

## **Illinois Nature Preserves Commission**



### **MANAGEMENT GUIDELINES FOR ILLINOIS NATURE PRESERVES**

### **HERBICIDE USE AND APPLICATION**

## GENERAL PROVISIONS

Use of herbicides on Illinois Nature Preserves should be limited to situations in which no other reasonable means of control are available. Herbicides potentially are damaging to the environment, and these hazards dictate that herbicides should be used only when less potentially damaging methods are not available, effective, or feasible. Natural or mechanical methods of controlling invasive and invasive plant species (e.g., introduction of fire, mowing, cutting, or hand removal) are preferable to chemical control. Control of invasive species and invasive native species with herbicides should occur only when these other methods have been proven or known to be ineffective or impractical. The final control method chosen often will depend on practical considerations and may include a combination of natural, mechanical, and herbicide approaches.

Herbicides may be applied only as per label directions unless other Illinois Nature Preserves Commission guidelines prescribe a U.S. Environmental Protection Agency approved application that is known to be more effective. Information in this guideline supplements label directions. Herbicides may be applied only by Pesticide Applicator or Operator licensed by the Illinois Department of Agriculture (see pesticide licensing procedures below). Information in this guideline is adapted from the A1989 Illinois Pest Control Handbook@, University of Illinois, Cooperative Extension Service; herbicide manufactures=label directions; and the staff of the Illinois Nature Preserves Commission and the Illinois Department of Natural Resources, Division of Natural Heritage.

Any herbicide use undertaken on a dedicated Illinois Nature Preserve must be in accordance with the ARules for Management of Illinois Nature Preserves@ (sections 4000.130 and 4000.470) and the master plan for the nature preserve, if such exists. This guideline identifies conditions for Commission approval of management not allowed under the ARules for Management of Illinois Nature Preserves@ unless allowed by a master plan or by specific Commission approval. In addition, this guideline clarifies and further explains herbicide uses and applications that are allowed under the ARules for Management of Illinois Nature Preserves@ (as per section 400.140).

Herbicide use undertaken on Illinois Nature Preserves requires advance approval of the Illinois Nature Preserves Commission. This approval can be given when the Commission approves (1) a master plan, (2) a 3-year management schedule and/or (3) individual requests to conduct management activities. This guideline serves to explain herbicide applications that are allowed on Illinois Nature Preserves and does not negate the need for Commission approval of herbicide use.

### PHILOSOPHY OF HERBICIDE USE IN NATURE PRESERVES

(Adapted from AOrientation to the use of Herbicides in Natural Areas@ John E. Schwegman, Ill. Department of Conservation)

This section is intended to provide managers or other decision-makers considering use of herbicides in natural areas with a philosophy regarding when herbicide use is warranted and how to select and when to apply herbicides. These recommendations are based on experience in Illinois and other central and mid-western states.

When considering herbicide use in natural community restoration and management, managers should have a clear understanding of goals, so as to provide the tempering and restraint crucial to proper decision-making. Natural areas are places where ecologists can study communities and species in their natural environment, and where the public can view nature as a result of natural processes. The managers' role is to assist nature in overcoming disruptive forces resulting from human dominion. To this end, the managers should leave as much as possible of the work and selection of plants for removal to natural processes. Personal landscaping talents and biases should not affect management activities in natural areas.

In the past, most herbicide-manufacturer research was on agricultural weeds and woody species that seldom invade natural areas. As awareness of invasive species increased, so did the need for more selective herbicides. As a result manufacturers have are working to develop more selective herbicides that are designed to affect specific groups of closely related plants. We should work to encourage further research to determine selectivity of different herbicides and application rates for invasive or aggressive species that are problematic in natural areas. The following guiding principles of herbicide use in natural areas are discussed on pages 2-3:

1. Never use herbicides unnecessarily.
2. Herbicide should be used when appropriate and only after careful consideration of alternate methods.
3. Use an herbicide and application time that make the herbicide as selective as possible for the target species.
4. Use the lowest dose of the least toxic and least persistent herbicide consistent with effective selective control.
5. Know your herbicide.
6. Follow all safety and ecological precautions per label instructions.

