
TABLE OF CONTENTS

WHY HERBICIDE	4
MANAGEMENT SCHEDULES & PLANS	5
PLANT ID AND PHENOLOGY	6
INVASIVE SPECIES & IPM	7
STATE LICENSING	9
<ul style="list-style-type: none">• Renewal• Testing• Categories of Licenses	
LABELS & SAFETY DATA SHEETS	11
SAFETY	12
<ul style="list-style-type: none">• Personal• Environmental	
ORDERING TOOLS/SUPPLIES AND HERBICIDES	14
HERBICIDE OPTIONS	15
<ul style="list-style-type: none">• Types• Additives• Used by FPCC	
APPLICATION METHODS	20
<ul style="list-style-type: none">• Foliar spraying• Hand wicking• Cut stump• Basal Bark• Methods used Elsewhere	
APPLICATION TOOLS	23
<ul style="list-style-type: none">• Pump sprayers• Sponge and Wick Applicators<ul style="list-style-type: none">○ Paint roller○ Weed Wand○ Side Swiper	

PRACTICAL HERBICIDE

- Handmade ones
- Handwicking gloves

MIXING, STORAGE, TRANSPORTATION 25

- Mixing
- Storage
- Transportation
- Rinsing and Disposal of Containers

PUBLIC SAFETY 27

- Weather Issues
- Managing group safety
- Signage
- Interacting with the Public

RECORDKEEPING 30

SPECIES SPECIFIC INFORMATION 31

OTHER RESOURCES AND WEBSITES 32

SPECIES TREATMENT LIST Appendix

Woodies (trees, shrubs, vines)

- Tree of heaven (*Alianthus altissima*)
- European black alder (*Alnus glutinosa*)
- Japanese barberry (*Berberis thunbergii*)
- Oriental bittersweet (*Celastrus orbiculatus*)
- Gray dogwood (*Cornus racemosa*)
- Autumn olive (*Elaeagnus umbellata*)
- Burning bush, non-native (*Euonymus alatus*)
- Asian honeysuckle (*Lonicera* spp)
- Silver/white poplar (*Populus alba*)
- Aspen (*Populus tremuloides*)
- Common buckthorn (*Rhamnus cathartica*)
- Glossy buckthorn (*Rhamnus frangula*)
- Black locust (*Robinia pseudoacacia*)
- Multiflora rose (*Rosa multiflora*)
- Siberian elm (*Ulmus pumila*)
- Highbush cranberry viburnum (*Viburnum opulus*)
- Viburnum, non-native (*Viburnum recognitum*, *Viburnum dentatum*)

Herbaceous

- Garlic mustard (*Alliaria petiolata*)
- Spotted knapweed (*Centaurea maculosa*)
- Canada thistle (*Cirsium arvense*)
- Biennial thistles, non-native (*Cirsium* spp)
- Lily-of-the-valley (*Convallaria majalis*)
- Crown vetch (*Coronilla varia*)
- Teasel , common and cutleaf (*Dipsacus* spp)
- Leafy spurge (*Euphorbia esula*)
- Japanese knotweed (*Fallopia japonica*)
- Dame's rocket (*Hesperis matronalis*)
- Yellow iris (*Iris pseudacorus*)
- Birdsfoot trefoil (*Lotus corniculatus*)
- Purple loosestrife (*Lythrum salicaria*)
- Wild parsnip (*Pastinaca sativa*)
- Reed canary grass (*Phalaris arundinacea*)
- Common reed (*Phragmites australis*)
- Sweet clover, yellow and white (*Melilotus* spp)
- Miscanthus grasses (*Miscanthus* spp)
- Lesser celadine (*Ranunculus ficaria*)
- Narrow-leaved cattail (*Typha alternifolia*)

Appendices

- Practical Herbicide Checklist
- Sample Ecological Management Schedule
- NIIP Phenology Calendar
- FPCC Species Treatment List
- FPCC Herbicide Guidelines
- Herbicide Application Log Form
- Volunteer Herbicide Order Form
- Volunteer Tool/Supply Order Form
- Sample Herbicide Labels

WHY HERBICIDE?

Herbicides are one of the primary methods used to manage invasive plants. They are part of a broader group of chemicals called pesticides which are also used to manage insects and diseases. Herbicides can efficiently and effectively suppress or kill unwanted plants and should be used judiciously, safely, and in a way that minimizes adverse effects on non-target resources.

Herbicides are potentially damaging to the environment, and should be used only when less potentially damaging methods are not available, effective, or feasible. Other

treatment options include biological, incendiary (fire), mechanical methods (cutting, mowing). Which control methods are utilized will vary depending upon the site's habitat type and level of threat.

Eradication or control of invasive species may take several years and multiple herbicide treatments or control methods. Monitoring of treated areas is important and dictates how many follow-up treatments are needed. Guidance of which areas merit herbicide treatment is provided through the land management schedules and plans.

MANAGEMENT SCHEDULES & PLANS

Forest Preserves of Cook County have a guiding document that defines all approved restoration activities that may be conducted by staff, interns, contractors and volunteers at all restoration sites. These are either management schedules or plans. These are living documents and are updated as needed.

Management schedules lay out the site management priorities and restoration practices for the short-term future (1-2 years). Schedules may contain a long-term vision for the site as part of the site description. Management schedules are prepared collaboratively with the Regional Ecologist and the Site Steward(s). The Site Steward's level of involvement depends on their interest, knowledge and time. The schedule defines the overall management of the site and which restoration activities are to be completed by volunteers, contractors, interns and/or Resource Management crews.

Management plans are primarily prepared for dedicated Nature Preserves and Land & Water Reserves. Plans are developed by the Regional Ecologist in collaboration with the Illinois Nature Preserves Commission and with input from the Site Steward(s). Plans include detailed history and ecological importance of the site, long-term site management goals, and a management schedule. There are 22 Nature Preserves and

2 Land & Water Reserves within the Forest Preserves of Cook County.

All restoration activities conducted at a site should be reflected on the management schedule or plan. If a new activity or area is identified for possible restoration efforts, the Site Steward(s) should discuss the proposed changes with the Regional Ecologist so that the schedule can be updated.

