

Atrazine—Alternatives to a Controversial Herbicide

Despite what atrazine's primary manufacturer claims, there are viable ways to raise corn without a total reliance on the herbicide.



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A popular weed killer

Since its development in 1958, Atrazine has become one of the most widely used corn herbicides in North America. Its relatively low cost and ability to kill broadleaf weeds like lambsquarter and water hemp without harming corn plants have made it popular with Midwestern farmers for decades.¹

Unfortunately, atrazine is also one of the most commonly detected pesticides in U.S. ground and surface water. This concerns scientists and healthcare experts because atrazine has been linked to several kinds of health problems in humans and amphibians.^{2,3} As a result of these concerns, use of the chemical has been restricted in some parts of the U.S. and around the world.

Beyond atrazine

Sygenta, the primary maker of atrazine, claims there are no viable alternatives to their best-selling herbicide, and has estimated that the chemical provides farmers an economic advantage of \$35 per acre.⁴ Industry-backed studies have estimated that banning atrazine nationwide would result in as much as a 6 percent yield loss for corn farmers.⁵

But in fact there are many viable ways of producing corn without relying on the controversial chemical. That has been proven in European countries such as Germany and Italy, which both banned atrazine in 1991 (a European Union ban went into effect in 2005 and a handful of extensions for limited use expired in 2007). Since the ban, corn yields and acres of corn harvested in Italy and Germany have risen, not dropped, an indication that atrazine use was not as integral to crop production as its manufacturer would like the public to believe.⁶

According to recent analyses, the experience in Europe and the introduction of new alternative herbicides in recent years show that dropping atrazine would result in yield losses of more like 0 to 1 percent.⁷

Keeping it out of the water

The problems associated with atrazine have sent farmers and agronomists in search of ways to keep the herbicide from becoming a water pollutant. The majority of atrazine that leaves crop fields is lost via water run-off, particularly after heavy rains. The remainder of lost atrazine is caused by soil erosion. Here are a few ways to reduce atrazine applications and keep it from becoming a pollutant:⁸

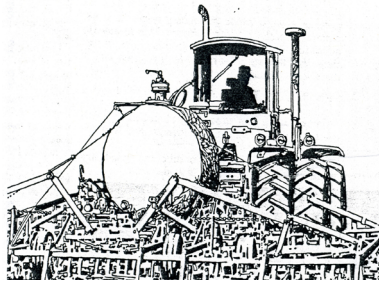
- Do not apply when heavy precipitation is in the forecast.
- Do not apply atrazine within 50 feet of any well or sinkhole. Mix atrazine and fill and rinse your sprayer at least 50 feet

from any well, sinkhole, stream, river, lake, reservoir or pond.

- Do not apply atrazine within 200 feet of a lake, reservoir or pond.
- Plant a 66-foot buffer of grass or other similar vegetation along streams or rivers.
- Incorporate atrazine into the soil using mechanical tillage equipment.
- Utilize no-till, mulch-till, ridge-till or other high-residue farming methods to reduce soil erosion, and thus atrazine runoff. However, be aware that no-till is not effective at reducing atrazine losses on tight, poorly drained soils or soils with a restrictive layer that limits water infiltration.

Reducing applications

There are numerous ways to reduce atrazine applications while maintaining corn yields:



- Use integrated pest management (IPM) to scout for weeds. This makes it possible to match spraying to weed infestations, rather than applying chemicals to an entire field indiscriminately. In many fields, weeds are clustered, with as much as 70 percent to 90 percent of the land having very few weeds. It is possible to map these infested areas at harvest time.
- Use less than the label recommends. Keep in mind that in years past, the recommendation was that farmers use four pounds of atrazine per acre. One to one and a half pounds per acre is now the typical recommended rate. However, studies have shown that by scouting weed infestations and using targeted spraying, even less atrazine can effectively control pests.

