

Revegetation Equipment Catalog

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

Tractors

Tractors are the main prime movers used in the revegetation of rangelands.

Tractors supply the force to move implements and power many accessories. Most tractors are equipped with hydraulic systems and power-take-offs. Hydraulics supply the force required to raise and lower implements and to operate remote cylinders and hydraulic motors. The power-take-off supplies power through a rotating shaft to implements attached to the tractor. Micro-processors and electronics now play a major part in controlling many functions, making the tractor more efficient and easier to operate. Tractors can be used on most terrain if safety procedures are followed. The broad range of horsepower available in tractors is enough to accomplish any reasonable revegetation application. Different tractors are described in the following sections and additional information on horsepower is listed in the [Appendix](#).

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Rear-Wheel-Drive Tractors

Rubber-tired, rear-wheel-drive tractors are designed to pull small to large implements on level to undulating ground.



Description

These tractors are usually powered by diesel engines. Gasoline engines are available only in the smallest models. Tractor horsepower ranges from 30 to about 175 but is usually less 140. Tractors less than 30 horsepower are usually used in residential areas. Transmissions can be standard or shift-on-the-go with 8 to 20 forward gears and several reverse gears. Tractors are equipped with a rear-mounted, three-point hitch and a trailing drawbar. The three-point hitch is instrumented to control load, depth, and weight transfer for optimum traction. A few models also have a front mounted three-point hitch. Tractors are equipped with specially designed cabs that are air conditioned and heated. They have power adjusted seats, fingertip adjustment of all controls, and many other conveniences. Tractors without cabs are equipped with roll-over protection structures. Hydraulic systems provide power for steering, brakes, lift capacity for the three-point hitch, and from one to five outlets for remote cylinders and/or motors. Power-take-off shafts operate at 540 or 1,000 rpm. Dual rear wheels provide higher horsepower tractors with added traction, reduced soil compaction, and stability in some situations.

Application

Rear-wheel-drive tractors are very maneuverable and create little soil disturbance when turning. Large rear wheels provide the traction necessary to pull implements in firm to loose soil without undue soil compaction. Small front tires provide the operator with good visibility and are used to steer the tractor. It is important to match tractor size to pulling requirements and size of the implement. Consideration must be given to addition of wheel weights and/or liquid in the rear tires for increased traction. Weights on the front of the tractor are necessary for weight transfer (increased traction) and stability. Tractors are designed to pull either large loads at slow speeds or lighter loads at higher speeds. Field speeds up to 10 mph are possible, but rangeland applications usually vary from 2 to 5 mph. Many attachments are available including front-end loaders. To meet the need for more traction, drive wheels can be added to the front axle (see the section on [Front-Wheel Assist](#)). Soil compaction from tractors can be a problem when soil moisture is high.

Sources

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

[AGCO Corporation](#)

Duluth, GA 30096

[Antonio Carraro](#)

Napa, CA 94559

[Belarus Tractor International](#)

Milwaukee, WI 53223

[Branson Tractors](#)

Lafayette, GA 30728

[Case IH Agriculture](#)

Racine, WI 53404

[Challenger \(Caterpillar rubber-track\)](#)

Duluth, GA 30096

[Deere & Company](#)

Moline, IL 61265

[Fendt](#)

Duluth, GA 30096

[Kioti Tractor Division](#)

Wilson, NC 27893

[Kubota Tractor Corporation USA](#)

Torrance, CA 90504

[McCormick USA, Inc.](#)

Pella, IA 50219

[Mahindra USA, Inc.](#)

Houston, TX 77095

[Massey Ferguson](#)

Duluth, GA 30096

[New Holland North America](#)

New Holland, PA 17557

[Same Deutz-Fahr North America](#)

Stone Mountain, GA 30083-1101

[Tafe USA, Inc.](#)

Guntown, MS 38849

[Valtra USA, Inc.](#)

Hoffman Estates, IL 60195

[Zetor Tractors](#)

Harrisburg, PA 17112

Front-Wheel-Assist Tractors

Front-wheel-assist tractors use a mechanical drive to the front wheels as well as the rear wheels.



