

Type	Systemic, broad spectrum fungicide (triazole fungicide in the conazole class of fungicides)
Controls	Controls powdery mildew
Mode of Action	Disrupts membrane function by inhibiting ergosterol biosynthesis and fungal cell wall formation.

Thurston County Review Summary:

Pesticide products containing myclobutanil are rated high in hazard and fail Thurston County's review criteria.

The risk of toxicity from potential exposures during applications to turf and from specific post-application exposures following turf grass applications is rated high in hazard for adults and children. Myclobutanil is rated high in hazard for chemical mobility and persistence but low in the potential to bioaccumulate.

MOBILITY

Property	Value	Reference	Rating
Water Solubility (mg/L)	132	1	Moderate
Soil Sorption (Kd=mL/g)	5.03	1	High
Organic Sorption (Koc=mL/g)	517	1	High

Mobility Summary:

Myclobutanil is not very soluble in water and adheres poorly to all soil types. The hazard of myclobutanil to move off the site of application with rain or irrigation water is rated high.

PERSISTENCE

Property	Value	Reference	Rating
Vapor Pressure (mm Hg)	0.0000015	2	Moderate
Biotic or Aerobic Half-life (days)	251	2	High
Abiotic Half-life (days)	365	1	High
Terrestrial Field Test Half-life (days)	>70	2	High
Hydrolysis Half-life (days)	Stable	1	High
Anaerobic Half-life (days)	626	1	High
Aquatic Field Test Half-life (days)	502	2	High

Persistence Summary:

Myclobutanil is not likely to dissipate into the air and is not expected to be significantly degraded by sunlight. Degradation is primarily through breakdown by soil microbes, but it will likely leave the site of application by leaching into the soil or with water runoff. If myclobutanil leaches deeply into soil or gets into aquatic sediment (environments without oxygen) it will likely persist for years. The EPA also noted that the rate of degradation for myclobutanil is not constant and it appears to degrade slower over time. The persistence hazard for myclobutanil is rated high because it is likely to take over two months to degrade to half of the applied concentration.

BIOACCUMULATION

Property	Value	Reference	Rating
Bioaccumulation Factor	Not found		
Bioconcentration Factor	Not found		
Octanol/Water Partition Coefficient	2.89	1	Moderate

Bioaccumulation Summary:

The octanol/water partition coefficient for myclobutanil indicates that it has a low to moderate attraction to organic solvents - which means it may bind to fish or animal tissue. In metabolism studies, rats quickly absorbed myclobutanil and completely eliminated it within 96 hours with no chemical accumulation in the rat's tissue (Reference 5). The hazard for bioaccumulation of myclobutanil is rated low.

ACUTE TOXICITY HAZARD - ECOTOXICITY

Test Subject	Value	Reference	Rating
Mammalian (LD50)	1,600 mg/kg	1	Moderate
Avian (LD50)	498 mg/kg	2	Moderate
Honey bee or insect (LD50)	>100 ug ai/bee	2	Low
Annelida -worms (LC50)	125 mg/kg	1	Moderate
Fish (LC50)	2.4 mg/L	2	Moderate
Crustacean (LC50)	11 mg/L	2	Moderate
Mollusk (LC50)	Not found		
Amphibian (LD50 or LC50)	Not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single dose toxicity testing indicates that myclobutanil is low in toxicity to bees and moderately toxic to mammals, birds, worms, fish, and other aquatic organisms.

Risk of mortality to bees and several other beneficial insects including wasps, beetles, and mites was considered low in an assessment of exposures from turf use of myclobutanil (Reference 2). Risk to other non-target organisms (birds, pets and other mammals, fish, etc.) could not be evaluated with the currently available data.

ACUTE TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Rating
Numerical inputs not found - see summary						
Numerical inputs not found - see summary						
Numerical inputs not found - see summary						
Numerical inputs not found - see summary						

Acute Toxicity Risk Assessment Summary:

Short-term risk assessments include potential exposures from 1 day to 30 days in duration. The worst-case exposures assessments combine dietary and drinking water inputs with inputs from specific activities (applying pesticide, post-application contact, etc.). Whenever possible, Thurston County separates the inputs from food and water from other routes of exposure so reviewers can see where the highest exposures are coming from. In the review of myclobutanil, the EPA did not provide the numerical inputs from each route of exposure so, calculating the inputs without food or water had to be inferred from the text. Because of this, there are no numerical margins of safety provided to support the following ratings.

