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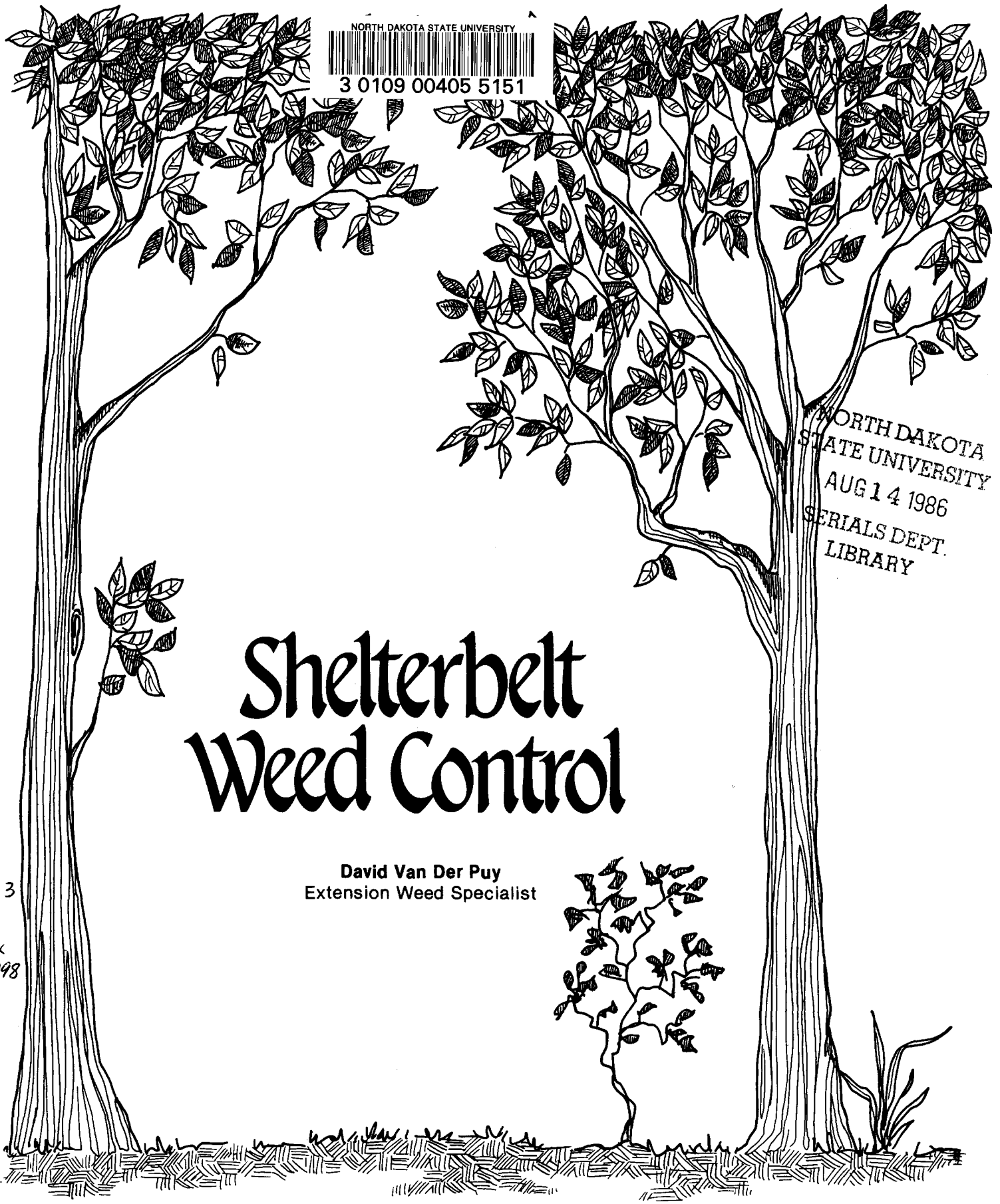

Shelterbelt Weed Control

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Introduction

Weed control is essential for the successful establishment and maintenance of shelterbelts. Trees and shrubs are slow growing and do not compete vigorously with weeds for light, nutrients, and water. Weeds may harbor rodents and insects and may act as alternate hosts for disease organisms which can damage shelterbelt plantings.

Site Preparation

Areas intended for shelterbelt use should be fallowed one year in advance of tree planting. The fallow period serves to enhance soil moisture reserves and provides an opportunity to control perennial weed species. Preemergence or incorporated herbicides are more easily and uniformly applied when the soil surface is free of weeds and trash.