Description

These tractors have become very popular in all horsepower ranges because they provide increased traction (pulling/pushing capacity) when soil conditions are not ideal. Front wheels on these tractors are larger than front wheels on two-wheel-drive tractors but smaller than the rear-drive wheels. Front-wheel-assist tractors are an extension of the rear-wheel drive tractors, but many models have more advanced controls over all phases of tractor operation. Horsepower selections from 30 to over 250 are available. In the higher horsepower range, dual tires are available for front wheels as well as duals or triples for the rear wheels. Transmissions can be standard or shift-on-the-go with up to 20 forward gears and several reverse gears. Some models automatically select optimum gear and engine speed for desired travel speed based on load and optimum engine efficiency. Tractors are equipped with a rear-mounted, three-point hitch and a trailing drawbar. The three-point hitch is instrumented to control load, depth, and weight transfer for optimum traction. A few models also have a front mounted three-point hitch. Tractors are normally equipped with climate-controlled cabs because of the many electronic devices used to control accessories. Global position systems (GPS/GIS) are available to control variable-rate applicators such as fertilizers, sprayers, and planters. Some models use GPS to assist in steering. Tractors without cabs are equipped with roll-over protection structures. Hydraulic systems provide power for steering, brakes, lift capacity for the three-point hitch, and from one to five outlets for remote cylinders and/or motors. The hydraulic remote outlets are programmable for various functions. Power-take-off shafts operate at 540 or 1,000 rpm depending on tractor size. On some models the three-point-hitch-raise/lower switch can be programmed to control several other functions. This is helpful when turning.

Application

Front-wheel-assist tractors have specially designed front axles for tight turns. They are maneuverable and create little soil disturbance when turning. These tractors are powerful and can pull and lift very large, heavy implements. Multiple tasks are possible in one tractor operation to accomplish complex revegetation projects. Matching tire size to the tractor manufacturer's specifications is very important to prevent undue tire or power train wear. Consideration must be given to addition of wheel weights and/or liquid in the tires for increased traction. Weights on the front of the tractor are still necessary. The front-to-rear weight ratio is different than for rear-wheel drive tractors; therefore, manufacturer's recommendations on the addition of extra weight should be followed for optimum tractor performance. If not in balance, a very noticeable vibration called "power hop" occurs under stressful pulling conditions. Reduced traction occurs during power hop and the resulting vibration is detrimental to the tractor. Dual and triple wheel combinations are used on many of the higher horsepower tractors to provide enough traction to pull large implements and reduce soil compaction. Soil compaction can be a problem with these heavy tractors in high moisture soil conditions. Sites with logs, stumps, and thorns can damage the tires. Tractor shielding and tire protection are necessary when operating on debris-littered wildland (see [Tractor Modifications for Rangeland Use](#)).

Sources

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

[AGCO Corporation](#)

Duluth, GA 30096

[Antonio Carraro](#)

Napa, CA 94559

[Belarus Tractor International](#)

Milwaukee, WI 53223

[Branson Tractors](#)

Lafayette, GA 30728

[Case IH Agriculture](#)

Racine, WI 53404

[Challenger \(Caterpillar rubber-track\)](#)

Duluth, GA 30096

[Deere & Company](#)

Moline, IL 61265

[Fendt](#)

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Stone Mountain, GA 30083-1101

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Guntown, MS 38849

[Valtra USA, Inc.](#)

Hoffman Estates, IL 60195

[Zetor Tractors](#)

Harrisburg, PA 17112

Four-Wheel-Drive Tractors

Four-wheel-drive tractors use articulate steering.



