

Protecting our Waters and Human Health

BY AMY J. W. SLOWIK

DR. VIJAY GOLLA HAS SPENT NEARLY A DECADE RESEARCHING THE HERBICIDE ATRAZINE AND ITS PRESENCE IN MIDWESTERN WATER SYSTEMS.

Dr. Golla is an assistant professor in Western Kentucky University's Department of Public Health, which is seated in the College of Health and Human Services. Atrazine is an herbicide commonly used on corn and sugarcane. Though widely used in the United States, atrazine was banned in 2004 by the European Union because of concerns over groundwater contamination. Controversy over the use of atrazine in the United States persists as scientists such as Dr. Golla study its effects on human health.

Dr. Golla's work directly affects environmental standards as he makes it possible to measure atrazine in communities and to calculate the effects on the health of Americans. His work can be applied worldwide to communities that still use atrazine and for researchers who want to perform studies with similar methodologies.

Atrazine is a chemical compound that both prevents and kills annual and broad-leaf weeds. Cheap and effective, atrazine is one of the most widely used herbicides in the world, commonly sprayed on corn, sorghum, sugarcane, and wheat. The United States produces more corn than any other crop, which means that both supply and demand are so high that farmers spend a considerable amount of their earnings on pesticides. Farmers believe that they cannot afford more expensive — yet perhaps safer — herbicides and still stay in business. In 2003, the EPA stated that “the total or national economic impact resulting from the loss of atrazine to control grass and broadleaf weeds in corn, sorghum and sugar cane would be in excess of two billion dollars per year if atrazine were unavailable to growers.”

However, the cost to the health of Americans may outweigh even two billion dollars. A 2003 Department of Health and Human Services informational release states, “The general population is probably not exposed to atrazine. However,

exposure to atrazine may occur at farms where it has been sprayed. The human health effects of atrazine are still being investigated and documented. Atrazine may affect pregnant women by causing their babies to grow more slowly than normal. Birth defects and liver, kidney, and heart damage have been seen in animals exposed to high levels of atrazine.”

On the other hand, in 2007, the United States Environmental Protection Agency (EPA) studied the effects of atrazine on amphibians and decided that no further testing would be necessary, despite results that showed damage to the amphibians tested. Scientists like Dr. Golla have yet to agree with the EPA. To the contrary, Dr. Golla's studies suggest that further testing is definitely necessary before concluding that atrazine is safe to use on crops grown near human habitations.

Dr. Golla, originally from India, earned the degree Bachelor of Medicine, Bachelor of Surgery (MBBS) from Andhra Medical College. He combined his medical knowledge

with a master's in public health from Western Kentucky University, and later a doctorate in Occupational and Environmental Health from the University of Iowa.

From 2001 to 2003, Dr. Golla examined atrazine levels in water before and after treatment. The study took place in the small community of Lewisburg, Kentucky, where drinking water supplies came from Spa Lake. One of Spa Lake's sources included run-off from agricultural fields that had high atrazine usage. Thus, the atrazine would flow from the plants and soil into traveling water (such as rain water or ground water) and down to Spa Lake. From Spa Lake, the atrazine would be collected in drinking water for treatment in the city's facilities.

Dr. Golla's question was whether the community's water treatment systems were able to adequately monitor and control the levels of atrazine in the water — water which was used in people's homes and public access places. Dr. Golla found that, despite water treatment, the presence of high concentrations of atrazine in finished water was of concern and posed a health risk to the people consuming water from Spa Lake in Lewisburg.

A later study produced by Dr. Golla between the years of 2004 and 2007 looked at atrazine's presence outside of drinking water. This research was conducted during his time as a doctoral student at the University of Iowa and in collaboration with the CDC/NIOSH (Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health). It measured the contamination of homes in farming households in three counties in Iowa that used atrazine.

Atrazine can travel through the air via dust and be absorbed into the human body through inhalation, ingestion, and skin absorption. It

cannot be completely cleaned out of a house, and it will remain in carpets, even after vacuuming, for at least six months after the planting season. In his research project, Dr. Golla wanted

drank either community water or non-community water. The goal was to determine whether atrazine was found equally in both water sources, or whether private water supplies

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to know whether atrazine levels dropped to safe levels in the farmers' homes and in their urine during the non-planting season. They did not.

