Minnesota Department of Natural Resources Pesticide Environmental and Social Risk Assessment

Pesticide Active Ingredient: Imazapic

Version 1.0

2021

Environmental Assessment

Pesticide: Imazapic	**Hazard Status:** Imazapic 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).		
Specific Formulation (CAS#):	**Plateau** (104098-49-9): ammonium salt of imazapic – 23.6%, other ingredients – 76.4%		
Exposure Elements	**Minimum list of values**	**Description of why/why not a risk**	**Mitigation strategies defined to minimize risk[1]**
Environmental	**Soil (erosion, degradation, biota, carbon storage)**	**Minimal indication of adverse effects to soil was found when imazapic is used according to label instructions. Additional considerations are provided below.** The average soil half-life of imazapic is 120-140 days, the soil sorption (Koc) is 206 mL/g and the primary degradation mechanism is via soil microbes (5).	**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). Additional risk mitigation strategies are provided below. Applicators 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.** **General consideration of exposure variables designed to mitigate risk:** -Know and understand the specific pesticide formulation and/or tank mixture, as its unique formulation may provide a different risk characterization. -Understand how the mixture of active ingredients affects the pesticides risk profile.
	Water (ground water, surface waters, water supplies)	**Some indication of adverse effects to water was found when imazapic is used according to label instructions. Additional considerations are provided below.** Ground water contamination may occur if this herbicide is used in areas with shallow water tables where soils are permeable (1, 2). Runoff is more possible in areas with clay soils and high rainfall rates, and negligible in arid environments as well as sandy or loam soils (3). Water contamination can occur through drift of spray in wind and several months after application has demonstrated “high potential” of runoff in poorly draining soils (1). Imazapic in rapidly photodegraded by sunlight in water, with a half-life of only 1 or 2 days (5).	

Environmental	**Atmosphere (air quality, greenhouse gasses)**	**Minimal indication of adverse effects to atmosphere was found when imazapic is used according to label instructions. Additional considerations are provided below.** This product will not evaporate into the atmosphere from the water surface (2).	-Seek to minimize the frequency, interval, and amount of application. -Use the most efficient and effective method of application by seeking to minimize risk to environmental and social values. -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. -Have appropriate waste management systems in place. **Mitigating Risk to the Environment:** *Reduce contact with water resources, follow all label requirements, and minimize application amounts and number of applications.* *General and non-target species:* - Do not rinse equipment on or near desirable trees or plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. - Do not exceed 12 ounces of Plateau per acre in one year -Do not apply this product in a way that will contact workers or other persons directly or through drift (1). *Water:* - For terrestrial use only. Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark.
	Non-target species (vegetation, wildlife, bees and other pollinators, pets)	**Some indication of adverse effects to non-target species were found when imazapic is used according to label instructions. Additional considerations are provided below.** No adverse effects were observed in mice or rats. Smaller mammals may be less sensitive to this chemical than larger mammals. "Adverse effects in terrestrial or aquatic animals do not appear likely" (3). Imazapic is essentially non-toxic to mammals, fish, birds, insects and aquatic invertebrates (2, 4, 5). LC-50 values for acute toxicity and reproductive effects for aquatic animals was found to be greater than 100 mg/L. However, aquatic macrophytes had a higher EC-50 (reported as 6.1 µg/L in *Lemna gibba*) (2, 3). A study reported by the US Forest Service indicated that at the highest dose (100 µg/L) mortality was found in 25% of honeybees. At a dose corresponding with the low rate of application (36 µg/L) mortality was not significantly different from the control (3, 5). The LD-50 in bobwhite quail was reported to be >2,150 mg/kg (D). During short term exposures, no adverse impacts in birds have been detected; however long-term exposures (22 weeks or more) have resulted in reduced growth in birds of all sizes (4).	

		Imazapic can be toxic to fish (LC-50 of >100 mg/L for sunfish and rainbow trout); however, due to its rapid degradation in water, it is relatively safe to aquatic animals (5). During small mammal dietary exposure studies, even imazapic dietary concentrations of 20,000 ppm have failed to demonstrate adverse effects (4). Imazapic is an amino acid synthesis inhibitor, which prevents the amino acids required for construction of proteins from being formed. This herbicide could damage some non-target plants (D). Non-target native trees and shrubs show variable tolerance to imazapic (1).	- Do not contaminate water when disposing of equipment washwaters or rinsate. - This chemical demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination. - This product may contaminate water through drift of spray in wind. This product has a high potential for runoff for several months or more after application. Poorly draining soils and soils with shallow water tables are more prone to produce runoff that contains this product. A level, well maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams and springs will reduce the potential for contamination of water from rainfall runoff. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours (1).
Environmental	**Non-timber forest products (as FSC-STD-01-001 V5-2 FSC Principles and Criteria, criterion 5.1)**	**Some indication of adverse effects to non-timber Forest Products were found when imazapic used according to label instructions. Additional considerations are provided below.** Imazapic is an amino acid synthesis inhibitor, which prevents the amino acids required for construction of proteins from being formed. This herbicide could damage some non-target plants (D). Non-target native trees and shrubs show variable tolerance to imazapic (1).	
	High Conservation Values (particularly HCV 1-4)	**Minimal indication of adverse effects to high conservation values was found when imazapic is used according to label instructions.**	
	Landscape (aesthetics, cumulative impacts)	**Minimal indication of adverse effects to Landscape was found when imazapic is used according to label instructions.**	
	Ecosystem services (water, soil, carbon sequestration, tourism)	**Minimal indication of adverse effects to Ecosystem Services was found when imazapic is used according to label instructions.**	

[1] Mitigation strategies have been categorized to avoid redundancy

Sources

(1) BASF Corporation. (2011). Plateau Herbicide Specimen Label. Retrieved from: http://www.cdms.net/ldat/ld2LP015.pdf.
(2) BASF Corporation. (2019). Material Safety Data Sheet: Plateau herbicide. Retrieved from: http://www.cdms.net/ldat/mp2LP001.pdf.
(3) Durkin, P. & Follansbee, M. (2004). Imazapic human health and ecological risk assessment – final report. USDA, Forest Service Forest Health Protection: GSA Contract No. GS-10F-0082K.

