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MontGuide

Weed Management in Shelterbelts

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Shelterbelts are strips of trees or shrubs planted to reduce wind speed and erosion, manage odor, mitigate noise, provide habitat for wildlife and beneficial insects, or improve landscape aesthetics. This Montguide provides information on cultural, mechanical and chemical approaches for weed control in shelterbelts.

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WEED MANAGEMENT IN SHELTERBELTS IS important as unwanted plants can compete for moisture, nutrients and light. Unmanaged shelterbelts can also serve as a source of weed propagules into surrounding habitats. If weeds are not properly managed they can reduce the growth and survival of desirable species in recently established shelterbelts. This is particularly important in Montana, where soil moisture and nutrient availability often limit plant growth.

Pre-planting weed control

Weed control is much easier to accomplish prior to shelterbelt planting, and adequate site preparation is essential for successful tree and shrub establishment. If possible, shelterbelts should be planted in areas that have been summer fallowed the year prior to planting to reduce weed pressure.

Cultivation can also help reduce weed pressure prior to planting. However, it is important to avoid excessive cultivation to reduce the risk of soil erosion. Spring tillage with a light disc or a harrow can help remove annual weeds while minimizing erosion. Many times a light harrow will stimulate weed seed germination and should be followed by cultivation or a herbicide application.

While it is important to reduce the abundance of annual weeds before planting, it is essential to effectively control perennial weed species as they are extremely difficult to control after planting trees or shrubs. Many perennial weeds such as Canada thistle, quackgrass and field bindweed have rhizomatous or stoloniferous habits and mechanical control such as cultivation or tillage can spread them. In this case the application of translocated herbicides can help manage perennial weeds, but care should be taken to avoid non-target detrimental effects on desired trees and shrubs. For example glyphosate (Roundup® and generic products) is a broad-spectrum, non-selective herbicide that moves within plants after being absorbed. As a non-selective product, glyphosate will injure or kill all green vegetation contacted by the spray. To maximize its effectiveness, it is important to make sure the herbicide moves down into the root system of perennial weeds. Do not till the ground for at least 10 days following glyphosate application.

Trifluralin (Treflan®) can be used for preplant control of grass and broadleaf weeds. Treatments can be applied in the fall or in the spring prior to planting and tillage (preferable) or irrigation is required for incorporation. Carefully read the label prior to any application as the treatment choice depends on the tree or shrub species to be planted.

Weed control after planting

Mulches, cultivation, mowing, hoeing and herbicides can help reduce the spread and abundance of weeds in shelterbelts. To maximize their effectiveness, these practices should be combined into an Integrated Weed Management (IWM) plan that considers the entire lifecycle of the weeds.

Tips to maximize perennial weed control

- Fall provides an excellent opportunity for perennial weed control. Cooler temperatures trigger the movement of food reserves down to the root systems, enhancing the movement of herbicides and improving control.
- Fall applications should be made only if plants still have green and pliable leaf tissue. As a rule of thumb, do not expect satisfactory control if less than 60 percent of the original leaf tissue still remains.
- If plants are stressed from drought or cold temperatures, herbicide applications will not provide satisfactory control. To secure active translocation, herbicides should be applied when temperature are expected to exceed 60 to 65°F during the day. However, high temperatures reduce herbicide efficacy.
- Be aware that perennial weeds vary in their sensitivity to frost and that the application window differs between species. For example, Canada thistle can survive light frosts and is effectively controlled with relatively late fall herbicide applications. Other perennial weeds such as hemp dogbane and common milkweed complete their life cycles by late summer and do not tolerate frost well.

In doing so, it is important to 1) use preventive tools to maintain weed density at a level that does not harm the shelterbelt, and 2) prevent shifts towards more difficult to control weeds.

Designing a successful IWM program requires understanding the different biological and ecological factors that influence the short-, mid-, and long-term dynamics of weeds. More information on IWM can be found in the MSU Extension Montguides, *Integrated Strategies for Managing Agricultural Weeds* (MT200601AG) and *Weed Seedbank Dynamics & Integrated Management of Agricultural Weeds* (MT200808AG).

