

**Maryland Department of Natural Resources  
Forest Service  
Pesticide Environmental and Social Risk  
Assessment**

**Pesticide Active Ingredient: Imazapyr**

**Version 1.1**

**2022**





### Appendix 3: National Guidance ESRA for Imazapyr

#### Environmental National Assessment

<b>Pesticide:</b>	Imazapyr		<b>Specific Formulation:</b>
<b>Hazard Status:</b>	Imazapyr is not considered a highly hazardous pesticide (HHP) per the FSC Pesticides Policy (FSC-POL-30-001 V3-0 EN) and the FSC Lists of Highly Hazardous Pesticides (FSC-POL-30-001a EN).		Arsenal AC
<b>Exposure Elements</b>			<b>National-level Mitigation strategies defined to minimize risk<sub>1</sub></b>
<b>Environmental</b>		<p style="text-align: center;"><b>used according to label instructions in forestry applications. Additional considerations are provided below.</b></p> <p>Imazapyr has minimal documented adverse effects on soil microorganisms at concentrations expected within the top twelve inches of soil (1).</p> <p>Increasing adverse effects on cellulose breakdown are documented only when imazapyr concentrations reach levels far higher than anticipated in soil (1).</p>	<p><b>Follow all pesticide label application instructions. Follow applicable criterion and indicators from the FSC US FM Standard V1.0 (e.g., Criterion 4.3 for worker safety, Criterion 7.3 for worker training, Criterion 6.5 for protecting water resources, and Criteria 8.1 and 8.2 for Monitoring). Applicators or persons supervising application of restricted use pesticides are required to be certified in accordance with EPA regulations and state, territorial and tribal laws. Additional risk mitigation strategies are provided below.</b></p> <p><b>Organizations should take reasonable steps to avoiding environmental and social impacts by considering the mitigation strategies provided below as well as application-, Organization-, or location-specific strategies.</b></p>
<b>Water (ground water, surface waters, water supplies)</b>		<p><b>Some indication of adverse effects to water was found when imazapyr is used according to label instructions in forestry applications. These are as follows below.</b></p> <p>As an effective herbicide, aquatic applications will damage aquatic macrophytes. Some sensitive species of algae may be damaged in the event of an extreme accidental spill (1).</p> <p>Expected imazapyr concentrations in water are far below the level of concern for toxicity in fish and aquatic invertebrates. Risk characterization assessment for amphibians is unavailable due to lack of relevant toxicity data (1). However, individual studies using Oregon spotted frogs and Bullfrogs have concluded that imazapyr use poses no significant risk to those species (4,5).</p>	<p><b>General consideration of exposure variables designed to mitigate risk:</b></p> <ul style="list-style-type: none"> <li>-Know and understand the specific pesticide formulation and/or tank mixture, as its unique formulation may provide a different risk characterization.</li> <li>-Understand how the mixture of active ingredients affects the pesticides risk profile.</li> <li>-Seek to minimize the frequency, interval, and amount of application.</li> </ul>

