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# Chemical Weed Control in Tree Planting Projects

## Part I - Pre-emergence Herbicides

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Weed control in tree planting projects can be grouped into two broad categories: the control of woody vegetation, annual and perennial grasses, and broadleaf weed species before their seeds germinate and the control of established weed species. This publication will discuss using pre-emergence herbicides to control weed species in forestry, wildlife habitat and conservation tree planting projects.

Weed control may be the most important post-planting maintenance activity that you can perform to ensure the success of your new tree planting project. Controlling volunteer woody vegetation, annual and perennial grasses, and broadleaf weeds may be necessary throughout the life of your plantation. However, it will be most important during the first three to five years after the seedlings are planted. Eliminating competing woody vegetation, annual and perennial grasses, and broadleaf weeds can greatly improve the survival and growth of your seedlings. They will compete with your tree seedlings for soil moisture, nutrients, sunlight and space, and provide cover for rodents that can damage young trees.

There are several methods that can be used to control weed species within and between the tree planting rows. These include mechanical cultivation (hoeing, rototilling, etc.), mowing or shredding, mulching (straw, wood chips or other organic mulches), and chemical control (pre- and post-emergence herbicides). If herbicides are used, their selection will depend on site conditions, tree species in your plantation and the weeds to be controlled. Soil texture, soil pH and precipitation should also be taken into consideration.

### **Site Preparation**

The best time to begin your weed control program is before the trees are planted. New planting sites usually require some type of mechanical soil preparation before the trees are planted. Herbicides can be used to destroy existing vegetation before the soil is tilled and/or after the soil has been tilled to prevent the germination of weed seeds. Fall herbicide applications are especially important for perennial weed control. Mechanical site preparation should be completed in the fall of the year before the trees are

planted. This allows additional moisture to accumulate in the soil which will improve your seedling's chances for survival. Spring tillage should be limited to a pre-planting disking or harrowing that is designed to reduce competition; pre-emergence herbicides can be incorporated into the soil at this time. Where mechanical preparation is not possible post-emergence herbicides, like Garlon 4, Accord, and Weedone LV4 can be used to control established woody vegetation, grasses and perennial weeds. Post-emergence herbicides can also be used to control woody vegetation, grasses and perennial weeds that are encroaching on areas where mechanical site preparation has been completed.

## **Herbicide Application**

Pre-emergence herbicides control weeds by interfering with seed germination and seedling establishment. These herbicides *must* be applied before weeds emerge. Pre-emergence herbicides will generally require at least one inch of rainfall to activate them, leaving a very small window of opportunity for control before the weed seeds germinate. Most pre-emergence herbicides, such as Pendulum, Princep, or Surflan, are applied to the soil surface after the trees are planted. Weed residues, prunings and trash should be thoroughly mixed into the soil or removed prior to any application of a pre-emergence herbicide. There are some pre-emergence herbicides, such as Treflan, that need to be incorporated into the soil before the trees are planted. Herbicide application rates — - the amount of active ingredient applied per acre — - will vary according to the weed species that need to be controlled, the soil texture, organic matter content of the soil and soil pH. Higher herbicide rates are often needed on fine textured soils (like clay soils), or soils that have a high organic matter content. Lower herbicide rates should be used on coarse-textured soils (like sandy soils), or alkaline soils (soils that have a high pH). You will also need to take into consideration the fact that some herbicides, such as Princep, should not be used in sandy or alkaline soils. It is generally recommended that you have your soil tested if you do not know the texture, organic matter content or pH of the soil.

Additionally, the proper calibration of your spray equipment is important to ensure an accurate and uniform herbicide application. Applying the right herbicide at the proper rate is important if you want to keep your costs down and avoid injury to your trees.

Herbicides are especially dangerous when improperly handled, applied or disposed of. They can cause injury to desirable plants, wildlife and fish, and they can contaminate water supplies. Always read and follow the directions on the herbicide label and follow all precautionary statements. It is a violation of federal laws to use any pesticide in a way that is inconsistent with its label. The label will list the tree and shrub species on which it can be used, the weed species it will control, recommended application rates, timing of applications, disposal and other directions and precautions.

