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January 17, 2020

WI DNR Pesticide Use Advisory Team

This Pesticide Assessment was conducted at the request of the Wisconsin Department of Natural Resources (WI DNR). The Department Pesticide Use Team requested that Dr. Mark Renz (University of Wisconsin Professor and Extension Weed Specialist) review and summarize aspects of active ingredients commonly used for unwanted plant control in forests and natural areas and provide his **professional opinion** on the risks and value of this active ingredient compared to other commonly used practices. For more detailed information about this active ingredient, please consult the US Environmental Pesticide Agency or National Pesticide Information Center. Pesticide labels are the law and must be followed.

Per your request, I am providing information to consider when determining if 2,4-D should continue to be listed as a general pesticide for use on Wisconsin Department of Natural Resources lands. My comments are related to the specific assessment considerations that you wanted me to consider. All of my toxicological information is taken directly from the US EPA or the National Pesticide Information Center. I have listed links to these resources at the end of this letter.

2,4-D is a selective herbicide providing broadleaf weed control in agricultural and nonagricultural settings, and it is registered for use in both terrestrial and aquatic environments. Major sites include pasture and rangeland, residential lawns, non-crop areas, natural areas and cropland. It is applied to foliage of plants that are actively growing. It is mostly targeted towards noxious and invasive annual, biennial and perennial weed species, but also has control of many agronomic broadleaf weeds. It is often one of multiple active ingredients mixed in a product. This is done to expand the range of species susceptible to the product and/or reduce the cost as 2,4-D is inexpensive compared to other products. It has been registered for use since the 1940s. Many alternatives exist to this product that are likely as effective or more effective when used alone. In some instances, products that are most effective on specific invasive plants only come pre-mixed with this product in formulations. Formulations of 2,4-D include esters, acids, and several salts, which vary in their chemical properties, environmental behavior, and to a lesser extent, toxicity. Unless otherwise stated, the discussion will refer to the acid form.

Department of Agronomy
College of Agricultural and Life Sciences
University of Wisconsin-Madison 1575 Linden Dr. Madison, Wisconsin 53706
608/262-1390 Fax: 608/262-5217 http://agronomy.wisc.edu/

Assessment Considerations

1. What are the human health risks (applicator and the public): Toxicity studies indicate that all chemical forms for 2,4-D have low acute toxicity for inhalation as well as oral and dermal exposure to humans. The acid and salt forms of 2,4-D are highly toxic to eye tissue, causing severe eye irritation. This is reflected on the formulated product label. The ester forms are not considered eye irritants, and have low to very low ocular toxicity. The ester and salt forms of 2,4-D are considered slight skin irritants. EPA is concerned about long-term exposure in residential areas due to widespread use. To reduce this risk labeled application amounts were reduced to 1.5 lbs ae/A in 2005. EPA was confident that this reduction in use will provide safety and prevent toxicity. This level of exposure is not expected in WI DNR applications. Chronic toxicity is also low for 2,4-D. Neurotoxicity, mutagenicity and developmental studies show no link between typical exposure levels of applicators or citizens. While exposure can be significant in residential areas, modeling suggests that exposure would still be well below accepted thresholds. 2,4-D has been implicated as a carcinogen due to the agent orange cases. Cancer from agent orange was the result of exposure to dioxin, not 2,4-D and multiple panels have consistently found that none of the epidemiological studies definitively link human cancer cases to 2,4-D. While there is risk of exposure to people visiting natural areas, following the label restrictions and using appropriate signage to prevent them from accessing areas where it was used for the appropriate time should minimize exposure. Citizens will be exposed to more 2,4-D through residential activities versus visiting natural areas if these precautions are followed.

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

- **Environmental fate**: 2,4-D persists in the environment for short periods. Soil half-life values can range from 1-14 days. In anaerobic conditions it can however persist for > 186 days. Breakdown occurs via microbes in soils into several products including 1,2,4-benzenetriol, 2,4-dichlorophenol (2,4- DCP), 2,4-dichloroanisole (2,4-DCA), 4-chlorphenol, chlorohydroquinone (CHQ), volatile organics, bound residues, and carbon dioxide. These degradates are expected to be of low occurrence in the environment and of low toxicity. 2,4-D breaks down in water via hydrolysis and photolysis with a half-life ranging from <1-15

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days unless water is acidic or anaerobic conditions exist then it can be > 1 year (depending on formulation). 2,4-D has been detected in streams and shallow groundwater at low concentrations, in both rural and urban areas so concern for off location transport through surface water and leaching into the water table exist. Due to its low affinity for soils a groundwater advisory statement has been placed on any product containing 2,4-D that suggests areas with a high water table and coarse soils be avoided. These risks can be further mitigated by avoiding these areas and using buffer strips to prevent off-target movement.

Risk to organisms: 2,4-D is moderately toxic to practically non-toxic to birds (species specific) with no differences among chemical forms. Toxicity to fish and aquatic invertebrates varies widely depending on chemical form, with esters being the most toxic. Marine invertebrate sensitivities are similar to aquatic invertebrates in toxicity. 2,4-D was considered practically non-toxic to honey bees. Spray drift could also pose risk as non-target plants are relatively susceptible to low doses of this product. In summary, EPA acknowledges that "some ecological risks are of concern on some sites for some species". They have mitigated these issues by reducing maximum application rates on labels and applying specific restrictions on where and how applications can be applied. EPA feels that these factors will minimize risks to wildlife/organisms.

In summary this product is used in Wisconsin, primarily in residential areas, but occasionally for invasive plant control. Studies indicate that applicators or citizens are not at risk from its use if label directions are followed (PPE and restricted entry intervals). While some wildlife are sensitive to this product, restrictions placed on the label minimize this impact. While rarely is there more than a cost benefit for selecting products containing 2,4-D over others, given the limited use by WI DNR I am confident that, ***if the label is followed***, limited to no impacts to the environment will occur due to WI DNR use.

3. How effective is the proposed pesticide for the proposed target(s)? Products that contain 2,4-D are effective on a range of broadleaf invasive species. While other products are usually as or more effective, the cost and products of choice come pre-mixed with 2,4-D are the main reason land managers use this product.

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4. What is the specificity of the proposed pesticide to the proposed target(s)? 2,4-D is used primarily for treating to foliage of invasive broadleaf plants but it is also used for application to trees/shrub stems.

5. Is there a need for a maximum application site frequency and/or area other than specified on the product label? No.

6. Is there another pesticide and/or Integrated Pest Management (IPM) technique that should be considered in-lieu of the proposed pesticide? As previously states several other products exist that will provide similar or better results compared to 2,4-D. The reason 2,4-D is selected is due to the cost for application and/or the fact that the product of choice comes pre-mixed with 2,4-D and another active ingredient(s). Details would be site and species specific. Other techniques to be considered include removal, grazing, burning, and repeated mowing. These techniques have positive and negative attributes which would need to be considered compared to herbicide use but most often these non-chemical treatments either result in a large amount of disturbance (removal) or need to be repeated multiple times at a higher cost to obtain similar levels of success as the use of this herbicide.
7. Other Considerations: Drift potential should be considered prior to use, especially in areas where sensitive plants (soybeans, grapes, tomatoes) are adjacent to the property.

http://npic.orst.edu/factsheets/archive/2,4-DTech.html
https://archive.epa.gov/pesticides/reregistration/web/pdf/24d_red.pdf

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
Office: 608 263-7437