The Minnesota P Index


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- History and Development
- Overview of Index
History

- 1999. MN Animal Agriculture G.E.I.S.
  - Need for a P Index emerged.
- 2000-2002. MN P Index development
  - funded by MN EQB and COAFES, UMN.
- 2004-2007. Further validation, field testing, and educational effort as well as a user interface

Development Process

- Literature Review
  - P Index approaches in other states
  - Relevant Data for MN Index
- Characterization of P relationships for MN soils
- Draft Index based on MN data
- Validation, Testing, and Evaluation
- Development of User Interface
- Excel Version and User's Guide Currently available from web site
  - http://www.mnpi.umn.edu
- Windows based version released
Balance science with simplicity

**Science**
- Phosphorus transport is complex and variable from site to site
- Impacts to waters from phosphorus additions are complex and variable from site to site

**Simplicity**
- Understood by farmers and their advisors
- Reasonable level of input

Dave Wall, MPCA-P Index Training, 2005

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**Minnesota P Index**

- **Transport mechanism**
  - RUSLE2 sediment delivery
  - Base runoff
  - Snowmelt runoff

- **Practice factors**
  - Manure factor
  - Runoff adjustment
  - Fall soil condition

- **P source**
  - Soil total P
  - Soluble soil P + applied P
  - Residue P + surface applied P

- **Risk**
  - Sediment-bound P risk
  - Soluble P, rainfall risk
  - Snowmelt risk

Overall risk of P loss
Required Inputs

- Location-County
- RUSLE2 sediment delivery to field edge
- Percent of field draining to depressions
- Distance to surface water
- Presence of BMPs/structures
- Soil Test P
- Soil type/hydrologic group
- Crop rotation/tillage
- P application timing (winter vs non winter)
- P application rate (fertilizer and/or manure)
- P application method

Overall P Index Risk Levels

<table>
<thead>
<tr>
<th>P Index Score</th>
<th>Relative Risk</th>
<th>Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 1</td>
<td>Very Low</td>
<td>None</td>
</tr>
<tr>
<td>1 - 2</td>
<td>Low</td>
<td>Minor Improvements</td>
</tr>
<tr>
<td>2 - 4</td>
<td>Medium</td>
<td>Small Improvements</td>
</tr>
<tr>
<td>4 - 6</td>
<td>High</td>
<td>Moderate Improvements</td>
</tr>
<tr>
<td>&gt; 6</td>
<td>Very High</td>
<td>Large Improvements</td>
</tr>
</tbody>
</table>
La Sueur Co. Surface Inlet 6
Storm Event July 4th 1998

SNOWMELT 1998
SNOW COVER 1997

FREEZING PAINS!
Tillage, Manure, and Season Interaction on Soluble and Particulate Annual P Losses

Tillage and Manure Effects on Soluble and Particulate Annual P Losses
Management Suggestions

- Reduce rate of erosion through conservation tillage
- Reduce sediment delivery through use of buffer strips
- Incorporate or inject P rather than surface apply
- Avoid winter applications of manure unless rough surface
- Base rate of P application on soil test and fully credit manure applications
- Prevent excessive build-up of soil P

Overview Summary

- Sensitive to Erosion/Erosion Control
- Encourages incorporation or injection of P
- Sensitive to application rate
- P Index score responsive to management changes