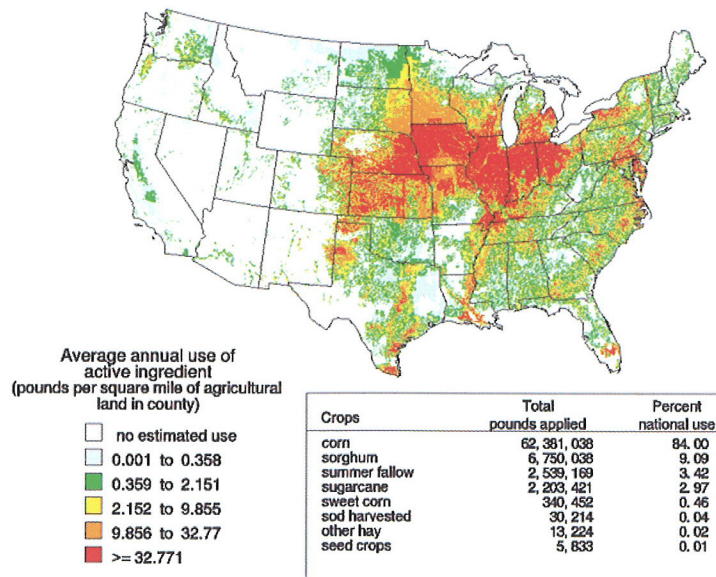
Dr. Golla found that atrazine made it inside the homes of even those who did not directly apply atrazine, and that neither time nor season made much difference in the levels of atrazine detected in dust and urine samples from farming households. This indicated the persistence of the pesticide over time.

Building upon his growing expertise in atrazine, Dr. Golla returned to Kentucky to teach at Western Kentucky University. From 2007 to 2008, he conducted another study on drinking water, this time examining farm families who

could be safer from atrazine than public ones. The study looked at farming households from four rural Kentucky counties. Almost seventy percent drank water from public sources, twenty-five percent drank water from private wells, and seven percent drank only spring water.

Dr. Golla tested the water in the homes of his participants to compare atrazine levels in water from these differing sources. He concluded that the atrazine levels were much higher in water from community sources than in water from private sources. Furthermore, his study did not make use of specialized laboratories, which paves the way for more such studies to be done without enormous costs.

ATRAZINE - herbicide
1997 estimated annual agricultural use





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Most recently — from 2008 to 2010 — Dr. Golla, along with researchers at the University of Kentucky College of Public Health, studied correlations between atrazine in public drinking water and lengths of pregnancies in Kentucky. Because of Kentucky's large crops of corn, atrazine usage in the state is quite high. Kentucky also ranks as one of the states with the highest rates of preterm births in the country. Preterm births refer to human births occurring before the full, normal gestational period. In his study, Dr. Golla examined levels of atrazine in all rural Kentucky counties' public drinking water with exception of counties in Appalachia. He also studied birth certificate data

from these counties to determine pregnancy lengths, taking account of other factors like maternal age, education, smoking, and prenatal care. The study ultimately found that a relationship indeed exists between even relatively low levels of atrazine in drinking water and preterm births.

In the future, Dr. Golla intends to further study atrazine's effects on long-term human health. Specifically, he will examine environmental and occupational exposure to atrazine through drinking water, dust, air, and biological samples. In this way he will build upon and combine his prior research studies.

So far, most studies involving atrazine have focused on amphibians, not humans. At present, Dr. Golla is

collaborating with the University of Kentucky's CDC/NIOSH agricultural health center to lead a larger research study to examine low-level pesticide exposures over time among inhabitants of farming areas.

In 2003, the Kentucky Public Health Association presented Dr. Golla with their Academic Excellence award, and in 2004 he won the Iowa Governor's Occupational Health and Safety Council's award. Given his continuing contributions to the science of health and safety, the awards will surely continue, as will Dr. Golla's research. ■