These blades are slightly wider than the KG blades.

Application

Shearing blades are used in forests for rapidly clearing non-sprouting trees. They leave the area relatively smooth with stumps usually left intact in the ground. They are not effective in rocky ground and are seldom used on brush-infested rangeland. Tractor operators must be well shielded from falling trees and limbs.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[Arrow-west Equipment Ltd.](#)

Spruce Grove, Alberta, Canada T7X 3G7

[Rockland Manufacturing Company](#)

Bedford, PA 15522

Hydraulic Shearing Blades and Brush Saws

Hydraulic shears are used to sever tree trunks near the ground.



Description

Two horizontally mounted blades are forced through the tree trunk by hydraulic cylinders attached to the blades. The shearing units can be front-mounted on skid-steer loaders, wheel loaders, or excavators. Skid-steer loaders equipped with 14-inch shears are commonly used for clearing non-sprouting brush species. A 20-inch unit is also available. Attachments include brush guards, push bars, and spray nozzles to treat sprouting species as they are sheared. Skid-steer loaders are also available with tracks called compact track loaders.

Hydraulic brush saws cut tree trunks near or slightly below ground level. Saws are front-mounted on skid-steer or compact track loaders, and can cut brush and trees up to 15-feet tall. The 28-inch diameter, high-tensile steel blade has eight replaceable weld-on carbide-tipped teeth. Loaders should be equipped with brush guards.

Application

Skid steers with shears or brush saws are highly maneuverable and move quickly between trees. They are valuable in sculpting brush-infested rangeland to provide cleared area while protecting wildlife habitat. Shearing or sawing is popular in species like junipers whose top-growth is valuable for fence posts or cedar oil. Tires need protection from puncture by thorns while rubber tracks resist punctures. Steep slopes, rocks, and large debris should be avoided. Compact track and skid-steer loaders are well suited to level and undulating landscapes.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[Dougherty Forestry Mfg., Ltd., Co. \(Brush Saw\)](#)

Hinton, OK 73047

[Dymax \(Shears\)](#)

Wamego, KS 66547

[Grace Manufacturing, Inc. \(Shears\)](#)

Plato, MO 65552

[Mighty Axe \(Shears\)](#)

Independence, KS 67301

[Templeton Equipment Co. \(Skid-steer, shears\)](#)
Abilene, TX 79604

[Case IH \(Skid-steer\)](#)
Racine, WI 53404

[Deere & Company \(Skid-steer\)](#)
Moline, IL 61265

[Bobcat Company \(Skid-steer, accessories\)](#)
West Fargo, ND 58078-6000

[Caterpillar Inc. \(Skid-steer\)](#)
Peoria, IL 61628

[New Holland North America \(Skid-steer\)](#)
New Holland, PA 17557

Grubbers

Grubbers are sharp, U-shaped blades mounted on the front of crawler tractors, wheel loaders, excavators, or farm tractors to uproot individual trees.



Description

Smaller tractors (65 horsepower) often use hydraulically assisted blades that enhance the output by tearing roots loose as the blade is rotated. Width of the cutting blade is usually 3 or 4 feet. Tractor size and type depend on the size of trees to be grubbed and the type of terrain. Tractor horsepower varies from 65 to 170. Units are available commercially, but many are fabricated in welding shops. Some units clamp the tree and pull the tree from the soil.

Application

Grubbing is an excellent method to selectively thin brush-infested land. This technique is called "sculpting" and it is very effective in protecting wildlife habitat while providing cleared areas for grazing. Wheel or track loaders or excavators give the operator excellent vision during plant uprooting. "Low-energy" grubbing is the use of small tractors on small trees, and it is cost efficient and effective. These units often use hydraulically assisted blades. Farm tractors with small, three-point-hitch grubbers are popular for use on limited acreages of previously cleared areas. Grubbing techniques can vary depending on sprouting characteristics of the targeted plant's roots (see [Appendix](#)). Grubbing is not practical in rocky soil or when tree densities are more than 250 per acre over extensive acreages.

