FOREST PRESERVES of Cook County

Ecological Stewardship

Practical Herbicide

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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 has 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.

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 the 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, herbiciders, Chainsawyers and BPB bosses), should be familiar with the management schedule. They are responsible for knowing what activities are approved within the schedule and should plan their workdays accordingly.

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 alikes 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 16 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 IDAG 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.

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.

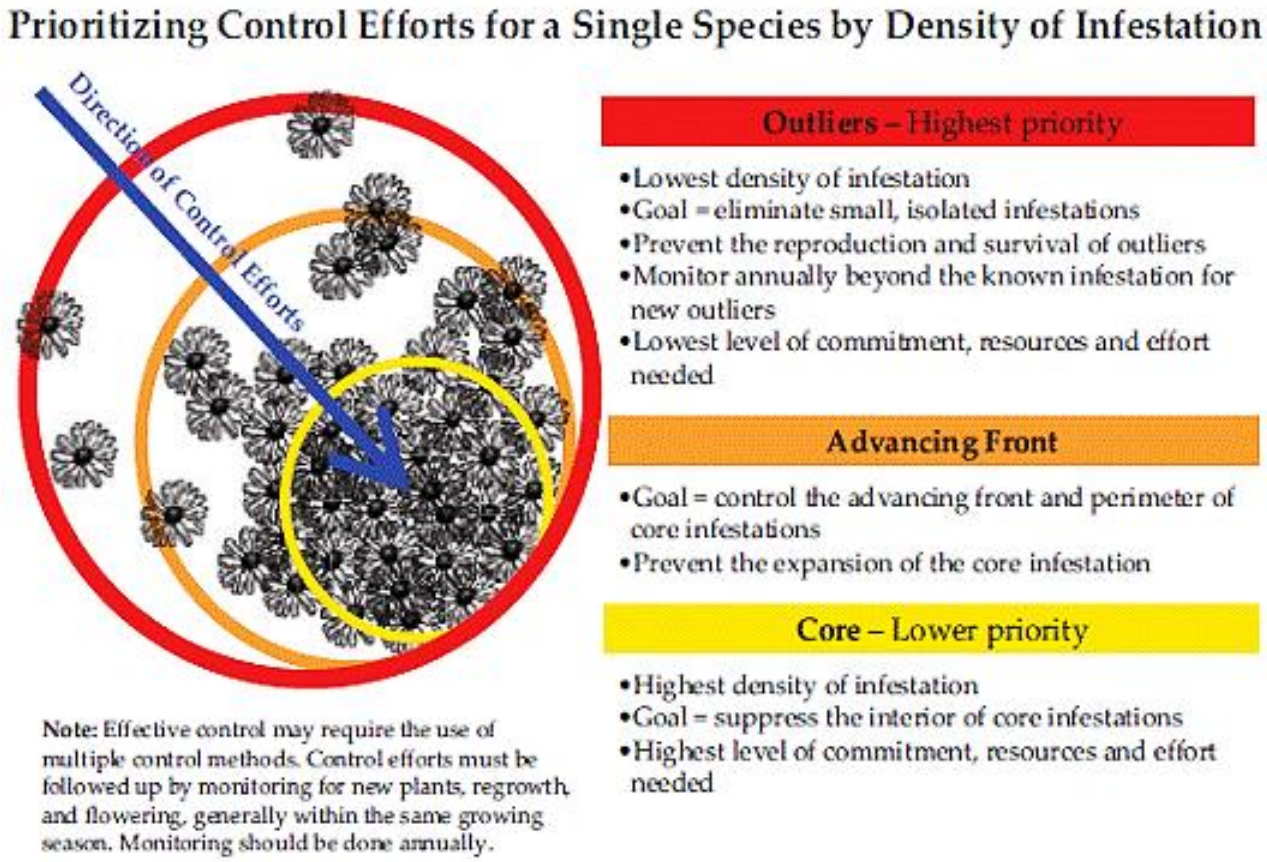


Figure 1 Adapted from work by Fred Clark, Clark Forestry, Inc. and Wisconsin DNR-Urban Forestry

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)
- 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

Licenses are valid for 3 years. Notices for retesting will be sent by Volunteer Resources, typically in early November. The 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:
https://www2.illinois.gov/sites/agr/Pesticides/Pages/Pesticide-Licensee-Results.aspx

Testing Process

Pesticide license exam sessions are typically offered yearly at a Preserve location. Review materials, including a recorded prep class, are available from Volunteer Resources to help aspiring license holders prepare for the exam.

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.

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.

Three levels of licenses are offered:
Applicator, Operator, and Alternative.

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 and Alternative License holder 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.

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.

Alternative License is obtained by completing the Practical Herbicide class offered by the Preserves yearly**.** The license is good for one calendar year (January 1-December 31). Alternative License holders can apply certain herbicides under the direct supervision of an Applicator. They may not transport, mix, or pour herbicide. Alternative License holders must renew yearly by retaking the Practical Herbicide class.

LABELS AND SAFETY DATA SHEETS

Labels are legal documents. The herbiciders 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 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

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
- Skin protection/general – long sleeves, long pants, closed toe shoes
- Hand protection – chemical resistant 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 the Forest Preserve Police 708.771.1001 immediately if the spill is beyond your ability to handle.
- 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

Herbicide orders can only be requested by a licensed Applicator.

Order forms are available electronically in the Resources section of the website: www.fpdcc.com/volunteer/resources

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: Intensity
- **Broadleaf herbicides:** formulated to kill forbs and other broadleaf plants without harming grasses or sedges. Examples include: Vastlan, 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.

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. 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 (basal 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.

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.

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.

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: Available only to approved sites.

Use

- Systemic herbicide for use in upland areas only, <u>not</u> 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 than Transline
- Restricted entry interval is stated on the label. FPCC re-entry is 12 hours.

Intensity (active ingredient is clethodim)

Use

- Systemic herbicide for use in upland areas only, not aquatic approved, do <u>not</u> apply directly to water or to areas where surface water is present
- Selective control of grasses

Technique

- Best for hand wicking or foliar 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

Advantages

- Grass specific, sedges and broadleaf plants are not affected
- Rainfast 1 hour after application with surfactant

Cautions:

- **Toxicity - WARNING**

Roundup Custom (active ingredient is Glyphosate), or Aquaneat, Rodeo

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.

Vastlan (active ingredient is Triclopyr choline)

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
- **Toxicity-WARNING**
- 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, Tahoe 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** (Ax- it) – basal bark oil, used as a carrier oil for Garlon 4
- **Methylated seed oil** - used as a surfactant with Intensity ONLY (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 handheld 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 <u>over</u> 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

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 mixed with Premier (basal bark 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.

  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.

- 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 be used 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 only used 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 Element 4 with Premier (basal bark 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

- 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** 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 does not prefer this technique because we cannot control when the treated specimen will fall, this method may be a safety hazard in public areas. Permission from the FPCC is needed for any use of girdling.

- **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

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 change style and type quite often. FPCC welcomes suggestions on new commercially available applicators to test. While not recommended, 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.
- 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, <u>not</u> 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 tend 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/Alternative License holders 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.

Tools

- **Measure Mate** – Used when measuring herbicide and other liquids to be poured into bottles/containers. 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.

Herbicide Storage

The Applicator is responsible for setting up the proper storage methods for each chemical and instructing Operators/Alternative License holders on proper methods. Product labels must be on all containers. 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
- High (above 80° F)

Storage containers – Re-using original herbicide containers is acceptable. Re-using

other containers such as milk bottles, soda bottles, etc. is illegal.

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.

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. Cancel or delay 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. The herbicide application should be confined to areas where the cutting is complete and there is no chance of entry. With a youth group, the herbicide application cannot be made until after the youth group is gone from the site. 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 are 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. 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 accidently 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 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 volunteer.fpd@cookcountyil.gov and for Resource Management is resourcemanagement.FPCC@cookcountyil.gov

RECORDKEEPING

FPCC requires that records are kept of all herbicide usage. (See Appendix for sample form). These forms can be kept by the Applicator or the Site Steward and are 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.

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/

Practical Herbicide Checklist

Do I have my herbicide license?

- While herbiciding you must have your license on you.
- Is my herbicide license up to date?
    - Applicator and Operator Herbicide Licenses expire every two years on December 31 and must be renewed
    - Every three years you must re-test and pass the State exams for Herbicide Applicator and Operator licensing
    - The Alternative Herbicide License is valid through the calendar year that the Practical Herbicide training was completed, expires December 31

What is the target?

