

The Impact of Imazapyr and Triclopyr on Bullfrog Tadpoles

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Killing the Weeds
without Killing the Frogs



Purpose of Study

- To assess the acute toxicological impact of two herbicide active ingredients and their formulated products commonly used in frog habitat.
 - Imazapyr (Stalker[®], Habitat[®])
 - Triclopyr TEA (Garlon[®] 3A)



Giant cane



Cape ivy



parrotfeather



tamarisk



5 Compounds

1. Imazapyr acid (active ingredient)
2. Stalker[®] (27.6% imazapyr IPA salt)
3. Habitat[®] (28.7% imazapyr IPA salt)
4. Triclopyr TEA (active ingredient)
5. Garlon[®] 3A (44.4% triclopyr TEA salt)



Why Be Concerned?

- Worldwide amphibian decline
- Recent CBD Lawsuit/Judgment
- CA Red-legged Frog is a USFWS threatened species



Why Be Concerned?

- These herbicides are commonly used to control invasive weeds in or near frog habitat.
- There's no acute tox data on the active ingredient or formulated products for amphibians.



Its really pretty simple...

- We ran tox tests in the lab with tadpoles
- We took those tox values and compared them to known/estimated maximum conc in water to determine a Risk Quotient
- Risk Quotient = exposure/toxicity
- RQ values < 0.05 indicate no risk



What We Know Already

- No acute tox data for the A.I.s for frogs
- Larval fish tox data indicates the A.I.s are "Practically non-toxic"
- No acute tox data for fish or frogs for Habitat or Stalker.
- Garlon 3A 96-h LC50: 300 - 450 ppm

Method

96-h Acute Tox Tests



- 3 to 18 day old tadpoles
- environmental chambers set at 22°C.
- 1000-ml Pyrex® measuring cups containing 400 ml of test solution
- 96-h test with 48-h renewal

THE ENVIRONMENTAL CHAMBER



This looks a little bit like what I do in front of the fridge at home,

except that I'm not usually holding a clipboard and I rarely wear a lab coat.

Method

96-h Acute Tox Tests

- Five treatment groups (concentrations)
- Four replicates per treatment group
- Each replicate had ten tadpoles
- The LC^{50} values were based on concentrations of active ingredients



Check out the very
little tadpoles...



Some Things to Keep in Mind

- This is an ACUTE toxicity analysis
- The endpoint is MORTALITY
- We used bullfrogs not CRLF
- This study says nothing about habitat impacts.



Method

Risk Quotient Analysis

- The US EPA's Level of Concern is 1.0 for terrestrial species
- LOC for Aquatic Species is 0.50
- LOC for Listed Aquatic Species is 0.05

LC⁵⁰ Definition

- That concentration of the pesticide in water that kills 50% of the test population in a lab tox test
- Small numbers = high toxicity
- LC50 values > 100 mg/L are considered to be “practically non-toxic”

Bullfrog tadpole 96-h LC⁵⁰ and 95% confidence interval values

	LC ⁵⁰	95% C.I.
Imazapyr acid	799.6	775.8 - 824.6
Stalker®	14.77	11.2 - 17.9
Habitat®	1,739	990.6 - 2,256.7
Triclopyr TEA	814.1	769.6 - 847.1
Garlon®3A	174.5	174.5 - 174.5

Environmental concentrations in water (EC) and risk quotients (RQ)

	EC	RQ
Imazapyr acid	0.50	$0.40/799.6 = 0.0005$
Stalker®	0.50	$0.40/14.7 = 0.027$
Habitat®	0.50	$0.40/1739 = 0.0002$
Triclopyr TEA	3.50	$3.50/814.1 = 0.004$
Garlon®3A	3.50	$3.50/174.5 = 0.020$

What this all means

- The preference to use glyphosate when these compounds are more effective and just as safe (perhaps safer)



Questions?



This paper will be published in DFG's
scientific journal...

California Fish and Game

<http://www.dfg.ca.gov/publications/journal/>