### **1. Never use herbicides in natural areas unnecessarily.**

In natural areas, most herbicides are used to control invasive or aggressive plants and to counter vegetative succession, such as woody invasion. When trying to control or counter succession, managers should attempt to restore the ecological forces (e.g. fire or hydrology) that maintained the desired successional stage in former years and allow adequate time for the ecological force to take effect before considering herbicides. For example, do not use herbicide on a native woody stem in a prairie that has adequate surrounding grass and leaf litter to kill the stem in a fire. Do not become impatient with ecological forces; results will come in time once the ecological force is restored.

In addition to considering restoration of ecological forces, always consider other non-herbicide control methods when available. Mowing, cutting, and/or girdling are effective controls for many problem plants. For example, multiple cutting during a growing season will kill smooth sumac and mowing of sweet clover can prevent seed set. The final method chosen may include a combination of natural, mechanical, and herbicide approaches.

Never use herbicides to kill unwanted conifers in the Midwest. Smaller cedar and pine are easily killed with fire and large or small specimens are easily killed if cut below the lowest leafy branch.

**2. Use herbicides when appropriate.**

For example, if woody stems are cut to reclaim an area where succession has replaced a desired grassland community with unwanted woody vegetation, apply herbicides to the stumps of sprout-prone species immediately after cutting unless fuel for fire or other ecological controls are adequate for follow-up maintenance. Clearing brush without adequate follow-up can be a waste of precious management resources.

**3. Use a herbicide and timing of application that will be as selective as possible for the target species.**

The objective is to kill the problem plant without injury to other plants or animals. Some herbicides are designed specifically to control either broadleaf (dicot) or grassleaf (monocot) plants. Others will kill herbs but not woody plants. These characteristics make it possible to select an herbicide such as 2, 4-D for control of a broad-leaved herb (sweet clover, for example) in a prairie. This chemical selectively controls the target plant (herbaceous broadleaf plant) and minimizes impacts on grasses and woody dicots, although native broad-leaved forbs are affected. Since much prairie vegetation is composed of grasses (monocots), any accidental herbicide drift will not kill the grasses or most woody dicots. However, caution in application is required because chemical drift or accidental spray of 2, 4-D will kill native broad-leaved prairie forbs.

Many invasive plants have annual cycles of dormancy different than our native vegetation. For this reason, many invasive species continue growing when our native plants go dormant for the winter and lose their leaves. These functional Evergreens® frequently are vulnerable to foliar herbicide application in late autumn and early spring when few, if any, native plants are vulnerable to foliar spray because of their lack of leaves. Thus, one can selectively kill the target species. Glyphosate is one herbicide that can be translocated by leafy plants and effectively kills many invasive species in late fall.

On large stems, specific control of target species can be achieved by direct trunk application. Options include herbicide injection with specific injector tools, bark application with the appropriate carrier, frilling the trunk with an axe or girdling and applying herbicide in the frill or girdle, and cutting the stem and applying herbicide to the stump. Some herbicides that are very non-selective when foliar sprayed can be safely directed into target species.

**4. Use the lowest dose of the least toxic and least persistent herbicide consistent with effective selective control.**

If a 20% solution of chemical on a stump will prevent sprouting, do not use a 50% solution. Only treat with herbicide the smallest area necessary for effective control. Do not spray adjacent plants or areas unnecessarily. If a non-persistent herbicide will kill the target species effectively, use it rather than a more persistent chemical. Once the decision to use an herbicide is made, keep in mind your goal of effective control of target species with minimum impact on other species in the ecosystem.

**5. Know your herbicide**

Several versions of an herbicide may be sold under the same trade name, Tordon K, Tordon 101, and Tordon RTU (Ready to Use) for example. Each of these herbicides has picloram as an active ingredient but the concentration of picloram is much different and the maximum use rates (MUR) are considerably different for these three herbicides.. Tordon K has 24.4% picloram, Tordon 101 10.2% and Tordon RTU 5.4%. Tordon 101 and Tordon RTU both also have 2, 4-d as an active ingredient while Tordon K does not. The MUR for Tordon K on forest sites is 2 quarts per acre within a period of two annual growing seasons. For Tordon 101 the MUR is eight quarts per acre within a period of two annual growing seasons while the Tordon RTU MUR is four gallons per acre within a period of two annual growing seasons.