- Indicated in Land Management Schedule
- Recognized by FPCC as invasive species & priority to remove
- Target determines what FPCC approved herbicide to use

How familiar am I with this target?

- Identification – bring pictures/field guides with if unsure; Familiarize yourself with common desirable look-a-likes to avoid during treatment
- Is it a perennial or biennial? (If it's an annual you probably wouldn't treat it)
- Where is it in its life cycle? (Flowering? Dormant? Rosette? Seedling?)
    - Can I identify it accurately at this point in its life cycle?
    - Will an herbicide application be effective at this time?

How dense is the target population?

- Influences herbicide method & amounts needed
    - Spot spray vs. Broadcast
    - Backpack sprayer vs. handheld
- Does patch size/density require additional applicators for effective coverage?
    - Alert other crew members of treatment area
    - Strategize treatment direction/areas with other applicators to ensure safety (no blue on shoes!)
- Start in scattered populations and progress to denser regions (prevent seed spread – try not to walk through high quality areas when leaving degraded areas at end of work day)
- Is the species rhizomatous?

Are there surrounding desirable native plants?

- Dictates application method
    - Handwick in very high quality areas
    - Broadcast applications may be necessary in degraded areas
- Determines what type of chemical to use
    - Use grass specific (Poast/Intensity) if sedges/forbs surround target
    - Use broadleaf specific if desirable grasses are present

What physical conditions are present at the site?

- Soil considerations?
- Upland vs. Wetland vs. Aquatic?
- Slopes?

What part of the site am I working?

- Must be included as an approved area in Mgmt Schedule
- Will I be close to other volunteer workers? Youth? Public?

What is the weather like?

- Temperature?
    - High temperatures pose risk for volatization
    - Use oil based solutions to treat stumps if below freezing
- Precipitation?
    - All FPCC chemicals with surfactant are rainfast in 1hr
    - If major rainfall is forecasted—consider postponing applications
- Cloud cover?
    - Some chemicals progress through plant faster in the presence of sunlight
    - Poast can only be used on cloudy days as it degrades in direct sunlight
- Must consider past, current and future conditions (i.e. drought, wind gusts, & rainfall)

Do I have the necessary supplies to carry out the work?

- Did I coordinate with the Site Steward to order the necessary supplies/herbicides from Volunteer Resource Center (VRC)?
- If I am an Applicator did I prepare enough herbicide for the Operators/Alternative Licensee to use?
- If I am an Operator/Alternative Licensee, did my Applicator prepare the necessary herbicide for me to use?

Do I have all my PPE?

- Minimum requirements listed on specimen label
- Strongly recommend additional precautions (googles/mask/rubber boots etc.) depending on chemical being used or site/weather conditions
- Remove clothing worn during treatment immediately & launder separately
- Always a good idea to bring a change of clothes to workdays

Do I have my Herbicide Application Log to fill out immediately after treatment?

- Did I return it to the Site Steward? (If Operator)
- Did I return it to VRC? (If Applicator)

Did I display the appropriate signage & flagging to the public?

- Appropriate amount & placed at reasonable intervals
- Can they be arranged to be removed the next day?

Is follow up required?

- Monitor treated populations to make sure application was effective
- After appropriate time has elapsed return to address any missed patches/individuals
- Return visit necessary if stumps were left high

Forest Preserves of Cook County
Herbicide Guidelines

Target Species	Herbicide Name	% Solution	Oz. per G	Additional Information
Foliar Application of Woody Plants*				
Autumn Olive	Vastlan (Triclopyr)	4-8%	5-10	Mix w/ water & surfactant for all foliar treatments.
Buckthorns	Vastlan (Triclopyr)	4-8%	5-10	Mix w/ water & surfactant for all foliar treatments.
Barberry	Vastlan (Triclopyr)	4%	5-10	Mix w/ water & surfactant for all foliar treatments.
Black Locust	Transline (Clopyralid)	0.50%	0.64	Mix w/ water & surfactant for all foliar treatments.
Callery Pear	Vastlan (Triclopyr)	4-8%	5-10	Mix w/ water & surfactant for all foliar treatments.
Dogwoods	Vastlan (Triclopyr)	4%	5	Mix w/ water & surfactant for all foliar treatments.
Multiflora Rose	Vastlan (Triclopyr)	3-5%	4-6.5	Mix w/ water & surfactant for all foliar treatments.
Oriental Bittersweet	Vastlan (Triclopyr)	4-8%	5-10	Mix w/ water & surfactant for all foliar treatments.
Honeysuckles	Roundup Custom/ Aquaneat (Glyphosate)	5-10%	6.5-13	Triclopyr is less effective on honeysuckle.
**All woody species above can also be treated with 5-10% Glyphosate (mix w/ water), but this is a non-selective herbicide so great care is needed in sensitive areas.*				
Foliar Application of Herbaceous Species**				
Birdsfoot Trefoil	Milestone (preferred)	0.25%	0.32	
	Transline	0.50%	0.64	Upland only. More selective.
Burdock	Vastlan	1.25%	1.6	
	Roundup Custom/ Aquaneat (Glyphosate)	2.50%	3.2	
Bull Thistle	Milestone (preferred)	0.25%	0.32	
	Transline	0.50%	0.64	Upland only. More selective.
Canada Thistle	Milestone (preferred)	0.25%	0.32	
	Transline	0.50%	0.64	Upland only. More selective.
Cattails	Roundup Custom/ Aquaneat (Glyphosate)	3%	4	Aquatic approved.
Crown Vetch	Milestone (preferred)	0.25%	0.32	
	Transline	0.50%	0.64	Upland only. More selective.
Day Lily	Roundup Custom/ Aquaneat (Glyphosate)	2-3%	3-4	
Garlic Mustard	Roundup Custom/ Aquaneat (Glyphosate)	2%	3	Apply @ rosette stage or hand pull & bag.
	Vastlan	1.25%	1.6	Apply @ rosette stage or hand pull & bag.
Lesser Celandine	Roundup Custom/ Aquaneat (Glyphosate)	4%	5	Apply when 50% of population is flowering.
Lily-of-the-Valley	Roundup Custom/ Aquaneat (Glyphosate)	4%	5	
Leafy Spurge	Roundup Custom/ Aquaneat (Glyphosate)	10%	13	
Wild Parsnip	Vastlan (Triclopyr)	1.25%	1.6	
Phragmites	Roundup Custom/ Aquaneat (Glyphosate)	3%	4	
Purple Loosestrife	Vastlan (Triclopyr)	1.25%	1.6	Aquatic approved.