Post-application exposures to adults performing yard work and to children playing on treated turf, is considered high in hazard. Potential exposures from "pick your-own" farms for fruit trees is also rated high in hazard. Post-application exposures to people working in their home garden after myclobutanil use, is rated moderate in hazard. Playing golf on treated turf is rated low in hazard.

The following scenarios were assessed for exposures to applicators:

- i. Aerosol Spray Can Application to Ornamentals and Fruit Trees
- ii. Hose End Sprayer Application to Ornamentals and Fruit Trees
- iii. Low-pressure (LP) Handwand Application to Ornamentals
- iv. LP Handwand Application to Vegetables
- v. Ready to use (RTU) Sprayer Application to Vegetables
- vi. Hose End Sprayer Application to Vegetables
- vii. Hose End Sprayer - Mix Your Own - Application to Turf
- viii. Hose End Sprayer - Ready to Use - Application to Turf
- ix. Belly Grinder Application to Turf
- x. Broadcast Spreader Application to Turf

The EPA stated that the application method(s) with the greatest potential for exposure are for "small-scale lawn applications". The margin of exposure calculated for these application exposures are rated high in hazard by Thurston County. It is unknown if all 4 application methods to turf are included in the "small lawn application" statement because the EPA did not present the numerical calculations. It is also unknown what the level of hazard is for the other application methods.

CHRONIC TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Group E	Not likely to be a human carcinogen	4	Low
Mutagenicity	1,000 g/ml NOAEL	No evidence of mutagenicity	5	Low
Neurotoxicity - (NOAEL)	--	No evidence of neurotoxicity	4	Low
Endocrine Disruption	Not listed	--	3	Low
Developmental Toxicity (NOAEL)	93.8 mg/kg/day	Increased incidence of ribs	4	Check risk
Reproductive Toxicity (NOAEL)	10 mg/kg/day	Stillborns, teste + prostrate atrophy	4	Check risk
Chronic Toxicity (NOAEL)	2.5 mg/kg/day	Increased liver weights	4	Check risk

Chronic Toxicity Hazard Summary:

The EPA considers myclobutanil not likely to be a human carcinogen and there were no signs of neurotoxicity or mutagenicity in long-term toxicity testing. Reproductive and developmental toxicity testing observed fetal toxicity only at doses equal to or above those that caused maternal toxicity. Myclobutanil has not been identified as a potential endocrine disruptor.

CHRONIC TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Rating
Long-term exposure assessments were not calculated						
Long-term exposure assessments were not calculated						
Long-term exposure assessments were not calculated						
Long-term exposure assessments were not calculated						

Chronic Toxicity Risk Assessment Summary:

The EPA performed long-term exposure assessments only for inputs from food and drinking water (which are not part of Thurston County's review). There are no residential or Thurston County uses for myclobutanil that are expected to result in chronic exposure (exposures throughout a lifetime).

Metabolites and Degradation Products:

Metabolites of myclobutanil include; carbon dioxide, 1,2,4-triazole, triazole acetic acid, triazole analine, myclobutanil butyric acid, (2RS) 2-(4-chlorophenyl)-5-oxo-2-(1H-1,2,4-triazol-1-ylmethyl)hexanenitrile, and (2RS,5RS) 2-(4-chlorophenyl)-5-hydroxy-2-(1H-1,2,4-triazol-1-ylmethyl)hexanenitrile (References 1 and 2).

1,2,4-triazole and its conjugates are common metabolites to the triazole class of compounds, including myclobutanil (Reference 2).

Comments:

Myclobutanil is not considered an eye or skin irritant (Reference 1).

References

1. International Union of Pure & Applied Chemistry. Pesticide Properties Database. Myclobutanil (Ref: RH 3866) Accessed 1/10/11. <http://sitem.herts.ac.uk/aeru/iupac/478.htm>.
2. USEPA. Environmental Fate and Effects Division. Risks of Myclobutanil Use to Federally Threatened California Red-legged Frog. June 17, 2009.
3. Scorecard - The Pollution Information Site. Health Effects / Endocrine Toxicants (Accessed 1/10/2011). <http://www.scorecard.org/health-effects>.
4. USEPA. [EPA-HQ-OPP-2006-0282; FRL-8105-1] Myclobutanil; Pesticide Tolerance. December 20, 2006 (Volume 71, Number 244).
5. USEPA. Myclobutanil; Pesticide Tolerances. [Federal Register: May 10, 2000 (Volume 65, Number 91)].