

# Hardwood Weed Control: Iowa Department of Natural Resources Forestry, Iowa State Nursery

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**Keywords:** fumigation, methyl bromide, herbicides

## Background

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The Iowa Department of Natural Resources Forestry, Iowa State Nursery in Ames grows approximately 4 to 8 million seedlings, consisting of about 50 species. Most of our production is hardwoods. We have not been fumigating very much, if at all, for about 20 years and, with the proposed rules under the 2008 U.S. Environmental Protection Agency (EPA) Risk Mitigation, many other nurseries may be joining us.

## Weed Control

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We determined that most fumigation was being done for weed control, and that it was not doing a very good job in our rich loam prairie soil. We were using Vorlex at the time. The nursery did some trials using methyl bromide, chloropicrin, and Vorlex, and compared them to different herbicide treatments. After establishing which herbicide treatments were most effective, we then tested their safety on the crops we were growing. As we add new species, the herbicides will again have to be tested. The result is that we have developed an effective herbicide program for our nursery.

## Pre-Emergent Treatments

We have a pre-emergent herbicide that we apply on each species after sowing and before germination. These, of course, vary by species groups, and the timing can be altered for weather and other factors.

## Post-Emergent Treatments

Post-emergent treatments may be used during the growing season according to weather and weed growth. We will normally apply an application of Pendulum® 3.3EC (4.7 L/ha [2 qt/ac]) around the first of July. This is usually done during irrigation to avoid spotting of the leaves and consequential stunting of plants. We may also apply a treatment of Vantage® or Fusilade® DX if we have enough grass pressure to warrant this application. Spot treatments of Lontrel® or Stinger® may be applied, mainly for thistle. Spot treatments of Classic® may also be used for yellow nutsedge (*Cyperus esculentus*). In areas of known yellow nutsedge pressure, we will use Pennant® as a pre-emergent wherever it is safe on the crop.

We have also developed shielded sprayers for spraying between rows, between beds, and along pipeline areas. These sprayers are mainly used with Roundup® Original, although pre-emergent herbicides are often added to try to discourage regrowth.

## Precautions

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Before using any herbicide applications in your nursery, make sure that you test the chemicals to make sure they are safe. Make sure you get the proper labeling in your state, as Iowa has some 24C state labeling. Some products that are soil-active, such as Princep® 4L or Simazine, may have to be changed for various soil types. The Ames program and the Montrose program (tables 1 and 2) differ for this reason. Montrose has very sandy soils, whereas Ames has very loamy soils.

**Table 1.** Iowa State Forest Nursery, Ames 2008 Herbicide Program.

Herbicide used	Application rate	Nursery crop	Stocktype (seedling/cutting)
Surflan®	4.7 L/ha ( 2 qt/ac)	Serviceberry ( <i>Amelanchier</i> spp.)	S
		Ninebark ( <i>Physocarpus</i> spp.)	S
		Elderberry ( <i>Sambucus</i> spp.)	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)	Buttonbush ( <i>Cephalanthus occidentalis</i> )	S
		Arrowwood ( <i>Viburnum recognitum</i> )	S
		Nannyberry ( <i>Viburnum lentago</i> )	S
		Cranberry ( <i>Viburnum opulus</i> )	S
		Basswood ( <i>Tilia americana</i> )	S
		Hard maple ( <i>Acer</i> spp.)	S
		Hackberry ( <i>Celtis occidentalis</i> )	S
		Chokeberry ( <i>Aronia</i> spp.)	S
Pendulum® 3.3EC	2.4 L/ha ( 1 qt/ac)	Sycamore ( <i>Platanus occidentalis</i> )	S
		River birch ( <i>Betula nigra</i> )	S
Princep® 4L	2.4 L/ha ( 1 qt/ac)	Gray dogwood ( <i>Cornus racemosa</i> )	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)	Red-osier dogwood ( <i>Cornus stolonifera</i> )	S
		Silky dogwood ( <i>Cornus amomum</i> )	S
		Wild plum ( <i>Prunus</i> spp.)	S
		Chokecherry ( <i>Prunus virginiana</i> )	S
		Nanking cherry ( <i>Prunus tomentosa</i> )	S
		Black cherry ( <i>Prunus serotina</i> )	S
		Kentucky coffeetree ( <i>Gymnocladus dioicus</i> )	S
		Goal® 2XL	4.7 L/ha ( 2 qt/ac)
Pendulum® 3.3EC	2.4 L/ha ( 1 qt/ac)	Red pine ( <i>Pinus resinosa</i> )	S
		Scotch pine ( <i>Pinus sylvestris</i> )	S
		Jack pine ( <i>Pinus banksiana</i> )	S
		Redcedar ( <i>Juniperus virginiana</i> )	S
		Norway spruce ( <i>Picea abies</i> )	S
		White spruce ( <i>Picea glauca</i> )	S – No Pendulum
		White ash ( <i>Fraxinus americana</i> )	S
Goal® 2XL	9.4 L/ha ( 4 qt/ac)	Green ash ( <i>Fraxinus pennsylvanica</i> )	S
		Poplar ( <i>Populus</i> spp.)	C
		Cottonwood ( <i>Populus</i> spp.)	C
		Willow ( <i>Salix</i> spp.)	C
Goal® 2XL	2.4 L/ha ( 1 qt/ac)	All carryover conifers	1-3 yr.
Princep® 4L	2.4 L/ha ( 1 qt/ac)		
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)		
Princep® 4L	4.7 L/ha ( 2 qt/ac)	Silver maple ( <i>Acer saccharum</i> )	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)		
Princep® 4L	7.1 L/ha ( 3 qt/ac)	All oaks ( <i>Quercus</i> spp.)	S
Goal® 2XL	2.4 L/ha ( 1 qt/ac)	Walnut ( <i>Juglans</i> spp.)	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)	Pecan ( <i>Carya illinoensis</i> )	S
Roundup® Original	4.7 L/ha ( 2 qt/ac)	Hickory ( <i>Carya</i> spp.)	S
		All carryover hardwoods	1-3 yr.
Princep® 4L	4.7 L/ha ( 2 qt/ac)	Hazelnut ( <i>Corylus americana</i> )	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)	All carryover shrubs	1-2 yr.
Goal® 2XL can be used as a post-emergent at 5 weeks after germination at 1.2 to 2.4 L/ha (1 pt to 1 qt/ac) on conifers.			
Goal® 2XL can be used as a post-emergent before and after candling at 1.2 to 2.4 L/ha (1 pt to 1 qt/ac) on conifers.			
Vantage® or Fusilade® can be used as a post-emergent to kill grasses over all species, except during the first 3 weeks after germination.			
A second application of Pendulum® 3.3EC may be applied, if needed, after plants reach approximately 5 cm (2 in) in height. This usually occurs in mid-June to July. When applying, wet the plants first and water immediately after, or apply while watering.			
Stinger® or Lontrel® can be applied over the crop for some broadleaf control, particularly thistle.			
Scepter® can be applied over the crop to control some broadleaf species, particularly in poplar and oak species.			
Classic® can be applied over the crop to control nusedge, particularly in oak species.			

