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Increased Corn Production Can Pollute Water

As farmers raise more corn for ethanol, they're likely to use more nitrogen fertilizer and other chemicals that can pollute water.

BY AARON E. PRICE

Record corn prices and ethanol mandates are sending signals for farmers to increase corn yields. Conventional corn production requires chemical inputs like nitrogen, phosphorus, insecticides and herbicides to help obtain high yields and maximize profits.

The push to grow more corn for ethanol may lead to water-quality problems from chemicals seeping into groundwater and running off into surface water.

"My biggest concern is water use, and if we can keep it safe during this ethanol boom," said Bruce Switzer, who ranches in Loup County in the Nebraska Sand Hills. "I worry about polluting the groundwater along with poor usage."

Impacts to water quality will depend on the intensity and type of cropping, on whether the corn is planted on good cropland or on marginal land and on the distance to groundwater and surface water. Planting corn in poor soils will require additional fertilizer, particularly nitrogen, which the soil cannot naturally provide. Fewer soybean-corn rotations will also increase the need for additional nitrogen.

Corn is a heavy nitrogen user; soybeans naturally replenish nitrogen in the soil, which is a major reason why farmers plant soybeans one year and corn the next in rotation on the same field. Planting corn every year can threaten water quality due to the application of additional nitrogen fertilizer.

Surface-water runoff can readily collect and move chemicals and soil into rivers, lakes and streams, creating problems for recreation, wildlife and public water supplies. Leaching, or the infiltra-

tion of chemicals into the soil, can carry chemicals into the groundwater — a primary source of drinking water.

"The quality of groundwater needs to be protected," said Susan Seacrest, founder and former president of the Groundwater Foundation. "You really can't let it get polluted, because once the groundwater is polluted, it is extremely costly to un-pollute it. Sometimes it's just not even technically feasible to do that."

Farmers are using better management practices — particularly for nitrogen fertilizer — than in the past, but even with better practices water quality problems still exist.

"Point-source" pollution typically comes from an identifiable, individual source like an effluent pipe at a factory. "Non-point source" pollution, such as runoff from farmland and city streets, can't be linked to any one source but can affect large areas. Agricultural chemicals can contribute to non-point source pollution.

The Nebraska Department of Environmental Quality monitors water pollution in the state; Marty Link, the NDEQ's associate director of programs for water, anticipates more problems from increased corn production.

"As more fertilizer's applied, more of it is going to be leached down into the groundwater, and we're going to have more of a non-point source overall over the whole state," Link said. The agency has found nitrate pollution — particularly in groundwater that's close to the surface, as it is along sandy areas near the Platte River. Nitrate in drinking water can cause health problems for pregnant women and

babies.

Non-point source nitrogen pollution of groundwater is a fairly localized problem; in contrast, non-point source pollution of surface water can have regional effects. For example, the dead zone in the Gulf of Mexico is an area off Texas and Louisiana where runoff from cities and farmland in the watershed of the Mississippi River has decreased oxygen in the water and created a large area with little sea life.

Non-point source pollution like this is hard to monitor because its sources are scattered. Among the chemicals used to grow corn, atrazine is the most widely used pesticide, according to the U.S. Environmental Protection Agency. Like nitrogen, atrazine concerns Link because it's difficult to track as a non-point source pollutant.

U.S. farmers use atrazine to suppress weeds in cornfields, but the chemical is banned in the European Union because its presence in drinking water concerned officials.

"Overall we haven't seen a whole lot of that showing up in the groundwater, and maybe we're not finding it cause we're not looking at it," Link said. The atrazine water-quality test is expensive to run, and funding at NDEQ is often tight, Link said.

One scientist working outside the NDEQ, Tyrone Hayes, professor of integrative biology at the University of California-Berkeley, has found atrazine in water in the Sand Hills, where little corn is raised.

"For example, Cherry County, Neb. We find atrazine that in some cases is at levels as high as in some of the corn-growing areas," Hayes said. "You don't have to necessarily be in an area where it's irrigated and where they're using it to actually find the atrazine."

Hayes has studied the impacts of atrazine on the leopard frog in Utah, Wyoming and Iowa, and has conducted "extensive studies" in Nebraska.

