



How to Use Grid Soil Sample Results for the NY-PI 2.0

Introduction

The NY-PI 2.0 is a management tool designed to estimate the relative risk of phosphorus (P) loss from agricultural fields. It uses soil test P (STP) levels to convert P index scores to P management implications. This factsheet includes guidance on use of grid sample results for NY-PI 2.0 determination.

NY-PI 2.0 and Soil Test P

The NY-PI 2.0 uses a transport × beneficial management practice (BMP) approach, where individual agricultural fields are scored based on factors that drive transport of P off the fields. Scores can be lowered by implementation of BMPs that reduce the risk of manure and fertilizer P transport (Figure 1).

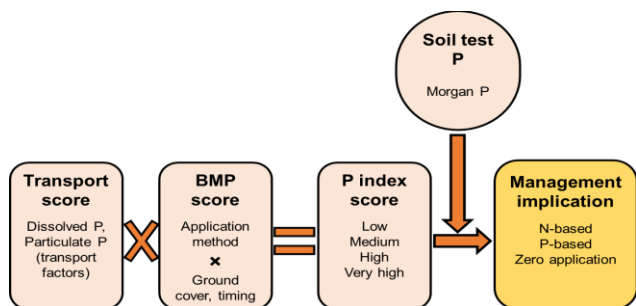


Figure 1: The NY-PI 2.0 has a transport × BMP approach.

The NY-PI 2.0 identifies four P loss interpretation categories: (1) low; (2) medium; (3) high; or (4) very high. Depending on the soil test P level of the field, these four P loss interpretation categories translate into one of three management implications: (1) "N-based" (manure and fertilizer application not to exceed annual nitrogen (N) needs for the crop grown based on Cornell nutrient guidelines); (2) "P-based" (manure and fertilizer P application not to exceed annual P removal with harvest); or (3) "Zero P" (no manure or fertilizer P).

If the STP of a field is <40 lbs/acre Cornell Morgan P, the NY-PI 2.0 score must be reduced below 100 if manure is to be applied, and below 75 if rates are to be N-based (Table 1). From 40-100 lbs/acre STP, the NY-PI 2.0 score must be <100 if manure is to be applied, application must be P-based or lower if the score is from

50-99 and can be N-based if the score is < 50. From 101-160 lbs/acre Morgan STP, P-based management is allowed only if a field has a NY-PI 2.0 score < 50. Fields with STP levels greater than 160 lbs/acre are generally restricted from P application. Incidental P applications with treated effluent or a very dilute source may occur to fields with STP exceeding 160 lbs/acre only if certain criteria are met; see [NY-PI 2.0 Manual](#), section 7).

Table 1: Management implication of the NY-PI 2.0.

P-loss risk	PI score	Management implication ¹			
		Soil test P (Cornell Morgan; lbs/acre)			
		<40	40-100	101-160	>160
Low	<50	N-based	N-based	P-based	Zero P
Medium	50-74	N-based	P-based	Zero P	Zero P
High	75-99	P-based	P-based	Zero P	Zero P
Very high	≥100	Zero P	Zero P	Zero P	Zero P

¹When Cornell crop guidelines call for P above the STP or rate limits in this table, P can be added to not exceed land grant guidelines as long as the NY-PI 2.0 score ≤100.

Grid Sampling for Soil Test P

It is recognized that soil test P and other nutrients as well as pH vary across a field and farmers and consultants are seeking to find these differences through grid or zone-based soil sampling to improve nutrient management (Figure 2).



Figure 2: Soil test P and other nutrients as well as pH can vary across a field. Recognition of such variability allows for more precise management, but planners and farmers need to be able to convert soil test information at a grid level to field-scale information, unless a farmer opts to plan at a smaller grid or within-field zone-based scale.

Grid size typically ranges from 0.5 to 2.5 acres. Because the NY-PI 2.0 was designed to evaluate P loss risk at the field scale, planners and farmers need to be able to convert soil test information at a grid level to field-scale information, unless a farmer opts to plan for P loss risk at a smaller grid or zone-based scale.

Weighted Whole-Field Average Soil Test P

Combining multiple soil sample results collected from grid sampling and calculating an area-weighted average to determine one STP value for a field for NY-PI 2.0 assessment is consistent with the current approach of one composite soil sample using cores from the whole field. There is no need to calculate a NY-PI for every grid for which a STP value is determined. If all grids are the same size, a simple average is sufficient. For irregular grid sizes, an acre-weighted approach best represents the field STP. See [Agronomy Fact Sheet #106](#) for information on how to derive weighted averages.

Zone-Based Soil Test P

If the farm is prepared to vary P fertilizer and/or manure application within a field (zone-based management), a weighted STP average can be used per management zone (either combined with transport and BMP scores for the whole field or the individual zone) to determine P management implications. Each management zone should be sampled at an intensity that targets an average sampling density of two soil cores per acre (see [Agronomy Fact Sheet #1](#)). If a zone falls within the same NY-PI category (N-based, P-based, zero P) as the whole field, no additional documentation or BMPs are needed.

Grid to Zone or Field

If grid sampling identifies zones with different NY-PI 2.0 categories (<40, 40-100, 101-160, >160 lbs P/acre Cornell Morgan test) than other zones in the same field, or than the category determined for the whole field, differences should be noted, but for NY-PI 2.0 purposes, field or zone area-weighted averages can still be used. Strategies for future sampling rounds for fields with grid maps could include (1) regular whole-field sampling along a zig-zag pattern through the field (see [Agronomy Fact Sheet #1](#)), or (2) zone-based sampling where samples are taken from each interpretation category, at an intensity that targets an average sampling density per category of two soil cores per acre.

Soil Test P Conversions

The test results from one soil testing method are not always directly comparable to those of another method. If soil tests other than the Cornell Morgan test are used, conversions are needed before the implications of the NY-PI 2.0 can be determined. For more information on conversion equations, see [Agronomy Fact Sheet #15](#). Keep in mind that not all soils give reliable conversions. It is recommended to check field histories to make sure results make sense and to occasionally split samples to verify conversion models are accurate.

In Summary

Grid sampling is an excellent way to identify low or high STP areas within a field. Grid-based sampling can be used to define management zones which can be effective in addressing both deficiencies and excess P. The NY-PI 2.0 uses STP level to determine implications of a specific NY-PI score. Farms that have grid soil sample results for P can determine a whole-field area weighted STP from grid sample results or subdivide into zones where STP results show opportunities for enhance P management.

Additional Resources:

- NY Phosphorus Index User Manual and Documentation: nmsp.cals.cornell.edu/publications/extension/NYPI_2_User_Manual.pdf.
- Cornell Nutrient Management Spear Program Factsheets: nmsp.cals.cornell.edu/guidelines/factsheets.html.
- Cornell Nutrient Management Spear Program Guidelines for Comprehensive Nutrient Management Plans: nmsp.cals.cornell.edu/guidelines/nutrientguide.html.

Disclaimer

This fact sheet reflects the current (and past) authors' best effort to interpret a complex body of scientific research, and to translate this into practical management options. Following the guidance provided in this fact sheet does not assure compliance with any applicable law, rule, regulation or standard, or the achievement of discharge levels from agricultural land.

For more information



Cornell University
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Nutrient Management Spear Program
<http://nmsp.cals.cornell.edu>

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