

# Herbicides Used in Forest Management in the Sudbury and North Bay Area

Only federally approved and FSC-sanctioned herbicides are used on the Sudbury and Nipissing Forests. Herbicides are applied only by provincially licensed applicators.

Almost all the herbicide applied on the Nipissing and Sudbury Forest has the active ingredient 'glyphosate'. Trade names of products used include VisionMax ([Label](#), [Material Safety Data Sheet](#)) and Glysil ([Label](#), [Material Safety Data Sheet](#)).

Garlon XRT ([Label](#), [Material Safety Data Sheet](#)) and Garlon RTU ([Label](#), [Material Safety Data Sheet](#)) with active ingredient 'triclopyr' has also been used. Garlon RTU provides forest managers very selective control of woody plants in a convenient, ready to use formulation for backpack basal bark and stump treatment programs.

## How Does VisionMax and Glysil Herbicide Work?

The active ingredient is glyphosate. Glyphosate inhibits an enzyme that is essential to formation of specific essential amino acids in a plant. It is absorbed through leaves and translocated throughout a plant's vascular system.

## Acute Toxicity

The United States Environmental Protection Agency (EPA) ranks acute effects of exposure to a substance into one of four categories, with 'I' being the most toxic and 'IV' being the least toxic. Glyphosate is rated as an EPA Category IV compound in oral rat tests.

Substance	LD50 (mg/kg)	Toxicity Rating
Alcohol	>7500	Very Low
VisionMax	>5000	Very Low
Vision	>5000	Very Low
Vantage	>5000	Very Low
Forza	>4000	Low
Table Salt	3000	Low
Garlon XRT	2966	Low
Vitamin A	2000	Low
Aspirin	1000	Moderate
Caffeine	200	Moderate

Nicotine	53	Moderate
Arsenic	15	High
Warfarin	1.6	High

### **Chronic Toxicity**

Extensive toxicological studies have determined that glyphosate does not cause tumours in laboratory animals. EPA classified glyphosate as Category E (evidence of non-carcinogenicity for humans), the most favourable rating in the scale.

Studies have shown that glyphosate does not cause birth defects or reproductive problems in laboratory animals. Pregnant rabbits and rats given high-dose levels of glyphosate delivered normal offspring. An extensive battery of mutagenicity and genotoxicity assays designed to evaluate gene mutations, chromosome aberrations, and DNA damage and repair showed that glyphosate does not interfere with the genetic make-up of cells.

### **Skin Exposure**

Human clinical studies comparing Roundup Original, baby shampoo, dishwashing detergent, and a household cleaner found that the effects of Roundup and shampoo were indistinguishable from each other and were less irritating than the other two products.

### **Environmental Fate**

VisionMax does not persist in the environment - it is degraded by microorganisms naturally present in the soil. The average half-life of glyphosate in soil is less than 45 days. Studies have shown that glyphosate does not accumulate in the environment after repeated applications over several years or after repeated applications in one year.

### **Wildlife Effects**

Glyphosate is poorly absorbed when ingested. Any absorbed glyphosate is rapidly eliminated, resulting in minimal tissue retention. Feeding studies with chickens, cows, and pigs have shown extremely low to no residues in meat and fat following repetitive exposure. Quebec Ministry of Forests researchers studying glyphosate residues in moose and deer shot during the hunting season concluded that the risk of glyphosate exposure from the consumption of this meat is very low.

Moose browse and browse-use reductions following conifer release may last up to four years. Early reductions in browse availability commonly found in treated areas may be offset by later additions. Such increases have been recorded eight growing seasons after treatment.

Responses of small mammals to glyphosate treatment are species specific. Only short term (one or two years) reductions in some small mammal densities have been reported. Some small mammals are unaffected while some select and others avoid herbicide treated areas.

## **Effects on Birds**

The Canadian Wildlife Service concluded that changes to habitat as a result of 7 to 9 years of glyphosate use in the Lower St. Lawrence Region yielded an increase in the density of several breeding bird species and an increase in avian diversity.

Hatchability and time to hatch chicken eggs were found to be unaffected by application of Roundup Original herbicide at three different concentrations and four different embryo ages.

## **Effects on Water, Fish and Other Aquatic Life**

The half-life of glyphosate in non-sterile water with sediment is less than 8 days.

VisionMax herbicide applied at common-use rates does not cause death, growth rate or migrational changes in fish or direct measurable effect on aquatic or terrestrial invertebrates even when intentionally sprayed over water.

## **More information about glyphosate-based herbicides**

A presentation by Canadian Forest Service, Natural Resources Canada researcher Dean Thompson '[Environmental Fate & Potential Effects of Glyphosate \(Vision\) Herbicide in Canadian Forest Ecosystems](#)'. Includes Frequently Asked Questions (D.Pitt).

