Pesticide Assessment: Oust XP™

EPA Reg Num: 432-1552

	Active Ingredient	Formulations		CASS #
Active Ingredients:	Sulfometuron Methyl	75.0%	l	74222-97-2

Signal Word: Caution. **SDS Signal Word:** No Signal Word on SDS

PPE Requirement (Application): Long sleeved shirt and long pants
Shoes plus socks
(Above required for normal use, from label)

PPE Requirement (Loader / Mixer): See above

Environmental Hazards (FROM LABEL): For terrestrial uses, except for uses under the forest canopy, do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwater or rinsate. Exposure to Oust® XP Herbicide can injure or kill plants. Damage to susceptible plants can occur when soil particles are blown or washed off target onto cropland.

SUMMARY ASSESSMENT

Sulfometuron Methyl (trade name Oust XP™) is a dispersible granule that when mixed in water and applied as a foliar application can control many annual and perennial grass and broadleaf weeds in forestry and non-crop sites. It is used in Wisconsin forests as site preparation and in the release of certain conifers and hardwoods. Interest exists in expanding use within DNR for reed canarygrass in riparian/floodplain habitats. This use pattern could fit the label requirements if the area is **under the forest canopy** or **does not have surface water present and is above the mean high water mark**.

Toxicological information suggests that it has low risk acute and long-term to the applicator if used following the label instructions.

Environmental data suggests that while in general it is an environmentally friendly product, under certain situations it has the potential to runoff a site or leach into groundwater. For this reason United States Forest Service estimates that 1% of the applied sulfometuron methyl **could** runoff from the application site after a moderate rain and **much more** if the rain is heavy/extreme[17]. Caution should be used to avoid using high rates to sloped areas, with clay soils, where large rainfall events could occur shortly after application. Per the label applications should also not be applied to **frozen or snow covered soils** or **soils subject to wind erosion within 48 hours of application**. This product also has the potential to leach into the groundwater, but this risk is minimal unless soils are sandy (potentially loamy) when high rates are used and excessive rainfall occurs[17].

Control of reed canarygrass has been documented to be effective although other options exist and are also effective (glyphosate, imazapic, imazapyr). Best results with sulfometuron have been observed when used in fall (October-November) or spring (May) to provide both reed canarygrass suppression and residual control of other herbaceous vegetation to allow the establishment of desirable woody species. This application is often at a reduced rate and in conjunction with a broad spectrum herbicide such as glyphosate. If utilizing other products the timing likely will need to be altered to maximize control, as glyphosate is most effective in the late summer (August/September) in the Midwest. This timing may not complement revegetation timing and could require additional treatments the following year to prevent competition that sulfometuron avoids through its residual activity. Any application of sulfometuron should consider the **soil type**, **groundwater level**, **slope**, and **rainfall potential** to determine if off-target movement will occur.

Oust XP™

1. Health Report

Property Assessed	Value observed	Risk	Comparison	
Acute Oral:	LD50 = >5,000 mg/kg (rat)[1,3] OSHA Not categorized	**Low**	1,090 mg/kg (rat) component in Tide	
Dermal Exposure:	LD50 = >5,000 mg/kg (rabbit)[1] LD50 = >2,000 mg/kg (rabbit)[3] OSHA Not categorized	**Low**	2,000 mg/kg (rabbit) component in Tide	
Inhalation:	LC50 = >5.3 mg/L (rat; 4 hours)[1] LC50 = >5 mg/L (rat)[2] OSHA Category 3	**Med**		
Eye Irritation	Slight irritation (rabbit)			
Skin Irritation	Slight irritation (rabbit)			
Subchronic/ Chronic	No effects at evaluated level, male or female 1,000 mg/kg, clinical pathology effects at 5,000 mg/kg[3]. 24-month dietary rat no effect at level reported of 200 mg/kg/day. 12-month dietary dog showed anemia; hemolytic effect on erythrocytes at 1,000 mg/kg.			
Teratogenicity	No effects at evaluated level, rat 1,000 mg/kg and rabbit 300 mg/kg[3].			
Reproduction	Not a reproductive toxin, but reduced second generation body weight and numbers (dog).			
Mutagenicity	Ames Test, negative; structural chromosome aberration, negative.			
Carcinogenicity:	Not listed on the EPA's list of carcinogens[3].			
NOTES:	OSHA Categories: Category 1 = High; Category 2 and 3 = Med and Category 4 = Low. Not categorized means that levels are above highest OSHA level. See below.			

