



# Additional Herbicide Information

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*Names and product descriptions given are for the purpose of discussing options  
and are not intended as endorsements.*

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## Spray

The use of spray equipment allows for many combinations of nozzle type, orientation, and pressure to achieve the correct delivery and contact of the herbicide with the target plant while minimizing drift. Label recommendations are given regarding the equipment and the acceptable weather conditions that have been approved for use. It is worth emphasizing that the use of spray equipment, while perhaps the easiest, produces the most non-target damage and drift. Under windless conditions with hand held equipment, herbicide (glyphosate) residues have been measured 800-1400 meters from the target. The use of a non-toxic, wetland labeled dye can help to visualize where the spray goes.

## Stem Injection

An ax and brush can be used to stem inject using the cut and frill technique. A sharp knife or hatchet is used to make cuts down through the bark and into the cambium. The cuts should be arranged to encircle the stem, and the number of cuts is proportional to the diameter of the stem. Each of these cuts is then filled with the recommended amount of herbicide with a squirt bottle or brush. The frill and stem injection techniques are good methods to deliver the active ingredient only to the target plant, helping to minimize unintended impacts on other vegetation. The number of cuts or injections made in the stem controls the delivery of active ingredient. Larger stems require a larger number of cuts or injections, usually one per inch of stem diameter. Stem injection and cut and frill may not be useful on stems less than a few inches in diameter. The Hypo-Hatchet® (about \$350) is a device that automatically injects with each hit of the hatchet, significantly increasing efficiency.

## Stump Painting

Cut stems can also be painted with herbicide to prevent resprouting of the stump. This is also a simple method that is labeled for use with some herbicides in wetlands. When using the cut and frill, stem or stump painting techniques, the likelihood of a spill of herbicide is very high and must be considered a likely event. The results of dripping or splashing the herbicide on the ground, on water, or on non-target plants might be very risky in habitat containing high biodiversity and rare species. Extreme care should be taken when using these techniques.

## Injection Lance

A product called an E-Z-Ject® lance can inject glyphosate capsules into woody trunks (lance = \$400, 1200 capsules \$125). This device uses a short compression stroke to implant the capsules into the desired location of the stem at the correct depth to meet the cambium. Since the lightweight lance is loaded with 400 capsules and is over 5 feet long, it can be used to treat target plants with no danger to non-target plants or the operator. The unit is approved for use in wetlands and aquatic sites, and this technology improves the ability to treat only the target

plants and also eliminates the chance of a spill. This technique also eliminates most of the surfactants and “inert ingredients” which make up most herbicide formulations and can lower the toxicity and breakdown products left after the active ingredient does the desired job.

## Wetland Labeled Herbicides

Accord<sup>®</sup> herbicide is a water-soluble, systemic that can be sprayed on herbaceous and woody plant foliage in wetlands during the growing season. The active ingredient is a 41.5% isopropylamine salt of glyphosate. This is the same active ingredient as Roundup<sup>®</sup>; however, “inert ingredients” toxic to aquatic life have been replaced with a less toxic formulation. The label also recommends the use of this agent 45-60 days before a growing season controlled burn to facilitate removal of both woody and herbaceous vegetation. Any spray application should be tested for calibration and proper targeting with minimal over-spray and run-off. The use of a non-toxic, wetland labeled dye can help to visualize where the spray goes. This will help to select the proper nozzle configuration and delivery pressure. Rodeo<sup>®</sup> aquatic herbicide controls herbs, woody brush, and tree species growing in and around wetland areas. It is labeled for use in a wide range of wetlands. After application there are no restrictions on the use of water for irrigation, domestic, or recreational purposes, which implies a relatively high level of safety.

Rodeo<sup>®</sup> is non-volatile, of low animal toxicity (tested only on mammals, birds and fish), and is claimed to not bioaccumulate in the food chain. It is also claimed to produce no residual activity. Rodeo<sup>®</sup> is also a glyphosate type formulation and can be sprayed or injected with a hypo-hatchet.

There is ample evidence to indicate that glyphosate is more of an environmental concern than assumed by the general public. The active ingredient and the carriers (solvents, surfactants, and spreading and penetrating chemicals) are acutely toxic to animals, including humans. Glyphosate has been shown to cause genetic damage to human blood cells, fruit flies, and onion cells. The active ingredient reduced sperm counts in male rats, lengthened estrous cycles in female rats, and decreased birth weight of their offspring. Adverse effects of glyphosate and its formulations have been documented in all forms of toxicological testing. The dynamics of glyphosate in soils has shown to be very complex with absorption and desorption occurring at nearly equal rates in a range of soil types. This leads to far more mobility in ground and surface water than had been expected based on studies with compounds of similar chemical structure. The breakdown of glyphosate in soil can also take a long time—residues have been found in foods grown in soil that had been treated a full year before planting the food crop. Taking all this into consideration, the US Fish and Wildlife Service has produced a list of endangered plants that are at risk due to some known uses of glyphosate. All registration information of these products carries a warning against use in areas of known endangered species; this warning may not be obvious on the commercial labels.

The stem injection technique also allows the use of Pathway<sup>®</sup> RTU herbicide, which can kill woody plants and be used to keep cut stems from sprouting. Pathway<sup>®</sup> is a formulation of picloram and 2,4 D and is more toxic and persistent than some other compounds but is active at lower concentrations. This chemical group of herbicides is widespread and very toxic to plants. The EPA registration document states that this is among the most mobile of all currently registered pesticides, and in some soils it is nearly recalcitrant to all degradation processes. As of 1993 detection of picloram in groundwater has been reported to the Agency from 10 states. Based on its known resistance to breakdown and ability to move through the soil, the major route of dissipation for the chemical is leaching into the groundwater, where its fate and effects remain unknown. The half-life of these compounds in aerobic conditions ranges from 200-600 days. In anaerobic conditions the compounds are virtually undegraded after 300 days of

incubation. In some forestry studies picloram applied at half the label rate was detectable 790 days later at a depth of 36 inches. The implications of this for wetlands fed by groundwater are ominous and use of these compounds in the wetland or its watershed should not be considered a viable choice.

Garlon®4, a formulation of triclopyr, can also be used with the stem injection system as well as a stem painting treatment that is most effective during the dormant season and might be used to treat bog vegetation during the winter when turtles and other species are dormant. At the current time this family of compounds is labeled for use on rice paddies and pasture rangeland. The low toxicity to most animal groups is a good aspect of this chemical class. The compound does accumulate in the food chain, causing the EPA to require assessments of the aggregate contributions from known dietary sources, in most cases rice products and meat and dairy products from range fed cattle. No acute or chronic risks were indicated. Triclopyr and related compounds dissociate in water to compounds that are photo and microbiologically degradable. The environmental danger from this compound comes from the actions of the active ingredient on non-target plants.

## Summary

It is recommended that you contact the local extension service for updated information on chemical herbicides that may be used in your wetland restoration project. Labels and manufacturers change constantly. New and more effective products are also being labeled; some may be improvements over those listed above.

When a chemical treatment is considered for wetland vegetation control, it should be integrated into a management plan that outlines the ultimate goals and a timeline of steps used to achieve these goals. These chemical techniques can and should be used in conjunction with other methods of woody vegetation management. It would be unlikely that a single herbicide treatment would achieve all the management goals in the typical wetland.

A single herbicide treatment, correctly and environmentally applied, can be an effective tool when used with care. However, the use of herbicides brings with it many documented problems and unknown effects that may endanger long-term success of wetland management. **All recommendations from the EPA and chemical manufacturers suggest that chemicals only be considered as an option of last resort in areas where rare species are found.**