Although the Site Steward(s) is the primary volunteer contact for FPCC in the development and update of the management schedules, input from other volunteer leaders at the site is strongly encouraged, depending on their knowledge, time and interest. Minimally, all site leaders (such as workday leaders, herbicides, chainsawyers and BPB bosses), should be familiar with the management schedule and they are responsible for knowing what activities are approved within the schedule and should plan their workdays accordingly.

The most current plan is available to site leaders (as identified by the Site Steward) on the Online Volunteer System (OVS). If you do not have access to the management schedule, please talk to your site steward for access. A sample management schedule is available in the Appendix.

PLANT ID AND PHENOLOGY

Herbiciders need to be skilled in plant species identification (ID), to distinguish between native and invasive species. At the very least, the herbicider should be able to identify the main invasive species targets outlined in the site's management schedule, and have an awareness of potential new plant invaders at their site.

Some of the invasive species are difficult to ID and have native species look alike that should be protected. If the herbicider is unsure about ID of a species, they should consult a fellow volunteer or someone else who is knowledgeable in the plant's identification. Limiting your work based on your ID expertise is important. For instance, an herbicider may be comfortable at Buckthorn ID when it is in leaf but not when it is dormant.

We recommend taking the FPCC Managing Invasives class, which tackles identification of 12 of the most common invasive species

found in the Forest Preserves and/or visit the resources listed at the end of the text.

Phenology is the study of periodic plant and animal life cycle events and how these are influenced by seasonal and inter-annual variations in climate, as well as habitat factors (such as elevation). Knowledge of phenology is essential to be able to determine the best time to herbicide target species and with what treatment method. For instance, the best time to treat some invasives is when the plant is in the seedling or rosette stage.

A phenology calendar created by Northeast Illinois Invasive Plant Partnership (NIIP) is available in the appendix to guide you in your treatment approach by species. Please note that this is only a guide and that time of treatment may need to be adjusted, due to the annual and geographic variation in weather patterns.

INVASIVE SPECIES AND THEIR CONTROL

Native vs Non-Native vs Invasives

The terms non-native and invasive are often used interchangeably but they are not the same.

Natives are plants and animals that historically evolved and adapted to the ecosystem at that site. Native communities developed under the specific conditions that shaped the surrounding landscape.

Non-natives are species that have been introduced from other areas. They can be from other parts of the world, other parts of the US, other parts of the state or just from another region or ecosystem nearby. Another term that is often used for introduced species is “exotic.”

Invasives are species that are able to take advantage of degraded ecosystems or altered conditions to displace or eliminate native species, upsetting the balance of the local ecosystem. The term is used to describe the behavior of the species to occupy an area rather than the origins of the species. Invasive behavior can be exhibited by native or non-native species.

When interacting with the public or new volunteers, explaining what non-native and invasive species are is often a good starting point for discussion. Then you can explain that we are actively managing against invasives because of the invasive behavior of that species in that particular environment or area.

IPM

Integrated Pest Management (IPM) is defined as an effective and environmentally sensitive approach to pest management that incorporates the life cycles of pests and their interaction with the environment and available pest control methods, including pesticides. IPM is used mostly in the agricultural and horticulture industry and to a lesser degree in natural resource management. (For more information on IPM, review your IL State Pesticide General Standards Manual.)

IPM uses strategies that keep pest populations below threshold damaging levels and help prevent unnecessary pest management risks to natural resources and humans.

In the eradication of invasive species, the acceptable pest threshold may be zero if an area is not infested. When limited resources or the degree of infestation preclude eradication, a more realistic management goal is to control the unwanted species by reducing their density and abundance to a level which does not compromise the integrity of the ecosystem and allows native species to thrive (refer to Figure 1 on pg. 8.)

The IPM Prevention, Avoidance, Monitoring, and Suppression (PAMS) techniques may be utilized to accomplish management goals. They include:

- 1) Prevention – Clean equipment and gear (boots) when leaving an infested area and before working in another area. When seeding or planting use pest-free seeds and transplants or plugs.
- 2) Avoidance – Maintain/steward for healthy and diverse plant communities.

PRACTICAL HERBICDE

- 3) Monitoring – Coordinate workday activities or target suppression strategies using pest scouting/monitoring (looking for new invaders and treating outliers), and weather forecasts.
- 4) Suppression – Use cultural, mechanical, biological and chemical control methods to reduce or eliminate a pest population or its impacts while minimizing risks to non-target species.