1. Taken from the Oust XP™ Safety Data Sheet. Toxicology value for full product.
2. Herbicide Handbook: Weed Science Society of America. 10th ed, 2014.
3. Risk Assessment for Carcinogens. EPA. Table 1. (accessed 12-27-2016).
https://www.epa.gov/fera/risk-assessment-carcinogens

OSHA Categories

Acute Oral Toxicity Categories and Classifications. Values based on kg of bodyweight.

Classification Criteria	Category 1	Category 2	Category 3	Category 4
Oral LD50	≤ 5 mg/kg	> 5 and ≤ 50 mg/kg	> 50 and ≤ 300 mg/kg	> 300 and ≤ 2,000 mg/kg

Acute Dermal Toxicity Categories and Classifications. Values based on kg of bodyweight.

Classification Criteria	Category 1	Category 2	Category 3	Category 4
Oral LD50	≤ 50 mg/kg	> 50 and ≤ 200 mg/kg	> 200 and ≤ 1,000 mg/kg	> 1,000 and ≤ 2,000 mg/kg

Acute Inhalation Toxicity Categories and Classifications.

Classification Criteria	Category 1	Category 2	Category 3	Category 4
Oral LD50	≤ 0.5 mg/L	> 0.5 and ≤ 2.0 mg/L	> 2.0 and ≤ 10.0 mg/L	> 10.0 and ≤ 20 mg/L

2. Environmental/Ecological Report

Oust XP Environmental Information

Note: no information is available on the product. Table below summarizes information of the active ingredient, Sulfometuron methyl.

Property assessed	Value observed/comments	**Risk**	**Comparison**	
Wildlife impacts	Bluegill LC_{50}: >150 mg/L (96-days) [1] >12.5 mg/L (96-hrs) [3] Bobwhite Quail 8-day Dietary LC_{50}: >5620 mg/kg bw [3] Daphnia 48-hr LC_{50}: 150 mg/L [1] >12.5 mg/L [3] Rainbow Trout 96-hrs LC_{50}: >148 mg/L [1] >12.5 mg/L [3] Mallard Duck 8-day Dietary LC_{50}: >5000 mg/kg bw [3]			
Behavior in soil (sorption to soil) coefficient (Koc)	Silty/Loam=66.15 mL/g [2] Sandy=35 mL/g [2] 78 mL/g (avg @ pH=7) [3]			
Method of breakdown	slow microbial breakdown and slower degradation at higher pH and lower temperatures [3]	**VARIABLE** Highly dependent on environmental conditions		
Persistence	Half-life = 57.8 days [2] Typical field half-life is 20-28 days at pH 6-7. [3]	**VARIABLE** Persistence increases with cooler temps, low soil moisture and high pH [3]		
Mobility/ groundwater Ubiquity score (GUS)	3.84 [2]	**MEDIUM** In silty loam soils it is likely to reach **shallow** groundwater		
Volatilization	$5.4x10^{-18}$ mmHG (25°C) [2]	**LOW** Very unlikely to vaporize		
Solubility in Water	244 mg/L (20°C) [2]	**MEDIUM** Moderately soluble		
Source: [1]Oust XP SDS; [2]npic.orst.edu; [3]Herbicide Handbook 10th Edition				

3. Effectiveness on Target Species Report

Several recommendations exist for the treatment of reed canarygrass. A table summarizing results is below. For more detailed information read text after this table.