		<p>Contamination of runoff water will impact sensitive nontarget plant species. Risks are greater in areas with predominantly clay soils and high precipitation and are lower in areas with sandy soil (1).</p> <p>Similarly, contaminated irrigation water will impact sensitive nontarget plant species (1).</p>	<p>-Use the most efficient and effective method of application by seeking to minimize risk to environmental and social values.</p> <p>-Understand the site (e.g., soil type, topography, etc.) and climatic (e.g., wind, temperature, and humidity) conditions and the likely effect on risk to environmental and social values.</p> <p>-Have appropriate waste management systems in place.</p>
	<p><b>Atmosphere (air quality, greenhouse gasses)</b></p>	<p><b>Minimal indication of adverse effects to atmosphere was found when imazapyr is used according to label instructions in forestry applications.</b></p>	<p><b>Mitigation Risk to the Environment:</b> <i>reduce contact with water resources and minimize application amounts and number of applications.</i></p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Environmental</b></p>	<p><b>Non-target species (vegetation, wildlife, bees and other pollinators, pets)</b></p>	<p><b>Imazapyr is hazardous to terrestrial macrophytes and as such nontarget macrophytes are at risk for spray drift and direct spray (1). Additional information for other non-target species is provided below.</b></p> <p>Despite data limited by the number of species available, imazapyr does not pose risk to mammals, birds, honeybees, fish, and aquatic invertebrates; it is classified as “practically non-toxic” by the EPA (1).</p> <p>Secondary effects to habitats and food availability could occur, which would affect virtually all nontarget organisms. These secondary effects caused by herbicide or mechanical methods could either be detrimental or beneficial to affected species (1).</p> <p>Adverse effects on microorganisms are not documented at expected imazapyr soil concentrations (1).</p>	<p>-Do not apply to water except as specified on the label. Treatment of aquatic weeds may result in oxygen depletion or loss due to decomposition of dead plants. Do not contaminate water when disposing of equipment, washwater, or rinsate" (3).</p> <p>Additionally, "DO NOT use on food or feed crops. DO NOT treat irrigation ditches, or water used for crop irrigation or for domestic uses. DO NOT apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result" (3).</p> <p>-DO NOT apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high-water mark (4);</p> <p>-DO NOT contaminate water when cleaning equipment or disposing of equipment washwaters or rinsate. This herbicide is phytotoxic at extremely low concentrations. Non-target plants may be adversely affected from drift (3);</p>
	<p><b>Non-timber forest products (as FSC-STD-01-001 V5-2 FSC Principles and Criteria, criterion 5.1)</b></p>	<p><b>Minimal indication of adverse effects to non-timber forest products was found when imazapyr is used according to label instructions in forestry applications. Additional considerations are provided below.</b></p> <p>Secondary effects to habitats and food availability could occur, which would affect virtually all nontarget organisms. These secondary effects caused by</p>	<p>-DO NOT apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result. Keep from contact with fertilizers, insecticides, fungicides and seeds</p> <p>-DO NOT apply or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations</p>

		herbicide or mechanical methods could either be detrimental or beneficial to affected species. (1)	where the chemical may be washed or moved into contact with their roots (3);
	<b>High Conservation Values (particularly HCV 1-4)</b>	<b>Minimal indication of adverse effects to high conservation values was found when imazapyr is used according to label instructions in forestry applications. Additional considerations are provided below.</b>  Unintentional secondary effects on habitat, landscape and ecosystem are possible due to changes in vegetation (1).	-Minimize risk of spray drift: unintentional spray drift has potential to significantly increase risk to the environment and public welfare.  <b>Mitigating Risk to Public Access/Public Welfare:</b>
	<b>Landscape (aesthetics, cumulative impacts)</b>	<b>Minimal indication of adverse effects to Landscape values was found when glyphosate is used according to label instructions in forestry applications. Additional considerations are provided, below.</b>  However, unintentional habitat/ landscape effects are possible, primarily due to changes in vegetation (1).	-Reduce the possibility of public consumption of contaminated wild food (e.g., fruit or fungi) and public exposure to pesticides through public outreach and engagement, limiting access, and/or appropriate signage. For instance, users of the forest may be excluded from the area using barriers or signage until the pesticide dries.
	<b>Ecosystem services (water, soil, carbon sequestration, tourism)</b>	<b>Minimal indication of adverse effects to Ecosystem services was found when imazapyr is used according to label instructions in forestry applications. Additional considerations are provided, below.</b>  However, unintentional habitat/landscape/ecosystem effects are possible, primarily due to changes in vegetation (1).	

<sup>1</sup> Mitigation strategies have been categorized to avoid redundancy

## Sources

(1) USDA/Forest Service. (2011). Imazapyr Human Health and Ecological Risk Assessment. Prepared by Syracuse Environmental Research Associates, Inc. under USDA Forest Service Contract AG-3187-C-06-0010. Retrieved from [https://www.fs.fed.us/foresthealth/pesticide/pdfs/Imazapyr\\_TR-052-29-03a.pdf](https://www.fs.fed.us/foresthealth/pesticide/pdfs/Imazapyr_TR-052-29-03a.pdf).

(2) U.S. Environmental Protection Agency. (2015, December). Imazapyr Proposed Interim Registration Review Decision Case Number 3078 (Docket Number EPA-HQ-OP-2009-0361). Retrieved from <https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0200-0019..>

(3) SSI Maxim (2018). Pesticide Product Label [Arsenal]. Retrieved from [https://www3.epa.gov/pesticides/chem\\_search/ppls/034913-00023-20180328.pdf](https://www3.epa.gov/pesticides/chem_search/ppls/034913-00023-20180328.pdf).

