Assessing the Effects of Fungicides on Non-target Aquatic Fungi in Southern Idaho

Emma R. Wilson[1], Kelly L. Smalling, Timothy J. Reilly, Lance Steele, Prasanna Kandel, Alison Chamberlin, Sarah Oman and Merlin M. White
[1]Boise State University
U. S. Geological Survey Toxics Substances Hydrology Program
Boise, ID 83725
(208) 426-4638
merlinwhite@boisestate.edu

Fungicides are pesticides designed to control fungal diseases, but tend to be understudied and are typically not included in routine water quality monitoring programs. Many broad spectrum fungicides, such as Chlorothalonil, have been applied for over 50 years, but the use of newly developed classes of fungicides (e.g. strobilurins, conazoles and carboxamides) has been increasing. The development and registration of new fungicides as well as an expansion of their use is driven by the presence of new fungal diseases (e.g. Asian Soybean Rust), the persistence of older diseases (e.g. Late blight) and increased fungicide resistance to many fungal pathogens. Fungicides are moderately hydrophobic (log Kow 3-5) and their persistence has been documented in water and sediment. Currently, there are limited data on the effects of fungicides on aquatic organisms particularly native fungal communities. To better understand potential effects, surface water samples and arthropod hosts of symbiotic gut fungi were collected from several sites between April and December 2010 in southern Idaho. Two control sites (Boise, Idaho) with no pesticide inputs and two agriculturally impacted sites (Parma, Idaho) with known fungicide use were selected for the study. No fungicides were detected in the control sites while at the Parma sites, azoxystrobin and boscalid were detected in over 90 % of the surface water samples. Gut fungi in larvae from control sites had higher density, diversity and spore production, while those collected from the two impacted sites typically had lower diversity and fecundity (spore production). Our results indicate that fungicides have the potential to affect non-target fungal communities in surface water systems and may have implications on lotic foodwebs.