Prioritizing Control Efforts for a Single Species by Density of Infestation

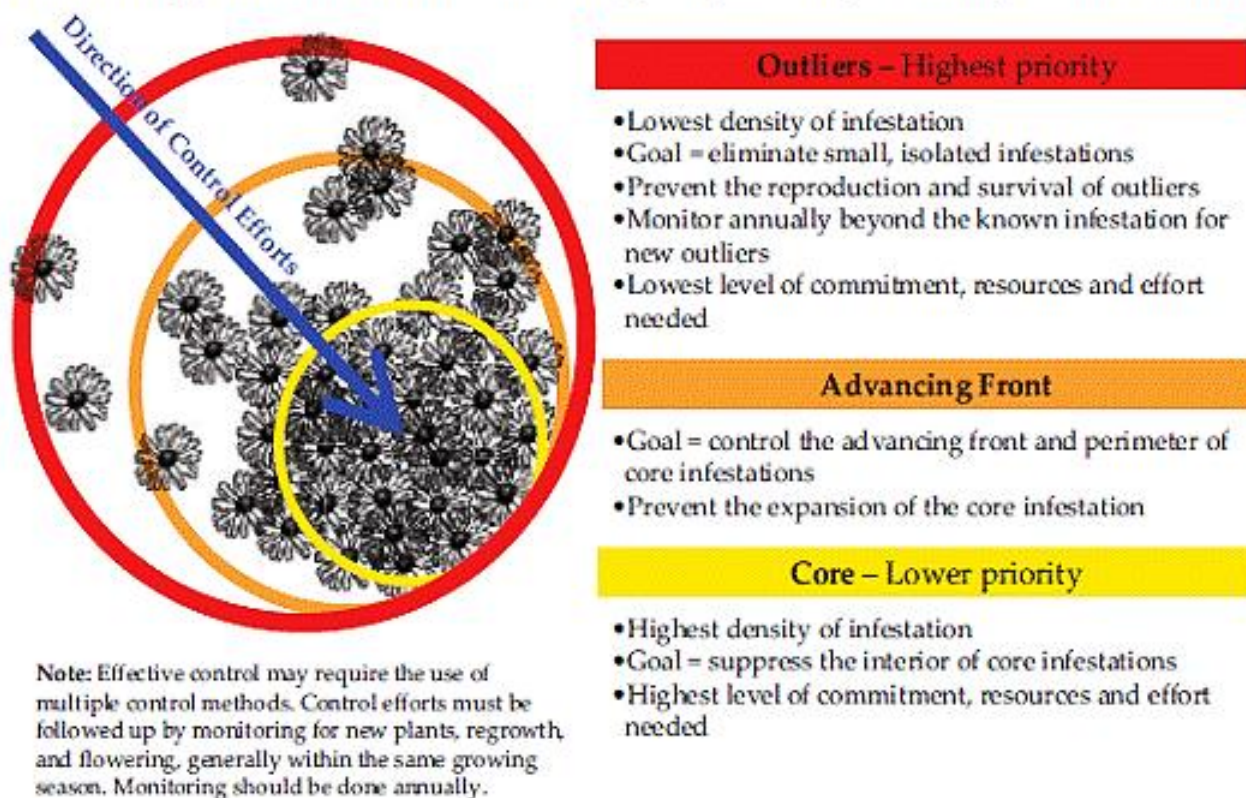


Figure 1 Adapted from work by Fred Clark, Clark Forestry, Inc. and Wisconsin DNR-Urban Forestry

STATE LICENSING

To become licensed to apply herbicides and to retain your license, volunteers must:

- be at least 18 years of age and provide social security number (not work visa)
- return the annual renewal form to the IL Department of Agriculture via Volunteer Resources
- re-test to renew your license every three years.
- carry license, pesticide label(s), and Safety Data Sheets (SDS) whenever using pesticides
- follow all state and federal laws and safety standards

Renewal Process

Renewals are required every year. All pesticide licenses expire on December 31st of each year. For years one and two, a simple renewal application is all that is required to renew a license. Individuals who are in the third year need to retest.

Renewal applications as well as notices for retesting will be sent by Volunteer Resources in early November. The Forest Preserves pays for the licenses but not any late fees or duplicate license fees. All paperwork must go through the Preserves for processing. The license application forms must be completed and returned to Volunteer Resources. The Forest Preserves will issue a check for renewal and send it to the state. The state then issues the license, returns it to Volunteer Resources and they will send it to the volunteer. The process has many steps and often takes several weeks to accomplish.

To check on the status of your license, please visit:

<http://www.agriculture.illinois.gov/Environment/Pesticide/certlic.html>

Testing Process

Two pesticide license exam sessions – one on a weekday and one on a Saturday - are typically offered each fall at the Volunteer Resource Center (VRC). Another exam session is typically offered in early December at the Salt Creek Resource Management facility on a weekday. A review workshop is also offered in conjunction with the VRC sessions to help aspiring license holders prepare for the exam.

Registration for the exam sessions and workshop is conducted on the Online Volunteer System. Volunteer Resources will send out testing reminders to herbicides who keep their license renewal up to date. There is also a wait list on OVS for new herbicides to be notified when the class is being offered.

If a volunteer cannot test on the day selected for the Forest Preserves, they can also test year round in DeKalb or Springfield and at a few selected sites in Cook County in winter and spring. Additionally the Department of Agriculture conducts a limited number of weekday sessions each year within the county.

PRACTICAL HERBICIDE

Categories of Licenses

All volunteers using herbicides at FPCC stewardship sites must possess a valid Public Category Pesticide License issued by the Illinois Department of Agriculture and must have their license with them whenever they are applying herbicide.

Two levels of licenses are offered: **Operator** and **Applicator**.

Operator is a person who uses herbicides at a stewardship site under the guidance of the stewardship site's pesticide Applicator. Operators cannot be licensed without an Applicator being properly licensed. Operators are expected to be in contact with their supervising Applicator the day of herbicide application.

Applicator is a person who is responsible for herbicide ordering, storage, handling, mixing, transportation, and providing guidance to Operators working under their license. Each

stewardship site should have at least one person licensed as an Applicator. They must be available for supervision of the Operator while herbicide is being applied. That means that the Applicator cannot be on vacation, in the hospital, etc. while an Operator is applying herbicide. In some cases, an Applicator may be willing to oversee operators at multiple stewardship sites.

The Forest Preserves strongly encourages all volunteers interested in herbicide application to earn the Applicator license, even if they plan to work primarily as an Operator and continue to receive guidance from a more seasoned, experienced Applicator.

Some organizations such as land trusts use a "Limited Operator" license. This requires that the operator test every year and only apply herbicide when the Applicator is physically present on site. FPCC does not use this "Limited Operator" license.

LABELS AND SAFETY DATA SHEETS

Labels are legal documents. The Applicator and Operator are legally responsible for following the label directions on the product container. All Stewards and Workday Leaders running the workday should also read the label before herbicide is applied at a workday that they are leading. Sample labels are in the appendix.

Safety Data Sheets (SDS) communicate the dangers of using hazardous chemical products. They were formerly known as Material Safety Data Sheets (MSDS). Every chemical manufacturer, distributor, or importer is required to make these available to general public. They contain more information about chemical composition, toxicity, exposure control, first aid, disposal, and other topics. Safety Data Sheets should be read by both Operators and Applicators in conjunction with the label; but it is not a substitute for reading and understanding a pesticide label. Stewards and Workday

Leaders should also be aware of their content in particular as it addresses safety.