(4) Trumbo, J. and Waligora, D. "The impact of the herbicides imazapyr and triclopyr triethylamine on bullfrog tadpoles." California Fish and Game 95, no. 3 (2009): 122-127.

(5) Yahnke, Amy E., Christian E. Grue, Marc P. Hayes, and Alexandra T. Troiano. "Effects of the herbicide imazapyr on juvenile Oregon spotted frogs." Environmental toxicology and chemistry 32, no. 1 (2013): 228-235.

## Social National Assessment

<b>Pesticide:</b>	Imazapyr		<b>Specific Formulation:</b>
<b>Hazard Status:</b>	Imazapyr is not considered a highly hazardous pesticide (HHP) per the FSC Pesticides Policy (FSC-POL-30-001 V3-0 EN) and the FSC Lists of Highly Hazardous Pesticides (FSC-POL-30-001a EN).		Arsenal AC  <b>n</b>
<b>Exposure Elements</b>	<b>Minimum list of values</b>	<b>Description of why/why not a risk</b>	<b>National-level Mitigation strategies defined to minimize risk<sub>1</sub></b>
	High Conservation Values (especially HCV 5-6)	<p><b>Minimal indication of adverse effects to high conservation values was found when imazapyr is used according to label instructions in forestry applications. Additional considerations are provided below.</b></p> <p>Unintentional secondary effects on habitat, landscape and ecosystem are possible due to changes in vegetation (1).</p>	<p><b>Follow all pesticide label application instructions. Follow applicable criterion and indicators from the FSC US FM Standard V1.0 (e.g., Criterion 4.3 for worker safety, Criterion 7.3 for worker training, Criterion 6.5 for protecting water resources, and Criteria 8.1 and 8.2 for Monitoring). Applicators or persons supervising application of restricted use pesticides are required to be certified in accordance with EPA regulations and state, territorial and tribal laws. Additional risk mitigation strategies are provided below. Organizations should take reasonable steps to avoiding environmental and social impacts by considering the mitigation strategies provided below, as well as application-, Organization-, or location-specific strategies.</b></p> <p><b>General consideration of exposure variables designed to mitigate risk:</b></p> <ul style="list-style-type: none"> <li>-Know and understand the specific pesticide formulation, as its unique formulation may provide a different risk characterization.</li> <li>-Understand the mixture of active ingredients.</li> <li>-Seek to minimize the frequency, interval, and amount of application.</li> <li>-Use the most efficient and effective method of application by seeking to minimize risk to environmental and social values.</li> <li>-Understand the site (e.g., soil type, topography, etc.) and climatic (e.g., wind, temperature, and</li> </ul>
	Health (fertility, reproductive health, respiratory health, dermatologic, neurological and gastrointestinal problems, cancer and hormonal imbalance)	<p><b>Minimal indication of adverse effects to human health was found when imazapyr is used according to label instructions in forestry applications. Additional considerations are provided below.</b></p> <p>Minimal to no risk to worker health due to acute or long-term exposure if proper protective and safety procedures are followed. No indication of health risk to general public (1).</p> <p>Eye irritation is possible for workers handling highly concentrated imazapyr solutions for longer periods of time. Workers who use highly concentrated imazapyr should use special caution to prevent prolonged skin contact (1).</p>	
<b>Social</b>	Welfare	<p><b>Minimal indication of adverse effects to welfare was found when imazapyr is used according to label instructions in forestry applications.</b></p>	
	Food and water	<p><b>Minimal indication of adverse effects to food and water was found when imazapyr is used according to label instructions in forestry</b></p>	

