AGRI-FACTS
Practical Information for Alberta's Agriculture Industry

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Weed Control for Alberta Shelterbelts

Competition by weeds for soil moisture, nutrients and light can reduce the growth and survival of newly planted shelterbelts. This is particularly true in the Brown and Dark Brown soil zones of Alberta, where soil moisture often limits plant growth. Moderate infestations of annual weeds can reduce the growth of tree or shrub seedlings by 50 to 75 per cent.

Perennial weeds must be controlled before planting a shelterbelt. After shelterbelt planting, weeds within the tree row can be controlled using mulches, herbicides, specially designed mowers or tillers, or hoeing. As well, weeds should be controlled in strips at least 2 m (6.5 feet) wide on each side of the tree row.

Pre-planting control

Site preparation is essential for shelterbelt establishment. Eradicate all perennial weeds by applying glyphosate products or Amitrol 240, or by tillage in the year before the shelterbelt is planted. Failure to do so makes it almost impossible to keep perennial weeds under control after the shelterbelt has been planted. Ideally, shelterbelts should be planted in a 2 to 3 m (6.5 to 10 feet) wide strip of land that has been summerfallowed the year prior to planting.

Mechanical control after planting

Mulches

Mulches can be made of black plastic, fabric or organic material. Along with controlling weeds, mulches conserve soil moisture and prevent wind and water erosion. Plastic mulches also increase soil temperature, thereby promoting faster tree growth. Before applying any type of mulch, make sure the planting site is weed-free and tilled until the soil is loose.

Plastic mulches are easy to use. The plastic comes in rolls. Simple-to-use, tractor-mounted or truck-mounted applicators are available for applying the plastic. The plastic is applied immediately after planting the seedlings. The seedlings are pulled through small slits made in the plastic at the time of application (Figure 1).

Figure 1. Spruce seedlings in a plastic mulch

The plastic must be resistant to ultraviolet (UV) light to prevent its rapid breakdown. Plastic mulch is susceptible to ripping and puncturing from equipment, wildlife and rough soil surfaces. These tears can easily become bigger if the wind catches them.

The plastic comes in 2.5 mm (0.1 inch) and 4.5 mm (0.18 inch) thicknesses. The thicker plastic is more durable, but still susceptible to ripping. Over time, the plastic can become a nuisance because it tears into fragments, which are easily blown by the wind.

Fabric mulches are applied in the same way as plastic mulches. They cost more than plastic but last much longer, usually about five years compared to around three years for the plastic. The fabric mulch disintegrates rather than tearing into fragments.

Organic mulches can be made of wood chips, straw or bark. They are more difficult to apply than plastic mulches. A layer about 10 cm (4 inches) thick of organic mulch is needed to provide adequate weed control, although results vary. The mulch has to be trucked to the site, which may not be economical in some areas.

Although straw mulches are inexpensive, wood chips or bark mulches are often preferred. Straw mulches should not be used in windy areas because they can be easily blown away. If using straw, take care to use clean straw to keep out grain and weed seeds.

Spraying herbicides or mowing is recommended for controlling weeds along the edge of the mulch. Care should be taken to prevent herbicide drift when spraying weeds adjacent to the shelterbelt plants. Tillage is not recommended, especially for plastic mulches, since the edges may get caught and ripped by equipment.

Tillage, mowing and hoeing

Specially designed equipment is available for tilling or mowing within the shelterbelt row. The equipment attaches to the side of a tractor and either mows the weeds or tills the soil, depending on the design. Some designs are operated manually, while others have a sensor that indicates when to go around a tree. Tillage in the tree row should go no deeper than 5 cm (2 inches) to avoid injuring tree roots.

Hoeing is an option for in-row weed control if sufficient labour and time are available.

Chemical control after planting

Herbicide selectivity

Selectivity refers to the ability of a herbicide to control weeds in a crop without damaging the crop. In shelterbelts, herbicide selectivity is based on some or all of the following conditions:

- the herbicide remains at the soil surface and does not reach the roots of the trees or shrubs;
- the herbicide is applied at the recommended rate; and
- the herbicide is not applied to the tree foliage.

Table 1 lists the herbicides registered for use in shelterbelts and the time to apply them.