Detailed information about labels and SDS is given in the herbicide license prep training class but a few key points to look for are:

- Product Information – Ingredients, EPA registration number, Emergency Contact information and Danger rating
- Precautionary Statements - Human and animal hazards, Personal Protective Equipment (PPE) needed, First Aid and Hazard Statements
- Directions for use - Agricultural or Forestry Use Requirements, Worker Protection Standard (WPS), Reentry information/notification (for unprotected people) and PPE required for workers; Directions for application; Storage/disposal directions; Use Restrictions

SAFETY

Personal Safety

PPE – Personal Protection Equipment

Before we present information on how to use the equipment to apply herbicide, it is important that the topic of safety is introduced. There are different safety requirements and guidelines to follow with various tasks in the herbicide application process and follow through. The label will inform the herbicider of the minimum safety requirements for each step – mixing, transport, application, cleanup and disposal. The common items within PPE are:

- Eye protection – glasses or goggles, with goggles being more safe than just glasses
- Skin protection/general – long sleeves, long pants, closed toe shoes
- Hand protection – chemical resistant gloves, disposable gloves

Labels outline the minimum safety requirements set by OSHA. Being dressed properly and avoiding spills and splashes are keys to safety. Some additional safety issues to note are:

Laundry- Items of clothing that have had herbicide contact should be washed separately, and in some cases (like a glove used for wicking) should be discarded

First Aid

- Instructions on what first aid to provide are included on each herbicide label
- Be prepared to have potable rinse water available for first aid

Environmental Safety

Both wind and precipitation impact safety. Labels will provide some guidance on those impacts. Knowing what weather conditions are predicted before, during and soon after the workday is important. Check www.NOAA.gov for current weather conditions and forecast. Consider canceling or delaying any herbicide application on days with rain predicted or high winds.

- **Drift** Some herbicides will volatilize in hot weather and drift even on windless days. Improper spray pressures or techniques can cause droplets or clouds of herbicide to drift and land on non-target vegetation. Strong winds will also cause these droplets to drift. The herbicide label will usually provide information about potential off-target risks.
- **Runoff** Hypothesize potential runoff scenarios and take appropriate measures to prevent environmental damage to existing water resources. By looking at the precipitation forecast, the herbicider may decide to postpone application to prevent runoff that day.
- **Spills** Specific instructions on how to manage spills are provided on the label. The action is to contain the spill rather than to spread it by diluting it with water.

Minor spills (already mixed solutions)

- Control access to the area
- Stay in the area and warn others of danger
- Confine spills with absorbent materials
- Do not hose down area
- Dispose of contaminated material per instructions on label

Major Spills (concentrate)

- Call RM or VR immediately if the spill is beyond your ability to handle. If you can't reach anyone, call Police

Dispatch to see if they can locate someone to advise you.

- Reporting – All major spills must be reported to the EPA. Notify VR as soon as possible to assist in process.

ORDERING TOOLS/SUPPLIES AND HERBICIDES

Every site should have a storage plan for their volunteers to access tools & supplies

Order forms are available electronically in the Resources section of the website:

www.fpdcc.com/volunteer/resources

Separate forms have been created for these major components:

- Tool and Supply Order
- Herbicide Order

Samples of these forms are in the Appendix.

Order Process

- The Site Steward completes the appropriate Order Form (from above options) and emails it to volunteer.fpd@cookcountyil.gov with the necessary information (i.e. delivery location).
- All orders must come from the site steward and volunteers should

communicate their supply needs to the site steward.

- VR processes the order or notifies Site Steward of any backorders; and schedules delivery

Delivery

- Delivery is made to the selected FPCC facility.
- VR strives to deliver any orders received by Tuesday morning by the end of the day on Friday.

Confirmation

- VR Clerk confirms that item has been delivered to the delivery site and notifies Site Steward.
- Site Steward (or their designee) picks up the items from the delivery site.

HERBICIDE OPTIONS

The choice of herbicide and concentration level depends on the target species, stage of growth, time of year, the presence of desirable species that may be affected, and the proximity of water resources and weather conditions (high winds and temperatures). Herbicides must always be applied in accordance with the label.

In general, it is best to select herbicides that are effective against the weed and not likely to drift, leach to groundwater or wash into streams, are nontoxic to people and other organisms, are not persistent in the environment, and are easy to apply. Always use the lowest concentration of herbicide that is effective and preferentially use more selective herbicides that degrade and break down quickly. Strive to do the job with the smallest total negative impact to the environment.

Types of Herbicides

Herbicides can be classified by either how they act or what they act on.

How they act:

- **Contact herbicides** injure only the portion of the plant contacted by the herbicide; plant death is typically more immediate and visible; these types of herbicides are not used by FPCC
- **Systemic herbicides** are translocated from the leaves to the roots causing plant mortality; plant death is typically more gradual; these herbicides are preferred by FPCC

What they act on:

- **Broad Spectrum herbicides:** kill or suppress all vegetation because they affect physiological processes common to all plants. Examples include: Round-Up Pro, Element 4 and Aquaneat (glyphosate)
- **Grass Specific herbicides:** formulated to kill or suppress only grasses without harming forbs or sedges. Examples include: Poast
- **Broadleaf herbicides:** formulated to kill forbs and other broadleaf plants without harming grasses or sedges. Examples include: Element 3A, Milestone and Transline

Herbicide Additives

Surfactants are compounds that lower the surface tension of a liquid. Surfactants are chemicals that increase the effectiveness of herbicides; however follow the label as the use of too much or too little surfactant can decrease the effectiveness of an herbicide. Surfactants are used to help herbicides adhere to plants and penetrate into the vasculature of the plant which allows for quicker absorption and less runoff of chemical. Surfactants can also make the herbicide rain-safe faster; or the term commonly used is “rainfast”.

Colorant is added to herbicide mixtures to allow the applicator to verify that the herbicide formulation was applied to the intended target and to provide notice to others who may be using the site. Colorants are required by FPCC. However, follow the label as the use of too much colorant can decrease the effectiveness of an herbicide.

PRACTICAL HERBICIDE

Application equipment usually requires more maintenance and regular cleaning when colorants are used and they can have a slight effect on the potency of the herbicide. Also, colorants help the applicator to see if their equipment is leaking or dripping, and if they are getting herbicide on themselves.

Oils are used as a carrier for the herbicide (as opposed to water). Example: Premier (bark oil)

Herbicides Available at FPCC

Different brands of the herbicides we use are supplied depending on availability from the State of Illinois, which is the supplier of herbicides to FPCC. The chemical formulations will remain consistent across these brands.

Half-life is the time it takes for half of the herbicide applied to the soil to dissipate. The half-life gives only a rough estimate of the persistence of an herbicide since the half-life of a particular herbicide can vary significantly depending on soil texture and moisture, temperature, and vegetation at the site.

FPCC staff has already done the “homework” on what herbicides are acceptable to be used on FPCC property. No other herbicides may be used in the Preserves without the prior approval of your Regional Ecologist. If you become aware of an herbicide that you think may have some practical use at your site, please present it to your Regional Ecologist. They can research it with area contractors and other agencies.

