Wisconsin Progress on Nutrient Management Education and Research

Presentation to the Wisconsin Fertilizer, Aglime, and Pest Management Conference
January 22, 2004

Scott J. Sturgul
NPM Program

Larry G. Bundy
Dept. of Soil Science

University of Wisconsin-Madison

Sue M. Porter
Wis. Dept. of Agric. Trade & Consumer Protection

Nutrient Management

- Combine on-farm nutrient sources, with commercial fertilizer, to meet crop need.

On-farm nutrient sources
(manure, legumes, soil reserves)

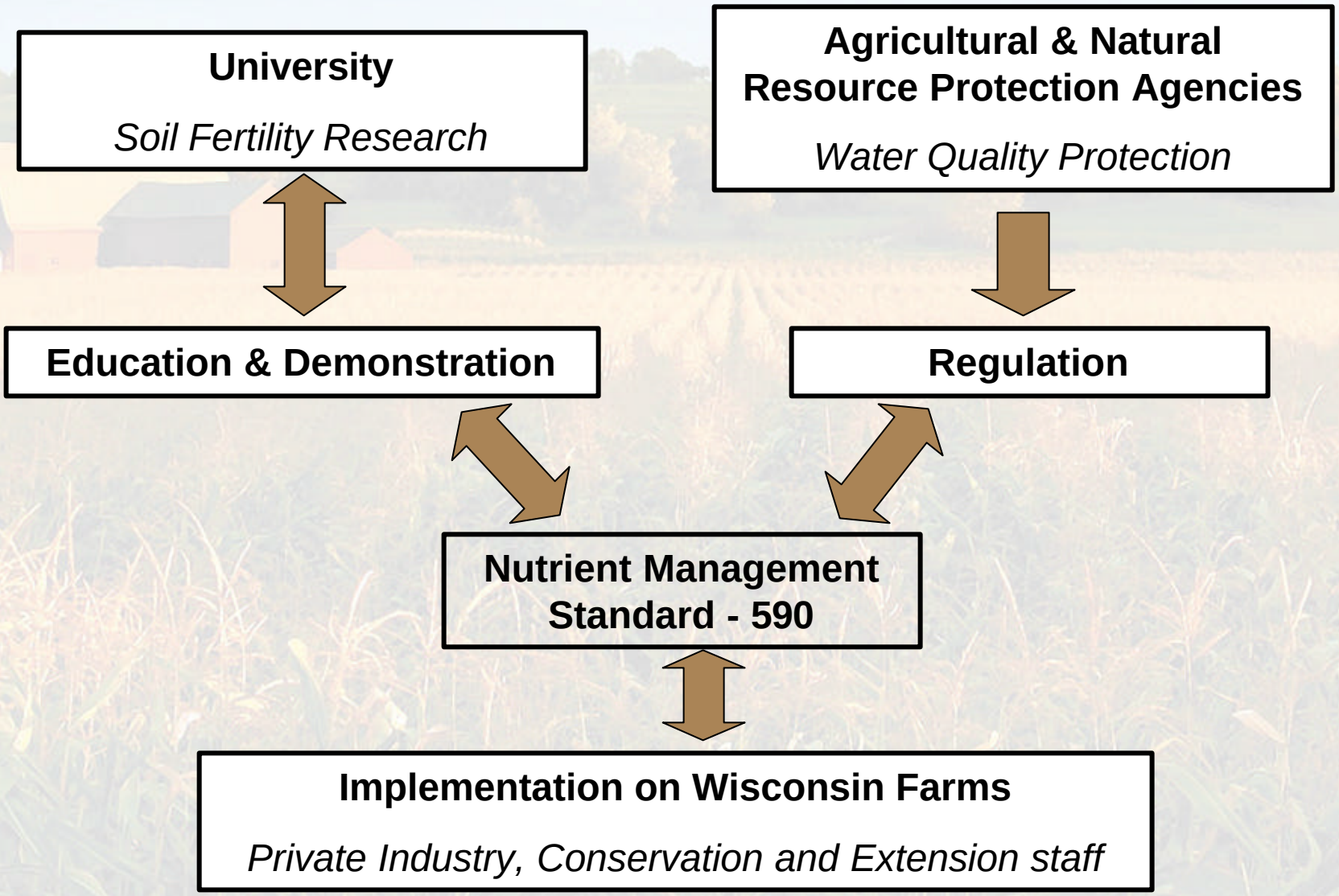
Commercial fertilizer

Minimize nutrient losses

Research-based Recommendations/BMP's

- Corn nitrogen recommendations
- P & K calibration & recommendations
- Legume-nitrogen credits
- Manure credits
- Residual soil nitrate tests
- Starter fertilizer recommendations