## **6. Apply herbicides safely.**

Follow all personal and public safety precautions and environmental requirements. It is the law.

### **ILLINOIS PESTICIDE LICENSING PROCEDURES**

The Illinois Pesticide Act of 1979 regulates pesticide (e.g., herbicide, insecticide) application and is administered by the Illinois Department of Agriculture. This law requires, among other things, that anyone who applies pesticides in areas where the public has access must obtain certification as a Public Pesticide Applicator or Operator. Public Licenses are issued at no charge to: (1) employees of government agencies who apply pesticides in the normal course of their duties, (2) volunteers licensed as operators under an applicator on staff of a public landowner where the pesticide is being applied, or (3) volunteers working on nature preserves and natural areas who are licensed as operators under an applicator on staff of the Illinois Nature Preserves Commission.

To be certified, you must first pass a General Standards (Core) Examination. This qualifies you to be licensed as a Pesticide Operator. To obtain your license, you must work under a licensed Pesticide Applicator, listing that Applicator's certification number on your application. As an Operator, you will be certified for the same category of license for which your Applicator is certified. To be certified as an Applicator, after passing the General Standards Examination, you must pass one or more Category Specific Examinations, such as Rights-of-Way Control or Aquatic Weed Control. Your type of license will be for the Category Specific Examination(s) you pass. Certification as a Pesticide Applicator allows you to work independently.

Certification is effective for 3 years. An annual renewal form will be sent to you (if you are an Applicator) or to your Applicator by the Illinois Department of Agriculture. You will be issued a new license each year. After 3 years, your license expires and you must retest to renew it.

Types of licenses covering application of pesticides in Illinois nature preserves or other natural areas are (1) Rights-of-Way Control and (2) Aquatic Weed Control. Rights-of-Way licensing covers persons applying pesticides to Rights-of-Way, roadsides, electric power lines, pipelines, railroads, cemeteries, parks, etc. Aquatic Weed Control licensing covers persons applying pesticides to control weeds in standing or running water.

Currently, natural areas are not recognized as a specific category for licensing, and training and licensing procedures are not aimed towards the specialized application necessary in high-quality natural areas. However, anyone applying pesticides will benefit from obtaining training and being licensed because the examinations emphasize the necessary health and safety precautions when handling and using pesticides.

The Illinois Department of Agriculture administers the licensing program. The Cooperative Extension Service of the University of Illinois writes the study guides and conducts the training sessions. Study guides are available for general standards training, Rights-of-Way control, and Aquatic Weed Control category tests. Study guides can be purchased from County Cooperative Extension Offices or from the University of Illinois, and are available at each training clinic. Questions regarding each year's scheduling for training clinics should be addressed to: Pesticide Training Clinics, University of Illinois, 172 Natural Resources Building, 607 E. Peabody Drive, Champaign, IL 61820 (217/333-6650).

## **METHODS OF HERBICIDE APPLICATION**

Control measures recommended in the Management Guideline are based on the best currently available information. As research identifies more effective or safer treatments, this guideline will be revised.

### **CUT SURFACE APPLICATION**

Cut-surface application of herbicides with a compression sprayer, spray bottle, wick-type applicator or brush is allowed. Brush application is less preferred because an open container is necessary and spillage is possible. Cut-surface applications are more effective than basal-bark applications on plants that are greater than 5 inches in diameter or on thick-barked species. Diluted or undiluted herbicide is applied to the stump of a cut plant or to frills or notches cut around the plant to a depth of at least 2 inch into the sapwood. On larger trees (>6" dbh), girdling the tree trunk with a chain saw and applying herbicide to the cut surface is very effective. Herbicide should be applied to the cut surface immediately, before the exposed plant tissue dries.

Where woody vegetation greater the 4 inches in diameter at breast height (dbh) is to be removed from Illinois Department of Natural Resources (IDNR) property, IDNR policy requires specific Commission approval of that activity.

### **BASAL BARK APPLICATION**

Basal bark application of herbicides with compression sprayer or spray bottle to individual plants is allowed. Basal bark treatments are labor intensive but are useful in selectively controlling undesirable species, and treatment can be done during the dormant season when nearby herbaceous plants should not be harmed.