## **Recommended Pre-emergence Herbicides<sup>1</sup>**

### **Metolachlor (*Pennant*)**

Pennant is labeled for weed control in field-grown ornamentals. Pennant will provide pre-emergence control of selected annual grasses and broadleaf weeds. However, it will not control established grasses or broadleaf weeds. Apply Pennant following the transplanting of dormant seedlings as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system. Broadcast applications of Pennant should be followed by sufficient overhead irrigation to wash the herbicide from the foliage to reduce the chance injury. Do not use in areas where the groundwater level is close to the surface.

### **Oryzalin (*Surflan*)**

Surflan is labeled for weed control in Christmas tree plantations, non-bearing fruit and nut trees,

and field grown ornamentals. Surflan can be applied as either a spring or fall application for pre-emergence control of a wide variety grasses and broadleaf weeds. However, it will not control established grasses or broadleaf weeds. Apply Surflan following the transplanting of dormant seedlings as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system.

#### **Oxyflourfen (*Goal 1.6E*)**

Goal is labeled for weed control in conifer plantations, cottonwood grown for pulp, and selected bearing and non-bearing fruit and nut trees. Goal will provide both pre- and post-emergence control of selected grasses and broadleaf weeds. Apply Goal for pre-emergence control of grasses and broadleaf weeds following the transplanting of dormant seedlings as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system. Goal can also be applied as a broadcast application for post-emergence control of grasses and broadleaf weeds in conifer plantations prior to bud-break. Goal can also be applied as a directed spray for post-emergence control of grasses and broadleaf weeds in conifer and fruit and nut tree plantations.

#### **Pendimethalin (*Pendulum 3.3 EC*)**

Pendulum is labeled for weed control in field-grown ornamentals. Pendulum will provide pre-emergence control of selected grasses and broadleaf weeds. However, it will not control established grasses or broadleaf weeds. Apply Pendulum following the transplanting of dormant seedlings as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system.

#### **Simazine (*Princep*)**

Princep is labeled for weed control in Christmas tree plantations and shelterbelts. Princep can be applied as either a spring or fall application for pre-emergence control of a wide variety grasses and broadleaf weeds. Princep will provide some post-emergent control on established perennial cool season grasses. However, it will not control established broadleaf weeds. Apply Princep as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system. Princep is not recommended for use in shelterbelts where transplanted seedlings are less than two years of age. Do not use in areas where the groundwater level is close to the surface.

### **Recommended Pre-emergence Herbicides Limited to Specific Uses**

#### **Atrazine (*Aatrex 4L, Atrazine 4L*)**

AAtrex 4L and Atrazine 4L are labeled for site preparation and weed control in conifer (spruces, pines, and firs) plantations. Atrazine formulations will provide both pre- and post-emergence control of selected grasses and broadleaf weeds. Atrazine can be applied as a broadcast application in the fall of the year prior to transplanting, after transplanting as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system, or in established plantations as either a directed spray or a broadcast application from late fall to early spring while the trees are dormant. Do not use on sandy or alkaline soils or in areas where the groundwater level is close to the surface.

#### **Hexazinone (*Velpar*)**

Velpar is labeled for site preparation and weed control in conifer plantations (selected species). Velpar will provide both pre- and post-emergence control of selected grasses and broadleaf weeds. Apply Velpar for pre-emergence control of grasses and broadleaf weeds following the

transplanting of dormant seedlings as either a directed spray to the soil surface or over the top of seedlings after the soil has firmly settled around the root system. Velpar can also be applied as a broadcast application for post-emergence control of grasses and broadleaf weeds in conifer plantations prior to bud-break.

**Trifluralin (*Treflan HFP*)**

Treflan is labeled for cottonwood grown for pulp, and for bearing and non-bearing citrus, fruit and nut trees. Treflan will provide pre-emergence control of selected grasses and broadleaf weeds. However, it will not control established grasses or broadleaf weeds. Apply Treflan and incorporate prior to transplanting seedlings in new tree planting projects. Treflan can also be applied as a directed spray and incorporated in established plantations.

