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PolicyPennings by Daryll E. Ray & Harwood D. Schaffer

Farm-based nitrogen emissions are unavoidable but can be minimized

Growing up, one of the events we looked forward to was the church pot luck dinner. There were so many delicious choices to choose from as we worked out way down the table that it was easy to overfill the plate and the desserts were still ahead. It took more than one pot luck dinner to finally come to the conclusion—well mothers and a stomach ache or two helped—that it was possible to have too much of a good thing.

In the recent algae bloom that shut down the public water system, we have been faced with the problems caused by too much of a good—and necessary—thing, as excess phosphorus, some of which came from agricultural production, in Lake Erie fed the algae bloom.

A United States Department of Agriculture (USDA) Economic Brief, "Nitrogen Management on U.S. Corn Acres" (http://tinyurl.com/k35oyto), points out that while nitrogen is an important input that allows farmers to "produce high yields profitably," excessive application can lead to problems. They note that "nitrogen compounds released into the environment can also be a source of environmental problems, including eutrophication and hypoxia in aquatic ecosystems, visibility-impairing haze, and the loss of biodiversity."

According to another USDA publication, "Nitrogen In Agricultural Systems: Implication for Conservation Policy" (http://tinyurl.com/p23hda4), "agriculture is the predominant source of reactive nitrogen emissions into the environment. In the United States, agriculture contributes 73 percent of nitrous oxide emissions…84 percent of ammonia emissions… and 54 percent of nitrate emissions." [In what follows, quoted material taken from the Economic Brief will be marked (A) and from the second publication will be marked (B)]

Despite all that we know about the problems created by crop nutrients that make their way into the environment, "in 2006, 65 percent of cropland (producing eight major field crops) did not follow what are considered to be nitrogen best management practices" (A).

In addition, "USDA's Natural Resources Conservation Service (NRCS) found that improvements in at least one aspect of nitrogen management…Nitrogen Management" were needed on 86 percent of cropland rotations in the Upper Mississippi Basin, 87 percent of cropland rotations in the Chesapeake Bay watershed, 82 percent of cropland rotations in the Great Lakes watershed, and 93 percent of cropland rotations in the Ohio-Tennessee Basin" (A).

The problem that farmers face is that they do not know what the weather will be like in a given year and so they seek "to maximize economic returns by setting an optimistic yield goal for a given field based on an optimum weather year to ensure that the needed amount of nitrogen for maximum yields is available…. Thus, during the years in which weather is not optimal for maximizing yields, nitrogen will be overapplied from an agronomic standpoint. Almost by definition, optimal conditions are infrequent, so farmers overfertilize crops in most years" (B).

While giving farmers the best shot at high yields to maximize income in an optimum weather year, overfertilization shifts costs to others. It is "estimate[d] that consumers spend over
$800 million each year on bottled water due to nutrient-related taste and odor problems" (B).

In addition, "Using data from water treatment plants, ERS estimates the cost of removing nitrate from U.S. drinking water supplies is over $4.8 billion per year…. Based on the contribution of nitrate loadings from agriculture…agriculture's share of these costs is estimated at about $1.7 billion per year. Most costs are borne by the large utilities, due to the volume of water treated" (B).

The use of three basis practices by farmers can reduce the amount of nitrogen that is released into the environment:

1. "Rate. Applying no more nitrogen (commercial and manure) than 40 percent more than that removed with the crop at harvest, based on the stated yield goal, including any carryover from the previous crop. This agronomic rate accounts for unavoidable environmental losses that prevent some of the nitrogen that is applied from actually reaching crops.
2. "Timing. Not applying nitrogen in the fall for a crop planted in the spring.
3. "Method. Injecting (placing fertilizer directly into the soil) or incorporating (applying to the surface and then discing the fertilizer into the soil) nitrogen rather than broadcasting on the surface without incorporation" (A).

While these recommended practices are generally well known among producers, the application of all three practices apparently has a long way to go.

Without significant progress in adopting all three practices, societal pressure will likely force stricter enforcement of existing conservation compliance rules on producers participating in farm programs or subsidized crop/revenue insurance programs. The next step could the introduction of far more onerous rules.

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