There are 2 recommended basal bark application methods: (1) conventional basal bark, and (2) thin line basal bark. Conventional basal bark application requires mixing the herbicide (e.g., Garlon 4) with a carrier (i.e. mineral oil) and applying the mixture to the base of the tree or shrub from the ground up to about 12-15 inches. Old or rough bark requires more spray than young or smooth bark. Thorough coverage all around the stem is important, but it is

recommended to stop just short of noticeable runoff (label directions will indicate to ASpray until runoff is noticeable.®). Herbicides that require diesel fuel or kerosene as a carrier should not be used in high-quality natural areas because the fuel can damage nontarget species. These herbicides should be used only in buffer or disturbed areas.

Thin-line basal bark application offers a preferred alternative to conventional basal bark application. It requires applying a pencilpoint thin line of full-strength herbicide all around the basal parts of trees or brush. Because a relatively small amount of herbicide is used, potential damage to non-target species (including the applicator) is reduced, and less refill is required. Some herbicide label instructions for dormant stem application recommend thoroughly wetting the entire tree or shrub stems. This type of dormant stem application, in which the entire tree or shrub is coated with herbicide, results in probable drift and should not be used in natural areas or nature preserves. Instead, dormant stem application should be done using conventional basal bark or thin-line basal bark application techniques, in which the herbicide is applied only around the tree or shrub.

## FOLIAR APPLICATION

Foliar application of herbicides with compression sprayer or wick applicator is allowed in monocultures of invasive or invasive native plant species (e.g., smooth brome fields or purple loosestrife stands) in combination with other control methods (e.g., fire, hand pulling) or where other control methods are not successful, but only after it has been determined that no threatened, endangered, or rare species are present within the monoculture.

Foliar application should be used with great caution because this type of application can harm non-target species. Although foliar treatments are often most effective when applied to fully developed plant foliage during late spring or early summer (approximately late May through July), this time of effective control of target species is accompanied by great vulnerability of non-target species. Consequently, herbicide application during this time should be used only in degraded or buffer areas and should be avoided in high-quality areas. During late autumn after a frost, or in early spring when most native vegetation is dormant, foliar application can be used when necessary in high-quality natural areas. Late autumn foliar spray can be used to control invasive plants that retain green leaves in autumn, after most native vegetation has dropped its leaves. Thorough foliar coverage is necessary for control, but plants should not be sprayed to the point of runoff.

Take precautions against particle drift from the spray by (1) not spraying when wind velocity is greater than 5 mph, (2) using low pressure, and (3) using large orifice nozzles. **DO NOT USE FOLIAR APPLICATION IF DAMAGE TO NON-TARGET SPECIES IS PROBABLE.**

The effectiveness of most foliar treatments will be reduced if rainfall occurs on the day of treatment. Foliar treatments should be used only to control small shrubs and trees and herbaceous plants. Large trees should be treated by another method to improve control and reduce drift potential.

## OTHER METHODS

On small to medium-sized woody stems (e.g., trees > 4 inches dbh), injecting an appropriate herbicide directly into the stem with specialized injector equipment is an option for specifically controlling a target species. Lance-type injection systems are easy to use and allow for the injection of a very small amount of a highly concentrated herbicide directly into the stem. This method is especially effective on shrubs and small trees; however, it is less effective on large trees and can be difficult to use on trees with dense wood such as Osage orange or hickories.

Aerial and/or soil application of herbicides is not allowed in dedicated Illinois Nature Preserves. Any exception requires specific approval of the Illinois Nature Preserves Commission. Aerial and soil application techniques are likely to damage non-target species, and soil-applied herbicides usually remain active for long periods.

### **SPECIFIC CONTROL RECOMMENDATIONS**

Specific control recommendations for 38 non-native and native aggressive plant species are given in the Nature Preserves Commission's Vegetation Management Manual, Vol. 1, Nos. 2-40. This manual (Vol. 1, Nos. 2-40) describes natural, mechanical, and chemical control methods that can be used in (1) high-quality natural areas and (2) buffer or severely disturbed sites. This manual may be obtained from Illinois Nature Preserves Commission, One Natural Resources Way, Springfield, IL 62702-1271. Invasive and aggressive plant species included in the Vegetation Management Manual and recommended herbicides for controlling these species are given in the chart below.