**Pre-emergence Herbicide Selection Guide\***

<i>Tree Species</i>	<i>Metolachlor</i>	<i>Oryzalin</i>	<i>Oxyflourfen</i>	<i>Pendimethalin</i>	<i>Simazine</i>
<b>Conifers</b>					
Eastern redcedar	b/d	b/d	b/d	b/d	b/d
Rocky Mountain juniper	b/d	b/d	b/d	b/d	b/d
Austrian pine	b/d	b/d	b/d	b/d	b/d
Jack pine	b/d	b/d	b/d		
Ponderosa pine	b/d	b/d	b/d	b/d	
Scotch pine	b/d	b/d	b/d		b/d
Colorado blue spruce	b/d	b/d	b/d	b/d	b/d
<b>Deciduous</b>					
Green ash	b/d	b/d		b/d	
Manchurian apricot	b/d	b/d			
River birch	b/d	b/d		b/d	
Black cherry	b/d				
Cottonwood	b/d	b/d	d		
Crabapple	b/d	b/d		b/d	
Siberian elm					b/d
Hackberry					
Hawthorne					
Honey locust	b/d	b/d		b/d	b/d
Kentucky coffeetree					

Amur maple	b/d	b/d		
Silver maple	b/d	b/d		
Mulberry		b/d		
Bur oak	b/d	b/d		
Red oak	b/d	b/d		b/d
Swamp white oak	b/d	b/d		
Osage-orange				
Russian olive	b/d	b/d		b/d
Harbin pear	b/d	b/d		
Black walnut		b/d	d	b/d

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**Shrubs**

Buffaloberry				
Chokeberry				
Elderberry		b/d		
Juneberry				
Winterberry				
Choke cherry	b/d			
Nanking cherry	b/d			
Sand cherry	b/d			
Cotoneaster	b/d			b/d
Golden currant		b/d		
American hazel		b/d	d	
Honeysuckle	b/d			b/d
Lilac	b/d	b/d		
American plum	b/d			
Siberian peashrub				b/d
Skunkbush sumac				

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\* The herbicides Atrazine, Velpar and Treflan were excluded from this table due to the limited number of species with which these herbicides are labeled for use. The letter b indicates that a herbicide can be used with this species as a broadcast application. Follow label instructions for broadcast applications. The letter d indicates that a herbicide can be used with this species as a directed spray application. Follow label instructions for directed spray applications.

**Comparison List of Weeds Controlled**

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<i>Weed Species</i>	<i>Metolachlor</i>	<i>Oryzalinn</i>	<i>Oxyflourfen</i>	<i>Pendimethalin</i>	<i>Simazine</i>
<b>Grasses</b>					
Barnyard grass	c	c	p	c	c
Downy brome					c
Smooth brome					
Cheat grass					c
Foxtail		c	p	c	c
Johnsongrass	p	c		c	
Panicum	c	c		c	c
Sandbur	p	c		c	
Shattercane	p	p			p
<b>Broadleaf Weeds</b>					
Bindweed					
Buffalobur					
Cocklebur					p
Henbit		c	c	c	c
Jimsonweed			c		p
Knotweed		c	c	c	c
Kochia			c	c	c
Lambsquarters		c	c	c	c
Morning glory		p			c
Wild mustard		p	c		c
Nightshade	c	p	c		c
Pigweed	c	c	c	c	c
Puncture vine		c		c	
Purslane	p	c	c	c	c
Ragweed	c	p			c
Russian thistle			c		c
Smartweed		p		c	c
Spurge		c		c	
Velvetleaf		p	c	c	c

This table is a partial list of weeds that often show up in tree planting projects across Nebraska. The level of control that any herbicide will provide is dependant on a complex series of factors.

A blank space indicates that a herbicide has no substantial effect on the listed weed species; a "p" indicates partial control; and a "c" indicates that the herbicide, when used properly, will provide good control.

### Comparison List of Herbicide Application Rates and Cost per Acre

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<i>Herbicide</i>	<i>Application rate per acre</i>	<i>Approximate cost per acre</i>
AAAtrex 4L	4 - 8 pts/ac	\$7.27 - \$14.53
Goal 1.6E	5 - 10 pts/ac	\$41.86 - \$83.73
Pendulum 3.3 EC	2.4 - 4.8 qts/ac	\$25.50 - \$51.00
Pennant	2 - 4 pts/ac	\$30.35 - \$60.70
Princep	2 - 4 qts/ac	\$8.66 - \$17.32
Surflan A.S.	2 - 4 qts/ac	\$40.01 - \$80.02
Treflan HFP	1 - 2 pts/ac	\$3.83 - \$7.66
Velpar L	4 - 8 pts/ac	\$26.75 - \$53.05

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<sup>1</sup>The use of trade names is for the convenience of the reader and does not imply any endorsement by the University of Nebraska Cooperative Extension or the Nebraska Forest Service.

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