Additional information

Wiedemann, H.T. 2004. Mechanical brush management: Current state of the art. In: Hamilton, W.T.; McGinty, A.M.; Ueckert, D.N.; Hanselka, C.W.; Lee, M.L., eds. Brush management: Past, present and future, College Station, TX: Texas A&M University Press.

Construction plans for front-mounted grubbers are available from: Texas Agricultural Experiment Station, P.O. Box 1658, Vernon, TX 76385.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information. Many grubbers are built in local welding shops.

[Holt-Cat \(crawler mounted blades\)](#)

San Antonio, TX 78220-7916

[Starhill Solutions AWZ Grabbing Tools](#)

San Francisco, CA 94110

[Jones Machine Shop \(3-point hitch grubber\)](#)

Vernon, TX 76385-1577

[Vail Products, Inc. \(excavator blade\)](#)

Horton, KS 66439

Rootplows

A rootplow is a heavy-duty, V-shaped, horizontal blade, 10- to 16-feet wide pulled by a large crawler tractor at a depth of 12 to 14 inches to sever tree roots.



Description

Tractor horsepower required to pull the integral mounted plows varies from 170 to 400. Fins are attached to the top of the blade to dislodge roots and stumps and move them near the soil surface. Commercial rootplowing averages about 2 acres/hour.

Application

The rootplow severs roots to prevent sprouting of most brush species, although it is not effective on those with shallow root systems. Plant mortality is usually 85 to 99%, but care must be taken to determine where and how it should be used. Chaining or raking following rootplowing helps to smooth the soil surface and remove sprouting species or stumps. Rootplows have been used since the 1940s to clear dense stands of mesquite and other hard-to-kill brush species in preparation for seeding to grass or crops. Sculpting dense brush infested areas by selective plowing and seeding with plants favorable for wildlife habitat, grazing animals, and watershed management could enhance the multiple-use value of depleted rangeland with fertile soils. Rocky soils prevent plowing and gravelly soils cause excessive blade wear.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[Holt-Cat](#)

San Antonio, TX 78220-7916

[Rockland Manufacturing Company](#)

Bedford, PA 15522

Regrowth Rootplows

In the middle 1990s a Texas company started manufacturing regrowth rootplows and rakes to control regrowth brush in pastures previously cleared by conventional rootplows and rakes.



Description

These 10-foot wide plows have been structurally downsized so they can be pulled by 140- to 170-horsepower crawler tractors. Additionally, regrowth root rakes, 14-feet wide, have been developed to operate in concert with the plows. The rakes remove roots from the soil and pile them with the above-ground brush debris. They use the same quick hitch as the regrowth plow. Regrowth plows are more energy efficient and cost effective than conventional rootplows when used in previously cleared areas or in the early stages of brush establishment.

Application

Regrowth plows are especially useful in pastures that have compacted soils and moderate to dense stands of brush with trunk diameters less than 4 inches. In pasture situations where herbicides and burning are restricted or ineffective, these plows may be the only option to control the brush. Regrowth plows can be pulled by rubber-track tractors and large wheeled farm tractors to fracture compacted soils when brush debris is not present. Pastures or rangeland must be free of underground stumps or rocks to prevent undue damage to the plow.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and their contact information.

[Holt-Cat](#)

San Antonio, TX 78220-7916

Offset Disks

Disks used in brush control are the heavy-duty with two gangs of disks.



Description

Offset disks chop and turn under surface debris and uproot shallow-rooted, sprouting brush species. Offset disks consist of two gangs of disks set at angles to each other. Each gang has a separate frame and axle assembly. On some models gang angles can be adjusted for varying soil conditions or desired disking action. Blades may be notched or straight-edged and vary from 24 to 36 inches in diameter. Disks range from 8 to 15 feet in width and require tractors with 70 to 350 drawbar horsepower. These disks usually have rubber tires that are raised and lowered hydraulically for transport or depth control. Disks without wheels are hinged and they must be transported on trailers.

