

Q&A

What you should know about Garlon® 4 herbicide

Vegetation managers and foresters use Garlon® 4 herbicide from Dow AgroSciences to control unwanted weeds, brush and trees beneath electrical power lines, along railroad beds, roadsides, pipelines, in commercial forestry and wildlife openings, including grazed areas on these sites. Garlon 4 contains the active ingredient triclopyr.

The following information provides specifics on Garlon 4 and explores questions often asked concerning its use.

Why do you need to control vegetation along rights-of-way?

For most right-of-way uses, safety remains a major reason for managing vegetation. Trees, brush and weeds along these rights-of-way can create hazards.

For driver and passenger safety, vegetation must not be allowed to block traffic signs or roadside markers. It also must not conceal guardrails or overtake road shoulders. Vegetation must not obstruct driver vision at intersections or block the line of sight around curves. Excessive vegetation also prevents proper drainage, which can damage roadbeds by creating potholes and other hazards.

Trees growing into power lines can cause electrical power outages and make maintenance difficult and dangerous. In addition, areas around utility substations and land beneath transmission towers require a vegetation-free zone to prevent fire hazards and ensure the transfer of electricity.

Railroad companies need to control weeds along their rights-of-way to maintain roadbeds. Weeds hold water around railroad ties. This causes the ties to rot, increasing chances for derailment accidents. Sparks from the rails can ignite weeds and brush growing too close to the roadbed, and can create a fire hazard. Brush that obstructs motorists' views at railroad crossings is especially dangerous. Controlling it can help avert car/train accidents.

Foresters control vegetation to maximize the amount of timber they can harvest, resulting in more timber harvested on less land. Controlling brush also decreases the potential for forest fires and allows young stands to get started.

Invasive plants, the ones that affect all of the areas we have talked about, threaten to create a monoculture – where one plant type

dominates an area. Invasive plants choke out native plant species and change wildlife habitats so animals cannot utilize the area.

Selective herbicides control these invasive plant species while promoting native plants that in turn attract a wide range of wildlife. More than 50 years of research by Dr. William Bramble, a forest ecologist, and Dr. William Byrnes, an ecologist specializing in forest soils, support the use of selective herbicides to increase biodiversity. (The Bramble and Byrnes study was done in conjunction with Penn State University, Purdue University and the Pennsylvania Game Commission.)

Why do you need to use Garlon 4? Can't you just cut the vegetation?

Mowing and trimming remain important parts of any right-of-way maintenance program. But mechanical means alone cannot protect a right-of-way adequately. Besides being very labor-intensive, mechanical methods can lead to soil erosion. In addition, flailing blades and moving parts pose a danger to employees, livestock and wildlife.

Mowing creates multiple resprouts – the plant's natural defense to the cutting. This only worsens the vegetation problem.

In some cases, mechanical methods quite simply cannot be used. Steep terrain may limit access by mowers, and in the case of railroads and substations, their crushed-stone construction makes mechanical weed control impossible.

Garlon 4 controls unwanted brush and eliminates resprouting. Because of this improved control, crews and heavy machinery visit a right-of-way less frequently, thus, less impact on property near yours.

Who will be applying Garlon® 4 herbicide?

A vegetation manager plans treatments with Garlon 4 herbicide and oversees crew activities. Trained, professional applicators apply Garlon 4 in designated areas using approved application techniques. Organizations may use on-staff crews or hire custom applicators. In either case, these applicators follow directions on the product label, which is reviewed by the U.S. Environmental Protection Agency (EPA).

Aerial applicators are highly trained and use specialized equipment to make applications.



How do I know these applicators are trained properly?

Most states enforce strict standards requiring applicators to be state certified. An experienced crew foreman oversees the application process to ensure all workers follow the specified vegetation-control plan outlined by the vegetation manager. It's in the best interest of any organization to hire qualified people to handle applications – for the good of the organization itself and its standing in the community.

How will they apply Garlon 4?

Crews apply Garlon 4 to unwanted vegetation through a variety of application techniques. Options include foliar, basal bark and cut-stump treatments. Foliar applications spray solution on the plant's leaves. Basal bark techniques apply solution to the lower 15 inches of bark at the base of brush, while cut-stump applications spray or brush solution on the stump's surface after tree removal.