The choice of available herbicides has been made by FPCC but within those offerings, the Site Steward and herbicider can decide which

one is appropriate for the species and time of year. They also decide which method and which tool is appropriate for the particular workday.

This course offers the suggested herbicide that FPCC and others have found to be the most appropriate for the life cycle stage. The product label is the final governing rule. If the label does not prohibit the timing, concentration and target species, then it can be used.

The selection considers the following properties:

- Effectiveness for the target species
- Dissipation – persistence, degradation, and likelihood of movement via air or water
- Behavior in soil or water.

Water bodies can be contaminated when directly sprayed upon, or when herbicides drift, volatilize (vaporize), leach into groundwater, or are carried in surface or subsurface runoff. Amounts of leaching and runoff largely depend on total rainfall the first few days after an application. To prevent water contamination, carefully consider the hydrology of the system that is being treated and the predicted rainfall.

The behavior of an herbicide in water is dictated by its solubility in water. Salts and acids tend to remain dissolved in water until degraded through photolysis or hydrolysis. Esters will often adsorb (stick or cling) to the suspended matter in water and precipitate to the sediments. Once in the sediments, esters can remain adsorbed to soil particles or be degraded by microbial metabolism.

Transline (active ingredient is Clopyralid)

Note: FPCC will be phasing out the use of Transline in 2015, to be replaced with Milestone

Use

- Systemic herbicide for use in upland areas only, not aquatic approved
- Selective control of annual and perennial broadleaf herbaceous plants; works best on legumes, thistles and teasel

Technique

- Best for foliar application, spot spray applied to leaves

Advantages

- Passes rapidly into leaves and roots of plants
- Non-toxic to birds, mammals
- Rainfast 1 hour after application with surfactant

Cautions:

- Does not bind with soils and is relatively persistent in soil, water and vegetation
- Has the potential to be highly mobile and a contamination threat to water resources and non-target plants
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Milestone (active ingredient is Aminopyralid)**Use**

- Systemic herbicide for use in upland areas, can be sprayed up to the edge of the water (approved for ditchbanks)
- Selective control of annual and perennial broadleaf herbaceous plants; extremely effective on legumes

Technique

- Best for foliar application, spot spray applied to leaves

Advantages

- Passes rapidly into leaves and roots of plants
- Non-toxic to birds, mammals
- Rainfast 1 hour after application with surfactant

Cautions:

- Does not bind with soils and is relatively persistent in soil, water and vegetation
- Less prone to movement through the soil
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Round Up Pro (active ingredient is Glyphosate)

Note: FPCC will be phasing out the use of Round Up in 2015, to be replaced with Aquaneat

Use

- Systemic herbicide for use in upland areas only, not aquatic approved
- Broad spectrum, non-selective control of annual and perennial herbaceous plants and woody brush and trees

Technique

- Best for spot spray application (applied to leaves), cut stump application and hand wicking application

Advantages

- Passes rapidly into leaves and roots of plants, effective in 48 hours
- Relatively non-toxic to birds and mammals
- Rainfast 1 hour after application with surfactant

Cautions:

- Certain surfactants or some formulations are toxic to fish and amphibians, not for use in aquatic ecosystems
- Use with care near desirable plants as this herbicide will kill anything green
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Aquaneat (active ingredient is Glyphosate), or Rodeo or Aquamaster

Use

- Systemic herbicide approved for aquatic use, can be used over standing water and near aquatic ecosystems
- Broad spectrum, non-selective control of annual and perennial herbaceous plants and woody brush and trees

Technique

- Best for spot spray application (applied to leaves), cut stump application and hand wicking application

Advantages

- Passes rapidly into leaves and roots of plants, effective in 14 days
- Relatively non-toxic to birds, mammals, fish and amphibians
- Rainfast 1 hour after application with surfactant

Cautions:

- Use with care near desirable plants as this herbicide will kill anything green
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Poast (active ingredient is Sethoxydim)

Use

- Systemic herbicide for use in upland areas only, do not apply directly to water or to areas where surface water is present
- Selective control of grasses; sedges and broadleaf plants are not affected

Technique

- Best for spot spray application (applied to leaves) in early spring when grasses are <6" high or late fall when native grasses are dormant
- Mix with methylated seed oil (replaces surfactant) and water, needs agitation
- Rapid degradation by sunlight and microbes can limit effectiveness, use only on cloudy days

Advantages

- Relatively low toxicity to birds and mammals
- Rainfast 1 hour after application with surfactant

Cautions:

- Do not apply directly to water or to areas where surface water is present
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Element 3A (active ingredient is Triclopyr) or Garlon 3A

Use

- Systemic herbicide, can be used near aquatic ecosystems but not over open water
- Selective control of annual and perennial broadleaf plants and woody brush and trees

Technique

- Best for foliar spray application (applied to leaves) and spot spray applications of brush re-sprouts
- This is an amine formulation that is diluted with water

Advantages

- Grasses are not typically affected; can show signs of burn on young grasses or sedges at high application rates
- Rainfast 1 hour after application with surfactant

Cautions:

- Can spray near water, but not in or over open water
- Slightly toxic to birds and mammals
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Element 4 (active ingredient is Triclopyr) or Garlon 4**Use**

- Systemic herbicide for use in upland areas only, do not apply directly to water or to areas where surface water is present
- Selective control of annual and perennial broadleaf plants and woody brush and trees

Technique

- Best for cut stump applications and basal bark applications

- This is an ester formulation that is diluted with basal oil (Premier) designed to penetrate the bark into the cambium layer

Advantages

- Grasses are not affected
- Does not freeze, can be applied during dormant season
- Rainfast 1 hour after application with surfactant

Cautions:

- Do not apply to cut stumps in standing water, highly toxic to aquatic organisms
- Slightly toxic to birds and mammals
- Volatilizes at high temperatures and should not be applied over 85F
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Herbicide Additives Available at FPCC

- **Colorant** - used to dye all herbicides used on FPCC property
- **Surfactant** – used to increase the effectiveness of herbicides
- **Premier** (replaces Ax- it) - used as a carrier oil for Element 4
- **Methylated seed oil** - used as a surfactant with Poast (grass specific herbicide)

APPLICATION METHODS

The method used to apply herbicide is dependent on the point in the annual growth cycle, weather conditions, species, site conditions, etc. All necessary tools are available from FPCC.

