

Legacy Herbicides in Lake Sediment

Hoyer, M.V., Haller, W.T., Ferrell, J. & Jones, D.

Introduction

Concerned stakeholders proposed that the lack of submersed aquatic plants (primarily hydrilla, *Hydrilla verticillata*) was caused by herbicide use. Hydrilla is valued by sportsmen because it provides a food source for ducks as well as habitat for organisms fish feed on.

Many different stakeholders enjoy lake systems, such as anglers, bird watchers, recreational boaters, hunters, and local residents. The many uses of a lake and the conservation of its biological resources rely on active management of its habitats, particularly with respect to control of aquatic vegetation.

Current Conditions

Problematic aquatic plants are commonly managed through repeated treatments of herbicide. The U.S. Environmental Protection Agency thoroughly tests herbicides to ensure their efficiency and safety. However, many people are still against using chemical solutions in lakes.

Many stakeholders suggested at public meetings that the longtime use of herbicides in Lake Istokpoga had built up legacy herbicide in the sediment. The stakeholders stated that they believed legacy herbicides remain active in lake sediment and cause negative impacts to lake systems, preventing regrowth of aquatic plants in the lake (Figure 1).

So What?

UF/IFAS Center for Aquatic and Invasive Plants researchers found that the stakeholder expectation is **not** the case when it comes to herbicide use in aquatic plant management.

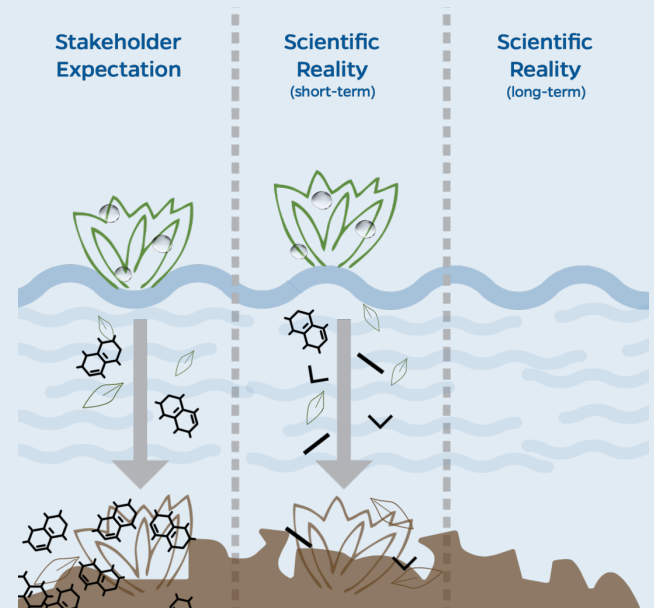
SCIENTISTS AND
STAKEHOLDERS
COLLABORATED TO
IDENTIFY THE IMPACTS
OF LEGACY HERBICIDES.

Legacy Herbicides

The idea that herbicides used for problematic plant management remain biologically relevant in lake sediment, hindering beneficial plant regrowth.

Figure 1

Below is a depiction of the stakeholders' suggested reality (left) of legacy herbicides, compared to the scientific reality of herbicide solutions once they enter a lake system. Initially, (center) herbicides are sprayed on the problematic floating plants and then as plants die and float to the bottom of the lake, the herbicide solution breaks down or otherwise disperses. **After some time (herbicide dependent), the herbicide breaks down into organic compounds (middle) and becomes biologically irrelevant (right).**



Experiment

UF/IFAS CAIP researchers responded to stakeholder concerns and designed a study on Lake Istokpoga.

Lake sediment samples were collected from stakeholder selected sites. Samples were tested for herbicide concentrations and tomato seeds were planted in the sediment to assess growth.

Tomato plants were used because they are easy to grow and extremely sensitive to herbicides and other stresses. Seeds were planted on April 12, 2019 and seedlings were harvested on May 10, 2019.



Objective

Determine whether legacy herbicides in lake sediments were inhibiting growth of vegetation

Results

Tomato plants grown in lake sediments grew at a rate that was between the two non-herbicide treated controls (sand only vs. sand and potting soil). This indicates that herbicides were likely not impacting plant growth. Analytical analysis found no herbicide in any of the lake sediments.

Aquatic plant management with herbicide solutions does not impact future lake health.

Figure 2

Average total dry weight of tomato seedlings by individual treatments and sample locations.

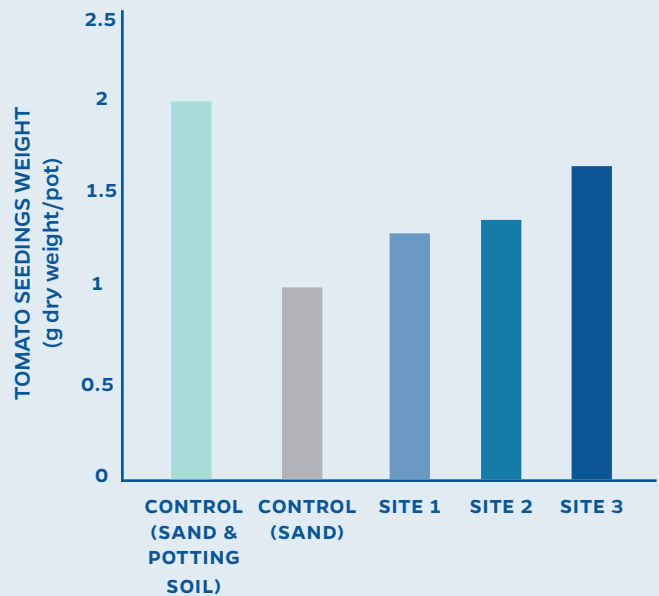


Table 1

Concentrations of herbicides (PPB) in sediments collected from nine locations in Lake Istokpoga on June 6, 2019. All nine samples had the same results with actual aquatic plant treatment rates from herbicide labels also listed.

U = undetected

MDL = minimum detection level (ug Kg⁻¹ of soil)

HERBICIDE	CONCENTRATION	MDL
FLUMIOXAZIN	U	20
GLYPHOSATE	U	50
IMAZAMOX	U	10
IMAZAPYR	U	10
PENOX SULAM	U	10
2,4-D	U	50
TRICLOPYR	U	50
DIQUAT	U	2,000

FOR MORE
INFORMATION
CONTACT US



352-392-9613
caip@ifas.ufl.edu
plants.ifas.ufl.edu

UF | IFAS
UNIVERSITY OF FLORIDA



CENTER FOR AQUATIC
AND INVASIVE PLANTS

TURNING SCIENCE INTO SOLUTIONS

***Adapted from:** Hoyer, M.V., Haller, W.T., Ferrell, J., & Jones, D. (2020). Legacy herbicides in lake sediments are not preventing the growth of submersed aquatic plants in Lake Istokpoga. *Journal of Aquatic Plant Management*, 58, 47-54.