



December 21, 2022

WI DNR Pesticide Use Advisory Team

Per your request, I am providing information pertinent to the use of hexazinone for weed control. The Wisconsin County Forest System has requested this assessment because of a need to treat wild parsnip while not damaging red pine trees. Note information provide below is related to the specific assessment considerations established by Wisconsin DNR's pesticide use advisory team. All of my toxicological information is taken directly from the US EPA (see references). I have listed links to all resources used at the end of this letter.

Hexazinone is a broad spectrum herbicides providing control of a wide range of species in agricultural and nonagricultural settings. It was first registered in 1975 by the EPA. Six herbicides that contain this active ingredient are currently registered for use in Wisconsin that contain either 25 or 75% hexazinone in their formulation. These products are registered for use in non-crop areas, alfalfa, blueberries, forested areas, and pastures as foliar or soil applied treatments. Hexazinone has broad spectrum activity on many annual and perennial grasses and broadleaf species and several woody plants. Some species can tolerate "over the top" applications if label directions are closely followed. It is used as a non-selective herbicide in non-crop areas. Alternatives to this product exist in some of the habitats/crops grown. Specific interest is the use in red pine plantations for wild parsnip control. Red pines are one of the more tolerant tree species to this herbicide, and when used properly this product can effectively release them from competition during establishment.

#### Assessment Considerations

1. What are the human health risks (applicator and the public): Toxicity studies indicate that hexazinone to be a severe eye irritant but have low to very low acute toxicity. Highest concern should be on limiting oral exposure as this route is more toxic than dermal exposure or inhalation. Developmental and reproductive toxicity studies found adverse effects to rats and rabbits at mid (reproductive only) and high doses levels (both reproductive and developmental). The EPA has struggled to address carcinogenicity with this product. While no data suggests it acts as a carcinogen in humans, one study has suggested it behaves as a carcinogen in animals. All other animal studies have been negative. Given the use pattern for this product, minor risk exists when using this product. Risk is to the applicator and with the



appropriate personal protective equipment this risk can be minimized. I do not expect a significant risk to non-applicators.

2. What are the potential negative environmental impacts and risks?

**Environmental fate:** Hexazinone and its degradates persist and can be mobile in the environment. Soil half-life values have been reported to average 90 days but range considerably depending on the environmental and physical conditions. This active ingredient has been detected in runoff water 6 months after application in a forest system so concern about off-site movement is high. This active ingredient has also been detected in groundwater (albeit at levels below the health advisory limit of 200 ppb). Wisconsin has been testing for presence since 2015 and as of November 2021 has found it in 17 of 1,472 private well samples. It did not detect hexazinone or degradates in any field edge wells however, suggesting runoff may not be common. Currently there is a voluntary enforcement standard of 400 ppb in groundwater in Wisconsin. Breakdown primarily occurs through microbial activity but it can also photodegrade.

**Risk to organisms:** Hexazinone is practically non-toxic to birds, honey bees, fresh water fish, and freshwater invertebrates and mollusks. It is slightly toxic to crustaceans. Given the mobility and persistence of this active ingredient concern for injury of nearby terrestrial and aquatic plants exist. Risk of physical drift to non-target plants exist but can be minimized if following label directions but potential for off-site movement is moderate to high depending on the environmental and physical conditions of the site. These concerns can be mitigated by applying lower use rates and/or banded applications vs broadcasting entire fields, and/or vegetated borders to limit offsite movement.

3. How effective is the proposed pesticide for the proposed target(s)? Products that contain hexazinone are effective on a range of grasses and broadleaf species in addition to some woody plants. The level of general weed control has resulted in this active ingredient being considered the optimal product for establishment of ***tolerant forest tree species***. Wild parsnip is listed as a weed that is controlled on the label. While I have no experience nor could I find any research to support this listing I am confident that it would effectively control this species. The rates labeled for control of wild parsnip seem excessively high (2-5 lbs ai/A) however, and would not be recommended in Wisconsin for red pine release/establishment (0.5-1.5 lbs ai/A typical use range). I would recommend research to determine the effective



rate on parsnip as I imagine it much less (<1 lbs ai/A). Many other herbicides registered for use in forests could be used as alternatives for parsnip control, and while not all, some are labeled for use in red pine forests. I found that glyphosate, metsulfuron, sulfometuron and triclopyr are registered for use in red pine plantations. These active ingredients are all effective at controlling wild parsnip. While applications methods may be different (spot vs broadcast, or directed vs over the top) these would provide viable alternatives. Additionally, the cost of these products (<\$25/A) are much less than hexazinone (\$75/A). These products do have limited soil residual activity compared to hexazinone, so depending on application method two applications may be needed for these products over hexazinone to obtain adequate control. Even if two applications were applied, the cost would be much lower for these alternatives than hexazinone.

4. What is the specificity of the proposed pesticide to the proposed target(s)? This product is safe to red pine trees, but many other forestry trees are susceptible. Use would need to be focused on tree species that have known tolerances. Red pines appear to be one of the most tolerant species.
5. Is there a need for a maximum application site frequency and/or area other than specified on the product label? EPA has invoked a maximum of 8 lbs ai/A applied to any one site. Only one application per year should be needed, less in many situations.
6. Is there another pesticide and/or Integrated Pest Management (IPM) technique that should be considered in-lieu of the proposed pesticide? As previously stated several other products exist that will provide similar control to wild parsnip compared to products that contain hexazinone. Non-chemical techniques for managing wild parsnip should also be considered. These include removal, grazing, burning, and repeated mowing alone or in combination. Research has found removal, grazing and mowing can control populations if conducted correctly. While prescribed fire can reduce populations this technique alone has not provided 100% control of plants. These techniques may be difficult to conduct in forestry/plantation settings compared to herbicide applications.



7. Other Considerations: Herbicide distributors rarely sell hexazinone due to the high cost (\$45/lbs, rates of 1-2 lbs/A) and the fact that it is difficult to ship due to its considered hazardous for shipping so can't be delivered by most common services (e.g. UPS).

In summary hexazinone is an effective herbicide that has historically been used in cropping and non-crop areas in Wisconsin. While it is considered a highly effective treatment for red pine release it has not been commonly utilized over the past decade due to cost and environmental concerns. It is still widely used on Christmas tree plantings. While some health risk is present it can be mitigated by applicators wearing the appropriate personal protective equipment. Impacts to non-target organisms exist and can be mitigated by altering application method and/or providing buffer areas. Potential for groundwater contamination does exist. Based on this information and the availability of alternative control methods I would not recommend approving the use of hexazinone in red pine forests for wild parsnip control.

References:

1. [RED FACTS: Hexazinone](#). United States Environmental Protection Agency. EPA-738-F-94-019.
2. Shaner, D.L. (2014) Herbicide Handbook. 10th Edition, Weed Science Society of America, Lawrence, 513 p.
3. [2016 Herbicide Label Guide for Forestry Site Preparation and Reforestation Projects](#). University of Minnesota.
4. [Proposed Groundwater Standards Wis. Admin. Code NR 140 Cycle 11. Hexazinone](#). Wisconsin Department of Trade and Consumer Protection.

Feel free to contact me if you have any specific questions with regards to this information.

Sincerely,

Mark Renz PhD  
Extension Weed Scientist  
Agronomy Dept., University of Wisconsin-Madison  
email: [mrenz@wisc.edu](mailto:mrenz@wisc.edu)  
Office: 608 263-7437