Foliar Spraying

The application of herbicide to intact green leaves.

Spot Spraying – the focused application of herbicide to one plant

- How - Typically a backpack sprayer or a hand held sprayer is used in this sort of application
- Advantages
 - highly effective method, minimal damage to surrounding vegetation
 - small amount of herbicide used
- Disadvantages
 - labor intensive
 - spray only when wind speeds are low; high wind speeds can cause drift and damage to non-target species

Broadcast Spraying – the application of herbicide to numerous plants in close proximity

- How - Typically a backpack sprayer is used in this sort of application
- Advantages
 - effective for heavier infestations of small brush, larger monocultures of herbaceous plants
 - can treat non-native invasives in early spring/late fall when natives are dormant

- Disadvantages
 - spray only when wind speeds are low; high wind speeds can cause drift and damage to non-target species

Hand Wicking

The application of herbicide to leaves and stems of herbaceous plants.

- How - Wear long sleeves tucked into long chemical-resistant gloves. Cuff the ends of the gloves to catch drips or runs. Place a cotton glove over a chemical resistant gloved hand or hold a sponge in a gloved hand. Dip hand/sponge into the appropriate herbicide and limit the saturation so that herbicide does not drip or run. Wipe both sides of the leaf blades from base to tip. Be sure to get complete coverage and to treat each leaf and all stems. Cotton gloves will become saturated with herbicide; keep used cotton gloves separate from other protective equipment and dispose of properly.
- Advantages
 - effective for individual scattered plants or small populations in high quality areas
 - highly effective method, minimal damage to surrounding vegetation
- Disadvantages
 - very labor intensive
 - may be difficult to get enough herbicide onto leaves for complete control
 - follow up treatment may be needed
 - uses higher concentration of herbicides

Cut Stump/Stem

The application of herbicide to the cut stump or stems of a woody plant

- How - Herbicide can be applied to a cut-surface with compression sprayer, spray bottle, wick-type applicator, small paint roller or sponge brush.
 - 1) Element 4 diluted with Premier (oil) is applied to the top of the cut stump and down the sides of the bark to the root crown, but not onto the ground. The bark must be dry; otherwise the oil won't make it into the cambium layer. Make sure the bark, cambium, and sapwood are treated; these are the conducting tissues that will be affected. Use 20% solution of Element 4 with Premier (oil).
 - 2) Round-Up Pro diluted with water is applied to the outer edge of the top of the cut stump, so it can be absorbed by the freshly exposed cambium tissue. Round-Up does not penetrate bark, so do not apply down the sides of the cut stump. Use 50% solution of Round-Up Pro or Aquaneat with water.
- Advantages
 - more effective than basal-bark applications on woody stems greater than 5" in diameter or on thick-barked species
 - oil-based herbicides do not need to be applied immediately after cutting, can use throughout fall and winter in temperatures below freezing
- Disadvantages
 - extra care must be taken with roller/brush application if an open container is used to dip into herbicide

- time consuming to refill wick applicators
- spray when winds are low
- water-based herbicide should be applied to the cut surface immediately, and use when temperature is above freezing

Basal Bark

The application of herbicide directly to all sides of the bark of the trunk or stems of woody plants from the root crown up to 12" high

- How - Herbicide can be applied to the bark with a compression sprayer, spray bottle, wick-type applicator, small paint roller or sponge brush. Extra care must be taken with brush application because an open container is necessary.

Use 20% solution of Element 4 with Premier (oil) and apply the mixture to the base of the tree or shrub stems from the root crown up to about 12". Avoid herbicide application to the soil. The bark must be dry otherwise the oil won't make it into the cambium layer. Old or rough bark requires more herbicide (rolled or sprayed) than does young or smooth bark. Thorough coverage all around the stem is important, but it is recommended to stop just short of noticeable runoff.

- Advantages
 - can apply herbicide without the necessity of cutting down the plant
 - this method does use somewhat more herbicide than cut stump but can be a less time consuming technique

PRACTICAL HERBICIDE

- Disadvantages
 - for multi-stemmed shrubs, all of the stems need to be treated
 - water-based herbicide mixtures are not effective using this method
 - follow up treatment may be needed
 - will leave dead standing material

Other Application Methods:

- **Girdling**, also called ring barking is the complete removal of a strip of bark (consisting of cork cambium, phloem, cambium and sometimes going into the xylem) from around the entire circumference of the trunk of a tree. FPCC currently does not use this technique; because we cannot control when the treated specimen will actually

fall, this method may be a safety hazard in public areas. Instead use basal bark technique on an uncut specimen.

- **Frilling** FPCC currently does not use this technique. Similar to girdling, hacks into bark around the trunk to allow herbicide to get into the vasculature. Again because we cannot control when the treated specimen will actually fall, this method may be a safety hazard in public areas.
- **Injection** In this method the herbicide is injected directly into the tree or plant. FPCC currently does not use this technique.

APPLICATION TOOLS

Pump Sprayers

One of the most common types of herbicide application tool is a pump sprayer. These can be simple spray bottles or more complex backpack sprayers.

Options available from FPCC

- Backpack sprayer - 4-gallon manual pump backpack unit for large herbicide spraying jobs. Optional Shoulder Saver Harness – Connects to backpack sprayer to help spread the weight of the sprayer across upper torso and not just shoulders.
- Medium Handheld Sprayer - Holds 1.5 gallons
- Small Handheld Sprayer - Holds 48oz (1.5 quarts). Good for small jobs.

Proper use

Handheld sprayers are good for spot spraying or small cut stump treatment. Backpack sprayers are good for foliar spraying small shrubs or for spraying large areas of forbs such as garlic mustard, reed canary grass or purple loosestrife. Always relieve all pressure in the tank before taking off the tank's lid so that any remaining herbicide is not quickly released onto the herbicider or the environment.

Care and cleaning

Because pump sprayers are made entirely of plastic and rubber, it is important to clean them out often with water. Many adjuvants added to herbicides are acidic, so do not store herbicides in sprayers as this will corrode plastic and metal parts.