Hayes' research shows that one part per billion of atrazine is enough to "induce hermaphroditism and chemically castrate or demasculinize exposed amphibians." Hermaphroditism occurs when animals have both male and female parts, and can usually produce asexually or without a partner.

Leopard frogs are not naturally hermaphrodites.

"They start to produce estrogen, and that causes the males to lay eggs," Hayes said.

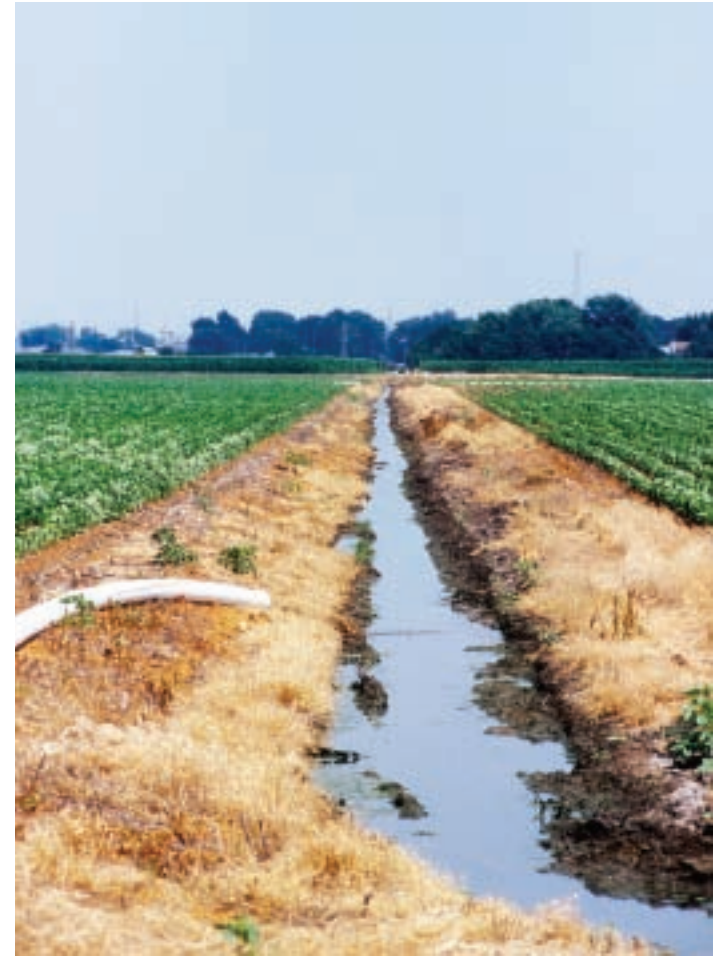
Other scientists have reached similar conclusions, but Syngenta, the company that makes atrazine, disputes these findings. On its Web site, the company says "atrazine is safe when used as directed." The EPA has identified atrazine as a hazard to human health when people are exposed to it at levels above 3 parts per billion (ppb) for even short periods of time. Nebraska is one of nine states where the EPA has found atrazine in drinking water at levels above the EPA limit of 3 ppb.

Hayes said atrazine does not collect in food, and exposure through drinking water and occupational

The use of atrazine and other pesticides is likely to become more widespread throughout the U.S. Corn Belt as farmers respond to economic incentives to plant more corn.

contact contribute to human atrazine accumulation. Speaking at a University of Nebraska-Lincoln conference in April, 2008, Frank Ackerman, the director of the research and policy program at Tufts University's Global Development and the Environment Institute, said more study needs to be done on the effects on humans of long-term exposure to low levels of atrazine.

Ackerman praised the European Union for ban-



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Groundwater and surface water are captured in irrigation canals and used to water crops. Nearly 1.4 billion bushels of corn was grown in Nebraska in 2007, according to the Corn Board, and 2.5 trillion gallons of water — some of it from rain — went into growing the 2007 Nebraska crop.

ning atrazine in line with the so-called "precautionary doctrine," that is, acting out of concern that "although the science isn't settled, it's disturbing."

Nevertheless, the use of atrazine and other pesticides along with nitrogen fertilizer is likely to become more widespread throughout the U.S. Corn Belt as farmers respond to economic incentives to plant more corn. ♪

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