Table 1. Invasive and aggressive plant species included in the INPC Vegetation Management Manual (Vol.1 Nos.2-40) and recommended herbicides for controlling these species. Practices recommended for high quality areas are also suitable for buffer and disturbed sites with additional practices recommended as noted.

#### Herbicides Recommended for Control and Application Method

<b>Alien or Aggressive Plant Species</b>	<b>In High-quality Natural Areas and Buffer or Degraded Areas*</b>	<b>In Buffer or Degraded Areas*</b>
Autumn olive ( <i>Elaeagnus umbellata</i> )	Glyphosate or Garlon 4 cut surface; EZ-Ject glyphosate capsules	Garlon 4-basal bark or thin line; 2,4-D, Crossbow & Banvel foliar spray
Black locust ( <i>Robinia pseudoacacia</i> )	Garlon 4, Tahoe 4E basal bark; Garlon 3A, Tahoe 3A, or Transline foliar spray; EZ-Ject glyphosate capsules; Garlon 4, Tahoe 4E cut surface	Krenite foliar spray; Glyphosate cut surface
Buckthorns (alien species) ( <i>Rhamnus cathartica</i> , <i>Frangula alnus</i> , <i>R. davurica</i> , <i>R. japonica</i> , and <i>R. utilis</i> )	Glyphosate cut surface, EZ-Ject capsules	Stalker, Tordon RTU, Pathway-cut surface
Bush honeysuckles ( <i>Lonicera tartarica</i> , <i>L. morrowii</i> , <i>L. x bella</i> , and <i>L. maakii</i> )	Glyphosate cut surface; EZ-Ject glyphosate capsules	Garlon 3A, Tahoe 3A, or glyphosate foliar spray; Garlon 4 thin line; Pathfinder, Stalker, or Arsenal basal bark
Canada thistle ( <i>Cirsium arvense</i> )	Glyphosate, 2, 4-D, or Transline foliar spray	Curtail foliar spray
Crown Vetch ( <i>Coronilla varia</i> )	Transline foliar spray	2,4-D, Glyphosate, Crossbow, Weed-b-Gone, Garlon 3A, or Tahoe 3A foliar spray
Fescue ( <i>Festuca pratensis</i> )	Roundup Ultra foliar spray	Plateau foliar spray
Garlic mustard ( <i>Alliaria officinalis</i> )	Garlon 3A, Tahoe 3A, or Glyphosate foliar spray	No additional herbicides
Japanese honeysuckle ( <i>Lonicera japonica</i> )	Roundup, Garlon 4, Garlon 3A, or Tahoe 3A foliar spray	No additional herbicides
Johnson grass ( <i>Sorghum halapense</i> )	Glyphosate, RoundupPro, Poast, Poast Plus foliar spray	No additional herbicides
Leafy spurge	Plateau, Garlon 3A, or Tahoe	Tordon + 2,4-D, Tordon 22K