Mulches and weed barriers

Solid plastic, fabric sheets or organic mulches can act as physical barriers that help control weeds. They also aid in conserving soil moisture and prevent water and wind erosion. By increasing soil temperature, mulches and weed barriers enhance tree seedling growth.

Solid plastic comes in rolls, is relatively cheap, and is easy to use. However, solid plastic does not allow adequate oxygen exchange between plant roots and open air. It can be installed mechanically over the top of newly planted trees or shrubs with a tractor- or truck-mounted applicator. A short slit or an "X" should be cut in the plastic over each seedling, followed by gently pulling the plant through the slit. Make the cuts as small as possible and expand them as the seedlings grow to prevent girdling.

With time, solid plastic breaks down, becoming a nuisance. When selecting solid plastic, choose an ultraviolet (UV) resistant material to prevent rapid breakdown. Also, it is important to avoid light colored materials to minimize solar reflection that can injure tree trunks. Finally, thicker plastic is less susceptible to ripping and puncturing.

Fabric sheets are manufactured with an interwoven or spun fiber and can be applied in the same way as solid plastic. Fabric sheets are usually more expensive than solid plastic but are permeable, allowing moisture and air exchange. Another advantage over solid plastic is that fabric sheets last longer and disintegrate rather than tearing into fragments.

Care should be taken to avoid soil and organic matter accumulation on the top of fabric sheets, as weeds can then become established on top and hinder effectiveness. Also, fabric sheets can reduce or eliminate the suckering ability of many shrub and tree species.

Organic mulches can be made of many materials including wood chips, straw, composts, leaves and grass clippings. Application of organic mulches can be more difficult and time consuming than solid plastic or fabric sheets as a layer of three to four inches is required to provide adequate weed control. Usually, material should be added every few years to maintain adequate depth. In general, finer-mulch materials are effective at thinner depths while a greater thickness is needed for coarse materials. Despite these potential disadvantages, the slow release of nutrients provided by organic mulches can enhance tree growth.

Cultivation, mowing, and hoeing

Mechanical control practices such as cultivation, mowing or hoeing can be used to reduce weed abundance, particularly of annual species at the seedling stage. Unfortunately, cultivation can bring weed seeds close to the soil surface where they can germinate. Therefore, repeated cultivation may be required to control newly emerged weeds, but care should be taken to avoid soil erosion.

Cultivation in established shelterbelts should be shallow to avoid tree root damage. Also, tractors and equipment can injure lower branches, root collars or tree trunks, providing entry wounds for insect pests and pathogens. Specially designed equipment can be used for tilling or mowing within shelterbelt rows. Many tree and shrub species send up shoots from their root systems within two to five years after planting. In this case, cultivation practices should be adapted to minimize damage to these newly emerged stems.

Hoes and hand cultivators are effective tools for cultivation, especially in closely spaced tree plantings. However, they can be laborious and time-consuming in larger tree plantings.

Rototillers can be effective in providing weed control for young plantings, but they should not be used around larger trees. To avoid tree root damage, rototillers should not penetrate deeper than two inches.

Managing Weeds with Mulches

- If using fresh manure, woodchips or sawdust as mulches, thoroughly compost prior to application.
- Sawdust and chips from certain trees such as redwood, cedar, Douglas-fir, larch, black walnut and spruce may contain allelochemicals that can inhibit growth of other trees when used as fresh mulch.
- Nitrogen immobilization can occur as fresh woodchips or sawdust materials decompose. A fertilization program should be implemented if nitrogen deficiency is suspected.
- Be aware that grass, hay, clippings or straw used in mulches can be contaminated with herbicides. These residual herbicides can damage trees and shrubs, particularly at the seedling stage. More information on approaches to minimize the risk of herbicide contamination in mulches can be found in the Montguide *Minimizing Pesticide Contaminated Soil Around the Home and Garden* (MT201008AG).