Herbicide (active ingredient)	Rate of application	Timing	Comments
Oust (sulfometuron)	3-5 oz/A	PRE to early POST	Do not apply to frozen ground[4, 5] ; Light/sandy/dry soils should not be treated if rainfall events are rare[5] ; and warns that it has fairly long soil residual activity[4] and cannot be used adjacent to water[4]
Oust (sulfometuron)	0.5 oz/A	PRE in fall (October)	Cover was lower with Rodeo® vs Fecon mowing+Oust® treatments 1 YAT[6].
Oust (sulfometuron)	0.5 or 1.0 oz/A	PRE in fall (November) annually for 3 years	Reduced RCG cover 60% in year one, 80% in year 2 and 3. Fall application delayed reed canarygrass emergence the next spring, allowing for native plant establishment. [7]
Oust (sulfometuron)	0.75 oz/A	POST (May)	Reed canarygrass cover averaged 1 % 5 MAT. [13]
Oust + glyphosate	0.75 or 1.5 oz/A[7]	PRE in fall (October) [7]	Resulted in similar reed canarygrass cover compared to glyphosate alone 11 MAT but gave higher control of solidago. [9]
Oust + glyphosate	0.75 oz/A + 3 lbs ae/a	POST (May)	Glyphosate + sulfometuron gave 99% control (1% cover) 5 MAT. Better than imazamox + glyphosate (10% cover) or glyphosate alone (21% cover). [13]
Rodeo (glyphosate)	5%	PRE in fall (October)	RCG cover was lower with Rodeo® vs Fecon mowing+Oust® treatments 1 YAT[6].
Glyphosate	3 or 4 lbs ae/a	PRE in fall (October)	Resulted in similar reed canarygrass cover compared to sulfometuron alone 11 MAT but gave lower control of solidago. [9]
Glyphosate	1.6 lbs ae/a	POST (Fall or spring)	Reed canarygrass cover was 23-30% fall of treatment year and 49(fall)-60(spring)% fall of second year [15]
glyphosate		POST May vs Aug/Sept	Applications in late August and late September were more effective than in mid-May [10]
glyphosate	3 lbs ae/a	POST (May)	5 MAT reed canarygrass cover, averaged 21 % percent.[13]
glyphosate	2% spot treatment (41% AI)	POST (Mid May, late Aug, Late Sept)	Applications in late August and late September (90% reduction 3 MAT) were more effective than in mid-May (71% reduction 3 MAT).Repeated applications for 2 years has >90% reduction regardless of timing.[16]
Glyphosate + imazapic	3 lbs ae/a + 70 or 140 g ae/ha	PRE in fall (October)	Resulted in similar reed canarygrass cover (2-3%) compared to glyphosate alone or glyphosate + sulfometuron 11 MAT.[9]
glyphosate + Imazapic	0.5 lbs ae/a + 0.18 kg ai/ha	Fall or spring	Reed canarygrass cover was 7-8% fall of treatment year and 16(fall)-28(spring)% fall of second year [15]
Sethoxydim (vantage)		POST +/- tillage	Tillage followed by applications to resprouts had a larger effect on reed canarygrass suppression that persisted longer than treatments without tillage. [11]
Sethoxydim (vantage)		POST (May vs Aug vs May + Aug)	Herbicide treatments reduced both seed production and biomass of RCG the year of application only. [12]
Imazamox (Clearcast)	0.28 or 0.56 kg ae/ha	POST (May)	Reed canarygrass cover was between 10-11% 5 MAT.[13]
imazapyr	0.64 kg ai/ha	Fall or spring	Reed canarygrass cover was 1% fall of treatment year and 5% fall of second year[15]

Imazapyr + glyphosate	0.64 + 1.5 lbs ae/a	Fall	Reed canarygrass cover was 1% fall of treatment year and 8% fall of second year [15]

Summary of research on reed canarygrass

In Floodplain forests of the Upper Mississippi River researchers compared 1) Rodeo®(glyphosate), 5% solution and 2) forestry mulching (Fecon) with Oust® (sulfometuron methyl), 0.5oz/acre in combination with three native planting strategies. Preliminary results show RCG mean percent cover was lower with Rodeo® vs Fecon+Oust® treatments 1 YAT[6].

Herbicide treatments utilized the pre-emergent herbicide Oust® XP applied at 0.5 or 1.0 oz/A, either alone or in combination with the pre-emergent herbicide Pendulum® at 3 qts/A in November as a pre-emergent treatment annually for 3 years and found all treatments reduced RCG cover 60% in year one, 80% in year 2 and 3. Conclude that the low concentration of Oust®, applied alone, provided an adequate level of control. Fall application of the pre-emergent herbicide delayed reed canarygrass emergence the next spring, allowing for native plant establishment in the absence of competition from the grass after spring floodwaters retreated. [7]

Sue Galatowitch recommends using imazapyr (Arsenal, Habitat, and others), sulfometuron (Oust), or glyphosate selectively in plantings of woody transplants when weedy, undesirable vegetation accounts for the majority of species growing around the transplants, or as spot-treatments to scattered RCG plants that may have survived initial control efforts. Some desirable species, including transplanted species, can be severely injured by these herbicides, however, so maintenance sprays should be used with care on plants that will tolerate them. However she recommends them in ROW areas [8]

