

# Rounding Up the Evidence

by Stacy Brannan, Ohio Sea Grant Communications

*Drs. McKay and Bullerjahn believe that glyphosate, the main ingredient in the commonly used herbicide Roundup, may be entering the Lake Erie watershed in the runoff from crops planted in the region. This may be causing the harmful algal blooms that have been recurrent in Lake Erie in the last fifteen years.*

The Roundup herbicide you're using to keep the weeds out of your garden may be contributing to the growth of harmful algal blooms in Lake Erie, according to new Sea Grant research. Drs. R. Michael McKay and George Bullerjahn of Bowling Green State University are testing the effect of glyphosate, a phosphonate and the main ingredient of the commonly used herbicide, on the strains of blue-green algae found in Lake Erie.

Their interest in this possible connection began three or four years ago, when McKay came across a related journal paper. It seemed researchers had discovered that some marine algae have the ability to break down and use a class of phosphorus-containing compounds called phosphonates when phosphate levels are low in the ocean. Phosphonates had been traditionally viewed as forms of organic phosphorus that are not easily utilized by plankton.

McKay knew the troublesome blooms of blue-green algae, also called cyanobacteria, had been recurrent in Lake Erie over the past fifteen years, even though phosphorus levels have been limited in the region. He thought this new discovery could provide an important link that may help to explain the source of the problem.

Fast forward to 2008, when McKay and Bullerjahn received funding from Ohio Sea Grant to study the effects of glyphosate on the blue-green algae found in Lake Erie. In the early days of the project, Irina Ilikchyan, Bullerjahn's graduate student, has already made some important discoveries.

"Irina has shown both that many cyanobacteria present in Lake Erie have the genes allowing the uptake of

phosphonates, and these cyanobacteria can grow using glyphosate and other phosphonates as a sole source of phosphorus," Bullerjahn says.

The next step, then, for McKay and Bullerjahn will be to determine exactly what the algae do when they're put in a glyphosate-rich environment. "If you take parcels of water and you add glyphosate to them, does that change the composition of the algae?" ponders Bullerjahn. "Does that lead to the perceived rise of cyanobacteria in Lake Erie?"

Currently, the pollution models that are used to create action plans to clean up Lake Erie do not factor in phosphonates. However, McKay and Bullerjahn estimate that as much as 1,000 metric tons of glyphosate are being applied to the Lake Erie watershed, much of it from Roundup Ready, glyphosate-resistant crops planted in the region—largely corn and soybeans. If it is determined that the glyphosate is indeed increasing the amount of algae in Lake Erie, new pollution models that account for the additional phosphonates as a phosphorus source can be created.

"Research is finding that Roundup is getting into the watershed at peak farming application times, particularly in the spring," says McKay. "The glyphosate is being detected in May and early June, and we know that blue-green algae native to Lake Erie can use the compound. What we have not determined is the extent to which they are using it, and if you see a massive change in the microorganisms in the lake at that time." TL