



# Soil Management Options Based on the Phosphorus Site Index

Amy L. Shober and J. Thomas Sims

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## Introduction

Minimizing nonpoint source pollution of surface waters by phosphorus (P) from agricultural cropland requires management practices that control both the supply and transport of soil P. The basic objective of environmentally sound P management is to maintain soil P fertility levels in a range that is optimum, but not excessive, for crop growth while reducing the loss of particulate and soluble P by processes such as erosion, runoff, or drainage. Determination of the P Site Index for soils near to sensitive surface waters is the first step in this strategy because this prioritizes the efforts needed to reduce P losses. Once this has been done, the P Site Index rating for a site should be used to determine the best management practices (BMPs) needed at the site to reduce the risk of P loss to waters. Some general recommendations are presented in this publication; however, P management is very site-specific and requires a well-planned, coordinated effort between farmers, extension agronomists, and soil conservation specialists.

## Phosphorus Site Index Rating < 50 (Low)

*Soil testing:* Have soils tested for P at least every three years to monitor build-up or decline in soil P.

*Soil conservation:* Follow good soil conservation practices. Consider effects of changes in tillage practices or land use on potential for increased transport of P from site.

*Nutrient management:* Consider effects of any major changes in agricultural practices on P losses before implementing them on the farm. Examples include changes to nutrient sources, the number of animal units on a farm, or the crops being planted (especially crops with a high demand for fertilizer P).

## Phosphorus Site Index Rating = 51 – 75 (Medium)

*Soil testing:* Have soils tested for P at least every three years to monitor build-up or decline in soil P. Conduct a more comprehensive soil testing program in areas that have been identified by the P Site Index as being most sensitive to P loss by erosion, runoff, or drainage.

*Soil conservation:* Implement practices to reduce P losses by erosion, runoff, or drainage in the most sensitive fields (i.e., reduced tillage, field borders, grassed waterways, and improved irrigation and drainage management).

*Nutrient management:* Any changes in agricultural practices may affect P loss; carefully consider the sensitivity of fields to P loss before implementing any activity that will increase soil P. Avoid broadcast applications of P fertilizers and apply manures only to fields with lower P Site Index values.

## Phosphorus Site Index Rating = 76 – 100 (High)

*Soil testing:* A comprehensive soil testing program should be conducted on the entire farm to determine fields that are most suitable for further additions of P. For fields that are excessive in soil test P, estimates of the time required to deplete soil P to optimum levels should be made for use in long range planning. Consider using crops with high P removal capacities in fields with “high” soil test P values (i.e., Mehlich-3 >150 FIV).

*Soil conservation:* Implement practices to reduce P losses by erosion, runoff, or drainage in the most sensitive fields (i.e., reduced tillage, field borders,

grassed waterways, and improved irrigation and drainage management).

*Nutrient management:* In most situations fertilizer P, other than a small amount used in starter fertilizers, will not be needed. Manure may be in excess on the farm and should only be applied to fields with lower P Site Index values. A long-term P management plan should be considered.

## Phosphorus Site Index Rating > 100 (Very High)

*Soil testing:* For fields with “excessive” soil test P levels (Mehlich-3 P >100 FIV), estimate the time required to deplete soil P to optimum levels for use in long range planning. Consider the site P saturation ratio (PSR) when making P management decisions. Consider using crops with high P removal capacities in fields with high soil test P values.

*Soil conservation:* Implement practices to reduce P losses by erosion, runoff, or drainage in the most sensitive fields (i.e., reduced tillage, field borders, grassed waterways, and improved irrigation and drainage management).

*Nutrient management:* Fertilizer and manure P should not be applied for at least one rotation and perhaps longer. A comprehensive, long-term P management plan must be developed and implemented.

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## Peer Reviewers

Sydney Riggi, Nutrient Management Extension Agent, University of Delaware Extension, Dover, DE

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## References

Sims, J.T., Shober, A. L., K.L. Clark, A.B. Leytem, & F.J. Coale. (2016). The Delaware phosphorus site index technical guidance manual. University of Delaware, Newark, DE.

## About the Author(s)

Amy L. Shober (corresponding author), Professor and Extension Specialist, University of Delaware, Newark, DE ([ashober@udel.edu](mailto:ashober@udel.edu))

J. Thomas Sims, Professor (retired), Environmental Soil Management, University of Delaware, Newark, DE

## About this Publication

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