Table 1. Herbicides for use in shelterbelts, with comments related to application timing and potential restrictions

Herbicide trade name (generic name)	Herbicide active ingredient	Remarks
Before planting		
Rival EC	trifluralin	Spring application prior to transplanting.
Treflan EC		Spring application. Apply prior to transplanting seedlings. Tank mixing with Sencor 75DF results in more registered species and additional weeds controlled.
Bonanza 400/480		Spring application. Apply prior to transplanting seedlings.
Sencor 480 F	metribuzin	Plus Treflan E.C. Apply in spring before planting. Follow all land preparation, mixing, spraying, incorporation directions and precautions on the label. Do not use on sandy soils or on soils with less than 5 per cent organic matter. Max 1x application per season.
Sencor 75 DF/ Sencor Solupak 75 DF		Plus Treflan E.C. Apply in spring before planting. Follow all land preparation, mixing, spraying, incorporation directions and precautions on the label. Do not use on sandy soils or on soils with less than 5 per cent organic matter. Max 1x application per season.
After planting/established shelterbelts		
Lontrel 360	clopyralid	Max 1x application per season. Apply at rosette to pre-bud stage.
Lorox L/Lorox DF	linuron	Apply only on stock planted for at least one year, as a directed spray under the trees/ shrubs before buds open. Do not use on sandy soils.
Linuron 400 L		Apply only on stock planted for at least one year, as a directed spray under the trees/ shrubs before buds open.
Princep Nine-T	simazine	For pre-emergent control of annual weeds in shelterbelts established for one or more growing seasons. Apply in fall or early spring. Injury may occur on trees grown on saline soils.
Simadex Simazine Simazine 480		Established 1 growing season or more. Apply in fall or early spring; Directed spray only. Avoid contact with desired species. Injury may occur on trees grown in saline soils. Rainfall is required to move chemical into root zone.
Casoron G-4 Casoron G-2	dichlobenil	Apply to established shelterbelts only; Apply in early spring or late fall before weed germination. Higher rates and fall application is required for control of some weed species.

Table 1. *(continued)*

Herbicide trade name (generic name)	Herbicide active ingredient	Remarks
After emergence, grass weeds only		
Venture L	fluazifop-p-butyl	Registered for weed control in specific tree and shrub species that may be used for shelterbelts. Check label for more detailed instructions and for rates. Treat annual grasses at the 2 to 5 leaf stage (green and yellow foxtail at the 2 to 4 leaf stage). Quackgrass should have 3 to 5 fully developed leaves.
Poast Ultra	sethoxydim	Apply 1x per growing season by ground as a directed spray. Apply when quackgrass is actively growing, up to the 3 leaf stage (8 - 12 cm high). Annual grasses should be treated at the 1 to 6 leaf stage. Add Merge surfactant. Higher rates may be required for some weed species
After weed emergence, directed spray only		
Gramoxone	paraquat	Gramoxone is a non-selective, non-residual herbicide that must be applied as a directed spray. Spray should cover weed foliage thoroughly. Application on cloudy days or just before dusk will generally increase effectiveness. Repeat application is required for weed regrowth. Gramoxone may be tank mixed with linuron and simazine products for residual control. Do not use on small conifers unless plants are protected from spray. Conifer needles sprayed accidentally with paraquat will be lost permanently.
Amitrol 240 L	amitrol	Use in established plantings only. Apply as directed spray to weed foliage. Do not allow spray to contact trunks or foliage of shelterbelt plantings. Amitrol is a systemic herbicide that inhibits chlorophyll production.
Roundup/Generics	glyphosate	The rate depends upon the weeds to be controlled. This glyphosate formulation is a non-selective, systemic herbicide for use in established plantings. Apply as a carefully directed spray, to prevent contact with tree or shrub foliage and immature bark. Do not apply if rain is expected within six hours. Applications may be repeated in one year.

Soil-applied herbicides

The soil-applied herbicides referred to in this factsheet are trifluralin, linuron (Figure 2), simazine, metribuzin and dichlobenil. Soil-applied herbicides are safer when applied to trees growing in medium to fine textured soil than on sandy soil. The active ingredients in the herbicides bind to clay and humus particles in the soil, and thereby remain near the soil surface. In sandy soil, the herbicide may cause injury if it leaches into the root zone of the shelterbelt. To avoid unwanted tie-up of the herbicide, ensure the ground underneath the shelterbelt is free of weeds and debris when the herbicide is applied.