Target Species	Herbicide Name	% Solution	Oz. per G	Additional Information
Foliar Application of Herbaceous Species** (continued)				
Reed Canary Grass	Roundup Custom/ Aquaneat (Glyphosate)	3%	4	
	Poast Plus w/MSO	2%	3	First mix with 1% oil (MSO) then add water. Upland only.
Spotted Knapweed	Milestone (preferred)	0.25%	0.32	
	Transline	0.50%	0.64	Upland only. More selective.
Sweet Clover	Not applicable			Hand pull & bag or brush cut in flower.
Teasels	Milestone	0.25%	0.32	Apply @ flowering, bolting, or rosette stage.
	Transline	0.50%	0.64	Apply @ flowering, bolting, or rosette stage. Upland only.
	Roundup Custom/ Aquaneat (Glyphosate)	2%	3	Apply only @ rosette stage.
Yellow Iris	Roundup Custom/ Aquaneat (Glyphosate)	5%	6.5	
Handwicking				
Cattails	Roundup Custom/ Aquaneat (Glyphosate)	20-33%	26-42	Mix w/ surfactant 1 oz per gallon.
Phragmites	Roundup Custom/ Aquaneat (Glyphosate)	20-33%	26-42	Mix w/ surfactant 1 oz per gallon.
Reed Canary Grass	Roundup Custom/ Aquaneat (Glyphosate)	10-20%	13-26	Mix w/ surfactant 1 oz per gallon.
Tall Goldenrod	Vastlan	5%	6.5	Mix w/ surfactant 1 oz per gallon.
***Always use a non-ionic surfactant for foliar applications, except with Poast Plus use MSO oil.*				
Cut Woody Stumps or Chemical Basal Bark Treatments				
Includes but is not limited to Honeysuckle, Black Cherry, Maples, Basswood, Tree-of-Heaven, White Poplar, Green Ash, Boxelder, Buckthorns, Barberry, Locusts, Dogwoods, Poison Ivy, Callery Pear, and Autumn Olive.				
Cut Stump/Basal bark	Garlon 4 (Triclopyr)	25%	32	Must be mixed with basal oil, NO WATER IS ADDED. Do not mix with MSO. Not aquatic approved.
Cut Stump	Roundup Custom/ Aquaneat (Glyphosate) or Vastlan	50%	64	For use in wetlands or close to streams, lakes. Mix w/water. Don't use when temps are below 32 degrees. Must be applied within 1-2 hours of cutting to be effective.
Commonly Used Herbicides & Adjuvants				
Brand Name	**Generic Names**		**Notes**	
Rodeo	Aquaneat, Glypro, Accord, Roundup Custom		Add a non-ionic surfactant labeled for aquatic use.	
Vastlan	Vastlan		Replaced Garlon 3A - use a slightly lower rate. Aquatic approved.	
Garlon 4	Tahoe 4, Element 4		Mix with basal oil for stump treatment. NOT recommended for foliar treatment - use Vastlan instead.	
Poast Plus	Vantage Grass		Already includes surfactant. First mix w/ MSO oil, then water.	
Stinger	Transline	Milestone	For foliar treatment, mix w/ water & surfactant. Upland only.	
Adjuvants				
Site/Delux/Bond			Surfactant, use 2-4 oz. per gallon.	
Chem-Stick / Penetrate			Surfactant, use 1 oz. per gallon.	
Liberate			Surfactant, penetrant, & drift reduction. Use 1 oz per gallon.	
Activator 90			Surfactant, use 0.5 oz per gallon.	
Clean Cut			Surfactant, use 0.5 oz per gallon.	
Signal			Dye, use ~1 oz per 3 gallons.	

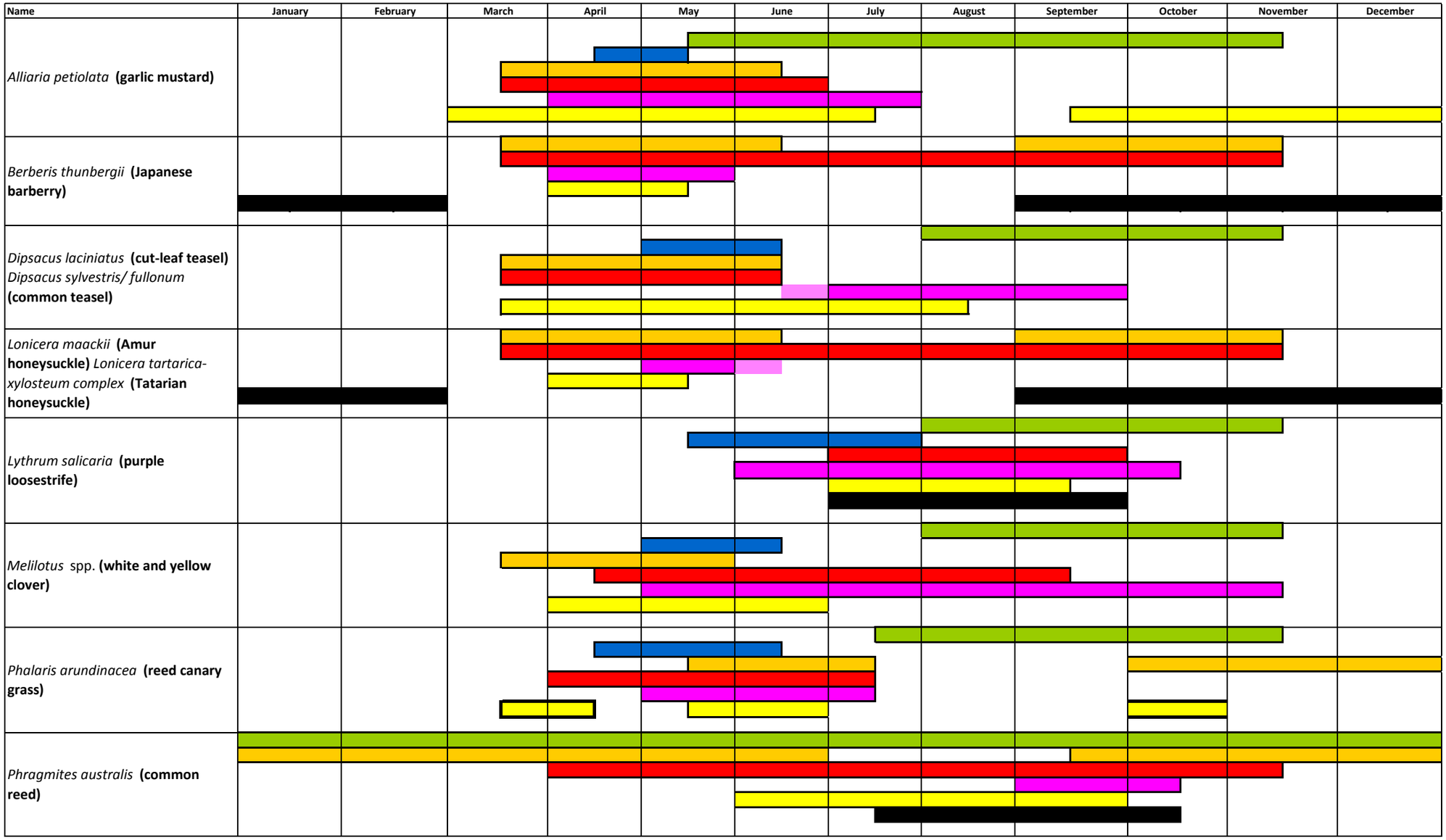
Last updated 11/10/2021 A. Brandon

Herbicide Application Log

of_____Applicator / Operator
(PLEASE PRINT)

	Date	Site Name	Wind Speed	Wind From		Chemical Name	Mix	Target Species
1				N NE E SE S SW W NW				
	Time	Specific Location	Temp. (F°)	Precip.	Amt	Application Type	Volume Applied	
				Rain Snow		❑ Cut Stump ❑ Foliar ❑ Other _____		❑ Signs Posted for re-entry ❑ Flagging Posted After
2	Date	Site Name	Wind Speed	Wind From		Chemical Name	Mix	Target Species
				N NE E SE S SW W NW				
	Time	Specific Location	Temp. (F°)	Precip.	Amt	Application Type	Volume Applied	
				Rain Snow		❑ Cut Stump ❑ Foliar ❑ Other _____		❑ Signs Posted for re-entry ❑ Flagging Posted After
3	Date	Site Name	Wind Speed	Wind From		Chemical Name	Mix	Target Species
				N NE E SE S SW W NW				
	Time	Specific Location	Temp. (F°)	Precip.	Amt	Application Type	Volume Applied	
				Rain Snow		❑ Cut Stump ❑ Foliar ❑ Other _____		❑ Signs Posted for re-entry ❑ Flagging Posted After
4	Date	Site Name	Wind Speed	Wind From		Chemical Name	Mix	Target Species
				N NE E SE S SW W NW				
	Time	Specific Location	Temp. (F°)	Precip.	Amt	Application Type	Volume Applied	
				Rain Snow		❑ Cut Stump ❑ Foliar ❑ Other _____		❑ Signs Posted for re-entry ❑ Flagging Posted After
5	Date	Site Name	Wind Speed	Wind From		Chemical Name	Mix	Target Species
				N NE E SE S SW W NW				
	Time	Specific Location	Temp. (F°)	Precip.	Amt	Application Type	Volume Applied	
				Rain Snow		❑ Cut Stump ❑ Foliar ❑ Other _____		❑ Signs Posted for re-entry ❑ Flagging Posted After