The vegetation manager assesses plant variety and size, and environmental conditions at each site before determining the correct application rate and technique for that location. Other considerations include season, temperature, weather and terrain.

How do these applicators know they are applying the correct amount?

The label indicates the rates to be used. Before an application begins, crews test and calibrate the application equipment to ensure they meet best management practices and any specific label directions.

Will Garlon® 4 herbicide harm my ornamentals or garden?

Garlon 4 has the potential to harm any woody or broadleaf plant that comes in direct contact with the spray solution. Therefore, applicators take care to apply Garlon 4 only on targeted vegetation specified by the vegetation manager. Garlon 4 will not harm grasses, like those in your lawn.

Crews use extra caution to protect your ornamentals or garden by leaving untreated “buffer” zones that add an extra measure of protection. The basal application technique makes damage to

ornamentals or gardens highly unlikely. Once crews apply Garlon 4 to the target vegetation's bark, it essentially “locks” into the plant. When making foliar applications, crews monitor wind speed and direction to assure accuracy.

Drift control agents also can be mixed with the spray solutions to produce larger, heavier droplets that aid application accuracy and reduce the chance of off-target drift.

What is the toxicology profile of Garlon® 4 herbicide?

Triclopyr, the active ingredient in Garlon 4, has been classified as Category D – “not classifiable as to human carcinogenicity” by the EPA. Toxicological studies show no evidence that triclopyr causes cancer, birth defects, genetic damage, genetic mutations, or adverse effects on the immune system or nervous system in humans.

All pesticides sold in the United States must be accepted for registration by the EPA based on scientific studies showing that the pesticide will perform its intended function without unreasonable adverse effects on the environment. The EPA defines unreasonable adverse effects as any unreasonable risk to man or the environment, taking into account the economic, social and environmental costs and benefits of the use of the pesticide.

How do you know the amount of Garlon 4 applied won't hurt animals?

The active ingredient in Garlon 4 disrupts the growth process within a plant by affecting hormones unique to plants. Garlon 4 does not have a similar effect on animals or insects.

To ensure there are no unintended effects to pets, livestock or wildlife, the EPA requires more than 120 different tests. Researchers determine the highest dose of a product that still shows no negative effect on animals, and call this the No-Observable-Adverse-Effect Level (NOAEL).

Scientists also determine a maximum exposure level – exposure to the highest estimated concentration level that could be expected with normal use. Using these two measurements, they calculate a “safety factor” for effects on animals. This factor shows a multiple



EPA's TOXICITY SCALE		LC50 (ppm)
LOW	Practically Nontoxic	>100
	Slightly Toxic	10 - 100
	Moderately Toxic	1.0 - 10
HIGH	Highly Toxic	0.1 - 1.0
	Very Highly Toxic	<0.1

EXPOSURE ASSESSMENT FOR WILDLIFE			
Animal	Type of Exposure	Factor Over the Rate Used	Toxicity Category
Bobwhite	Diet	17x	Slightly toxic
Mallard	Diet	17x	Slightly toxic
Bluegill	Freshwater	**	Moderately toxic
Rainbow trout	Freshwater	**	Moderately toxic
<i>Daphnia magna</i>	Freshwater	**	Moderately toxic
Eastern oysters	Saltwater	**	Highly toxic
Pink shrimp	Saltwater	**	Moderately toxic

**There is no safety factor over maximum labeled rate.

of the maximum exposure level that an animal would have to be exposed to in order to reach NOAEL.

For instance, a factor of 10X means that an animal would have to be exposed to 10 times the maximum expected labeled application rate of Garlon® 4 herbicide to reach NOAEL.

As you can see in the Exposure Assessment chart, there's a large margin of safety for birds. However, you'll find no additional margin of safety figures of aquatic organisms. This reflects laboratory studies that show Garlon 4 applied directly to water and artificially maintained for 96 hours at a concentration equal to 2 quarts per acre, in a 1-foot deep stream or pond, is potentially harmful to aquatic organisms.

