

New York P Index Survey: What Caused Impressive Improvements in the NYS P Balance?

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Introduction

The New York Phosphorus Index (NY-PI) was introduced in 2001. Since then, phosphorus (P) fertilizer sales (farm use) declined from 36,506 tons of P₂O₅ in 2001 (19.5 lbs P₂O₅/acre) to 18,610 tons P₂O₅ in 2009 (10.2 lbs P₂O₅/acre). In 2011, we surveyed Certified Nutrient Management Plan (CNMP) developers certified through the New York State Agricultural Environmental Management (AEM) program to evaluate their perceptions of the drivers for this change in P use. All 24 planners responded to the survey allowing us to document: (1) farms and acres covered by CNMPs and changes in management practices and soil test levels; and (2) planner perceptions of the drivers of these changes since the introduction of the NY-PI in 2001. The survey contained questions related to (1) farms and acres for which CNMPs were developed in 2010; (2) time and effort needed to do a NY-PI assessment for a field; (3) impact of NY-PI field assessment on changes in manure and/or fertilizer practices; and (4) changes in soil test P levels after 2001 when the NY-PI was introduced. In addition, planners were asked what they would tell policy makers about why farmers made changes and what policies and programs are needed to continue progress. The 24 CNMP planners consisted of 18 from the private sector, 5 from Soil and Water Conservation Districts (SWCD) and one from Cornell Cooperative Extension based in the New York City Watershed. One of the SWCD planners works with a private sector planner and their joint response is included in the private sector planner category.

Results and Discussion

Farm Sizes

The private sector planners were responsible for CNMPs covering 88% of all CNMP cropland and 76% of all farms with a CNMP (Table 1). Although private sector planners also planned most of the new plans in 2010 (74% of all acres, 62% of all farms), 22% of all acres newly planned in 2010 were farms in the NYC Watershed. The SWCDs planned less than 10% of all farmland and farms.

The private sector and the SWCD planners worked primarily with CAFO-farms (200 cows or more) with average farm size exceeding 800 acres/farm. The planner from the NYC Watershed worked primarily with smaller operations (<200 acres/farm and 50-80 cows per farm) (Table 2). About 1/3rd of all the farms that CNMPs were developed for in 2010 did not meet the minimum size requirements to be qualified as a medium or large CAFO but were in state or federal programs that required a CNMP. Most of the farms in the NYC Watershed are included in this category. For both private sector planners and SWCD planners, new plans developed in 2010 tended to be for smaller farms (Table 2), consistent with the 100% compliance for CAFO farms in NY and expansion of CNMP planning to smaller farms involved in federal or state programs.

Table 1: Percent of all acres and farms under nutrient management planning in 2010 in New York planned by Soil and Water Conservation Districts (5 planners), Cornell Cooperative Extension (1 planner, New York City Watershed), and private sector planners (18 planners).

Planner affiliation	All farms		New plans in 2010		Plan updates in 2010	
	Area-basis	Farm-basis	Area-basis	Farm-basis	Area-basis	Farm-basis
	-----%-----					
Soil and Water Conservation District	7	6	4	4	7	6
Cornell Cooperative Extension (NYC Watershed)	5	18	22	33	4	15
Private sector	88	76	74	62	89	79

Table 2: Total acres and number of farms as well as farm size for farms with certified nutrient management plans in 2010 planned by Soil and Water Conservation Districts (SWCD, 5 planners), Cornell Cooperative Extension (CCE, 1 planner, working in the New York City (NYC) Watershed), and private sector planners (18 planners).

Planners	All planners	SWCD planners	CCE planner (NYC-Watershed)	Private sector planners
All 2010 plans				
Total acres	756,032	54,063	40,000	661,969
Total farms	923	52	170	701
Acres/farm	819	1,040	235	944
New plans				
Total acres	67,434	2,816	15,000	49,618
Total farms	180	8	60	112
Acres/farm	375	352	250	443
Plan updates				
Total acres	688,598	51,247	25,000	612,351
Total farms	743	44	110	589
Acres/farm	927	1,165	227	1,040

Time Required for NY-PI

The time needed to complete an NY-PI assessment for a field varied from 10 to 90 min, mostly dependent on whether the assessment was for a new field (and included determination of dominant slope and flow distance to streams), or if the assessment was an update from a previous year. Averaged across all planner responses, 40 min per field was needed, although 50% of all planners indicated assessments could be done within 30 min. About 40% estimated they needed 30-60 min per field, while 10% said more than 1 hour per field was needed. These differences might reflect differences in field topography (complex slopes, multiple flow paths etc.).