Line trimmers can help manage weeds around trees. To minimize the risk of accidental wounding, plastic tree guards should be placed around the base of young trees and trees with thin bark.

Cultural weed control

Planting a cover crop between shelterbelt rows can protect young saplings from weeds, reduce soil erosion, harvest snow moisture, and allow better rainwater penetration. Moreover, cover crops help minimize the drying effects from tillage and can provide temporary small-scale windbreaks to protect sensitive tree seedlings from drying winds. To minimize nutrient and moisture competition, a three feet fallow area should be maintained around individual trees.

Cover crops should be planted as narrow rows using highly competitive crops such as small grains during initial development of the shelterbelt. Using oats, rye, fescue grasses and hairy vetch as cover crops can facilitate weed control as these species contain allelopathic chemicals that suppress growth of certain plants. If patches of perennial weeds become established, spot treatment with an approved herbicide may be necessary.

Chemical Weed Control

Herbicides can provide selective and rapid weed suppression, particularly of hard-to-control perennial species. To maximize effectiveness, herbicides should be applied at the proper growth stage and care should be taken to avoid injury to desirable shelterbelt plants.

Soil-applied herbicides are absorbed by the roots or the shoots of germinating weeds and generally provide residual weed control. This family of herbicides may be applied prior to, during or after planting and should be placed at the site of absorption (usually the top one inch of the soil) aided by rainfall, irrigation or mechanical incorporation.

As a general rule, soil-applied herbicides are safer when used in sites with medium to fine textured soil, as opposed to areas with sandy soils where leaching into the root zone of the shelterbelt can occur. Soil-applied herbicides commonly used in shelterbelts and tree plantings include Treflan® and other trade names (trifluralin), Princep® (simazine), and Casoron® (dichlobenil), among others. More information on factors influencing the fate, effectiveness and persistence of soil-applied herbicides and be found in the Montguide, *Getting the Most from Soil-Applied Herbicides* (MT200405AG).

Postemergence foliar herbicides are applied directly to the weeds and their activity is based on entering the plant through the foliage. For maximum effectiveness, these herbicides should be applied when the weeds are small and actively growing. Spray additives such as surfactants and crop oil concentrates often are required with postemergence products to improve herbicide absorption. These additives should be used as directed on the herbicide label as their misuse can result in plant injury or reduced performance. Examples of postemergence herbicides commonly used in shelterbelts include Poast® (sethoxydim), Finale (glufosinate), Fusilade® (fluazifop-butyl), and Roundup® and other trade names (glyphosate), among others.

Read and Follow Herbicide Label Directions

- Instructions for registered uses of herbicides are given on container labels. It is your responsibility to carefully read and follow the label directions.
- The label is the final guide and should be followed strictly. While this publication provides suggestions to avoid problems, it does not supersede product label instructions, listed hazards, first aid recommendations, and storage and disposal requirements.
- Labels can and do change frequently. You should confirm that you are following the most recent label.
- The container label lists plants for which that herbicide has been approved.
- Never use more herbicide than recommended or damage to desirable plants may result.
- To use a product in any way that is inconsistent with the label is in violation of federal laws.

Casoron® (dichlobenil). A pre-emergence herbicide that can be applied in early spring or late fall to new plantings. As a general rule, fall applications provide more consistent weed control than spring applications. Apply 4 to 6 lb. ai/A for control of annual weeds and 6 to 8 lb. ai/A for control of perennial weeds including quackgrass, Canada thistle, dandelion, and leafy spurge. Avoid use on light sandy soil as tree injury can occur. Consult label for complete list of approved species.

Finale® (glufosinate). Provides control of emerged annual and perennial grass and broadleaf weeds in non-crop areas. It can be used for trimming or edging around trees and shrubs. As a non-selective herbicide, Finale® will injure or kill all green vegetation contacted by the spray. Apply at 0.75 to 1.5 lb ai./A. Avoid drift and all contact with desirable vegetation.