Description

These tractors are designed to pull very large loads on wide open spaces. Tires are the same size on both the front and rear axles. Horsepower ranges from 250 to 500 or more. Transmissions are standard or shift-on-the-go with up to 20 forward gears and several reverse gears. They are equipped with climate-controlled cabs and have many of the same features described for front-wheel-assist tractors. These include power seats, finger-tip controls, and features to give optimum engine efficiency and hydraulic performance. Multiple hydraulic control valves for remote devices are available. Tractors are equipped with a drawbar hitch; a three-point hitch is optional. Duals or triple wheels are commonly used on both front and rear. An option available from some manufacturers is a rubber-track instead of rubber tires.

Application

Four-wheel-drive tractors are very powerful and are used to pull very wide implements or implements pulled in tandem. Wheels can be adjusted for row crops. These tractors are commonly used to pull very large subsoilers, disks, chisel plows, air seeders, and land leveling scrapers. Tire size, wheel weights, liquid added to the tires, and weight distribution (front to rear ratios) are all critical for the necessary traction and should follow the manufacturer's recommendations. If not in balance, a noticeable vibration called "power hop" occurs under stressful pulling conditions. Reduced traction occurs during

power hop and the resulting vibration can damage the tractor. Tractors used on debris-littered rangeland require special tire modifications (see section on tractor modifications for rangeland use). The rubber-track system overcomes much of the soil compaction problem associated with rubber tires, and when properly weighted, track systems are more stable on slopes.

Sources

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

[AGCO Corporation](#)

Duluth, GA 30096

[Buhler Versatile](#)

Winnipeg, MB

[Case IH Agriculture](#)

Racine, WI 53404

[Challenger \(Caterpillar rubber-track\)](#)

Duluth, GA 30096

[Deere & Company](#)

Moline, IL 61265

[Massey Ferguson](#)

Duluth, GA 30096

[New Holland North America](#)

New Holland, PA 17557

Crawler Tractors

Crawler tractors are designed to pull or push very large loads at slow speeds and can operate on rough terrain, rocky areas, or steep slopes.



Description

Crawler tractors move over a pair of steel tracks that revolve around two or three sprockets and a series of rollers. Cleats on the track are 2- to 3-inches tall and provide traction. The cleat and associated portion of the track is called a grouser. Grousers are about 24-inches wide. They are available in a variety of sizes and types appropriate for wet or dry soil conditions, presence of rocks, and desired ground pressure and weight distribution. Turning is accomplished by reducing the power to one of the tracks. Diesel powered engines vary in size from 65 to 1,150 horsepower. Transmissions can be direct-drive, power-shift, or hydrostatic. Tractor speed varies from less than 1 mph to about 7 mph. Climate controlled cabs are available with power seats and electronically controlled transmission and hydraulic functions. Options are available to control steering and gear selection from one lever and all hydraulic controls from a second lever. Roll-over protection structures are standard with both cab and open canopy models. Bulldozer blades are standard.

Application

Crawler tractors are well suited for many revegetation and reclamation projects because they are rugged and versatile machines that can move tremendous loads relative to their size. Crawlers can be used on rough, debris-littered terrain that is not practical for rubber-tired tractors. They can also be used on wet, spongy soil. Small crawlers are versatile for confined areas. For most rangeland applications, horsepower will be between 65 to 300 and their operating speed between 2 to 3 mph. Track-type tractors disturb the soil, especially when turning and this can be a concern in fragile environments.

Sources

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

[Case Construction Business Case, LLC](#)

Racine, WI 53402-5133

[Caterpillar Inc.](#)

Peoria, IL 61628

[Deere & Company](#)

Moline, IL 61265

[Komatsu American Corp.](#)

Vernon Hills, IL 60061-8112

[New Holland Construction](#)

Carol Stream, IL 60188

Tractor Modifications for Rangeland Use

Bulldozer Blades & Crawler Tractor Hitches

Bulldozer Blades



Description

Bulldozer (or dozer) blades are attached on the front of crawler tractors for the purpose of moving objects or soil. The blade height, tilt angle, and pitch are adjusted hydraulically, and they are supplied by the crawler tractor manufacturer. Dozer blades are also available for rubber-tired tractors as optional equipment from independent manufacturers.