Scientists conducting field trials in a natural aquatic setting find it's impossible to maintain that laboratory concentration for 96 hours due primarily to degradation. These study results for Garlon 4 show that the moderately toxic ester formulation quickly converts to the

practically nontoxic technical acid within a few hours. In other words, intentional applications to water in outdoor field trials did not reach toxic levels for the length of time necessary to cause harm.

Although these aquatic studies indicate some margin of safety, applicators do not apply Garlon 4 to water.¹ In addition, they leave buffer zones (land where no herbicide is applied) between the application site and lake, river or stream to add an extra measure of protection.

In addition to the safety factor, you'll also find a relative toxicity designation. Scientists group substances together according to their toxicity level, as you see on the scale above.

Each animal group may respond differently to a substance. For instance, a substance might be slightly toxic to birds and at the same time highly toxic to aquatic organisms. Therefore, it is important to consider the toxicity category when evaluating a product for use near certain habitats.

¹Another formulation, Garlon® 3A herbicide, is labeled for control of emerged weeds and brush in standing water or on banks and shores of ponds or lakes found on rights-of-way or production forests.



How does this relate to my protection?

To avoid exposure from the application, you should stay away from the treated area until leaves, stems and bark have dried. Since the product degrades in a short time and is absorbed into the vegetation, you control your exposure by using common sense and avoiding the area until the vegetation has dried. If you were to become exposed, it would happen through either accidental ingestion, like eating treated berries, or skin absorption from touching treated vegetation before it dries. The next three sections will address these two situations.

What if I have eaten some treated berries?

You should not consume berries that have been treated with Garlon 4. However, scientists have studied accidental ingestion. These studies indicate that accidental ingestion of some treated berries would not cause people harm. These studies, like the animal studies mentioned above, use NOAEL as a benchmark. Based on these studies and residue levels likely to be found at the highest labeled use rate, scientists have determined that an average person (150 pounds) could accidentally consume 5.5 quarts of treated berries each day for the rest of his or her life without experiencing any adverse effects.

What if I walk across a treated area?

Exposure may occur from walking across an area still damp from a foliar treatment. However, the dose you'd receive from this type of activity is not likely to cause any harm. Using NOAEL figures and the maximum expected exposure, scientists have determined that an average person has a safety factor of 1,000² times over the exposure received when walking through an area that was sprayed at the maximum labeled rate. Of course, we do not recommend walking through a treated area until the vegetation has dried.

Do I need to stay indoors during the application?

No. However, it's a good idea to stay away from the application site during treatment and until the vegetation dries. After applicators apply the foliar treatment, avoid the area until the vegetation dries.

What happens to plants after they've been treated?

The active ingredient, triclopyr, works like a growth regulator found only in plants. It enters treated vegetation through leaves, stems and bark, and uses the plant's own transportation system to move into the roots and leaves. It induces rapid growth, which disrupts food production and causes the plant to die from lack of nutrients.

Will Garlon® 4 herbicide remain in the soil?

Garlon 4 is broken down by soil microorganisms (fungi and bacteria) and sunlight. Final breakdown products are carbon dioxide, water and other organic materials. The breakdown rate depends on rainfall, soil temperature and how these factors impact soil microorganism activity – the main cause of breakdown. The time required to break down 50 percent of the active ingredient in soil ranges from 30 to 45 days.

Is it likely that Garlon 4 will seep into groundwater?

In the opinion of Dow AgroSciences, it is not likely that Garlon 4 will seep into groundwater due to environmental factors and the product's chemical properties. Garlon 4 binds tightly to soil organic matter and clay particles, which limits its downward movement in soil. Researchers find most of the active ingredient remains in the upper 12 inches – far from the water table.

Whom may I contact for more information?

Contact your Dow AgroSciences sales specialist or visit our Web site at www.vegetationmgmt.com. To receive printed materials, please fax your request to Dow AgroSciences at 1-800-905-7326. If you have further questions or require technical assistance, please contact our Customer Information Center via e-mail at info@dow.com or call 1-800-263-1196.

²Margin of safety values taken from Environmental Impact Statement – USDA Forest Service – January 1989.

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