Fields Impacted by NY-PI

The planners estimated that management of 17% of acres under nutrient management planning was altered because of an initially very high or high NY-PI score. As a result of NY-PI implementation, manure was reallocated to fields that would otherwise not have received manure

(as indicated by 77% of the planners). The most frequent changes made in manure management were changes in timing and rate (86% of the planners ranked timing and rate as the top two changes made). Changes in method of application were less common (ranked in the top two by 13% of the planners only). According to 65% of the planners, the introduction of the NY-PI resulted in an increase in both acres per farm and amount of exported manure. Forty three percent of the planners indicated that NY-PI based planning decreased the average soil test P levels over time and 48% said the percentage of fields classified as very high in soil test P decreased. The introduction of the NY-PI did not change cow numbers per farm or poultry litter use over time, according to 57% and 78% the planners, respectively.

Soil Test P Trends

Only 5% of the fields represented in the assessment tested above 80 lbs/acre Morgan extractable P, the level at which the NY-PI exceeds 100 if the transport risk from the field is high, and slightly less than ten times the agronomic critical level for most crops. Of the total cropland area, 4% could not receive manure under NY regulations because the NY-PI already exceeded 100 without the manure application.

Perceptions of Drivers

The two most important drivers for the changes in fertilizer use observed by NY planners were the price of fertilizer and the on-farm research partnership that showed that no additional starter P was needed if the soil test was classified as high or very high in P (Figure 1).

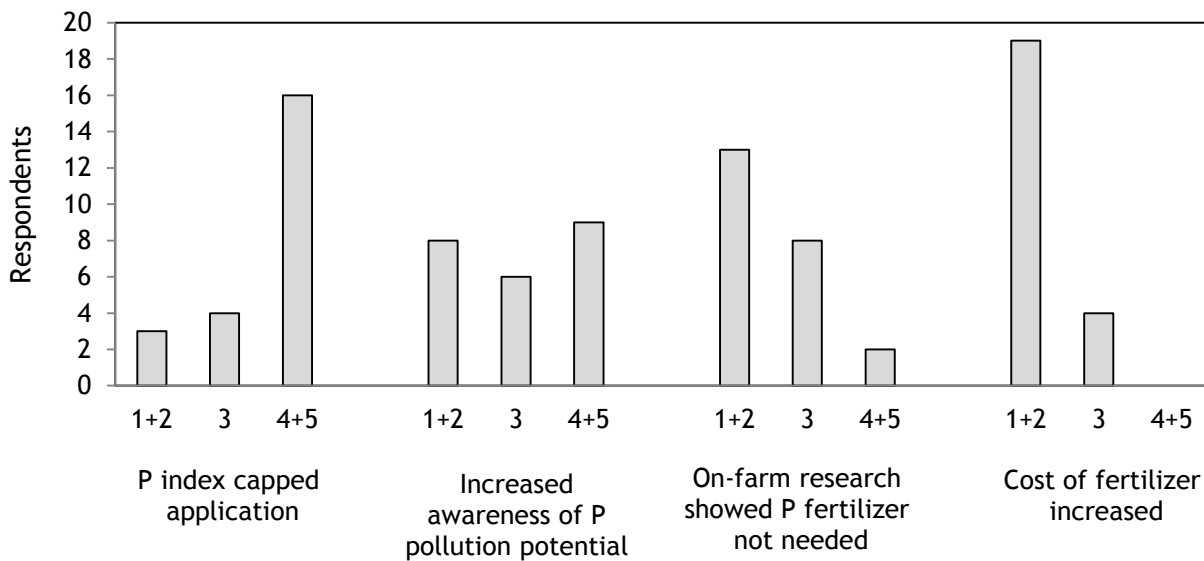


Figure 1: Planner perceptions of the drivers of the drastic reduction in P fertilizer sales for on-farm use in New York. Planners were asked to rank the drivers from 1-5 with 1-2 considered important, while 4-5 was not an important contributor to the change over time. Cost of fertilizer and on-farm research were identified as the most important drivers (23 respondents).

The reply related to fertilizer sales is most likely reflecting recent memory of the peak in fertilizer prices in 2008, as actual fertilizer sales decreased over time, prior to the 2008 price spike. Other reasons included greater use of soil testing for fertilizer use decisions, the expansion of manure application options in the state, awareness of the link between animal numbers and

acres needed to apply the manure generated by the animals, improvements in herd nutrition, and the onset of a regulatory environment. One planner pointed out the importance of involving stakeholders when addressing environmental concerns:

“The history of collaboration and trust between the public, academic, and private sector stakeholders in New York State has led to a track record of efficient problem solving. Involve stakeholders in the process and hold them accountable to create real solution.”