Site Selection

Herbicides which are phytotoxic to shelterbelt species and which possess long soil residual activity should not be applied to the site for several years preceeding transplanting. Examples of herbicides which may injure transplants are atrazine (various formulations), chlorsulfuron (Glean), picloram (Tordon), dicamba (Banvel) and simazine (Princep). If herbicide residues are suspected, sites can be tested by a herbicide bioassay. See Extension Circular W-253 Revised Agricultural Weed Control Guide, for details of the herbicide bioassay technique.

Perennial Weed Control

Perennial weed species should be controlled before shelterbelt establishment; few effective control measures are available for perennial weed control following shelterbelt establishment.

Systemic herbicides with short soil residual should be used during the fallow period to control perennial weeds. Glyphosate (Roundup) and 2,4-D may be used to control perennial broadleaf weeds while fluazifop (Fusilade), sethoxydim (Poast) or Roundup may be used to control perennial grasses during the fallow period. Tillage should be delayed for seven to 10 days following application of these herbicides to assure maximum weed control.

Types of Herbicides

Incorporated herbicides are applied to the soil surface and mechanically incorporated to a depth of 2 to 4 inches. They are most easily applied before shelterbelt establishment since incorporation is difficult in established shelterbelt areas.

Preemergence herbicides are applied to the soil surface and depend on rainfall to move them into the zone of weed seed germination and root growth.

Most incorporated or preemergence herbicides will not control established weeds. Replacement trees or shrubs may be injured when they are transplanted into sites previously treated with a herbicide having long soil residual.

Weed control from preemergence and incorporated herbicides is improved by application to a soil surface free of weeds and trash. Granular formulations are more effective than liquid sprays when trash is present. Preemergence herbicides should be applied in late fall before soil freeze-up or in early spring. Late fall application is preferred since more moisture is generally available to move the herbicide into the soil before weed seed germination than with spring applications. The soil surface should not be disturbed by cultivation following surface-applied herbicide application unless dry conditions prevail. Under dry conditions, weed control from preemergence herbicides can often be improved by incorporation. Apply herbicides at the rate recommended for the specific soil type and organic matter content.

Postemergence herbicides are applied as a spray to foliage of emerged weeds. The herbicide is absorbed by the foliar portion of the plant and may remain at site of application in the foliage (non-translocated herbicide) or move to other parts of the plant for action (translocated or systemic herbicide). Herbicide drift can seriously injure shelterbelt plantings. Postemergence herbicides should be applied with low pressure (25 to 30 psi maximum). The amine forms of 2,4-D should be used to reduce vapor drift.

Postemergence herbicide effectiveness is enhanced when weed foliage at the time of spraying is free of dust and when rain does not follow within a few hours after treatment. The label should be consulted for the optimum stage of growth at which to treat the weeds and the proper rate of herbicide to use.

Herbicide Application

Herbicides may be applied either as broadcast, band or spot applications. Broadcast applications are most often used with herbicides that are applied prior to shelterbelt establishment where the entire

soil surface is treated. Band applications are best used where trees or shrubs are closely spaced. For band applications of herbicides, the herbicide should be applied to a 2 to 3 foot band on either side of the row. Spot applications are ideally suited to situations where trees or shrubs are closely spaced.

Sprayer Calibration

Calibration is requried for accurate herbicide application. Improper calibration can result in either poor weed control (too little herbicide applied) or tree injury (too much herbicide applied). Spray equipment, especially nozzles, should be checked periodically for spray pattern uniformity and rate of spray delivery.

Hand-Held Sprayers

Calibration of hand-held sprayers is often difficult since uniform spray pressure and maintenance of the correct height above the soil or target weed is hard to achieve. Application accuracy can be improved through practice by spraying water on a warm, dry surface and observing the spray pattern. The rate of drying across the spray swath will give an indication of application uniformity. Uneven drying of the treated area indicates a non-uniform application. Practice until a uniform application is achieved. To calibrate, determine the amount of spray solution needed to treat the area. Fill the sprayer tank and spray an area of 0.01 acre (436 square feet). Determine the amount of water used by refilling the tank. The number of gallons applied times 100 is the number of gallons applied per acre.

The amount of herbicide to use per acre can be obtained from the herbicide label and the amount to put in the sprayer can be calculated as shown in the following example.

Calibration Example

A sprayer applied 0.5 gallon of water on 436 square feet. The herbicide label recommends 2 quarts of product per acre. How much product must be added if the sprayer has a 5 gallon capacity?