Phenology Calendar Treatment for Common Invasive Plants in Northeast Illinois

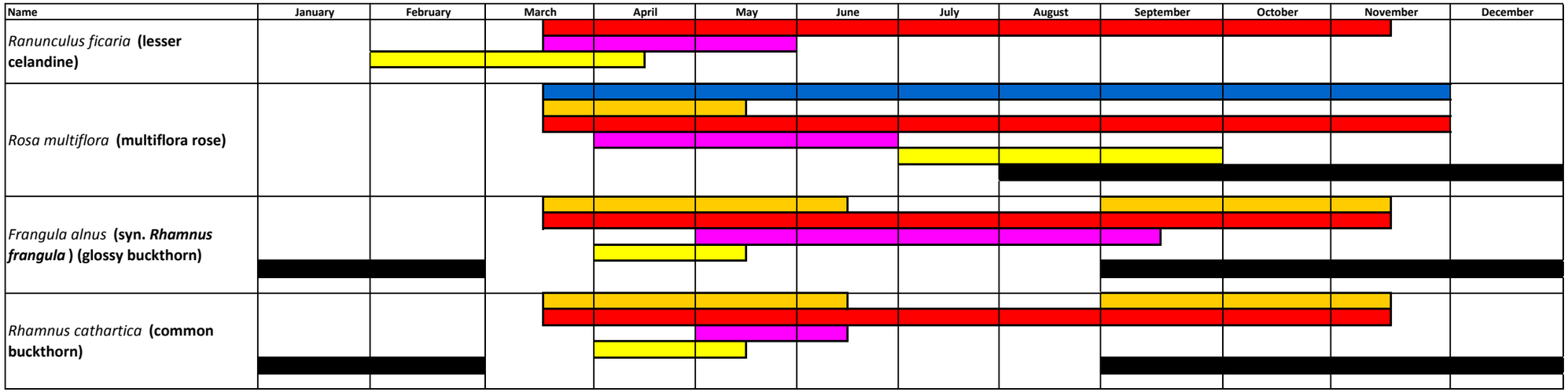


	Mowing
	Do Not Mow
	Flowering
	Spray foliar herbicide
	Burn
	Hand pull, dig
	Spray herbicide on cut stems

Special thanks to:
Ed Hedborn - The Morton Arboretum
Floyd Catchpole - Will County FPD
Rob Littiken - TNC Kankakee Sands
Becky Collings - The Field Museum

NIIPP
NORTHEAST ILLINOIS INVASIVE PLANT PARTNERSHIP
A COOPERATIVE WEED MANAGEMENT AREA

Phenology Calendar Treatment for Common Invasive Plants in Northeast Illinois



	Mowing
	Do Not Mow
	Flowering
	Spray foliar herbicide
	Burn
	Hand pull, dig
	Spray herbicide on cut stems

Specimen Label

Dow AgroSciences

Vastlan™

SPECIALTY HERBICIDE

®™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

TRICLOPYR CHOLINE	GROUP	4	HERBICIDE

For the control of woody plant species and annual and perennial broadleaf weeds on

- **range and permanent grass pastures, grasses grown for hay, Conservation Reserve Program (CRP) sites;**
- **forest sites, conifer and tree plantations, and Christmas tree plantations;**
- **non-crop areas for example, airports, barrow ditches, communication transmission lines or structures, manufacturing and storage sites, electrical power and utility rights-of-way, fencerows, gravel pits, industrial sites, military lands, mining and drilling areas, non-irrigation ditch banks, oil and gas pads, parking lots, petroleum tank farms, pipelines, railroads, roadsides, storage areas, storm water retention areas, substations, unimproved rough turf grasses, vacant lots and other non-crop residential areas, and around farm buildings;**
- **natural areas (open space) for example, campgrounds, parks, prairie management, trails and trailheads, recreation areas, wildlife openings and wildlife habitat and management areas;**
- **including grazed areas on these sites; and**
- **aquatic sites**

For use in New York State, comply with Section 24(c) Special Local Need labeling for Vastlan, SLN NY-160004.

Active Ingredient:
Triclopyr choline: 2-[(3,5,6-trichloro-2-pyridinyl)oxy] acetic acid, choline salt 54.72%
Other Ingredients 45.28%
Total 100.0%

Acid equivalent: triclopyr – 39.02% - 4 lb/gal

Precautionary Statements

Hazard to Humans and Domestic Animals

EPA Reg. No. 62719-687

WARNING

May be fatal if swallowed • Causes substantial but temporary eye injury • Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Protective eyewear
- Long-sleeved shirt and long pants
- Shoes plus socks
- Waterproof gloves

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40 CFR 170.240(d)(4-6)), the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

First Aid

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.
If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Environmental Hazards

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 24 hours.

Agricultural Use Requirements (Cont.)

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Protective eyewear
- Coveralls
- Shoes plus socks
- Waterproof gloves

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for Agricultural Pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

Storage and Disposal

Do not contaminate water, food, or feed by storage and disposal. Open dumping is prohibited.
Pesticide Storage: Store above 32°F or agitate before use.
Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Nonrefillable containers 5 gallons or less:
Container Handling: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Refillable containers 5 gallons or larger:
Container Handling: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water. Agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

Nonrefillable containers 5 gallons or larger:
Container Handling: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Product Information for All Use Sites

Use Vastlan™ for the control of woody plants and broadleaf weeds in range and pasture, grasses grown for hay, Conservation Reserve Program (CRP) sites; forest sites, conifer and tree plantations, and Christmas tree plantations; non-crop areas for example, airports, barrow ditches, communication transmission lines or structures, manufacturing and storage sites, electrical power and utility rights-of-way, fencerows, gravel pits, industrial sites, military lands, mining and drilling areas, non-irrigation ditch banks, oil and gas pads, parking lots, petroleum tank farms, pipelines, railroads, roadsides, , storage areas, storm water retention areas, substations, unimproved rough turf grasses, vacant lots and other non-crop residential areas, and around farm buildings; natural areas (open space) for example, campgrounds, parks, prairie management, trails and trailheads, recreation areas,wildlife openings and wildlife habitat and management areas and aquatic sites.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

Use Precautions

When making applications to control unwanted plants on banks or shorelines of moving water sites, minimize overspray to open water.

It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs), and transitional areas between upland and lowland sites.

It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions for use and precautionary statements of each product in the tank mixture.

Use Restrictions

For use in New York State, comply with Section 24(c) Special Local Need labeling for Vastlan, SLN NY-160004.

Chemigation: Do not apply this product through any type of irrigation system.

Do not apply Vastlan directly to, or otherwise permit it to come into direct contact with, grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants. Do not permit spray mists containing Vastlan to drift onto such plants.

Do not apply to salt water bays or estuaries.

Do not apply directly to un-impounded rivers or streams.

Do not apply where runoff water may flow onto agricultural land as injury to crops may result.

Do not apply with a mistblower.

Irrigation waters:

Do not apply on ditches or canals currently being used to transport irrigation water or that will be used for irrigation within 4 months following treatment. It is permissible to treat non-irrigation ditch banks and the outer banks of irrigation ditches.

Water treated with Vastlan may not be used for irrigation purposes for 120 days after application or until residue levels of Vastlan are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Seasonal Irrigation Waters: Vastlan may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis provided that there is a minimum of 120 days between applying Vastlan and the first use of treated water for irrigation purposes, or until residue levels of Vastlan are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Irrigation Canals/Ditches: Do not apply Vastlan to irrigation canals/ditches unless the 120-day restriction on irrigation water usage can be observed or residue levels of Vastlan are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Restrictions for Potable Water Intakes for Emerged Aquatic Weed Control – Lakes, Reservoirs, Ponds:
See chart below for specific setback distances near functioning potable water intakes.
Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

	Vastlan Application Rate			
Area Treated	**1.5 qt/acre**	**3 qt/acre**	**4.5 qt/acre**	**6 qt/acre**
(acres)	**Setback Distance (ft)**			
4	0	200	400	500
>4 - 8	0	200	700	900
>8 - 16	0	200	700	1000
>16	0	200	900	1300

To apply Vastlan around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

Recreational Use of Water in Treatment Area: There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.