Glyphosate was applied alone at 3.4 or 4.5 kg ae/ha, and alone at 3.4 kg ae/ha with triclopyr at 1.7 kg ae/ha, imazapic at 70 or 140 g ae/ha, or sulfometuron methyl at 52 or 105 g/ha in october. Treatment combinations were applied to a mixed stand of partially senesced reed canarygrass and goldenrods (Solidago spp.) that averaged 75 and 23 percent cover, respectively, on October 18, 2011. All herbicide treatments reduced reed canarygrass cover compared to the controls 11 MAT. Glyphosate alone or with imazapic produced similar results, with reed canarygrass cover ranging from 2 to 3 percent. Adding triclopyr to glyphosate resulted in increased reed canarygrass cover (15 percent) compared to glyphosate alone. The addition of sulfometuron at 52 or 105 g/ha resulted in similar reed canarygrass cover compared to glyphosate alone but gave higher control of solidago. [9]

A multiyear experiment evaluated the effects of burning and herbicide application timings on reed canarygrass. Burning did not reduce biomass but reduced the seed bank. Glyphosate applications in late August and late September were more effective than in mid-May such that two mid-May applications reduced P. arundinacea biomass to a level equivalent to that achieved by one late-season application. [10]

Annen tested whether coupling pretreatment tillage or pretreatment plant growth regulator (PGR) application to herbicide application would result in greater reed canarygrass control compared to herbicide application alone. he tested: (1) Sethoxydim (Vantage (R)) application only (standard method control), (2) Tillage followed by Vantage (R) application, and (3) Plant Growth Regulator application (2:1 (a.i.) Cycocel (R)/Proxy (R)) followed by Vantage (R) application. Tillage-Vantage (R) treatments had a larger effect on reed canarygrass suppression and native species abundance than the other two treatments, and these effects persisted into the subsequent growing season after treatments were discontinued. Coupling PGR pretreatments with herbicide application reduced reed canarygrass stem density 26% greater than herbicide application only. Tillage and PGR pretreatments have potential for enhancing the effects of Vantage (R) herbicide on reed canarygrass. [11]

Annen also evaluated Sethoxydim (Vantage) by applying the following treatments: 1) control (no applications), 2) early summer sethoxydim application (May 29), 3) early + late summer sethoxydim applications (May 29 and August 2), and 4) late summer mowing (July 28, 2001). Findings suggest that treatment with sethoxydim significantly reduces both seed production and biomass of reed canarygrass, although this effect is limited to the year of application. [12]

Tested if Imazamox could be a suitable alternative for sulfometuron if it provides similar vegetation suppression and does not damage transplants. Glyphosate was applied on May 27 at 3.4 kg ae/ha, alone or in combination with imazamox at 0.28 or 0.56 kg ae/ha, or sulfometuron at 0.053 kg/ha pre- or post-planting to 6 by 6 ft sites around tree

shelters planted to 1-year seedlings. 5 MAT no treatment had a significant effect on tree mortality. Another study at the same site and with the same treatments examined suppression of reed canarygrass. 5 MAT untreated plots had 100 percent reed canarygrass cover, while glyphosate alone plots averaged 21 percent, imazamox low and high rates averaged 11 and 10 percent, respectively, and sulfometuron-treated plots averaged 1 percent cover. These results suggest imazamox does not present a useful alternative to sulfometuron for weed control around sheltered woody seedlings due less suppression of reed canarygrass compared to sulfometuron. [13]

In a prairie tested if sethoxydim (Vantage (R)) would reduce Phalaris growth and favor native vegetation with and without adding a seed mix of 32 native plants. Sethoxydim reduced flowering but not cover of Phalaris; A second experiment combined late-May burning followed by late-June sethoxydim application. This combination reduced Phalaris cover the most of all treatments but the result was not found in 2007. Seed addition had no effect.[14]

Reed canarygrass (Phalaris arundinacea L.) is an invasive species that forms dense, monotypic stands in wetlands, moist meadows, and riparian areas. We implemented a reed canarygrass removal study at five sites in eastern South Dakota using imazapyr, imazapic, and glyphosate individually and in combination. Eight treatments (five in fall, two in spring, and a control) were applied at each location in fall 2005-spring 2006. Herbicides were applied over clipped vegetation that had residual vegetation removed. Reed canarygrass cover was 93% in untreated plots, and ranged from 21%-66% in herbicide treated plots at the conclusion of the study. Herbicide treatments containing imazapyr provided control for two growing seasons. [15]

Evaluated the effects of burning and herbicide application timings. Burning did not reduce biomass but reduced the seed bank, potentially limiting recolonization. Glyphosate applications (2% spot spray) in late August and late September (90% reduction 3 MAT) were more effective than in mid-May (71% reduction 3 MAT).Repeated applications for 2 years has >90% reduction regardless of timing. Recolonization occurred rapidly from the seed bank where control was sub-optimally timed. [16]

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