

Reduce loss of ammonia gas from urea fertilizer

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More urea fertilizer (46-0-0) is applied to farm fields in Montana than all other nitrogen fertilizers combined, largely due to both cost and availability. However, urea fertilizer has some potential to 'volatilize' into ammonia gas and escape into the atmosphere, reducing the nitrogen available for plant uptake. Fortunately, enough is known about urea volatilization that, through sound management, it may be greatly minimized.

According to Clain Jones, Montana State University Extension soil fertility specialist in the Department of Land Resources and Environmental Sciences, "The worst-case scenario for urea volatilization is to surface broadcast during a warm period on a moist sandy soil, a grass hay field or a field with a lot of residue." This can be a significant problem if the urea is not incorporated into the soil with tillage, rainfall or irrigation within a couple days after application.

"Once urea is about two inches down into the soil, it has little chance of leaving the soil as ammonia gas," Jones said.

Urea is not the only nitrogen fertilizer that can volatilize. Ammonium sulfate and liquid nitrogen fertilizers may also volatilize. In addition, anhydrous ammonia can volatilize if not placed deep enough into the soil or if cracks form above the knife point. Ammonium nitrate (34-0-0) generally does not volatilize, yet its availability is limited in many regions in the state.

A large number of research studies that have compared yields between crops applied with either ammonium nitrate or urea in Montana and Idaho have shown very similar yields, suggesting minimal losses as ammonia gas from urea. Grant Jackson, professor at the Western Triangle Agricultural Research Center at Conrad conducted many of the Montana studies. He said "Growers can expect similar yields from urea as from other forms of nitrogen fertilizer, and like other nitrogen sources, it needs to be applied correctly."

"Fortunately, Montana often does not have conditions that cause substantial volatilization, particularly during the major fertilizer application period from mid Fall to early Spring," Jones said.

The best ways to prevent urea volatilization are to apply it during cool periods, or incorporate the fertilizer one or two days after application either with tillage or with one-half-inch or more of irrigation or rain. Less caution is needed on fine, textured soils, especially when they have low amounts of crop residue. Jones said that "Once nitrogen fertilizer is in contact with the soil, it has a much better chance of staying in the soil than escaping as a gas."

Although there is always a risk of losing nitrogen to the atmosphere, well thought out planning can greatly minimize the potential for nitrogen loss.

For additional information on how to efficiently manage urea fertilizer, please see MSU's new regional publication entitled "Management of Urea Fertilizer to Minimize Volatilization" at <http://landresources.montana.edu/SoilFertility/ammonvolat.html> or order it from MSU Extension Publications.