(4) ENSR International and Bureau of Land Management. 2005. Reno, Nevada Imazapic ecological risk assessment: Final report. All U.S. Government Documents (Utah Regional Depository). Paper 539. Retrieved from: https://digitalcommons.usu.edu/govdocs/539.
(5) Tu, M., C. Hurd, and J.M. Randall. 2001. Weed Control Methods Handbook. The Nature Conservancy. Retrieved from: https://www.invasive.org/gist/products/handbook/methods-handbook.pdf.

Social Assessment

Pesticide: Imazapic	**Hazard Status:** Imazapic 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).		
Specific Formulation (CAS#):	**Plateau** (104098-49-9): ammonium salt of imazapic – 23.6%, other ingredients – 76.4%		
Exposure Elements	**Minimum list of values**	**Description of why/why not a risk**	**Mitigation strategies defined to minimize risk[1]**
Social	**High Conservation Values (especially HCV 5-6)**	**Minimal indication of adverse effects to high conservation values was found when imazapic is used according to label instructions.**	**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). Additional risk mitigation strategies are provided below.** **General consideration of exposure variables designed to mitigate risk:** -Know and understand the specific pesticide formulation and/or tank mixture, as its unique formulation may provide a different risk characterization. -Understand how the mixture of active ingredients affects the pesticides risk profile. -Seek to minimize the frequency, interval, and amount of application. -Use the most efficient and effective method of application by seeking to minimize risk to environmental and social values. -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. -Have appropriate waste management systems in place. **Mitigating Risk to Workers:** *When applying pesticides, label instructions should be followed.*
	Health (fertility, reproductive health, respiratory health, dermatologic, neurological and gastrointestinal problems, cancer and hormonal imbalance)	**Minimal indication of adverse effects to health was found when imazapic is used according to label instructions. Additional considerations are provided below.** Relatively non-toxic after single ingestion, short-term skin contact and short-term inhalation. May cause slight but temporary irritation to the eyes. May cause slight irritation to the skin (2). No substance-specific organ toxicity was observed after repeated administration to animals. The results of animal studies gave no indication of carcinogenic or reproductive effects (2, 4). Typically, applying the label rate of chemical following all label instructions does not lead to doses that exceed a level of concern. Mild eye irritation can result from exposure to high levels of imazapic (3).	
	Welfare	**Minimal indication of adverse effects to welfare was found when imazapic is used according to label instructions.**	

	Food and water	**Minimal indication of adverse effects to food and water was found when imazapic is used according to label instructions.**	Avoid breathing spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling (1). For all pesticide applications, Personal Protective Equipment (PPE) should be worn as follows: • chemical-resistant gloves, • overalls or long-sleeved shirt and long pants, • shoes/boots plus socks, • eye protection (goggles, or safety glasses with side shields), • an appropriate respirator if called for in applicable Safety Data Sheets. Users should wash hands before eating, drinking, chewing gum, using tobacco or using the toilet; remove clothing/PPE immediately if pesticide gets inside, then wash thoroughly and put on clean clothing. (1). **Mitigating Risk to Public Access/Public Welfare:** - 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. -Consider effects on local communities and indigenous peoples when considering limiting access to treatment areas. Entry Restrictions: Do not enter or allow people (or pets) to enter the treated area during the restricted entry interval (REI) of 12 hours (1).
Social	**Social Infrastructure; (schools and hospitals, recreational infrastructure, infrastructure adjacent to the management unit)**	**Minimal indication of adverse effects to social infrastructure was found when imazapic is used according to label instructions.**	
	Economic viability (agriculture, livestock, tourism)	**Minimal indication of adverse effects to economic viability was found when imazapic is used according to label instructions.**	
	Rights (legal and customary)	**Minimal indication of adverse effects to ights was found when imazapic is used according to label instructions.**	
	Others	**No additional values were identified in this assessment.**	

[1] Mitigation strategies have been categorized to avoid redundancy

Sources:

(1) BASF Corporation. (2011). Plateau Herbicide Specimen Label. Retrieved from: http://www.cdms.net/ldat/ld2LP015.pdf.

(2) BASF Corporation. (2019). Material Safety Data Sheet: Plateau herbicide. Retrieved from: http://www.cdms.net/ldat/mp2LP001.pdf.

(3) Durkin, P. & Follansbee, M. (2004). Imazapic human health and ecological risk assessment – final report. USDA, Forest Service Forest Health Protection: GSA Contract No. GS-10F-0082K.

(4) ENSR International and Bureau of Land Management. 2005. Reno, Nevada Imazapic ecological risk assessment: Final report. All U.S. Government Documents (Utah Regional Depository). Paper 539. Retrieved from: https://digitalcommons.usu.edu/govdocs/539.

(5) Tu, M., C. Hurd, and J.M. Randall. 2001. Weed Control Methods Handbook. The Nature Conservancy. Retrieved from: https://www.invasive.org/gist/products/handbook/methods-handbook.pdf.