

Proactive Farmer-Led Discovery Farm Program Determines Effectiveness of Conservation Practices on their Farms to Increase Fertilizer-Use Efficiency

Report to Arkansas Corn and Grain Sorghum Board

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In AR, the conservation practices evaluated include managing the rate, timing and placement of fertilizer, reducing tillage, use of cover crops, buffer strips, and water harvesting along with other practices. The Program uses a unique approach based on agriculture producers, scientists and natural resource managers working jointly to identify on-farm conservation issues and potential solutions to agricultural sustainability challenges, and is based on the following four cornerstones; 1) sound science, 2) unbiased research, 3) stakeholder driven transparency, and 4) strong partnerships.

Need for the Program

Nutrient enrichment remains a major impairment to the designated uses of fresh and coastal waters of the U.S. While there are many sources of nutrients, the contribution of agriculture, in particular intensive livestock and crop production, has received increased attention to reduce nutrient losses. This attention has been fueled by recent modeling efforts and surveys that have suggested that agriculture remains a major contributor of nutrients to surface waters and thereby to their impairment. For instance, a recent model estimates suggest that up to 85% of the phosphorus (P) and nitrogen (N) entering the Gulf of Mexico originates from agriculture. While these estimates are based on large-scale modeling within the Mississippi River Basin, there have been few farm-scale studies of P and N loss from agricultural production systems in the Basin, particularly the Lower Mississippi Alluvial Valley, especially largely agricultural states of AR and MS.

What has been learnt to date

Nutrient runoff from pastures fertilized with mineral as well as organic manures can be reduced three-fold by simply maintaining a good stand of grass cover, avoiding concentration water flow, and avoiding fertilizer applications to wet soils when heavy rains are forecast.

One common theme has resonated with our row crop farms, in that only a small proportion of the N and P applied as fertilizer each year are lost in

	Applied	Loss	Percent loss
	--- lbs/acre ---		%
Nitrogen			
Cotton	110	6.1	5.6
Corn	268	4.4	1.6
Phosphorus			
Cotton	42	1.9	4.6
Corn	41	0.9	2.2

runoff from no-till corn, cotton, rice, and soybeans. Typically, these losses are less than 5% of that applied. These losses are decreased further where cover crops were planted in winter to protect to soil surface and applied chemicals from runoff and erosive forces.

Also, because of a dramatic fall in aquifer levels over the last decade in the Delta region of AR, these areas are now designated by the State as critical groundwater zones and more farmers are turning to land-levelling and water harvesting to ensure adequate irrigation water supplies that last through the growing season. On these farms, nutrient loss is minimal as farmers are doing all they can to retain any rainwater on their farm in reservoirs or retention ponds.

In summary

Implementation of standard water quality monitoring methods on private working farms across the State has started to document the true impacts of Arkansas agriculture on environmental quality and efficiency of current conservation measures. As this monitoring is being conducted on private property, the results have greater impact and resonate with the farming community more than that conducted on University property. In fact, we are already seeing farmer ownership of the Discovery Farm Program to the extent that they are requesting runoff data to present data at farm meetings. Also, in some cases, neighboring farmers are voluntarily introducing additional conservation practices to further reduce nutrient runoff after seeing the results. Most importantly, the Discovery Farm Program is empowering farmers to proactively address environmental concerns.