Figure 2. Control of annual weeds by fall-applied linuron

Soil-applied herbicides are absorbed either by the roots or by the shoots of germinating weeds (usually in the top 2 to 3 cm (1 inch) of soil). These herbicides are placed at the site of absorption for weeds by rainfall (or irrigation) or mechanical incorporation. Subsequent herbicide uptake kills young annual weeds. Weeds that emerge before the herbicide is activated by moisture may continue to grow.

Soil-applied herbicides generally provide residual weed control for one growing season. These herbicides can seriously injure or kill plants if applied at rates above the recommended rate.

Foliar-applied herbicides

Foliar-applied herbicides, unlike soil-applied herbicides, generally do not depend on soil activity for weed control; their herbicidal action is based on entering the weed through the foliage. For maximum effectiveness, these herbicides should be applied when the weeds are small and actively growing.

Herbicides applied after weed emergence are Gramoxone (paraquat), Roundup/generics (glyphosate products) and Amitrol 240 (amitrol). Sprays of these herbicides must be carefully directed to avoid hitting the foliage and immature bark of trees and shrubs.

Gramoxone is a contact herbicide that controls annual weeds and top growth of perennial weeds. Glyphosate and Amitrol are systemic herbicides. Both of these herbicides are translocated into rhizomes and root systems, and they provide effective control of several perennial weeds. Neither Gramoxone nor Glyphosate provides residual weed control because they are inactivated on contact with soil particles. Amitrol has some residual activity for several weeks.

Other herbicides, such as Venture (fluazifop-p-butyl) and Poast Ultra (sethoxydim), are available for treatment of grassy weeds after they emerge and are actively growing.

Herbicide application equipment

Field sprayers can be adapted to apply herbicides in shelterbelts; however, a special spray boom or a spray gun will be needed. Special spray booms are not commercially available but can be fabricated in your own shop or by a commercial shop. Alberta Agriculture and Food and the Agriculture and Agri-Food Canada (AAFC) PFRA Shelterbelt Centre at Indian Head, Saskatchewan have designed U-shaped spray booms for use in small shelterbelts. Farmers can spray both sides of a newly planted shelterbelt at one time by straddling the row with this boom. For trees over 120 cm (50 inches) tall, herbicide can be applied along one side with only one nozzle in use.

A spray gun, hooked to a field sprayer, can be used to apply directed sprays in shelterbelts. This equipment is more suited to foliar-applied than soil-applied herbicides because it is virtually impossible to accurately control the herbicide application rate. It is particularly useful for spraying spotty infestations of weeds.

Backpack sprayers are practical for use in small-sized plantings and for spot treatment of weed infestations.

Granular herbicides are more suitable than liquid sprays when debris or dead vegetation is present under shelterbelts. Granules can fall through to the soil surface, without being intercepted by dead vegetation. Hand-operated applicators such as Whirlybird, Casoron Spreader and Cyclone are available for spreading granular herbicides. Tractor-mounted spreaders are also available, but they are usually not practical for use in the average shelterbelt. Uniform application and correct calibration are important considerations when using granular formulations.

Herbicide product information

Table 2 provides information on the registration status of herbicides for use on shelterbelt tree or shrub species, and Table 3 lists the weeds controlled by these herbicides. Consult ***Crop Protection*** (Agdex 606-1) and the herbicide label for more information about the weeds controlled and about personal safety when handling herbicides.

Additional practices

Other practices, such as choosing a tree species suited to the local conditions and proper planting of seedlings, help tree seedlings to compete with weeds. It is important to properly plan before planting; consider tree spacing and location carefully.

Species selection

Each tree and shrub species grows best under a specific set of soil and climatic conditions. For more information on shelterbelt species, refer to *Shelterbelt Varieties for Alberta* (Agdex 277/33-1) or AAFC's *Trees and Shrubs for Prairie Shelterbelts*.

Planting

Tree seedlings will die if left to dry out or if the roots are exposed for more than one or two minutes. Plant seedlings as soon as possible after delivery. Moist burlap can be used to keep the plants cool and protected before and during planting. If the soil is dry, the seedlings should be watered as soon as possible after planting.