- Advantages
 - effective, efficient tool for various herbicide treatment options
 - can transport larger quantities of herbicide into the field
- Disadvantages
 - a full backpack sprayer can be heavy
 - can adjust pressurization depending on type of target being sprayed
 - need to estimate how much you will need for workday to avoid having leftover to store
 - cleanup is more difficult

Sponge and Wick Applicators

Sponge and wick applicators seem to change style and type quite often. And many volunteers use their own home made versions of these applicators. FPCC welcomes suggestions on new commercially available applicators to test, and it is okay to use homegrown versions as long as leaking and dripping are managed.

Options available from FPCC

- Small paint roller & replacement sponge rollers - Handle with 2" small foam roller used to apply herbicide directly to stump or foliage to limit collateral damage. Handle Extensions to eliminate/reduce bending and stooping are also available.
- Side Swiper & replacement fiber rollers - "Golf Club" design type tool that holds several ounces of herbicide that is applied with a roller angled near the end of the tool. Intended to be used on bark treatments.

PRACTICAL HERBICIDE

- Weed Wand & replacement sponge tips– “Cane” type tool that holds several ounces of herbicide that is applied with a sponge applicator tip on the end of the cane. Intended to be used on resprouts of 1” or less diameter, not larger stems.
- Homemade wicking tools are acceptable but leaking and dripping can be issues
- Handwicking gloves – chemical resistant gloves and cotton gloves worn over them
- Additional application tools
 - 1 gallon pitchers to serve as open container used when wicking or a roller wand is being used.
 - 5 gallon buckets for transport of equipment to the field and stabilization in the field. Large 5 gallon bucket used to transport herbicide supplies to the work site. Also used on ground to hold herbicide pitcher to prevent spilling.
 - Funnels - Used when filling herbicide bottles/containers
 - Measuring cups – used to measure chemicals, surfactants and other additives

Proper Use

Sponge and wick applicators are good for cut stump treatments, hand wicking and basal bark treatments. Sponge applicators and hand wicking can be used to target single stems or entire plants.

Care and cleaning

Buy applicators that are sturdy, have few parts, and have a very durable sponge or wick. Store used sponges and wicks in a closed container, or dispose of properly after use.

- Advantages
 - effective, efficient tools for various herbicide treatment options
 - lightweight equipment, less strain on back
- Disadvantages
 - Sponge and wick applicators have a tendency to leak or drip, this may lead to excess herbicide dripping off the sponge or wick and causing damage to non-target species
 - Wick applicators are hard to fill in the field and may result in spillage
 - Sponges, rollers and tips are easily worn and must be replaced often.

MIXING, STORING, TRANSPORTING, DISPOSAL

Mixing

The Applicator is responsible for mixing herbicides for themselves and all Operators that work under their license. They must assure that they are mixed properly so that they retain their properties and toxicity. It is illegal to mix pesticides with other products that are prohibited on the label.

Herbicide concentrates need to be carefully handled, measured and transferred. When mixing herbicides, wear an apron or coveralls over regular clothing, eye protection (we suggest goggles rather than glasses), long sleeves, and chemical resistant gloves. The herbicide label may have additional PPE requirements. Always mix herbicide on a flat, level surface and in an area that is well ventilated.

- Have access to water for mixing and cleaning equipment
- Have potable water available for first aid if needed
- Herbicide packs, sprayers, and storage containers should be flushed after each use with rinse water sprayed on target species, or use the rinsate with the next herbicide application. If unsure about prior rinsing, then rinse again.
- All containers must be clearly labeled and should include the name of the chemical, the percent solution and what date the herbicide was mixed. Duplicate labels are available from VRC.
- When switching from one herbicide to another herbicide, all packs/applicators must be thoroughly flushed or unintended plant mortality may occur after application. If unsure, rinse again.

- All measuring cups, funnels, containers, etc. must be triple rinsed after usage.
- If possible, mix herbicides out of public view.
- Dye is extremely concentrated and will persist long after many rains.
- Due to the use of hard water, FPCC will be introducing Water Conditioner as an additive to boost the effectiveness of herbicide treatments

Tools

- **Measuring Cup Set** – Used when measuring herbicide and other liquids to be poured into bottles/containers. 8oz, 16oz, and 32oz sizes are included in the set. Must be tripled rinse after every use.
- **Funnel Set** – Used when pouring herbicide into tool in storage area or out in the field. Must be tripled rinsed after every use and kept isolated in the field.

Herbicide Storage

The Applicator is responsible for setting up the proper storage methods for each chemical and instructing Operators on proper methods. Product labels must be on all containers. Volunteer Resources provides a second label with every herbicide order. The ziplock bag that it is in can be used to write the concentration on. In addition, concentration levels of any herbicides that have already been mixed must be indicated on the container. Herbicides cannot be stored in any container that does not have both its contents and concentration level clearly identified; this includes rinse water.

Temperature Extremes – Special considerations

- Low (below 50° F) – May need to be re-mixed by stirring
- High (above 80° F)

Storage containers – Re-using original herbicide containers is acceptable. Re-using other containers such as milk bottles, soda bottles, etc. are **not** acceptable.

Volunteer Resources has the following chemical resistant storage containers available:

- 14oz bottles with screw-on lid
- 32oz with flip-up spout
- 64oz with screw-on lid

Transportation

Never transport herbicide within a closed cab vehicle. Herbicide should be stowed in an open air bed or in a closed trunk compartment. Double check all lids, fittings, nozzles and containers before placing

herbicide sprayers/containers in vehicles to reduce the chance of spillage. Use a box or crate that cannot be tipped to stabilize. Extra copies of labels are available and should be on all containers.

Container Disposal

Herbicide containers can be placed with garbage to be landfilled, but careful handling is required. Containers should be triple rinsed and punctured so no accidental re-use can occur. The rinse water can be stored in marked containers and used in the next batch of that herbicide or can be applied to a patch of invasives near your worksite. Although this is highly diluted, it could have some positive effect and is better than running it into a drain system.

Pesticide containers are **not** recyclable.

PUBLIC SAFETY

Weather

Knowing what weather conditions are predicted before, during and soon after the workday is important. Check www.NOAA.gov for current weather conditions and forecast. Consider canceling or delaying any herbicide application on days with rain predicted or high winds. Wind speed, direction, etc. are critical for public safety.