Application

Bulldozer blades are used to remove trees, clear land, construct roads, excavate ditches and ponds, dig contour trenches, and rake brush. The blades can be very a useful tool to shape sites before revegetation.

Crawler Tractor Hitches

Implement-tool carrier with a 3-point hitch at the rear, a tool carrier in the middle, and drawbar hitch at the front.



Description

Crawler tractors are designed for a drawbar hitch and a winch on the rear of the tractor or a ripper toolbar. Toolbars for agricultural implements are available for smaller crawlers (120 horsepower or less). These hitches attach to the trunnions on the side on the tractor. Aftermarket three-point hitches are available for smaller crawlers. Hydraulic cylinders are used to control implement height and depth for both toolbar styles. Implement-carrier hitches designed for grain and no-till drills are hooked to the tractor's drawbar. They are supported with rubber tires of sufficient size to support the weight of the implements. These hitches have several methods of attaching implements including three-point hitches, and they may be designed for single or multiple drills or tillage tools. Specialized hitches for Forest Service implements used in fire protection or range revegetation have been developed but must be fabricated in a machine shop.

Application

Hitches adapted to crawler tractors allow for the use of tillage implements, or land-forming equipment. Precautions should be taken to size the tool to the pulling capacity of the tractor to prevent undue implement breakage. There is no draft control on these hitches; the operator must monitor implement depth. Ripper toolbars are optional equipment supplied by the manufacturer. Implement carriers can be used in some situations where it is not practical to install three-point or toolbar hitches that attach directly to the rear of the tractor. Implement-carrier also called tool-carrier hitches provide a viable method of towing agricultural implements used in revegetation. They are available from drill manufacturers (see Seeder and Drills section of the [Ground Seeding](#) chapter).

The Forest Service [Missoula Technology and Development Center \(MTDC\)](#) can provide drawings of an implement-carrying hitch, tandem-Brushland-Plow hitch, and a hitch for two or three Rangeland Drills. These drawings originally were done by the San Dimas Technology and Development Center, but are now filed at MTDC.

Sources

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

[Degelman Industries Ltd.](#)

Regina, Saskatchewan

[Holt-Cat](#)

San Antonio, TX 78220-7916

[Leon's Manufacturing Company, Inc.](#)

Yorkton, Saskatchewan

[Rome Plow Company](#)

Cedartown, GA 30125

[TDS Equipment \(3-point hitches\)](#)

Hermiston, OR 97838

[USDA Forest Service](#)

Missoula, MT 59808-9361

Tractor and Tire Protection

Protection of the operator and critical tractor parts are vital to the safe and successful use of tractors in the vegetation control and other phases of revegetation.



Heavy frames with special screens are needed to protect cabs or operators in open canopies when crawler tractors are used to fell large trees. When operating in areas dominated by thorny shrubs, rubber-tired tractors need special tires, front-end guards, belly pans, shielding of the operator or cabin, and, in some circumstances, engine side guards. When shrubs are being shredded, sturdy shielding behind the operator is needed.

Application

Very few companies provide protective frameworks for crawler tractors. Most adaptations are fabricated in a welding shop. Protection for rubber-tired tractors is universally constructed at local welding or fabrication shops. Various methods are used for tire protection. These include steel-belted tires, tire liners, airplane tires (used), rice-tires with 3- to 4-inch lug height (R-2 treads), liquid sealants, and "foam" filling. Foam filling is not foam, but a special polyurethane compound used to completely fill the tire. The product is available in several grades of hardness, and these solid tires do not deflate when punctured. They do retain some of the pneumatic characteristics of air-filled tires. Foam filling is expensive but may be cost effective because there are no flats. Airplane tires require modification of wheels and rims to be used on tractors.

Sources

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

Airplane Tire Salvage
210-627-2691
San Antonio, TX 78214

[Carpenter Company](#)
Richmond, VA 23261

[ARNCO](#)
Chattanooga, TN 37416

Synair Corporation
423-698-8801
Chattanooga, TN 37406