Application

Disks with 36-inch blades are used for brush control on undisturbed soil while units with blade diameters less than 30 inches are used for seedbed preparation following rootplowing. In both situations, disks bury much of the surface brush debris and form a desirable seedbed (see chapters on [Site Preparation](#)). Most disks used on rangeland employ notched disk blades to chop and bury debris. Disks can be used on a wide range of soil conditions and moderately rocky soil, but they cannot be used if there is excessive timber or rock. Farm-type disks are not suited for the rigors of debris-littered rangeland.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[AMCO Manufacturing, Inc.](#)
Yazoo City, MS 39194

[Rome Plow Company](#)
Cedartown, GA 30125

Roller Choppers

Roller choppers are large drums with a series of longitudinally mounted blades.



Description

As the drums rotate they chop and crush brush debris, small trees, and slash. They also form small trenches or pits in the soil to capture rainfall, increase infiltration, and provide a seedbed. The drums are hollow and are usually filled with water to increase their weight and chopping action. Drum diameters vary from 24 to 60 inches. Choppers can be pulled in single, duplex, triplex, or tandem configurations. Width can vary between 5 to 16 feet, and required horsepower for pulling varies from 60 to 350.

Application

Roller choppers are effective in forest site preparation. They are also popular for treating brush species that produce regrowth valuable for goats and wildlife. Choppers can cut brush up to 5 inches in diameter. They should not be used in rocky soils. The faster choppers are pulled the more they bounce, increasing chopping effectiveness, but the vibration is detrimental to the equipment. Hitches often use springs to absorb the vibration. Models called "land imprinters" use wedges rather than blades to form depressions in different directions to decrease runoff and increase infiltration. They are used more for seedbed preparation (see chapters on [Site Preparation](#)). A popular variation in blade pattern is a [spiral-blade chopper](#), often called an aerator or renovator.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[Lawson Manufacturing, Inc.](#)
Kissimmee, FL 34741

[Marden Industries Inc.](#)
Mulberry, FL 33860

[Rockland Manufacturing Company](#)
Bedford, PA 15522

Spiral-blade Choppers

Spiral-blade choppers, often called aerators or renovators, differ from conventional roller choppers in that they use small blades welded to the heavy drums in a staggered, spiral pattern around the drum rather than the long, longitudinally mounted blades.



Description

These choppers normally use two drums mounted on a frame similar to an offset disk, and they are equipped with rubber tires for transporting. Spiral-blade choppers are pulled by a crawler tractor or a four-wheel drive tractor with special tire protection (see [Tractor chapter](#)). Drum diameters vary from 18 to 42 inches and they can be filled with water for extra weight. Width is 12 foot but options are available. Tractor horsepower requirements vary between 120 and 350 and depend on chopper size, weight, tree/shrub size, and type of terrain.

Application

Spiral-blade choppers gained popularity in the 1990s, especially in brush-dominated landscapes, because of minimal vibration, effective top growth removal, soil fracturing, and the small basins formed in the soil to hold rainfall. The basins also provide a good seedbed (see chapters on [Site Preparation](#)). Because of the rubber tires, the units are easily transported from site to site. Blade wear can be a problem, and new blades are welded in place. These choppers should not be used on rocky ground. Gravelly and some sandy soils can cause excessive blade wear.

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and contact information.

[Holt-Cat](#)

San Antonio, TX 78220-7916

[Lawson Manufacturing, Inc.](#)

Kissimmee, FL 34741

[Marden Industries Inc.](#)
Mulberry, FL 33860

Shredders and Rotobeaters

Brush shredders are similar to pasture or crop shredders but are more heavy duty.



