

MEASURING FARMER BEHAVIOR IN NUTRIENT MANAGEMENT PLANNING

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Introduction

A common approach used in environmental protection efforts is the promotion of best management practices (BMPs) to control excess crop nutrients and soil erosion. While BMPs include a wide range of actual practices, their defining characteristics should include agronomic and environmental effectiveness as well as economic and social feasibility (Bailey and Waddell, 1979). In the 1990s the central BMP of choice seems to be the nutrient management plan. The nutrient management plan identifies management and conservation actions that will be followed to meet clearly defined soil and water conservation goals (NRCS, 2000). In Wisconsin, nutrient management plans are widely promoted by state and federal agencies. Currently, however, there is limited knowledge about the extent to which those plans are being followed by farmers and if those plans actually result in on-farm management changes.

Study Methods

Data were collected from 127 Wisconsin farmers in two watersheds where nutrient management plans are known to have been extensively promoted. These two areas were selected based on a cross section of involvement from private and public sector providers of planning assistance and nutrient management information. The data collection effort focused on the application of all sources of nitrogen (N), and phosphorus (P_2O_5), because those nutrients have been shown to negatively affect the surface and groundwater resources when used in excess or in ecologically sensitive areas. The primary data comparisons are between applied nutrients and University of Wisconsin recommendations, and between farmers with and without nutrient management plans.

The underlying goal of the University of Wisconsin's crop fertility recommendations has been to supply nutrients to the crop so that economically damaging nutrient stress does not occur at any point during the production season. This concept is founded in the belief that one avoids plant stress by insuring a minimum nutrient concentration in the soil through fertilizer application (Madison et al., 1986; Kelling et al., 1981). Farming systems that combine animals, forage and cash grain production have the opportunity to augment commercial fertilizers with nutrients from on-farm sources.

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Results

The results focus on two issues: 1) the distribution of nutrient application rates by farmers in the production of corn, and 2) the use of recommended management practices that should influence total nutrient application rates.

In comparing recommended levels to actual rates applied, findings show that farmers over-apply commercial nitrogen and phosphorus. Farmers on average used an excess of 43 kg/ha (38 pounds per acre) of nitrogen beyond University of Wisconsin recommendations for growing corn. Similar results were found for phosphorus application rates. On average, farmers applied an excess of 83 kg/ha (74 pounds per acre) of phosphorus. Results also show that 62 percent of the farmers without nutrient management plans over-applied nitrogen, while 37 percent of the farmers with plans over-applied nitrogen. Twenty-six percent of the farmers with plans over-applied phosphorus, while 37 percent of those without plans applied more phosphorus than the previous year's crop removed.

When considering the source of the nutrient (i.e., the specific component sources such as commercial fertilizer, manure and rotations), the only substantial differences are found in the amount of manure nitrogen and phosphorus applied. Average nitrogen application from manure was 86 lbs/ac (96 kg/ha) by farmers without plans and 53 lbs/ac (60 kg/ha) for those with plans. Phosphorus application rates from manure were 81 lbs/ac (90 kg/ha) for farmers without plans and 51 lbs/ac (57 kg/ha) for farmers with plans. Nitrogen applications due to crop rotations decreased by 10 lbs/ac (11 kg/ha) between farmers with and without plans. Purchased nitrogen applications only decreased by 1 lbs/ac (1 kg/ha) between farmers with and without plans. Purchased phosphorus decreased by 6 lbs/ac (7 kg/ha) when a plan was used.

When addressing perceived barriers to the adoption of nutrient management plans, those most commonly recognized by farmers with plans included: difficulties associated with weather (60 percent), difficulty getting to fields included in the plan (59 percent) and not having enough manure (55 percent). The top barriers for farmers without plans included: time to spread manure (44 percent), difficulties associated with weather (34 percent) and not having enough manure (31 percent). Interestingly, when asked what the barriers to implementing a nutrient management plan are, the open-ended responses provided by farmer without plans were completely different than those provided by farmers with plans. Issues cited by non-plan farmers that were not mentioned by farmers with plans included: they don't trust the plan (34 percent), they can't afford to follow the plan (32 percent), the plan won't protect profits (22 percent), the plan is too hard for hired help (22 percent), the plan won't protect yields (20 percent), the farmer doesn't trust the person who wrote the plan (18 percent).

Summarizing Thoughts

Nutrient management plans do influence nitrogen and phosphorus application rates. However, the most direct influence is on manure management. Survey results show that most reductions in nitrogen and phosphorus applications are due to changes in manure distribution on the farm. Furthermore, farmers with plans perceive they are saving money, and that by following the plan they are protecting profitability. Finally, barriers identified by farmers with plans are substantially different than barriers perceived by farmers without plans.

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