[Health Canada's Re-evaluation Decision RVD2017-1, Glyphosate](#)

## **How Garlon XRT/RTU Works**

Triclopyr, the ester formulation herbicide in Garlon XRT and Garlon RTU, mimics the natural plant growth hormone auxin. Auxin controls cell elongation and thus plant growth. Triclopyr imitates auxin but causes mature cells to elongate – this breaks cell walls and stops movement of water and nutrients in the plant. Lack of water and nutrients at growing points causes the plant to die.

Triclopyr (and Garlon XRT/RTU) have been thoroughly tested through environmental, residue and toxicological trials. Both the Environmental Protection Agency and Agriculture Canada have run risk assessment of this herbicide and established that it is safe when used as labelled.

## **Acute Toxicity**

Acute toxicity is usually shown as an LD50 – the dose in milligrams of substance per kilogram of test animal body weight, at which half a population of test animals dies. The tests for this are standardized and carefully run so the LD50 number is a good way of comparing the acute toxicity of substances. The following table shows the LD50 of triclopyr, Garlon XRT and several other common substances. For hazard classification purposes, Health Canada rates

Garlon XRT as moderately toxic: High <100 mg/kg, Moderate 100 to 1999 mg/kg, Low 2000 to 5000 mg/kg, Practically None >5000 mg/kg.

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### **Chronic Toxicity**

Extensive long-term testing (monitored by Health Canada) has produced no evidence that triclopyr or Garlon XRT causes tumours, birth defects, or changes in parent animals' genetic material. Mammals do not break down triclopyr or accumulate it in their body fat. If exposed to triclopyr they excrete it rapidly and unchanged in the urine. This means that bioaccumulation does not occur. Animal and human exposure studies have shown triclopyr consumed in the diet will be cleared from the body in three days.

### **Skin Exposure**

Triclopyr is non-irritating to the skin on a single exposure. Even a prolonged single exposure to concentrated Garlon XRT is unlikely to be absorbed through the skin in harmful amounts. Repeated exposures to Garlon XRT may cause sensitivity similar to an allergy in some individuals, resulting in skin irritation.

### **Environmental Profile: Mammals**

Mammals do not metabolize triclopyr. If ingested, triclopyr is rapidly excreted unchanged. Animal studies have shown that triclopyr consumed in the diet will be cleared from the body within 3 days of intake, with no accumulation in body organs or fat.

Triclopyr has moderate acute oral toxicity.

Extensive, long-term testing has produced no evidence that triclopyr causes carcinogenic, mutagenic or teratogenic effects in mammals, including humans.

Animal dietary tests to determine the effects of frequent, long term ingestion of triclopyr on mammals, established the no-observable-adverse-effect-limit as 2.5 to 5.0 mg/kg/day. Animals will not receive this level of exposure – directly or through eating treated foliage – due to the operational use of Garlon XRT.

### **Environmental Profile: Birds**

Triclopyr has a very low toxicity to birds. Consequently, environmental exposure should not result in any significant acute hazards to birds. In a one-generation reproduction study, mallard duck and bobwhite quail showed no effects when exposed to triclopyr in their diet.

### **Environmental Profile: Soil**

Triclopyr has an average half-life of 46 days, with the range being 30-64 days, varying with soil moisture content and temperature.

Soil moisture converts Garlon XRT to triclopyr acid. Triclopyr acid is degraded rapidly by soil microorganisms (fungi and bacteria). Final breakdown products are carbon dioxide, water and organic acids. Triclopyr has little herbicide activity in soil, therefore residual soil activity is of no biological significance.

Triclopyr is considered to have only slight potential for mobility in forest soils because it adsorbs to organic matter in the upper 15 cm of the soil. This ensures the molecule stays in contact with the microorganisms that are degrading it. There is little risk of triclopyr reaching ground water, and it poses no significant environmental hazard due to leaching. There is little lateral movement of triclopyr in soil.

### **Environmental Profile: Water, Fish and other Aquatic Life**

Half life of triclopyr to triclopyr acid is 1 to 6 hours, half life of triclopyr acid in solution is 3 days. In water sunlight (UV light) and water breakdown triclopyr molecules.

Triclopyr ester has a higher order of toxicity to fish – due to de-esterification at the gill membranes. Used following label directions, Garlon XRT poses no threat to fish.

Triclopyr acid has a very low toxicity to other aquatic organisms.

### **Environmental Profile: Air**

Garlon XRT can be volatile in warm weather requiring management when applying under warm conditions.

## **More Information About Herbicides**

For more information about herbicides visit the following sites:

[Forest Stewardship Council Pesticides Policy](#)

[Using Pesticides in Ontario](#)

[FAQ – Pollinators and Vegetation Management](#)

[Corteva Canada](#)

[Bayer Crop Science](#)

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