Plant seedlings about 1 cm (0.4 inches) deeper than they were growing in the nursery. Shallower planting causes the roots to dry out, and deeper planting may cause suffocation.

Tubes

Some growers place clear plastic tubes over the planted seedlings. The tube provides a warm, protected enclosure around the seedling, speeding up growth and provides protection against wildlife damage. It slides over the seedling and is held in place with stakes. It disintegrates within five years.

Table 2. Herbicides and registration* status for shelterbelt trees and shrubs

Herbicide trade name	Active ingredient	Spruce	Juniper	Pine	Poplar	Willow	Caragana	Ash	Elm	Chokecherry	Russian Olive	Buffalo Berry	Lilac	Maple	Saskatoon Berry	Sea Buckthorn
Rival EC Treflan EC Bonanza 400/480	trifluralin			R			R	R	R							
Sencor 75 DF Sencor Solupak 75 DF Sencor 480 F					R		R	R		R			R		R	R
Lontrel 360	clopyralid	R				R				R		R	R			
Linuron 400 L Lorox DF Lorox L	linuron	R		R	R	R	R	R	R					R		
Simazine 480 Simadex Simazine Princep Nine-T	simazine						R	R	R					R		
Casoron G-4 Casoron G-2	dichlobenil		R		R	R	R	R	R				R	R		
Venture L	fluazifop-p-butyl	R	R	R	R	R	R	R	R				R	R		
Poast Ultra	sethoxydim	R	R	R			R	R		R		R	R	R	R	R
Gramoxone	paraquat	All shelterbelts														
Amitrol 240 L	Amitrol	Established shelterbelts														
Glyphosate products	glyphosate	R	R	R	R	R	R	R	R		R		R	R		

* R – Herbicide is registered for that specific shelterbelt tree/shrub species.

Products listed are not being endorsed. Users should refer to product labels and follow instructions carefully.

Table 3. Herbicides for use in shelterbelts and weeds controlled

Active ingredient	trifluralin			metribuzin	clorpyralid	linuron			simazine		dichlobenil	fluazifop-p-butyl	sethoxydim	paraquate	amitrol	glyphosate
Herbicide trade name	Rival EC	Bonanza 400/480	Treflan EC	Sencor 75 DF/Sencor Solupak 75 DF/480 F	Lontrel 360	Linuron 400 L	Lorox L	Lorox DF	Simazine 480/Simadex Simazine	Princep Nine-T	Casoron G-4/Casoron G-2	Venture L	Poast Ultra	Gramoxone	Amitrol 240 L	Glyphosate Products
Broadleaf weeds																
Chickweed	R	R	R			R	R	R			R			R	*	R
Buckwheat, wild	P	P	R	R		R	R	R	R	R	R*				*	R
Dandelion						S*					R*			R	R	
Groundsel, common						R					R			R	*	*
Kochia						R					R			R	*	R
Lamb's-quarters	R	R	R	R		R	R	R	R	R	R			R	*	R
Mustards						R		R			R			R	*	R
Pigweed, redroot	R	R	R			R	R	R			R			R	*	R
Purslane, common	R	R	R	R		R	R	R	R	R	R			R	*	*
Smartweed (lady's thumb)						R	R	R	R	R	R			R	*	R
Shepherd's purse				R		R	R	R			R			R	*	R
Stinkweed				R			R				C			R	*	R
Thistle, Russian	R			R											*	R
Thistle, Canada					R						R*			T	R	R
Thistle, sow (perennial)						S*								T	R	R
Grass weeds																
Cereals, volunteer						*					C	R	R	R	*	R
Foxtail, green	R	R	R	R		*	R	P		R	R	R	R	R	*	R
Grass, barnyard	R	R	R			*	P	P	R	R		R	R	R	*	R
Oats, wild	P	P	S	R		*			R	R		R	R	R	*	R
Quackgrass												R	R	T	R	R

R = Controlled

R* = Weed controlled with higher rates and late fall applications

C = Control can be expected, but weed not on label

T = Top growth control only

S = Suppression

S* = Seedling control only

P = Partial control only

* = controls most annual weeds

Contact your local pesticide handler or retailer for recent prices and product information.

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