- Applying atrazine after corn has emerged, rather than before, can reduce runoff by as much as half.
- Applying atrazine in a narrow band in crop rows can reduce the amount of herbicide needed.
- Rotate crops. Rotating corn with soybeans, for example, can reduce atrazine use by at least half. Adding a third crop such as oats or other small grains can reduce reliance on the herbicide even more.⁹

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A chemical alternative

In recent years farmers have begun replacing atrazine with mesotrione, a triketone herbicide. It is marketed by Syngenta under the trade name Callisto, and was developed after it was noted that the bottlebrush plant produced a weak herbicide called leptospermon. Research led to the development of mesotrione, a closely related compound. So far, mesotrione appears to not be a carcinogen, although its other health impacts are unknown. Field trials conducted by Syngenta show that in some cases corn treated with mesotrione actually out-yielded atrazine-treated corn.¹⁰

One farmer who has switched to mesotrione is Mike Phillips. Phillips raises corn and soybeans in southern Minnesota using a no-till system, which reduces soil erosion and cuts fuel usage dramatically. But because he can't rely on tillage to control weeds, Phillips says having a good herbicide is important to the success of his system.

For about a dozen years he used atrazine on his corn. He would spray it after the corn had emerged, killing weeds on contact as well as gaining a residual effect which kept weeds from germinating later in the growing season.

"For a low cost, you really got some results with it," says Phillips. Approximately five years ago he dropped atrazine from his weed-control arsenal. The farmer, who is certified by the state to apply his own chemicals, didn't like handling the pesticide because of its tendency to settle into spraying equipment, making it difficult to clean tanks and spray booms.

Phillips says mesotrione provides just as good of weed control as atrazine without the hassle of fouling up spraying equipment. He uses a lot less of the new herbicide—about two ounces per acre, as opposed to one to one and a half pounds of atrazine per acre. Because he does his own spraying, Phillips can tailor application amounts according to how much weed pressure certain parts of his farm are facing.

He says the major disadvantage to mesotrione is the cost: \$5 to \$8 per acre. He could kill weeds with atrazine for around \$1 to \$2 per acre.¹¹

Dropping atrazine

Certified organic crop farmers have been proving for years that weed control is possible without chemicals. That doesn't mean you have to be completely organic to be atrazine-free. However, it has become clear recently that certain organic cropping strategies can help remove herbicides like atrazine from conventional farm fields. Here are a few proven strategies:

- **Rotary hoes, cultivators, flame weeders and other mechanical weed control methods.** These can be effective tools, particularly on land that is not highly erosive.

- **Long crop rotations that consist of soybeans, forages and small grains.** These rotations can break up weed cycles quite effectively.

- **Cover crops.** Farmers have found that planting crops that have low market value after harvest of the main crop in the fall or even in the spring before planting can suppress weeds, as well as reduce erosion and enrich the soil. For example, an increasing number of farmers in the Upper Midwest are planting winter rye in the fall. This cover crop grows well in early spring, and suppresses weeds by competing for sunlight, nutrients, moisture and space. In addition, crops like rye contain alleopathic compounds, which naturally interfere with weed growth. Cover crops can be particularly useful for controlling cool-

season perennials.¹²

- **Chemical-free no-till.** The Rodale Institute in Pennsylvania has developed a corn production system that utilizes a cover crop of hairy vetch or rye and a specially designed roller. The roller knocks down the vetch, and corn is planted into the natural mulch. Weed suppression has been so effective that trials show this system out-yields corn systems reliant on herbicides for weed control. The University of Minnesota's Southwest Research and Outreach Center in Lamberton is experimenting with this system.^{13,14} More information on the Outreach Center is at <http://swroc.cfans.umn.edu>. The telephone number is 507-752-7372.

What you can do

- If you have your agrichemicals applied by a contract sprayer, check with them to see what alternatives to atrazine they have available, as well as what can be done to reduce application rates.

- Check out the Minnesota *Greenbook* (www.mda.state.mn.us/protecting/sustainable/greenbook.htm) for examples of farmers who are utilizing various alternative methods to eliminate or reduce applications of herbicides like atrazine.

- The University of Minnesota's Organic Ecology initiative (<http://organicecology.umn.edu>; 507-454-8310) has details on alternative weed control research being conducted in various parts of the state.

Sources

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⁷Ackerman. 2007

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