Livestock Use of Water from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

Restrictions for Potable Water Intakes for Submerged Weed Control – Lakes, Reservoirs, Ponds:
For applications of Vastlan to control submerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see the chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Area Treated (acres)	**Concentration of Triclopyr Acid in Water (ppm ae)**				
	0.75 ppm	1 ppm	1.5 ppm	2 ppm	2.5 ppm
	Required Setback Distance (ft) from Potable Water Intake				
<4	300	400	600	800	1000
>4 – 8	420	560	840	1120	1400
>8 – 16	600	800	1200	1600	2000
>16 – 32	780	1040	1560	2080	2600
>32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800*ln (acres) – 160)/3.33	Setback (ft) = (800*ln (acres) – 160)/2.50	Setback (ft) = (800*ln (acres) – 160)/1.67	Setback (ft) = (800*ln (acres) – 160)/1.25	Setback (ft) = (800*ln (acres) – 160)

Example Calculation 1: to apply 2.5 ppm Vastlan to 50 acres:

Setback in feet = (800 x ln (50 acres) - 160
= (800 x 3.912) – 160
= 2970 feet

Example Calculation 2: to apply 0.75 ppm Vastlan to 50 acres:

Setback in feet = (800 x ln (50 acres) - 160
3.33
= (800 x 3.912) – 160
3.33
= 892 feet

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Vastlan around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

Maximum Use Rates

- Apply no more than 6 lb ae of triclopyr (6 quarts of Vastlan) per acre per year on aquatic sites.
- Apply no more than 2 lb ae of triclopyr (2 quarts of Vastlan) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting of hay is allowed.
- On forestry sites, Vastlan may be used at rates up to 6 lb ae of triclopyr (6 quarts of Vastlan) per acre per year.
- For all terrestrial use sites other than range, pasture, forestry sites, and grazed/hayed areas, the maximum application rate is 9 lb ae of triclopyr (9 quarts of Vastlan) per acre per year.
- See Maximum Labeled Rate versus Spray Volume per Acre table below for relationship between mixing rate, spray volume and maximum application rate.

Maximum Labeled Rate versus Spray Volume per Acre

Total Spray Volume (gal/acre)	**Maximum Rate of Vastlan**		
	Range and Pasture Sites[1] (gal/100 gal of spray)	**Forestry Sites[2] (gal/100 gal of spray)**	**Non-Cropland Sites[3] (gal/100 gal of spray)**
400	Do not use	0.375	0.57
300	Do not use	0.5	0.75
200	Do not use	0.75	1.125
100	0.5	1.5	2.25
50	1	3	4.5

Maximum Labeled Rate versus Spray Volume per Acre (Cont.)

Total Spray Volume (gal/acre)	**Maximum Rate of Vastlan**		
	Range and Pasture Sites[1] (gal/100 gal of spray)	**Forestry Sites[2] (gal/100 gal of spray)**	**Non-Cropland Sites[3] (gal/100 gal of spray)**
40	1.25	3.75	5.63
30	1.67	5	7.5
20	2.5	7.5	11.25
10	5	15	22.5

[1]Do not exceed the maximum use rate of 2 lb ae of triclopyr (2 quarts of Vastlan)/acre/year.
[2]Do not exceed the maximum use rate of 6 lb ae of triclopyr (6 quarts of Vastlan)/acre/year.
[3]Do not exceed the maximum use rate of 9 lb ae of triclopyr (9 quarts of Vastlan)/acre/year on non-cropland use sites other than rangeland, pasture, forestry, and grazed/hayed areas.

Use the higher dosage rates in the chart when woody plants approach an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

Haying Restrictions

Haying (harvesting of dried forage)

- Do not harvest hay for 14 days after application.

Slaughter Restriction: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

Avoiding Injurious Spray Drift

Make applications only when there is little or no hazard from spray drift. Small quantities of spray, which may not be visible, may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Spray Drift Management
Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

Aerial Application:
The following drift management requirements must be followed to avoid off-target drift movement from aerial applications with aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they must be observed.

The applicator should be familiar with and take into account the information covered in the following Aerial Drift Reduction Advisory, below.

Aerial Drift Reduction Advisory
Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see Wind, Temperature and Humidity, and Temperature Inversions).

For aerial application on rights-of-way or other areas near susceptible crops, apply through a Microfoil† or Thru-Valve boom†, or use an agriculturally labeled drift control additive. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free as mixtures containing agriculturally labeled thickening agents or applications made with the Microfoil or Thru-Valve boom. Do not use a thickening agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. If a spray thickening agent is used, follow all use directions and precautions on the product label.

†Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by Dow AgroSciences is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than Dow AgroSciences, in selecting and determining how to use its equipment.

Controlling Droplet Size:
- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length: The distance of the outer most operating nozzles on the boom must not exceed 75% of wingspan or rotor diameter.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of the smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Vastlan should be used in thickened (high viscosity) spray mixtures using an agriculturally labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low (follow state regulations). In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine-droplet spray.

High Volume Leaf-Stem Treatment: To minimize spray drift, do not use pressure exceeding 50 psi at the spray nozzle and keep sprays no higher than brush tops. An agriculturally labeled thickening agent may be used to reduce drift.

Use Information

Use Vastlan at rates of 0.75 to 9 quarts of Vastlan per acre to control broadleaf weeds and woody plants. In all cases, use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. Refer to Maximum Use Rates paragraph - follow defined rates restrictions based on use sites and whether or not grazing or haying is involved.

Surfactants
For best results, use a surfactant with foliar applications and apply when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, elm, maples, oaks, pines, or winged elm are prevalent and during applications made in late summer when the plants are mature or during drought conditions, use the higher rates of Vastlan alone or in combination with Milestone, Opensight, Tordon® or other herbicides to broaden the spectrum of activity.

Tank Mixing
Before using any recommended tank mixtures, read the directions and all use precautions and restrictions on all labels in the tank mix. Prior to large scale batch mixing, conduct a "jar test" for spray mixture compatibility by mixing each component in the required order and proportion in a clear glass jar. **Note:** If tank mixing with glyphosate herbicides, mix the Vastlan with at least 75% of the total spray volume desired and ensure that Vastlan is well mixed before adding the glyphosate herbicides to avoid incompatibility. When using Vastlan in combination with Freelexx, 2,4-D amine (like DMA 4 IVM) or low volatile ester herbicides, generally the higher rates should be used for satisfactory brush control.

A surfactant should be added to the spray tank last or as recommended on the product label. If combined with emulsifiable concentrate herbicides, moderate continuous adequate agitation is required.
It is the pesticide user's responsibility to ensure that all products are registered for the intended use. Read and follow the applicable restrictions and limitations and directions for use on all product labels involved in tank mixing. Users must follow the most restrictive directions for use and precautionary statements of each product in the tank mixture.

Broadcast Applications With Ground Equipment
Apply using equipment that will ensure uniform coverage of the spray volumes applied. To improve spray coverage, add a non-ionic surfactant. See Maximum Labeled Rate versus Spray Volume per Acre table below for relationship between mixing rate, spray volume and maximum application rate.

Aerial Application
Aerial sprays should be applied using suitable drift control. (See Use Precautions and Restrictions.) Add a non-ionic surfactant. See Maximum Labeled Rate versus Spray Volume per Acre table above for relationship between mixing rate, spray volume and maximum application rate.

Woody Plant Control With Ground Equipment for Noncropland sites

High Volume Foliage Treatment

For control of woody plants, use Vastlan at the rate of 3 to 9 quarts per 100 gallons of spray solution, or Vastlan at 0.75 to 3 quarts may be tank mixed with Freelexx, 2,4-D (like DMA 4 IVM, or low volatile esters), or products such as Milestone, Opensight, Tordon* and diluted to make 100 gallons of spray solution. Apply at a volume of 100 to 400 gallons of total spray per acre depending upon size and density of woody plants. Applications should be sufficient to provide thorough plant coverage. (See Use Precautions and Restrictions.) Do not exceed maximum allowable use rates per acre.

* Tordon is not registered for use in the states of California and Florida. This product is a restricted use pesticide. Check to ensure tank mix partners are state registered before use. See this product label for more information.

Low Volume Foliage Treatment

To control susceptible woody plants, apply up to 9 quarts of Vastlan in 10 to 100 gallons of finished spray. The maximum volume of the finish spray applied to an acre is limited by the maximum use rate per site type (See Maximum Use Rate section - Range and Pasture, Grazing, Haying sites 2 lb ae, Forestry and aquatic sites 6 lb ae, and all other sites 9 lb ae triclopyr). For best results, a surfactant should be added to all spray mixtures. The spray concentration of Vastlan and total spray volume per acre should be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see Use Precautions and Restrictions). Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Tank Mixing: As a low volume foliar spray, up to 9 quarts of Vastlan may be applied in tank mix combination with Tordon* or Graslan L* in 10 to 100 gallons of finished spray. The maximum volume of the finish spray applied to an acre is limited by the maximum use rate per site type (See Maximum Use Rate section - Range and Pasture, Grazing, Haying sites 2 lb ae, Forestry and aquatic sites 6 lb ae, and all other sites 9 lb ae triclopyr).