<i>(Euphorbia esula)</i>	3A foliar spray	
Moneywort <i>(Lysimachia nummularia)</i>	None	None
Multiflora rose <i>(Rosa multiflora)</i>	Glyphosate, Garlon 4, Garlon 3A, or Tahoe 3A cut surface; Garlon 4 basal bark; EZ-Ject lance	Glyphosate, Krenite, Banvel foliar spray
Osage orange <i>(Maclura pomifera)</i>	Garlon 3A, Tahoe 3A, Garlon 4, or Tahoe 4E cut surface or basal bark	Surmount or Krenite foliar spray
Purple loosestrife <i>(Lythrum salicaria)</i>	Triclopyr (Garlon 3A, Tahoe 3A) foliar spray	Glyphosate foliar spray
Quaking aspen <i>(Populus tremuloides)</i>	Garlon 3A, Tahoe 3A, or Garlon 4 cut surface	Glyphosate or Krenite foliar spray
Reed canary grass <i>(Phalaris arundinacea)</i>	None	Glyphosate, Poast, Dalapon, or Amitrol foliar spray
Round-leaved bittersweet <i>(Celastrus orbiculatus)</i>	Glyphosate cut surface	Crossbow foliar spray
Siberian elm <i>(Ulmus pumila)</i>	Roundup or Garlon 4 cut surface; EZ-Ject capsules	Garlon 4 basal bark
Smooth sumac <i>(Rhus glabra)</i>	Glyphosate cut surface; Garlon 4 or Tahoe 4E basal bark; EZ-Ject glyphosate capsules	Glyphosate, Garlon 3A, or Tahoe 3A foliar spray
White and yellow sweet clover <i>(Melilotus alba and M. officinalis)</i>	Stinger, Transline, Garlon 3A, or Tahoe 3A foliar spray	Glyphosate foliar spray
Cut-leaved and common teasel <i>(Dipsacus laciniatus &amp; D. sylvestris)</i>	Glyphosate, 2,4-D, Garlon 3A, Tahoe 3A, Transline, or Stinger foliar spray	No additional herbicides
White poplar <i>(Populus alba)</i>	Garlon 3A, Tahoe 3A, Remedy, or Garlon 4 cut surface or basal bark	Glyphosate, Escort, or Ally foliar spray
Wild parsnip <i>(Pastinaca sativa)</i>	Garlon 3A or Tahoe 3A foliar spray	Glyphosate or 2,4-D foliar spray
Wintercreeper (climbing euonymus) <i>(Euonymus fortunei)</i>	Garlon 3A or Tahoe 3A cut surface; Glyphosate foliar spray	No additional herbicides
Kentucky bluegrass <i>(Poa pratensis)</i>	None	Poast, Poast Plus, Acclaim Extra, Fusilade DX, or Envoy foliar spray
Smooth brome <i>(Bromus inermis)</i>	None	Glyphosate, Fusilade, or Poast foliar spray
Honey locust	Glyphosate, Garlon 3A, or	Glyphosate foliar spray

<i>(Gleditsia triacanthos)</i>	Tahoe 3A cut surface; Garlon 4 basal bark	
White Mulberry <i>(Morus alba)</i>	Garlon 3A, Tahoe 3A, or Garlon 4 cut surface	No additional herbicides
Kudzu <i>(Pueraria lobata)</i>	Transline, Garlon 3A, Tahoe 3A, or Veteran 720 foliar spray; Garlon 4 or Tahoe 4E cut surface	No additional herbicides
Sericea lespedeza <i>(Lespedeza cuneata)</i>	Glyphosate, Remedy, Ally, Escort, Garlon 4, or Transline foliar spray	No additional herbicides
Gray dogwood <i>(Cornus racemosa)</i>	Garlon 4, Garlon 3A, Tahoe 3A, or glyphosate cut surface; Garlon 4 or Pathfinder basal bark; EZ-Ject glyphosate capsules; Krenite foliar spray	Garlon 3A foliar spray
Tree-of-heaven <i>(Ailanthus altissima)</i>	Glyphosate, Garlon 3A, or Tahoe 3A cut surface; Garlon 4 basal bark	Glyphosate foliar spray
Chinese yam <i>(Dioscorea oppositifolia)</i>	Glyphosate, Crossbow, Garlon 3A, Tahoe 3A, or Seythe foliar spray	No additional herbicides
Spotted knapweed <i>(Centaurea maculosa)</i>	Transline, Stinger, Curtail, 2,4-D, Garlon 3A, or Tahoe 3A foliar spray	Tordon, Banvel, or Trooper foliar spray
Phragmites <i>(Phragmites australis)</i>	Glyphosate or Habitat foliar spray	No additional herbicides
Japanese stiltgrass <i>(Microstegium vimineum)</i>	Poast, Poast Plus, Acclaim Extra, Fusilade DX, Fusion, or Envoy foliar spray	Glyphosate foliar spray
Japanese hops <i>(Humulus japonicus)</i>	Garlon 3A or Tahoe 3A foliar spray	Glyphosate foliar spray
Musk thistle <i>(Carduus nutans)</i>	Glyphosate cut surface; Glyphosate, Garlon 3A, or Tahoe 3A foliar spray	2,4-D, Crossbow, or Curtail foliar spray
Purple rocket <i>(Hesperis matronalis)</i>	2,4-D, Crossbow, Curtail, Garlon 3A, Tahoe 3A foliar spray	Glyphosate foliar spray

\* See vegetation management guidelines (Vol 1. Nos. 2-40) for detailed information on appropriate use, including restrictions and warnings concerning use and time of application.