

Environmental Concerns

Nitrogen Fertilizers and Freaky Frogs

I'm sure that most of you are aware that water pollution by agricultural chemicals is a very hot news topic. The general public is convinced that their drinking water is polluted with chemicals, which explains the increasing use of bottled water.

The Press - A recent Associated Press newspaper article was entitled: "Declared OK for People, Fertilizer in Water can Kill Frogs, Study Finds." The accompanying photograph certainly caught your attention (Figure 1), as did the quote by a college professor: "Are You Comfortable Drinking Water with Levels of Fertilizer that Kills Off Frogs?" If you were having your morning oatmeal while reading this, you might have thought twice about swallowing.

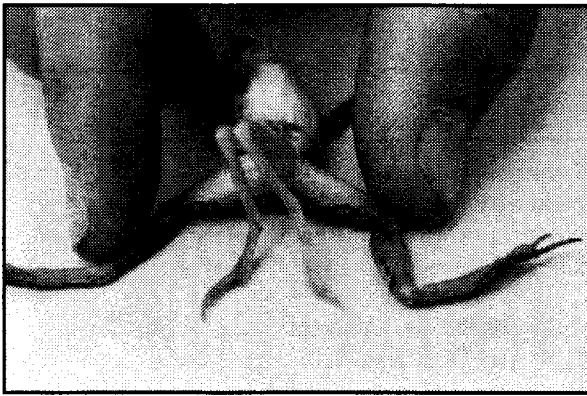


Figure 1

Reading further, the article quotes a research paper entitled "Sensitivity to nitrate and nitrite in pond-breeding amphibians from the Pacific Northwest, USA". The researchers studied 5 species of amphibians including the spotted frog (*Rana pretiosa*), the red-legged frog (*R. aurora*), the western toad (*Bufo boreas*), a tree frog (*Hyla regilla*), and the northwestern salamander (*Ambystoma gracile*). At low levels of nitrates, they found that two of the amphibians experienced increased rates of mortality (Figure 2). Extrapolating these controlled laboratory experiments to riparian systems, the authors suggested "that nitrogen-based chemical fertilizers are a possible cause of the decline of *Rana pretiosa* species in the lowland valleys (of western Oregon and Washington)".

Ecologists began noticing a global decline in amphibian populations in the mid 1980's and the freaky frog phenomenon (how's that for alliteration?) has even been adopted as a science project in some Minnesota schools. There is even a website showing Photos of Deformed Frogs: <<http://www.pca.state.mn.us/hot/frogphotos.html>>

Human Health Concerns - Should we be concerned about drinking water "with levels of fertilizer that kills off frogs?" The answer, according to a team of government scientists commissioned by the National Academy of Science, is not to worry. Reviewing the scientific literature, they found that current water quality standards (Table 1) "are adequate to protect human

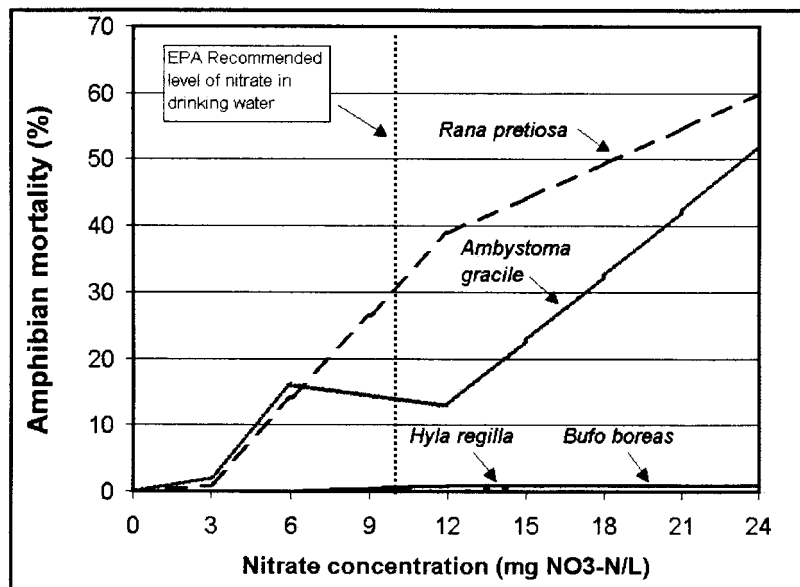


Figure 2

health" and that, at these levels, there is no supporting data to associate nitrate and nitrite exposure from drinking water to human ailments. In fact, nitrate is a normal component of our diet. The typical adult daily intake of nitrate in the US is 75 milligrams (mg) and 85% of that comes from natural nitrates in vegetables. Because of these naturally high levels, the daily intake by vegetarians can exceed 250 mg/day.

Chemical	Symbol	Concentration (mg/l)
Nitrate	NO ₃	44
Nitrate-nitrogen	NO ₃ -N	10
Nitrite	NO ₂	3.3
Nitrite-nitrogen	NO ₂ -N	1
*milligrams per liter = parts per million		

Back to the freaky frogs - are all frog deformities caused by environmental pollutants? The journal Science published a recent article concluding that some frog deformities might have less to do with pollutants than to a microscopic flatworm called *Bieroria trematodes*. This natural parasite burrows into the hindquarters of frogs at the tadpole stage, rearranging the limb buds and interfering with limb development.

Conclusions and Recommendations - The general public is not going to read the follow-up articles or dig through the scientific reports that exonerate fertilizers because they are convinced that there is a problem. Therefore, we must continue to find ways to reduce the amount of fertilizers and pesticides that we use in our greenhouses and on our fields. We must also find ways to clean up water before it leaves the nursery and enters any waterway. Whether the press reports these issues in a responsible manner or not, we must not lose sight of our responsibilities to the environment through the use of good, applied science in our daily management activities.

Sources:

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