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Effects of Insecticides on Amphibians

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Neonicotinoid Contamination in Northern Leopard Frog Brains

The widely practiced agricultural system tile drainage may have a negative impact on non-target organisms like Northern Leopard Frogs (*Lithobates pipiens*) in the Prairie Pothole Region of South Dakota. Other possible non-target organisms are humans, domestic animals, and bees. Farm crops are sprayed with an insecticide called neonicotinoids that dissolve well in water. One neonicotinoid is imidacloprid. Imidacloprid has been found in fish brains (Iturburu et al., 2017). Amphibians have skin extremely absorbent skin (Lanctot et al., 2017). That could make leopard frogs an indicator of how much imidacloprid is in wetlands. Our study exposes fifty leopard frogs collected from Wetland Production Areas in Eastern South Dakota to 0, 0.1, 5.0, and 10.0 $\mu\text{g/L}$ of imidacloprid over a twenty-one-day testing period. After the testing period, we will collect the frogs' brains and send them to the University of North Dakota for analyzing. Once the samples are analyzed we will draft and submit for publishing a paper on imidacloprid impacts.

Hypothesis:

The level of contamination will increase as the amount of imidacloprid becomes more potent.



Selenium Concentration in American Toads and Tiger Salamander Larvae Livers

American Toads (*Anaxyrus americanus*) and Tiger Salamander Larvae (*Ambystoma tigrinum*) are indicative species like Leopard Frogs. We were looking for Selenium concentrations in their livers. We collected toads from a few sample sites, some of them were controlled and some were tile drain sites. Tile drains are an agricultural technique to improve crop yield. The installation process involves digging trenches 3-4 feet into the field and placing drain pipe at the bottom then covering them up again to be planted over. The drains all lead to the nearest water source, in the prairie pothole region that source is wetlands. Selenium is naturally found in soil but this process results in excess amounts being deposited into wetlands.

We also tested wetland water, invertebrates in addition to toad and salamander larvae liver to track the Selenium concentration up the food web. My job was to capture the toads and salamanders and then remove their livers, an organ that was found to be indicative of Selenium concentrations in other studies. Those livers will be sent to the University of North Dakota for analysis.

References

Lanctot, C.M., et al. 2017. Uptake and tissue distributions of cadmium, selenium and zinc in striped marsh frogs exposed during early post-embryonic development. *Ecotoxicol Environ Saf* 144:291-299.

Iturburu, F.G., et al. 2017. Uptake, distribution in different tissues, and genotoxicity of imidacloprid in the freshwater fish *Australoheros facetus*. *Env Tox and Chem* 36(3):699-708.