* Tordon and Graslan L are not registered for use in the states of California and Florida. These products are restricted use pesticides. See product labels for more information.

Foliage Treatment (Non-Grazed/Non-Hayed Areas)

Use 6 to 9 quarts of Vastlan alone or in a tank mix combination with other herbicides such as Freelexx, 2,4-D (like DMA 4 IVM, or low volatile esters) or Milestone, Opensight, Tordon*, or Graslan L* and apply in a total spray volume of 10 to 30 gallons per acre. Use the higher rates and volumes when plants are dense or under drought conditions.

Interspersed areas in non-grazed/hayed rights-of-ways that may be subject to grazing or haying may be spot treated with this rate if the treated area comprises no more than 10% of the total grazed/hayed area.

* Tordon and Graslan L are not registered for use in the states of California and Florida. These products are restricted use pesticides. See product labels for more information.

Foliage Treatment (Range and Pasture and Grazed/Hayed Areas)

Use 1 to 2 quarts of Vastlan per acre. Apply as a broadcast spray in a total volume of 10 gallons or more per acre. Apply anytime the weeds are actively growing. Tank mixtures can be made with other herbicides registered for use on grazed/hayed sites such as Milestone, Opensight, PastureGard HL, Surmount, Freelexx, or Tordon* or Graslan L*.

* Tordon and Graslan L are not registered for use in the states of California and Florida. These producst are restricted use pesticides. Check to ensure tank mix partners are state registered before use. See product labels for more information.

Weed Resistance Management:

Triclopyr, the active ingredient in this product, is a Group 4 herbicide based on the mode of action classification system of the Weed Science Society of America. Any weed population may contain or develop plants resistant to Group 4 herbicides. Resistant weeds may dominate the weed population if these herbicides are used repeatedly in the same field. Such resistant weed plants may not be effectively managed using Group 4 herbicides but may be effectively managed utilizing other herbicides alone or in mixtures from different herbicide Groups that are labeled for control of these weeds and/or by using cultural or mechanical practices. Consult your local company representative, state cooperative extension service, professional consultants or other qualified authorities to determine appropriate actions for treating specific resistant weeds.

Best Management Practices:

Proactively implementing diversified weed control strategies to minimize selection for weed populations resistant to one or more herbicides is recommended. A diversified weed management program may include the use of multiple herbicides with different modes of action and overlapping weed spectrum with or without tillage operations and/or other cultural practices. Research has demonstrated that using the labeled rate and directions for use is important to delay the selection for resistant weeds. Scouting after a herbicide application is important because it can facilitate the early identification of weed shifts and/or weed resistance and thus provide direction on future weed management practices. One of the best ways to contain resistant weed populations is to implement measures to avoid allowing weeds to reproduce by seed or to proliferate vegetatively. Cleaning equipment between sites and avoiding movement of plant material between sites will greatly aid in reducing the spread of resistant weed seed.

Woody Plants and Weeds Controlled

alder
arrowwood
ash
aspen
Australian pine
bear clover (bearmat)
beech
birch
blackberry
blackgum
Brazilian pepper
broom, Scotch, French, Spanish, Portugese
cascara
ceanothus
cherry
chinquapin
choke cherry
cottonwood
crataegus (hawthorn)
Douglas fir
dogwood
elderberry
elm
gallberry
gorse
hazel
hornbean
kudzu[1]
locust
madrone
maples
melaleuca (seedlings)
mulberry
oaks
persimmon
pine
poison ivy
poison oak
poplar
Russian olive 1/
salt-bush (*Baccharis* spp.)
salt cedar[2]
salmonberry
sassafras
scotch broom
sumac
sweetbay magnolia
sweetgum
sycamore
tanoak
thimbleberry
tulip poplar
waxmyrtle
western hemlock
wild rose
willow
winged elm

[1]For complete control, re-treatment may be necessary.
[2]Use cut surface treatments for best results.

Annual and Perennial Broadleaf Weeds

bindweed
burdock
Canada thistle
chicory
clover
curly dock
dandelion
field bindweed
ground ivy
lambsquarter
lespedeza
Mexican petunia
plantain
purple loosestrife 2/
oxalis
ragweed
smartweed
Spanish needles/ common beggarthicks
tansy ragwort
thistle
tropical soda apple
vetch
wedelia
wild lettuce

Aquatic Weeds

alligatorweed
American lotus
American frogbit
aquatic sodaapple
Eurasian watermilfoil
milfoil species
nuphar (spatterdock)
parrotfeather*
phragmites 3/
pickerelweed
pennywort
purple loosestrife
waterhyacinth
waterlily
waterprimose
watershield

*Re-treatment may be needed to achieve desired level of control.

1/ Russian olive

Apply Vastlan at 3 quarts per acre plus Milestone® and a non-ionic surfactant at 0.25 to 0.5% v/v or 1 quart/acre of crop oil concentrate or methylated seed oil. Treatments can be made to small (usually less than 6 feet in height) trees or to regrowth of trees after cutting, mowing, or shredding operations. For foliar applications, apply until foliage is wet, but not to runoff. When treating regrowth of mowed trees, allow time for the plants to re-grow and develop adequate leaf area for a foliar application. This may mean the application will need to be done the year after cutting or, at least, in September or October after mowing the previous winter or early spring.

These treatments may need to be re-applied in subsequent years to achieve the desired level of long term control if trees resprout after the initial treatment

2/ Purple Loosestrife
Purple loosestrife can be controlled with foliar applications of Vastlan. For broadcast applications, use a minimum of 4.5 to 6 quarts of Vastlan per acre. Apply Vastlan when purple loosestrife is at the bud to mid-flowering stage of growth. Follow-up applications for control of regrowth should be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is needed for ground broadcast applications.

If using a backpack sprayer, a spray mixture containing 0.75% to 1.25% Vastlan should be used. All purple loosestrife plants should be thoroughly wetted.

3/ Phragmites (*Phragmites australis*)
Phragmites can be selectively controlled with foliar applications of Vastlan. For broadcast applications, a minimum of 2 1/4 lb ae of triclopyr (2 1/4 quarts of Vastlan) per acre should be used. For optimum control, apply Vastlan when phragmites is in the early state of growth, 1/2 to 3 feet in height, prior to seed head development. Follow-up applications for control of regrowth may be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If a backpack sprayer is used, a spray mixture containing 0.75% to 1.25% of Vastlan should be used. All phragmites foliage should be thoroughly wetted.

Aerial application by helicopter may be needed when treating restoration sites that are inaccessible, remote, difficult to traverse, isolated, or otherwise unsuited to ground application, or in circumstances where invasive exotic weeds dominate native plant populations over extensive areas and efforts to restore native plant diversity are being conducted. By air, apply in a minimum spray volume of 30 gallons per acre.

Cut Surface Treatments
Individual plant treatments such as cut surface applications may be used on any use site listed on this label at a maximum use rate of 6 or 9 quarts of Vastlan (6 lb ae on forestry sites and 9 lb ae of triclopyr on other sites) per acre. These types of applications are made directly to ungrazed parts of plants and, therefore, are not restricted by the grazing maximum rate of 2 quarts of Vastlan (2 lb ae of triclopyr) per acre on a grazed site.

To control unwanted hardwood trees such as elm, maple, oak and conifers in labeled sites, apply Vastlan, either undiluted or diluted in a 1 to 1 ratio with water, as directed below.

Tree Injector Method
Apply by injecting 1/2 milliliter of undiluted Vastlan or 1 milliliter of the diluted solution through the bark at intervals of 3 to 4 inches between centers of the injector wound. The injections should completely surround the tree at any convenient height. **Note: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is injected directly into plants.**

Hack and Squirt Method
Make cuts around the tree trunk at a convenient height with a hatchet or similar equipment so that the cuts overlap slightly and make a continuous circle around the trunk. Spray 1/2 milliliter of undiluted Vastlan or 1 milliliter of the diluted solution into the pocket created between the bark and the inner stem/trunk by each cut.

Frill or Girdle Method
Make a single girdle through the bark completely around the tree at a convenient height. The frill should allow for the herbicide to remain next to the inner stem and absorb into the plant. Wet the cut surface with undiluted or diluted solution.

Both of the above methods may be used successfully at any season except during periods of heavy sap flow of certain species - for example, maples.

Stump Treatment
Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Vastlan. The cambium area next to the bark is the most vital area to wet.