$0.5 \text{ gallon}/436 \text{ ft}^2 = 0.5 \times 100 = 50$ gallons per acre

$$\frac{\text{5 gallon capacity}}{\text{50 gallons water per acre}} = 0.1 \text{ acres/tank}$$

$0.1 \times 2 \text{ qt/A} = 0.2$ qt/tank

Power Sprayers

Calibration of agricultural type sprayers is essentially the same as for hand-held sprayers. Fill the tank with water and spray a distance 660 feet long using the same speed and pressure you will use in the actual spray operation. The calibration should be conducted in the area to be treated or on a soil with similar firmness. Measure the amount of water delivered in the 660 foot test run by determiing the amount of water required to refill the tank. The following formula can be used to determine the number of gallons delivered per acre:

$$\text{gallons per acre} = \frac{\text{gallons delivered} \times 66}{\text{total width of spray swath (feet)}}$$

Calibration Example

A sprayer which produces a 20 foot swath delivered 5 gallons of spray in a 660 foot test run. How many gallons per acre does the sprayer apply? The herbicide should be applied at 1 quart per acre. How much herbicide should be put in 100 gallons of water?

$$\frac{5 \times 66}{20} = 16.5 \text{ gallons per acre}$$

$$\frac{\text{100 gallons of water}}{\text{16.5 gallons per acre}} = 6.06 \times 1 \text{ qt/A} = 6 \text{ qts or } 1.5 \text{ gal}$$

Major Shelterbelt Herbicides

The most commonly used shelterbelt herbicides are included in this section. Rates are expressed as amount of active ingredient or product per acre on a broadcast basis. Read and follow label directions before applying any pesticide.

Herbicide	Active Ingredient lb/A (Formulation/A)	Weeds	Application Timing
Amitrole (Amitrole-T, Cytrol)	1 to 4 lb (½ to 2 gal)	Annual and perennial grass and broadleaf weeds including Canada thistle and Quackgrass	Apply postemergence when annual weeds are 3 to 4 inches tall and actively growing.

Remarks

Treat perennial broadleaf weeds at bud to early bloom stage. Amitrole is non-selective and spray should not be allowed to contact tree foliage. Good coverage is essential. Apply in a minimum of 40 gallons of water per acre. Does not control field bindweed. Canada thistle should be treated in the bud to bloom stage for best results. Use ½ to 1 gal/A of Amitrole-T or Cytrol to control annual weeds. Amitrole is most frequently used to control emerged weeds at the time of preemergence, residual herbicide application. Amitrole is a Restricted Use Herbicide.

Amitrole + Simazine (Amazine)	1 + 3 lb (7 lb)	Annual and perennial grass and broadleaf weeds including Canada thistle and quackgrass	Apply postemergence in established shelterbelts. Apply in early spring when weeds are small.

Remarks

Amitrole controls emerged weeds while simazine provides residual control of germinating grass and broadleaf weeds. Apply as a directed spray to avoid contact with stem or foliage of desirable plants. Labeled for use in plantings of elm, and several species of pine and spruce. Treat only plants that have been established for one year or more. Do not apply more than once a year. Amazine is a Restricted Use Herbicide.

Dalapon (Dowpon)	3 to 10 lb (4 to 15 lb)	Annual and perennial grasses	Apply postemergence when weeds are small.

Remarks

Apply postemergence as a directed spray in established trees. Avoid contacting tree foliage or stems with spray. Small trees should be shielded. Dowpon may be used prior to planting tree seedlings; however, allow 2 to 4 weeks between application and planting. Dowpon may be mixed with 2,4-D or amitrole to kill broadleaf weeds as well as grasses.

Dichlobenil (Casoron, Norosac)	4 to 8 (8 to 12 lb Casoron 50W) (100 to 200 lb Casoron or Norosac 4G)	Annual grass and broadleaf weeds	Apply in early spring before weed growth has started or in late fall before soil freeze-up.

Remarks

Apply to new plantings established at least 4 weeks or to established shelterbelts. Shallow incorporation may improve weed control, especially under dry conditions. Do not apply more than 150 lb/A granules to plantings less than one year old. The higher granule rate is suggested for suppression of perennial weeds. Control is reduced considerably if applied when soil temperature is over 50 F. Provides shorter residual control of annual weeds than diuron or simazine. Labeled species include: ash, boxelder, caragana, cottonwood, elm, honeysuckle, maple, Russian olive, and willow.

Diuron (Karmex)	2 to 4 (2.5 to 5 lb 80W)	Controls some annual grasses and broadleaf weeds	In early spring before weeds emerge or trees leaf out

Remarks

Apply as directed spray in a band 2 feet on each side of row. Use only under established plantings (1 year or older). Do not contact tree foliage with spray. Injury may occur to trees growing in areas where water may stand. Use lower rates on sandy soils or those low in organic matter. Do not use on sand, loamy sand, or gravelly soil or on exposed subsoil. Labeled species include: American elm, caragana, cottonwood, Douglas fir, green ash, honeysuckle, Ponderosa pine, redcedar, Russian olive and Siberian elm.