**Table 2.** Iowa State Forest Nursery, Montrose 2008 Herbicide Program.

Herbicide used	Application rate	Nursery crop	Stocktype (seedling/cutting)
Surflan®	4.7 L/ha ( 2 qt/ac)	Serviceberry ( <i>Amelanchier</i> spp.)	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)	Buttonbush ( <i>Cephalanthus occidentalis</i> )	S
		Basswood ( <i>Tilia americana</i> )	S
		Hard maple ( <i>Acer</i> spp.)	S
		Hackberry ( <i>Celtis occidentalis</i> )	S
		Chokeberry ( <i>Aronia</i> spp.)	S
Pendulum® 3.3EC	2.4 L/ha ( 1 qt/ac)	Sycamore ( <i>Platanus occidentalis</i> )	S
		River birch ( <i>Betula nigra</i> )	S
Goal® 2XL	4.7 L/ha ( 2 qt/ac)	White pine ( <i>Pinus strobus</i> )	S
Pennant®	3.6 L/ha ( 1.5 qt/ac)	Red pine ( <i>Pinus resinosa</i> )	S
		Scotch pine ( <i>Pinus sylvestris</i> )	S
		Jack pine ( <i>Pinus banksiana</i> )	S
		Redcedar ( <i>Juniperus virginiana</i> )	S
		Norway spruce ( <i>Picea abies</i> )	S
		White spruce ( <i>Picea glauca</i> )	S – No Pennant
		White ash ( <i>Fraxinus americana</i> )	S
		Green ash ( <i>Fraxinus pennsylvanica</i> )	S- Goal @ 3 qt/ac
Goal® 2XL	2.4 L/ha ( 1 qt/ac)	All carryover conifers	1-3 yr.
Princep® 4L	2.4 L/ha ( 1 qt/ac)		
Pennant®	3.6 L/ha ( 1.5 qt/ac)		
Princep® 4L	4.7 L/ha ( 2 qt/ac)	Silver maple ( <i>Acer saccharum</i> )	S
Pendulum® 3.3EC	4.7 L/ha ( 2 qt/ac)		
Princep® 4L	4.7 L/ha ( 2 qt/ac)	All oaks ( <i>Quercus</i> spp.)	S
Goal® 2XL	2.4 L/ha ( 1 qt/ac)	Walnut ( <i>Juglans</i> spp.)	S
Pennant®	3.6 L/ha ( 1.5 qt/ac)	Pecan ( <i>Carya illinoensis</i> )	S
Roundup® Original	4.7 L/ha ( 2 qt/ac)	Hickory ( <i>Carya</i> spp.)	S
		All carryover hardwoods	1-3 yr.
Princep® 4L	4.7 L/ha ( 2 qt/ac)	Hazelnut ( <i>Corylus americana</i> )	S
Pennant®	3.6 L/ha ( 1.5 qt/ac)	All carryover shrubs	1-2 yr.
Goal® 2XL can be used as a post-emergent at 5 weeks after germination at 1.2 to 2.4 L/ha (1 pt to 1 qt/ac) on conifers.			
Goal® 2XL can be used as a post-emergent before and after candling at 1.2 to 2.4 L/ha (1 pt to 1 qt/ac) on conifers.			
Vantage® can be used as a post-emergent to kill grasses over all species, except during the first 3 weeks after germination.			
A second application of Pendulum® 3.3EC may be applied, if needed, after plants reach approximately 5 cm (2 in) in height. This usually occurs in mid-June to July. When applying, wet the plants first and water immediately after, or apply while watering.			

The content of this paper reflects the views of the authors, who are responsible for the facts and accuracy of the information presented herein.