		<p><b>applications. However, additional considerations are provided below.</b></p> <p>Risk of contact with contaminated vegetation, fruit, and water. These scenarios are extremely low risk due to the implausibility of acute or long-term occurrences (1). Of these, the predominant route of exposure is through consumption of contaminated vegetation (1).</p>	<p>humidity) conditions and the likely effect on risk to environmental and social values.</p> <p>-Have appropriate waste management systems in place.</p> <p><b>Mitigating Risk to Workers:</b> <i>When applying pesticides, label instructions should be followed.</i></p>
	<p><b>Social Infrastructure; (schools and hospitals, recreational infrastructure, infrastructure adjacent to the management unit)</b></p>	<p><b>Minimal indication of adverse effects to social infrastructure was found when imazapyr is used according to label instructions in forestry applications.</b></p>	<p>Personal Protective Equipment (PPE): Some materials that are chemical-resistant to this product are listed below. Applicators and other handlers must wear:</p> <ul style="list-style-type: none"> <li>• Long-sleeved shirt and long pants;</li> <li>• Chemical-resistant gloves, such as barrier laminate, butyl rubber or polyethylene;</li> <li>• Shoes plus socks.</li> </ul>
	<p><b>Economic viability (agriculture, livestock, tourism)</b></p>	<p><b>Minimal indication of adverse effects to economic viability was found when imazapyr is used according to label instructions in forestry applications. However, additional considerations are provided below.</b></p> <p>There is a potential for spray drift to adversely affect sensitive terrestrial and aquatic plant species.</p> <p>Sensitive species will be affected up to 900 feet downwind of application site, regardless of application method, and will likely be affected well beyond 900 feet (1). Risk characterization is similar for aquatic plant species.</p> <p>Given no documented adverse effects on animals (1), there is low risk for economic viability of livestock or tourism.</p>	<p>Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions exist for washables, use detergent and hot water. Keep and wash PPE separately from other laundry. DO NOT enter treated areas without protective clothing until sprays have dried. (3)</p> <p><i>Applicators should:</i></p> <ul style="list-style-type: none"> <li>-Avoid breathing spray mist. Avoid contact with skin, eyes or clothing.</li> <li>-Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.</li> <li>-Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.</li> <li>-Remove PPE immediately after handling this product. Wash the outside of gloves before</li> </ul>



<b>Social</b>	<b>Rights (legal and customary)</b>	<b>Minimal indication of adverse effects to rights was found when imazapyr is used according to label instructions in forestry applications.</b>	<p>removing. As soon as possible, wash thoroughly and change into clean clothing (3).</p> <p><b>Mitigating Risk to Public Access/Public Welfare:</b></p> <ul style="list-style-type: none"> <li>-Reduce the possibility of public consumption of contaminated wild food (e.g., fruit or fungi) and public exposure to pesticides through public outreach and engagement, limiting access, and/or appropriate signage. For instance, users of the forest may be excluded from the area using barriers or signage until the pesticide dries;</li> <li>-Consider effects on local communities and indigenous peoples when considering limiting access to treatment areas;</li> <li>-Do not allow children or pets to enter the treated area until it has dried.</li> </ul>
	<b>Others</b>	<b>No additional values were identified in this assessment.</b>	<p><b>Minimizing Risk to Food and Water Resources:</b></p> <ul style="list-style-type: none"> <li>-Minimize spray drift - unintentional spray drift has potential to significantly increase risk to the environment and public welfare.</li> <li>-DO NOT apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result.</li> <li>-DO NOT apply directly to water bodies including lakes, streams, rivers, ponds.</li> </ul>

<sup>1</sup> Mitigation strategies have been categorized to avoid redundancy

## Sources

(1) USDA/Forest Service. (2011). Imazapyr Human Health and Ecological Risk Assessment. Prepared by Syracuse Environmental Research Associates, Inc. under USDA Forest Service Contract AG-3187-C-06-0010. Retrieved from [https://www.fs.fed.us/foresthealth/pesticide/pdfs/Imazapyr\\_TR-052-29-03a.pdf](https://www.fs.fed.us/foresthealth/pesticide/pdfs/Imazapyr_TR-052-29-03a.pdf).

(2) U.S. Environmental Protection Agency. (2015, December). Imazapyr Proposed Interim Registration

Review Decision Case Number 3078 (Docket Number EPA-HQ-OP-2009-0361). Retrieved from <https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0200-0019..>

(3) SSI Maxim (2018). Pesticide Product Label [Arsenal]. Retrieved from [https://www3.epa.gov/pesticides/chem\\_search/ppls/034913-00023-20180328.pdf..](https://www3.epa.gov/pesticides/chem_search/ppls/034913-00023-20180328.pdf..)