Fluazifop (Fusilade-2000)	0.25 to 0.375 (2 to 3 pt)	Annual and perennial grasses	Annual grasses 2 to 8 inches tall and actively growing. Perennial grasses 3 to 5 leaves, not more than 10 inches tall and actively growing.

Remarks

Apply postemergence in 5 to 10 gal water/A. Does not control broadleaf weeds. Add non-ionic surfactant of at least 75% active ingredient at 0.25% v/v. Crop oil concentrate at 1% of final spray volume can be used for directed applications. Labeled for use on a wide variety of shelterbelt species.

Herbicide	Active Ingredient lb/A (Formulation/A)	Weeds	Application Timing
Glyphosate (Roundup)	0.75 to 3.75 lb (1 to 5 qt)	Annual and perennial grass and broadleaf weeds	Annual weeds actively growing and before flowering. Perennial grasses 6 to 10 inches and perennial broadleaves at bud to early bloom stage.

Remarks

Apply postemergence as a directed spray. Non-selective, translocated herbicide with no soil residual. May be applied over tree roots but do not allow spray to contract tree foliage or green bark. Use lower rate on annual weeds and perennial grasses. Use higher rate on perennial broadleaves. Fall aplication usually more effective for perennial weeds than spring. Do not till treated areas for 7 to 10 days after application. Dust present on leaf surfaces will reduce effectiveness. Add surfactant of at least 50% active ingredient at a rate of 0.5% v/v or for surfactants of less than 50% active ingredient use at a rate of 1% v/v.

Oxadiazon (Ronstar)	2 to 4 lb (100 to 200 lb 2G)	Annual grass and broadleaf weeds including common lambsquarters, redroot pigweed and common purslane	Apply in late fall or early spring before weeds emerge. Can be applied to both newly transplanted and established trees.

Remarks

Do not soil incorporate. Retreatment may be required for full season control. Do not apply when foliage is wet or under conditions in which granules will collect on leaves. Labeled species include: green ash, lilac, honeysuckle and Russian olive. Restricted use herbicide.

Sethoxydim (Poast)	0.33 to 0.5 lb (1.5 to 2.5 pt)	Annual and perennial grasses	Annual grasses small and actively growing Perennial grasses 6 to 8 inches tall and actively growing.

Remarks

Apply postemergence in maximum of 10 gal water/A. Use lower rate for annual grasses less than 6 inches tall and higher rates for annual grasses taller than 6 inches or for perennial grasses. Does not control broadleaf weeds. Add oil concentrate at 2 pt/A. Labeled for use on cotoneaster, forsythia, juniper, red maple, certain pine and spruce species.

Simazine (Princep)	2 to 4 (2.5 to 5 lb 80W, 2.2 to 4.4 lb 90WDG 50 to 100 lb 4G, 2 to 4 q 4L)	Annual grass and broadleaf weeds	Apply in late fall for best results to established shelterbelts or new plantings if transplants are at least three years old.

Remarks

The wettable powder or water dispersable granule formulations are recommended for spring application (unless trashy conditions prevail) because they require less moisture and time for activation than the granules. Do not use on sandy, gravelly or low organic matter soil. Delay application on new plantings until trees are established 6 weeks or preferably delay treatment until late fall. Labeled species include: ponderosa, Austrian and Scotch pine, Black Hills, white and Norway spruce, red and white cedar, Siberian elm, boxelder, caragana, dogwood, honey locust and Russian olive. Shallow rooted species such as lilac, cottonwood, green ash or poplar may be injured by simazine.

Trifluralin (Treflan)	0.5 to 1 (1 to 2 pt 4EC, 10 to 20 lb 5G)	Annual grass and broadleaf weeds	Apply before planting as it is difficult to incorporate adequately after trees are planted.

Remarks

Liquid and granular formulations must be incorporated into the top 2 to 3 inches of soil. A second incorporation pass insures thorough mixing with the soil. Cultivation is required for broadleaf weeds during the first season. Labeled species include: redcedar, white ash, cotoneaster, cottonwood, honeysuckle, lilac and several species of pine and spruce.

2,4-D (Various formulations available)	1 to 2 lb	Annual and perennial broadleaves	Annual weeds small and actively growing. Perennial weeds in bud to bloom stage and again in late August and September.

Remarks

Apply postemergence directed. 2,4-D is a selective, translocated herbicide effective on broadleaf weeds only. Do not allow 2,4-D to contact tree foliage or green stems. Use amine formulations to reduce tree injury due to vapor drift. Do not apply under windy conditions.

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