Chemical Mowing
Vastlan may be applied to the cut surfaces of weed or brush stubble under the deck of a rotary mower such as the Brown Brush Monitor or other equipment that is designed to uniformly apply the herbicide. This method of application may be used for control of annual and perennial broadleaf weeds and for suppression and stem density reduction of woody species. Apply when growing conditions are favorable and there is active plant growth.

Application

Broadleaf Weed Control: Apply at labeled rates for Vastlan under the section "Broadcast Applications with Ground Equipment - Broadleaf Weed Control". Apply the specified rate in a minimum spray volume of 3 gallons per acre. Follow label directions for herbicides that may be applied in tank mix combination with Vastlan to improve weed control or broaden the spectrum of weeds controlled.

Woody Plant Control: For suppression and stem density reduction of woody species, use 2.25 to 4.5 quarts of Vastlan in a minimum spray volume of 5 gallons per acre. Follow label directions under the woody plant control for herbicides that may be applied in tank mix combination with Vastlan to improve control or broaden the spectrum of woody plants controlled.

Tank mixing: For possible increased effectiveness of this treatment, Vastlan may be tank mixed with other herbicides such as Milestone, Tordon*, Graslan L* or imazapyr. Follow all product use directions and do not exceed maximum labeled use rates.

* Tordon and Graslan L are not registered for use in the states of California and Florida. These products are restricted use pesticides. See product labels for more information.

Forest Management Applications
For best control from broadcast applications of Vastlan, add a surfactant and use a spray volume which will provide thorough plant coverage. Recommended spray volumes are usually 10 to 25 gallons per acre by air or 10 to 100 gallons per acre by ground. For spray volumes less than 50 gallons per acre the additon of a non-ionic surfactant will improve spray coverage. Nozzles or additives that produce larger droplets of spray may require higher spray volumes to maintain brush control.

Forest Site Preparation
Use up to 6 quarts of Vastlan alone and apply in a total spray volume of 10 to 30 gallons per acre or Vastlan may be used in a tank mix with other herbicides such as Graslan L*, Freelex, or 2,4-D amine or low volatile ester in a total spray volume of 10 to 30 gallons per acre. Use a non-ionic surfactant for all foliar applications.

*Graslan L is not registered for use in the states of California and Florida. This product is a restricted use pesticide. Check to ensure tank mix partners are state registered before use. See product label for more information.

Note: Conifers planted sooner than one month after treatment with Vastlan at less than 4 lb ae of triclopyr (4 quarts of Vastlan) per acre or sooner than two months after treatment at 4 to 6 lb ae of triclopyr (4 to 6 quarts of Vastlan) per acre may be injured. When tank mixtures of herbicides are used for forest site preparation, labels for all products in the mixture must be consulted and the longest waiting period before conifer planting must be used.

Directed Spray Applications in Tree Plantations such as for Conifer Release
To release conifers or desirable trees from competing vegetation, mix 3 to 6 quarts of Vastlan in enough water to make 100 gallons of spray mixture. To improve spray coverage, add a non-ionic surfactant. The spray mixture should be directed onto foliage of competitive vegetation using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after vegetation has reached full leaf size, but before autumn coloration. When treating woody plants, it is best if the majority of treated plants are less than 6 feet in height to ensure adequate spray coverage. Use care to direct spray away from contact with foliage of conifers and desirable vegetation as injury or death could occur .

Note: Spray may cause temporary damage and growth suppression where contact with conifers occurs; however, injured conifers should recover and grow normally. Over-the-top spray applications can kill pines.

Broadcast Applications for Conifer Release in the Northeastern United States
To release spruce, fir, red pine and white pine from competing hardwoods, such as red maple, sugar maple, striped maple, alder, birch (white, yellow or gray), aspen, ash, pin cherry and *Rubus* spp. and perennial and annual broadleaf weeds, use Vastlan at rates of 1.5 to 3 quarts per acre alone or with Freelexx, 2,4-D (like DMA 4 IVM), or a low volatile ester to provide no more than 4 lb ae per acre from both products. Apply in late summer or early fall after conifers have formed their over wintering buds and hardwoods are in full leaf and prior to autumn coloration.

Broadcast Applications for Douglas-fir Release in the Pacific Northwest and California

To release Douglas-fir from susceptible competing vegetation such as broadleaf weeds, alder, blackberry or Scotch broom, apply Vastlan at 1 to 1.5 quarts per acre alone or in combination with other herbicides to broaden the spectrum of activity. Apply in early spring after hardwoods begin growth and before Douglas-fir bud break ("early foliar" hardwood stage) or after Douglas-fir seasonal growth has "hardened off" (set winter buds) in late summer, but while hardwoods are still actively growing. When treating after Douglas-fir bud set, apply prior to onset of autumn coloration in hardwood foliage. **Note:** Treatments applied during active Douglas-fir shoot growth (after spring bud break and prior to bud set) may cause injury to Douglas-fir trees.

Christmas Tree Plantations

Use Vastlan for the control of woody plants and annual and perennial broadleaf weeds in established Christmas tree plantations. For best results, apply when woody plants and weeds are actively growing. Vastlan does not control weeds which have not emerged at the time of application. If lower rates are used on hard to control woody species, resprouting may occur the year following treatment. Brush over 8 feet tall is difficult to treat efficiently using hand equipment such as backpack or knapsack sprayers. When treating large brush or trees or hard to control species such as ash, blackgum, choke cherry, elm, hazel, madrone, maples, oaks or sweetgum, and for applications made during drought conditions or in late summer when the leaves are mature, use the higher rates of Vastlan or use cut surface applications (see Cut Surface section above). For foliar applications, use a surfactant and apply in enough water to give uniform and complete coverage of the plants to be controlled. Applications made under drought conditions may provide less than desirable results.

Use Precautions:

- Newly seeded turf (alleyways, etc.) should be mowed two or three times before treatment with Vastlan.
- Use Vastlan where legumes, such as clover, are present only if injury and possible control of legumes can be tolerated.

Use Restrictions:

- Do not use on newly seeded grass until well established as indicated by vigorous growth and development of secondary root system and tillering
- Do not reseed Christmas tree areas treated with Vastlan for a minimum of three weeks after application.
- Apply Vastlan only to established Christmas trees that were planted at least one full year prior to application.
- **Do not apply with 2,4-D containing products.**

Application

Apply in late summer or early autumn after terminal growth of Christmas trees has hardened off but before leaf drop of the target weeds. Apply at a rate of 0.75 to 1.75 quarts of Vastlan per acre as a foliar spray directed toward the base of Christmas trees. Use sufficient spray volume to provide uniform coverage of target plants (20 to 100 gallons per acre). Application rates of Vastlan directed for Christmas trees will only suppress some well established woody plants that are greater than 2 to 3 years old (see table below). Broadcast sprays may also be applied in bands between the rows of planted trees. Use spray equipment that will ensure uniform coverage of the desired spray volume.

Vastlan can cause needle and branch injury to Christmas trees. To minimize injury to Christmas trees, direct sprays so as to avoid or minimize contact with foliage. Blue spruce, white spruce, balsam fir and Frasier fir are less susceptible to injury than white pine and Douglas-fir.

Application Rates and Species Controlled (or also see list above):

Vastlan		
0.75 quart/acre	1.25 to 1.5 quarts/acre	1.75 quarts/acre
clover dandelion dock, curly lambsquarters lespedeza plantain, broadleaf plantain, buckhorn ragweed, common vetch	bindweed, field (TG) blackberry[1] chicory (s) fireweed ivy, ground lettuce, wild oxalis poison ivy smartweed (TG) thistle, Canada (TG) violet, wild Virginia creeper[1]	arrowwood (SDL) aspen beech (SDL) birch (SDL) chinquapin cottonwood (SDL) elderberry grape, wild mulberry (SDL) poplar (SDL) sassafras (SDL) sumac (SDL) sycamore (SDL)

(TG) Top growth control, retreatment may be necessary
(S) Suppression
(SDL) Seedlings less than 2 to 3 years old
[1]Use 1.5 quarts per acre rate

Directed Applications

To control hardwoods such as red maple, sugar maple, striped maple, sweetgum, red and white oaks, ash, alder, birch, aspen, and pin cherry, mix 0.19 to1 pint of Vastlan in enough water to make 3 gallons of spray mixture. For directed applications, do not exceed 6 quarts of Vastlan per acre per year. To improve coverage, add a non-ionic agricultural surfactant to the spray. This spray mixture should be directed onto foliage of competitive hardwoods using knapsack or backpack sprayers with flat fan nozzles or equivalent any time after hardwoods have reached full leaf size, but before autumn coloration (when plants are actively growing). The majority of treated hardwoods should be less than 8 feet in height to ensure adequate spray coverage. **Note:** To prevent Christmas tree injury, care should be taken to direct spray away from contact with Christmas tree foliage.