Managing Group Safety

Depending on the volunteer group, the herbicider and Site Steward or Workday Leader should decide when and where to start herbiciding. With an experienced group, an herbicider can follow the cutting immediately. With an inexperienced group, the herbicide application may be confined to areas where the cutting is complete. With a youth group, the herbicide application may need to wait until after the youth group is gone or at least, back at the base enjoying the brush pile burn or recap discussion. Delaying application until much later or next day could impact your decision on techniques or chemical used.

Signage

The Stewardship Workday Leader and the Site Stewards are responsible for the safety of the other volunteers during the workday as well as the general public who may be using the area after the workday. In addition to requiring that colorant be used in mixing herbicide, FPCC requires the following signs be used to inform the public that herbicides were used at the site.

- **Herbicide/Management Notice:** This alerts volunteers and other Forest Preserve patrons that herbicide has been applied to a restoration site. The sign indicates the time when re-entry is safe. This reusable sign should be posted in a highly visible location before herbicide application begins. It is commonly taped or tied near the work site. The re-entry time and date is required. If specific requirement is not noted (or indicates “when dry”) on the chemical label, use 12 hours for re-entry from time of application.
- **Herbicide Notice Flags:** Wire or plastic staked flags that indicate the use of pesticides at a restoration site are placed around the perimeter of the area where herbicide was applied. Reasonable flag intervals are recommended as dictated by the site.

Although the immediate removal is not required, the less time the signs and flags are displayed, the better. Leaving them out there for weeks at a time gives the impression that we are continually herbiciding which is not the case. It is desirable for a volunteer to return to the site the next day to remove the sign and the flags. This does not need to be the herbicider, Steward or Workday Leader, but any volunteer who has the time to retrieve them.

Hansen Ordinance and Signage Policy

You may hear reference to a document called the Hansen Ordinance which dealt with signage in the past. It required that the Herbicide notice sign be posted 24 hours in advance. The ordinance is not in effect any longer. It was replaced in 2014 by the following:

HERBICIDE SIGNAGE POLICY adopted effective February, 2014

Forest Preserve management and all related personnel are required to operate under the following guidelines for herbicide use in land management activities:

The notice period prior to and following the workday will be informed by the herbicide label. If no requirement specifically for forestry is shown on the label, a minimum of before the application work begins at the work site and re-entry of 12 hours after the work is completed will be followed. Notice shall be posted in a manner to identify the area to be treated by signage and/or flags. The signage will contain specific and pertinent information of the date of re-entry and time, after the herbicide application.

Herbicide will only be applied by state licensed personnel with approval from Forest Preserve District Staff and within rules and guidelines set by Illinois Department of Agriculture.

Interacting with the Public

When out in the field applying herbicides, you become a frontline representative of FPCC restoration efforts. On occasion, you may encounter people who will ask questions about what you are doing. People may also be skeptical and challenge you to explain the benefits of your work. In most cases, providing information in an educational way will be successful. In a few cases, however, the situation is a no-win one. In those cases, removing yourself from the confrontation is the best action. The Site Steward or Workday Leader should manage the situation and if necessary, call the FPCC Police. Here are a few frequently asked questions to help prepare you.

Why are you removing and destroying plants?

Many of the invasive shrubs and herbaceous plants that are common on our public lands are not native to the United States. Many of these plants were introduced purposefully or accidentally to this country, and their natural predators, pests and diseases are absent, giving these plants more opportunity to become invasive. Shrubs like buckthorn and weeds like garlic mustard crowd out other desirable, native plant species by reducing light levels to the ground and competing for resources in the soil. Where a dense thicket of buckthorn grows, nothing grows underneath it. One of the most significant threats to our native plant species is loss of habitat due to competition with invasive species.

Why use herbicides?

We would avoid all herbicide use if we could. But like it or not, cutting most shrubs and perennials doesn't stop them from growing back. All of our herbicide volunteers are tested and licensed by the State of Illinois Department of Agriculture. Also, to let people know where herbicide is in use, we put up signs, place notification flags in the ground, and mix brightly-colored dye into the herbicide.

Can't we just let nature take its course?

Humans are a part of nature and we need to make sure we act in such a way that the rest

of nature thrives even in the presence of abundant human activity. If we do nothing, we will continue to let the land deteriorate, and whole native plant and animal communities could disappear—which means a loss of biodiversity and ecosystems that support us.

Who can we give our complaints and concerns to?

The contact information for Volunteer Resources is volunteerfpd@cookcountyil.gov and for Resource Management is john.mccabe@cookcountyil.gov

RECORDKEEPING

FPC requires that records are kept of all herbicide usage. (See Appendix for sample form). These forms can be kept by the Applicator, the Site Steward or they can be turned into the Forest Preserves periodically. The records are useful to provide historical information of what methods, chemicals and concentrations were used to inform future practices. By looking back at those records, the Site Steward will know what combination of factors was effective or ineffective.

The records are also needed to answer any complaints made by other agencies or the public to the Department of Agriculture. Data must be kept for three years to prove that the herbicides were applied properly and within the law.

The Site Steward should be involved in decisions about recordkeeping. Some sites use GIS mapping to identify areas that have been treated to provide a better historical record.

SPECIES SPECIFIC INFORMATION

The most important issue in developing an invasive species control strategy is correct identification of the target plant and its stage in its lifecycle. It's very important to pay attention to the details of identification.

Many different plant species share common physical traits, so we rely upon a unique set of identifying characteristics for each species. Herbiciders should always be working within their plant ID skill level.

Most of the time, the plants we wish to eliminate are growing among plants we wish to preserve, so we must walk lightly among

them and choose the timing and methods of control wisely. As much as we want to remove the invasive species, it shouldn't be at the expense of other desirable specimens.

The appendix has a chart which contains the herbicide options, technique options, timing options, and other considerations for both invasive species and native species that behave in an invasive way. The appendix also provides a phenology calendar for the invasive species to help plan timing of the various treatment options.

OTHER RESOURCES AND WEBSITES

Illinois Nature Preserves Commission – Vegetation Management Manual

<http://www.dnr.illinois.gov/INPC/Pages/INPCManagementGuidelines.aspx>

Illinois Invasive Species Awareness Month

www.illinoisinvasives.org

Northeastern Illinois Invasive Plant Partnership - A cooperative Weed Management Area

<http://www.niipp.net/>