Policy Message

Some planners pointed to improvements made in NY, the farms' investment in protection of the environment, and the role of the NY-PI in achieving such improvements. Others pointed to the need for partnership, science-based guidelines, and funding for applied research and planner and farmer training:

“The bottom line for the success that we have seen in NYS is because of the “systems” approach taken by the state and not just focusing on one problem area. Not only was phosphorus looked at, but, nitrogen and now potassium research is ongoing. On-farm research is one of the major “keys” to have “real data” from a true farm field setting with actual weather and field conditions with specified goals being measured. This approach has proven to be successful within all farming regions of NYS.”

“Another “key” to the success in NYS is that ALL agencies have collectively worked together in providing funding for research, data collection and analysis, training and educational programs for certified CNMP planners and farmers along with assistance for implementation of all needed conservation practices. Funding at the state and federal levels is the life blood for continued success that NYS has experienced thus far.”

The role of qualified professionals was stressed by several of the planners:

“The support of a skilled and knowledgeable planner using good information and effective tools applying the right strategies in the right places at the right times has been critical in helping NY farmers achieve reduced environmental impact. The P-Index applied by trained Nutrient Management Planners helps farms implement practices that are both environmentally effective and economically feasible.”

Also pointed out were the needs for farm-specific solutions and flexibility to address the challenges in nutrient management:

“Farmers need to know why changes are required, but they need flexibility to manage with day to day changes. Economics will continue to be major driver.”

In addition, the need for research and improvement of tools for management in general was pointed out in the planner responses:

“We need to continue to use science based technology such as the P index, N index, etc. rather than using broad restrictions to nutrient management planning (i.e. no winter spreading)”

“Keep supporting our farms with research and training programs.”

Planners referred to benefits of the collaborative approach to P management among dairy farms in NY for other industries, and/or called for action by other sectors of agriculture:

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“The system is working!! Good research coupled with effective communication and on-farm planning has brought incredible benefits to New York agriculture. It goes beyond livestock agriculture. I know of several successful landscape businesses that never apply any P fertilizer to lawns anymore.”

Enforcement of regulations was identified as a key component as well in achieving improvements at the farm level:

“I think however that the biggest driver of changes in terms of nutrient management, amount of manure applied and reduction of overall P applications is due to the fact that the DEC is enforcing the CNMP. We have been doing CNMPs in NY since [...], most (and maybe all) of our medium and large CAFO clients have been inspected several times, and as the competence of the inspectors increase, and the inspections became more thorough, the attitude of the farmers was to look for the recommendations and to make sure that they actually applied what was there. [...].”

Others indicated the need for continued support for planners, training, and on-farm research:

“With the success that has been obtained in NYS, I would recommend continuing the current programs that are in place with more funding devoted to enhancing our farm producers viability, farmers know their farms and fields better than anyone else, including government officials, but they continually need assistance with improving production and lessening environmental risk through state and federal programs so new technology and implementation practices or best management practices can be adopted in a timely and financially stable manner.”

Conclusions

The key ingredients for success identified by the CNMP planners were: (1) statewide awareness of environmental issues driven by both regulations and extension programming/training; (2) development and implementation of science-based and practical tools (like the NY-PI) that allow for farm-specific solutions to the challenges; (3) demonstrated need for or benefits of alternative management practices (i.e. an on-farm research partnership that addresses relevant questions and on-farm research that results in credible answers); (4) accountability; (5) state enforcement of regulations; and (6) the presence of economically feasible solutions. The success story of NY reflects a recognition of the need for change by both farmers and farm advisors, an interest in exploring management alternatives while looking for win-win approaches (i.g. reduced fertilizer use, re-evaluation of dairy rations, etc.), and a willingness by farmers and farm advisors to contribute to on-farm research that generated reliable data and believable results (with as the foundation a trust-based farmer-advisor-researcher relationship). We conclude that the NY-PI contributed to the successful reduction in P use in NY by being acceptable to farmers and farm advisors as a risk assessment tool, by being directionally correct (it made sense) and by allowing farms to design farm-specific solutions. The story of NY shows that change can be obtained via policy, incentives, measuring and monitoring.

Acknowledgments

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