



March 4, 2019

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 indaziflam should 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. Nearly all of my toxicological information is taken directly from the US EPA or state analyses of the use of this product. I have listed links to these resources at the end of this letter.

Indaziflam is a selective herbicide providing pre-emergent control of annual grasses and broadleaf weeds. Indaziflam is registered for application to residential and commercial areas (lawns, ornamentals, and hardscapes including patios, walkways, etc.), turf (parks, cemeteries, golf courses, sod farms, sports fields, and commercial lawns), field grown ornamentals, Christmas trees, commercial nursery and landscape plantings, and forestry sites. It can be mixed with other herbicides to provide pre and post-emergent control. It has been registered for use since 2010, and its use patterns and habitats registered are expanding. Its main benefit is its effectiveness as a residual product to provide long-lasting pre-emergent control of annuals and other plants establishing from seed. It is currently the standard pre-emergent herbicide used to provide long-term residual control of these species in the United States. I would expect use of this product to be mostly in industrial areas like parking lots, but also it could be used in forested sites. We are evaluating its potential to assist in establishment of forb dominated prairies and for pre-emergent control of garlic mustard. I would expect additional use patterns will emerge that will be of benefit to Wisconsin DNR over the next decade.



Assessment Considerations

1. What are the human health risks (applicator and the public)? The New York State Department of Occupational Health stated that indaziflam or any of the formulated products were NOT acutely toxic to lab animals. While chronic feeding studies (fed daily for one year) found some potential neurotoxicity and developmental issues, this was only at high exposures rates. The US EPA has determined this product “not likely to be carcinogenic to humans” by the EPA. So in summary while some risk exists with this material to human health the US EPA and other feel that “risks posed by indaziflam to workers and homeowners from use of these products are within the range considered acceptable”. Proper use of the required personal protective equipment (PPE) will be important to minimize any potential impact.
2. What are the potential negative environmental impacts and risks?
 - **Environmental fate:** This product persists in the environment (half-lives >150 days for aerobic soils; > 200 days in anaerobic environments). It breaks down readily in clear shallow water (half-life < 5 days) and is not volatile. As it and degradates are moderately soluble and do not bind tight to soil, there is potential to leach (detected at depths greater than 100 cm in field studies). Thus the label contains an advisory statement suggesting under what situations use should be limited (permeable soils, shallow water table). Also concern exists about indaziflam impacting water quality via runoff of rainwater for several months after application, especially on poorly drained soils with shallow ground water.
 - **Risk to organisms:** This product does have the potential to impact aquatic organisms (toxic to freshwater and estuarine/marine fish, moderately to slightly toxic to aquatic invertebrates). Although this risk is severe, the use pattern and ability to rapidly degrade in aquatic systems will limit exposure to a deemed acceptable level by the EPA. Chronic risk is not expected to estuarine/marine fish. Buffer strips and spray drift management language has been added to the label to further limit this risk. In contrast Indaziflam is practically nontoxic to birds and honey bees. Terrestrial plants are at risk for non-target injury through drift but following label directions and added advisory statements should limit these risks to an acceptable level.



In summary several key risks are associated with this product (groundwater contamination, contaminate surface water, toxicity to aquatic species, toxicity to terrestrial plants). These risks have been minimized by the EPA by requiring label language on all products to minimize this risk. Labels all contain ground and surface water advisory statements, detailed information in the environmental hazards section on how to minimize/eliminate risk, restrictions on how close applications can be made to water, and detailed directions on how to limit drift with the appropriate spray equipment and environmental conditions. Given that this product would be likely used on limited acres in specific situation I am confident that, ***if the label is followed***, limited to no impacts to the environment will occur.

3. How effective is the proposed pesticide for the proposed target(s)? Indaziflam is a selective herbicide providing pre-emergence and post-emergence (when indaziflam is formulated with 2,4-D, dicamba, mecoprop, and penoxsulam) control of annual grasses and broadleaf weeds. Indaziflam is registered for application to residential and commercial areas (lawns, ornamentals, and hardscapes including patios, walkways, etc.), turf (parks, cemeteries, golf courses, sod farms, sports fields, and commercial lawns), field grown ornamentals and Christmas trees, commercial nursery and landscape plantings, and forestry sites. As previously stated it is the standard herbicide used for residual control of annuals and other species germinating from seed.
4. What is the specificity of the proposed pesticide to the proposed target(s)? Indaziflam is a selective, pre-emergent herbicide. It would be used to control annual grasses and broadleaf weeds for bareground situations (parking lots) or to aid in the release/establishment of desirable perennial plants. It has limited to no activity on established perennial plants.
5. Is there a need for a maximum application site frequency and/or area other than specified on the product label? No, the only concern I would have is if a site was repeatedly treated with this one active ingredient as it could select for herbicide resistance. If applied correctly only annual applications would be required and rotating to a different chemistry for weed control periodically would be recommended.
6. Is there another pesticide and/or Integrated Pest Management (IPM) technique that should be considered in-lieu of the proposed pesticide? Several other residual products exist that will provide



similar results, but they often have a higher cost, shorter residual, or greater non-target impacts. Details would be very site and species specific.

7. Other Considerations: This product will be an asset for vegetation management in gravel parking areas. I have heard several comments about the need for long lasting weed control in these areas, and this herbicide should do well in this environment as well as other situations. I think given the restrictions imposed on the label and via WI DNR on application area, this would be a valuable additional herbicide for land managers.
- https://www3.epa.gov/pesticides/chem_search/reg_actions/registration/fs_PC-080818_26-Jul-10.pdf
 - http://pmep.cce.cornell.edu/profiles/herb-growthreg/fatty-alcohol-monuron/indaziflam/indaziflam_reg_1012.pdf

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

Sincerely,

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