Aquatic and Wetland Sites

Use Vastlan™ for control of emersed, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, and ditches which have little or no continuous outflow, marshes and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

Aquatic Application Methods

Use a non-ionic surfactant in the spray mixture to improve control with foliar applications. Follow all directions and use precautions on the aquatic surfactant label.

Surface Application

Use a spray boom, handgun or other similar suitable equipment mounted on a boat or vehicle. Thorough wetting of foliage is essential for maximum effectiveness. Use 20 to 200 gallons per acre of spray mixture. Special precautions such as the use of low spray pressure, large droplet producing nozzles or addition of a labeled thickening agent may minimize spray drift in areas near sensitive crops.

Aerial Application (Helicopter Only)

Apply with a helicopter using a Microfoil or Thru-Valve boom, or a drift control additive in the spray solution. Apply in a minimum of 10 gallons of total spray mix per acre. Do not apply when weather conditions favor drift to sensitive areas. See label section on aerial application directions and precautions.

Floating and Emerged Weeds

Apply when plants are actively growing. For control of waterhyacinth, alligatorweed (see specific directions below), and other susceptible emerged and floating herbaceous weeds and woody plants, apply 1.5 to 6 quarts of Vastlan per acre as a foliar application using surface or aerial equipment. Use higher rates in the rate range when plants are mature, when the weed mass is dense, or for difficult to control species. Repeat as necessary to control regrowth and plants missed in the previous operation, but do not exceed a total of 6 quarts of Vastlan per acre per annual growing season.

Aquatic Weeds

alligatorweed	parrotfeather[1]	purple loosestrife
aquatic sodaapple	phragmites	waterprimose
Eurasian watermilfoil	pickerelweed	
milfoil species	pennywort	

[1]Re-treatment may be needed to achieve desired level of control.

Alligatorweed

Apply Vastlan at 2 to 6 quarts per acre to control alligatorweed. It is important to thoroughly wet all foliage with the spray mixture. For best results, add an approved non-ionic aquatic surfactant to the spray mixture. Alligatorweed growing outside the margins of a body of water can be controlled with this treatment. However, alligatorweed growing in water will only be partially controlled. Top growth above the water will be controlled, but the plant will likely regrow from tissue below the water surface.

Restrictions for Potable Water Intakes for Emerged Aquatic Weed Control– Lakes, Reservoirs, Ponds:

See chart below for specific setback distances near functioning potable water intakes.

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

	Vastlan Application Rate			
Area Treated	**1.5 qt/acre**	**3 qt/acre**	**4.5 qt/acre**	**6 qt/acre**
(acres)	**Setback Distance (ft)**			
4	0	200	400	500
>4 - 8	0	200	700	900
>8 - 16	0	200	700	1000
>16	0	200	900	1300

To apply Vastlan around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

Recreational Use of Water in Treatment Area: There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
Livestock Use of Water from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

Submerged Weeds

For control of Eurasian watermilfoil and other susceptible submerged weeds in ponds, lakes, reservoirs, and in non-irrigation canals or ditches that have little or no continuous outflow, apply Vastlan as either a surface or subsurface application. Select rates according to the rate chart below to provide a triclopyr concentration of 0.75 to 2.5 ppm ae in treated water. Use higher rates in the rate range in areas of greater water exchange. These areas may require a repeat application. However, total application of Vastlan must not exceed an application rate of 2.5 ppm of triclopyr for the treatment area per annual growing season.

Apply in spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing.

Areas near susceptible crops or other desirable broadleaf plants may be treated by subsurface injection applied by boat to avoid spray drift.

Surface Application
Apply the desired amount of Vastlan as either a concentrate or a spray mixture in water. However, use a minimum spray volume of 5 gallons per acre. Do not apply when weather conditions favor drift to sensitive areas.

Average water depth (feet) x 0.678 x target concentration (ppm) = gallons of Vastlan per surface acre treated.

Example: to achieve a 2 ppm concentration of triclopyr in water averaging 4 feet deep

4 x 0.678 x 2 ppm = 5.4 gallons of Vastlan per surface acre treated

	Concentration of Triclopyr Acid in Water (ppm ae)				
	0.75 ppm	**1 ppm**	**1.5 ppm**	**2 ppm**	**2.5 ppm**
Water Depth (ft)	**Gallons of Vastlan per Surface Acre at Specified Depth**				
1	0.5	0.7	1.0	1.4	1.7
2	1.0	1.4	2.0	2.7	3.4
3	1.5	2.0	3.1	4.1	5.1
4	2.0	2.7	4.1	5.4	6.8
5	2.5	3.4	5.1	6.8	8.5
6	3.1	4.1	6.1	8.1	10.2
7	3.6	4.7	7.1	9.5	11.9
8	4.1	5.4	8.1	10.8	13.6
9	4.6	6.1	9.2	12.2	15.3
10	5.1	6.8	10.2	13.6	17.0
15	7.6	10.2	15.3	20.3	25.4
20	10.2	13.6	20.3	27.1	33.9

Subsurface Application
Apply desired amount of Vastlan per acre directly into the water through boat-mounted distribution systems. When treating target plants that are 6 feet below the surface of the water, trailing hoses should be used along with an aquatic approved sinking agent (except California).

Restrictions for Potable Water Intakes for Submerged Weed Control – Lakes, Reservoirs, Ponds:
For applications of Vastlan to control submerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see the chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Area Treated (acres)	Concentration of Triclopyr Acid in Water (ppm ae)				
	0.75 ppm	1 ppm	1.5 ppm	2 ppm	2.5 ppm
	Required Setback Distance (ft) from Potable Water Intake				
<4	300	400	600	800	1000
>4 – 8	420	560	840	1120	1400
>8 – 16	600	800	1200	1600	2000
>16 – 32	780	1040	1560	2080	2600
>32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800*ln (acres) – 160)/3.33	Setback (ft) = (800*ln (acres) – 160)/2.50	Setback (ft) = (800*ln (acres) – 160)/1.67	Setback (ft) = (800*ln (acres) – 160)/1.25	Setback (ft) = (800*ln (acres) – 160)

Example Calculation 1: to apply 2.5 ppm Vastlan to 50 acres:

Setback in feet = (800 x ln (50 acres) - 160
= (800 x 3.912) – 160
= 2970 feet

Example Calculation 2: to apply 0.75 ppm Vastlan to 50 acres:

Setback in feet = (800 x ln (50 acres) - 160
3.33
= (800 x 3.912) – 160
3.33
= 892 feet

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Vastlan around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

Wetland Sites

Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within noncropland, rangeland, pastures, forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of woody plants and broadleaf weeds in wetland sites, follow use directions and application methods on this label for terrestrial sites.

Note: Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

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Revisions:

1. Updated MOA box per PR Notices 2017-1/2
2. Updated storage temperature under Storage and Disposal section.
3. Deleted the following restriction: Do not apply using fixed wing aircraft.
4. Updated the Aerial Application section under Avoiding Injurious Spray Drift and Use Information sections by deleting Helicopter Only and adding fixed wing language. The aerial fixed wing application language can be found on other triclopyr labels (e.g. Garlon 4)
5. Updated language for High Volume Foliage Treatment under Woody Plant Control with Ground Equipment for Noncropland sites.
6. Updated title and language under Foliage Treatment (Non-Grazed/ Non-Hayed Areas) section.
7. Added the following under the Foliage Treatment (Range and Pasture and Grazed/Hayed Areas) section:
    a. Check to ensure tank mix partners are state registered before use.
8. Updated rates under Cut Surface Treatment section.
9. Updated language under Forest Site Preparation section.
10. Updated rate for Directed Applications under Christmas Tree Plantations.
11. Corrected Vastlan's application rates calculations and units throughout the label.
12. Deleted "in a water spray" for the following sentence under Foliage Treatment:
    a. Use 1 to 2 quarts of Vastlan per acre in a water spray.
13. Added "containing products" to the following restriction under Christmas Tree Plantations:
    a. Do not apply with 2,4-D…