Fusilade® (fluazifop-butyl). Foliage-applied postemergence herbicide. It controls several perennial and annual grasses. While Fusilade® can be applied to several tree species, label does not include all shelterbelt species. Consult label for complete list of approved species.

Karmex® (diuron). For use only on established plantings one year or older. It can be used on several tree and shrub species including caragana, cottonwood, honeysuckle, green ash, and American elm. As a pre-emergence herbicide, apply 2.5 to 5 lb/A of Karmex® 80DF to control annual grasses such as foxtail and barnyardgrass. It provides fair to good control of several broadleaf weeds including mustard, field pennycress, prickly lettuce and kochia.

Poast® (sethoxydim). A postemergence foliar applied translocated herbicide with no residual soil activity. It can be applied over the top of many woody species, including shrubs, ornamentals and trees. It provides control of most emerged grasses but does not control broadleaf weeds. Apply at 1.5 to 2.5 pt./A 1.5EC (0.33 to 0.5 lb. ai/A)

Princep® (simazine). A pre-emergence herbicide that can be applied in early spring or late fall, with improved control observed in fall applications. Princep® provides long-lasting control of several grassy and broadleaf weed species. Apply 2.2 to 4.4 lb./A (Princep® Caliber 90DF) or 2 to 4 qt./A Princep® 4L (2 to 4 lb. ai/A), depending on rate used and soil pH, with lower rates during the first year of planting. Consult label for complete list of approved species.

Roundup® and other trade names (glyphosate). A non-selective translocated herbicide with no residual activity that provides control of emerged annual and perennial weeds. It can be applied anywhere soil covers tree roots, but do not spray desired plants as it will injure or kill all green vegetation contacted by the spray. Refer to label for rates, surfactants and ammonium sulfate adjuvants to enhance weed control.

Treflan® and other trade names (trifluralin). As a preplant incorporated herbicide, trifluralin should be used prior to planting due to difficulty in incorporating in the row after shelterbelt planting. It provides several months of residual control of grassy weeds and small-seeded broadleaf species. Treflan® must be incorporated into the top two to three inches of the soil profile. Immediate incorporation is preferred; a second incorporation ensures uniform mixing in treated soil. Apply 0.5 to1 lb. ai /A, but rate recommendations are based on soil texture class and organic matter content. Consult label for complete list of species.

Glossary

Annual species are plants that reproduce only by seed and complete their life within one year. Summer annual weeds germinate in spring, flower and produce seeds before they die in the fall. Winter annuals geminate in late summer or fall, produce a rosette of leaves and a root system, overwinter, flower the next spring, produce seeds, and die. Controlling annual weeds early in their life cycle is critical to reduce competition with trees and to prevent weed/seed production.

Allelopathic compounds are produced by certain plant species and influence the growth, survival and reproduction of other organisms. Allelochemicals can have significant beneficial or negative effects on shelterbelt plants and weeds.

Biennial weeds require two growing seasons to complete their life cycle. The first year, biennials usually form rosettes and a root system. They reproduce the second year by bolting or growing a flower stalk. As a general rule, it is easier to control the rosettes the first year.

Contact herbicides do not move within the plant after application and kill the treated part of the plant. Generally, contact herbicides are fast-acting but less effective on perennial plants which are able to regrow from rhizomes, roots or tubers.

Perennial weeds live for several years, re-growing from an overwinter root or stem system every year. They can also reproduce by seeds. Perennial weeds, including leafy spurge and Canada thistle, are the most troublesome in shelterbelts and control may require greater and more consistent efforts than for annual weeds.

Translocated herbicides move from the treated leaf or root to other parts of the plant. In general, translocated herbicides act slowly and uniform coverage is necessary to maximize control.

Common chemical and trade names are used in this publication for clarity by the reader. Inclusion of a common chemical or trade name does not imply endorsement of that particular product or brand of herbicide and exclusion does not imply non-approval. Recommendations are not meant to replace those provided in the label. Consult the label prior to any application.

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