Description

Shredders use rotating, horizontal blades attached to a vertical shaft that can be driven by the tractor's power-take-off (PTO) or hydraulic system. The blades are enclosed in a metal frame and shroud for safety and to increase the mulching effect. Width can be 5 to 20 feet. The wide models, 15 feet or more, use three sections that flex to conform to the terrain. Some manufacturers classify their shredders according to the diameter of trees or shrubs they can cut: up to 1 inch, light duty (pasture); 2 inches, medium duty; 3 inches, heavy duty; and 4 to 6 inches, extra-heavy duty. A few models that can cut from 6- to 12-inch diameter trees are built for excavators or loaders.

Flail shredders use blades attached to a long, rotating horizontal shaft. Flail shredders used for tree masticating are called rotobeaters. Blades can be flails, swing stirrup cutters, or hammers. Tree size capabilities are similar to those for horizontal-blade shredders. All of these shredder-types can be pulled by a tractor drawbar or three-point hitch mounted on the side or front of the tractor, or they can be mounted on a boom that can reach up to trim trees or down into ditches. Tractor horsepower required to power the shredders varies from 35 to 150 or more. Self-propelled units are available with either the horizontal-blade-type or the rotobeater-type shredders and tree size can be 6 or more inches in diameter (check manufacturers' ratings).

Application

Brush shredders are effective in removing weeds and small trees of non-sprouting species in pastures,

rangeland, and utility or road rights-of-way. Shredding results in a manicured appearance with vegetation a few inches above the ground. Repeated mowing is necessary to remove top growth of sprouting species and re-occurring weeds. Brush shredding is prone to mechanical failures when cutting too large a tree or too many trees too fast and should not be attempted on rocky ground. Protection of the operator, tractor, and tires is usually required (see [Tractor chapter](#)). Self-propelled units can shred dense stands of brush and trees and can traverse rough terrain. Care must be taken to match the shredder to tractor size and size of the trees/brush to be cut as some manufacturers have over a hundred models. A recent innovation is spraying herbicide on the blade for a stem application at time of cut. See Diamond Mowers, Inc. website below for additional information).

Sources

The manufacturers' websites list information on equipment sizes, accessories, dealers, and their contact information.

[Alamo Group \(All types\)](#)

Seguin, TX 78155

[ASV Inc. \(Track-steer shredder\)](#)

Grand Rapids, MN 55744

[Blount, Inc. \(Self-propelled shredder, rotobeater\)](#)

Zebulon, NC 27597

[Bobcat Company \(Skid-steer, rotobeater\)](#)

West Fargo, ND 58078-6000

[Brown Bear Corporation \(Rotobeater\)](#)

Corning, IA 50841

[Brown Manufacturing Corporation](#)

Ozark, AL 36360

[Bush Hog, LLC](#)

Selma, AL 36701

[D&M Machine Division, Inc.](#)

Montesano, WA 98563

[Diamond Mowers, Inc. \(Chemical application\)](#)

Sioux Falls, SD 57106

[Fecon Incorporated \(Rotobeater\)](#)

Lebanon, OH 45036

[Loftness \(Shredder, rotobeater\)](#)

Hector, MN 55342

[Rayco Manufacturing, Inc. \(Self-propelled shredder, rotobeater\)](#)

Wooster, OH 44691-9954

[Sidewinder, LLC](#)

Republic, MO 65738

417-732-5155

[Woods Equipment Company](#)

Oregon, IL 61061

Hand Tools



Description

Common hand tools may be adapted for brush control. Tools such as chain saws, brush cutters, crosscut saws, pruning saws, pruning shears, hand clippers, brush hooks, axes, Pulaski axes, mattocks, and machetes are readily available.

Application

The use of hand tools is very labor intensive and best applied to small, remote areas or very sparse stands. Brush may be cut, pruned, or grubbed to control growth. Hand tools can easily be transported to remote sites. Safety equipment and protective clothing should always be used.

Sources

Company websites list information on hand-tool types and sizes, accessories, safety equipment and clothing, and contact information. Local hardware stores also stock many items.

[Forestry Suppliers, Inc.](#)

Jackson, MS 39284-8397