SnapPlus

Wisconsin's Nutrient Management Software

Basic Concepts

What is the Wisconsin Phosphorus Index?

The Wisconsin Phosphorus Index (P Index) is a planning and assessment tool for managing phosphorus runoff from cropland and pastures.

✓ **The P Index** uses general cropping, soil test and long-term weather information to estimate a field's annual phosphorus runoff to nearby surface waters.

✓ **The P Index** is reported as a whole number—the higher the number, the greater the potential for that field to contribute phosphorus to nearby lakes and streams; even very low additions of phosphorus in water can grow an abundance of algae and degrade water quality! Another way of thinking about it is *the P Index estimates how well phosphorus is kept in the field*.

What does the P Index have to do with nutrient management planning?

The P Index is one of the two phosphorus management strategies used to meet Wisconsin's Nutrient Management Planning Standard (the other strategy uses the field's soil tests phosphorus levels to determine nutrient applications). To calculate the Wisconsin P Index, you must use the nutrient management software SnapPlus—free download at **snapplus.wisc.edu**.

NPM

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Can a field's P index value be reduced?

Yes! The following management strategies can be used to reduce a field's P Index value.

1. Use in-field practices that reduce erosion/runoff

- ☑ Use crop rotations that maximize crop residues (i.e. grasses, alfalfa, cornstalks left in the field)
- ☑ Add a nurse crop to alfalfa seedings
- ☑ Work the field on the contour
- ☑ Reduce tillage intensity
- ☑ Strip-crop
- ☑ Install in-field grass contour buffer strips

2. Plan manure and fertilizer applications carefully

- ☑ Avoid or reduce winter applications of manure when possible
- ☑ Apply high solid content manure to fields that have little residue at the time of application

3. Reduce soil test phosphorus to optimum level

- ☑ Apply manure to fields where much of the phosphorus will be removed over the rotation (i.e. fields in rotation with alfalfa)
- ☑ Reduce or eliminate applications of manure to fields that do not have a recommendation for phosphorus.

4. Use below-field grass filter areas or buffers on critical slopes

- ☑ Install grassed filter strips following design specifications set by the Natural Resource Conservation Service

Does the P Index work on pastures?

Yes, the P Index is calculated for pastures with the same equations as for cropland. Manure rates are estimated according to the number, type, and time of animals present and an average excretion rate for each type of animal.

- ☑ Managed pastures that have a stocking density low enough to maintain sod cover generally have very low soil loss and rainfall runoff, and therefore have low P Index values compared to most cropland.
- ☑ Exercise-area type pastures where sod cover is not maintained can have high soil erosion rates and also can have comparatively high manure rates, resulting in higher P Index values.
- ☑ Pastures used for over-wintering, especially those on medium to heavy textured soils, can have high P Index values in snowmelt or winter rain.

Below are some scenarios that illustrate how the P Index value can be reduced using different management strategies in SnapPlus. Keep in mind these examples are only for illustration, **you must run your own data to verify if these strategies will work in your situation**. To meet Wisconsin's Nutrient Management Planning Standard, the P Index must be at 6 or below.

Rotation Average P Index values

1	2	3	4	5	6	7	8	9	10

← acceptable — not acceptable →

Reduce tillage intensity

On a McHenry silt loam field with 9% slope, 150 ppm soil test phosphorus, 2.5% organic matter, with a corn/soybean rotation.

Fall chisel-plowed and disked	9
No-till	3

Avoid winter manure applications

On a McHenry silt loam field with 4% slope, 200 ppm soil test phosphorus, 2.5% organic matter, with a winter application of 7,000 gallons per acre of liquid dairy manure before corn in a spring chisel-plowed corn grain, baled stalks/soybean rotation.

Winter manure application	7
Spring manure application	6

Eliminate applications of phosphorus

On a McHenry silt loam field with 4% slope, 250 ppm soil test, 2.5% organic matter in a strip till system with continuous corn silage.

14,000 gallons per acre dairy manure	7
No manure applications and no additional phosphorus for 4 years	6

Installing a down-slope grass filter

On a McHenry silt loam field with 4% slope, 200 ppm soil test phosphorus, 2.5% organic matter, with a winter application of 7,000 gallons per acre of liquid dairy manure before corn in a spring chisel-plowed and disked corn grain, baled stalks/soybean rotation.

No designed edge of field filter area	8
30 ft. cool season grass filter strip installed at the edge of the field	3

A note about the forms of phosphorus in runoff

The total runoff phosphorus concentration is made up of two forms of phosphorus: soluble (dissolves in water) and insoluble (particles that don't dissolve in water). The P Index accounts for both forms.

Soluble phosphorus can come from the soil, manure and fertilizer. Insoluble or particulate phosphorus comes from the soil in the form of eroded sediment. Since most phosphorus is bound to the soil, reducing soil loss from fields and pastures is a key strategy for reducing the P Index value.