

Prior herbicide use -- not irrigation -- is critical to herbicide efficacy

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Crop and herbicide use history are more critical to herbicide efficacy and environmental safety than the timing and amount of irrigation water used, according to Agricultural Research Service (ARS) scientists.

ARS [plant physiologists](#) Dale Shaner and Lori Wiles made this discovery from ongoing experiments on two irrigated fields at Colorado State University (CSU) at Fort Collins, Colo. Shaner and Wiles work in the ARS Water Management Research Unit at Fort Collins.

In collaboration with CSU colleague Neil Hansen, Shaner and Wiles compared the behavior of the [herbicide](#) atrazine in conventionally tilled corn grown continuously year after year versus corn grown in three different crop rotations. They tested various levels of tillage and [irrigation](#), including no irrigation.

The amount of irrigation used-including a total absence of irrigation-had no impact on the rate of degradation of atrazine by [soil](#) microbes in the top foot of soil. The only factors that made a difference were prior herbicide use and the choice of crop sequences, with prior herbicide use the most important factor by far.

Earlier studies, including one by Shaner, have shown that previous applications of atrazine can predispose soil to more quickly degrade later applications of the herbicide. But until now, it was not clear if other factors such as cropping history and quantity of irrigation played a role.

There are two consequences of the more rapid dissipation of atrazine in the plots with a history of use. The first consequence is a loss in [weed control](#). In the plots with the most rapid dissipation, weeds began to re-infest the plots within four weeks after treatment, while the plots with the slowest rate of dissipation remained weed-free through the growing season.

The second consequence is that atrazine leached more deeply in the soil in the plots where it did not dissipate rapidly, but the herbicide did not move below the top three inches of the soil in the plots where it was degraded rapidly.

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