Implementing Nutrient Management Planning in Wisconsin

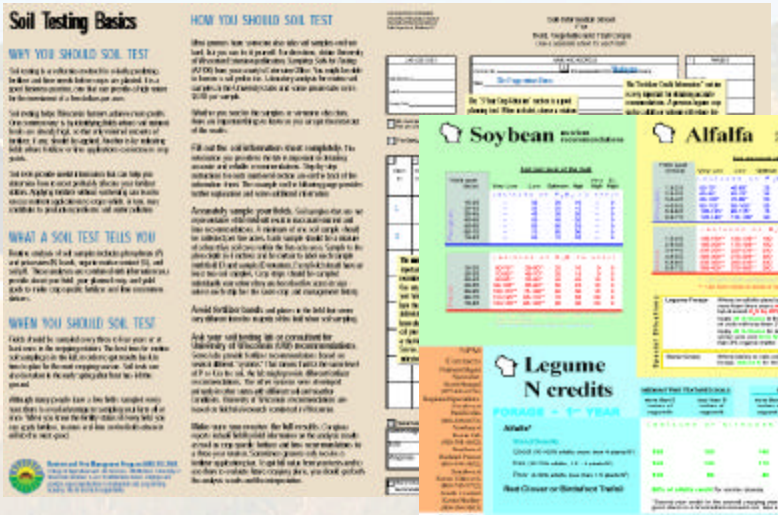


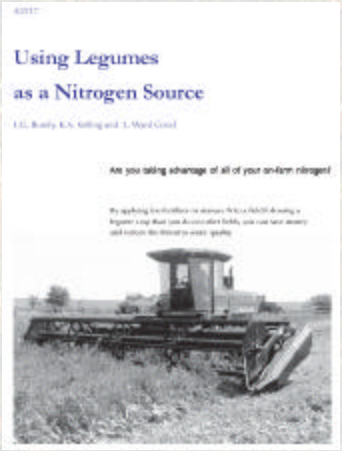
Education/ Implementation Efforts

On-farm Demonstrations

- Promote agricultural management practices that protect water quality while maintaining or improving farm profitability.
- Facilitate information exchange between farmers and researchers.

Publications





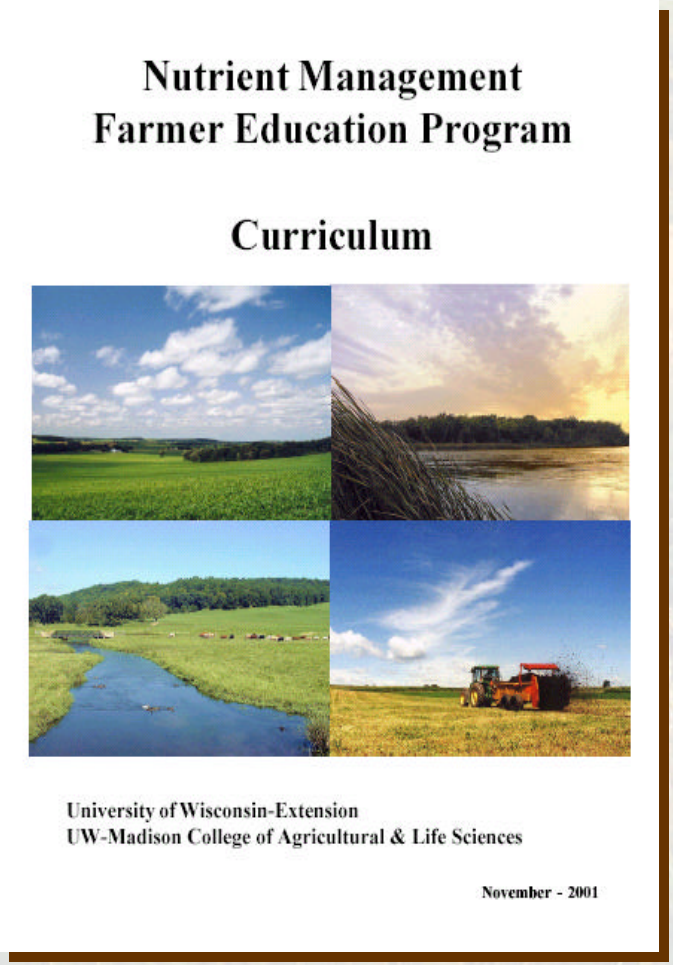
Certified Crop Adviser (CCA) Training

- Annual 2-day pre-test training
- Educational programs to provide CEU's
  - Area fertilizer/soil & water management meetings
  - Wisconsin Fertilizer Conference
  - Research Station Field Days
  - Crop Diagnostic Clinics
- Currently 700+ CCA's in Wisconsin
  - 463 in 1996

Regional Nutrient Management User Groups

- Intent: Resolve local nutrient management planning issues.
- Location: Six groups regionally distributed across Wisconsin.
- Composition: Local (county-based) conservation and Extension, private sector businesses, state and federal agencies.

Nutrient Management Farmer Education Program - Curriculum



- Based on UW soil fertility recommendations and current nut. mgmt. regulations.
- Delivered locally by UWEX, LCD, NRCS, private industry.
- Workshops, on-farm demonstration, etc. with end product being ***functional*** nutrient management plans.
- Accomplishments:
  - 1,000+ producers
  - ~ 300,000 acres
  - 28 Wisconsin Counties

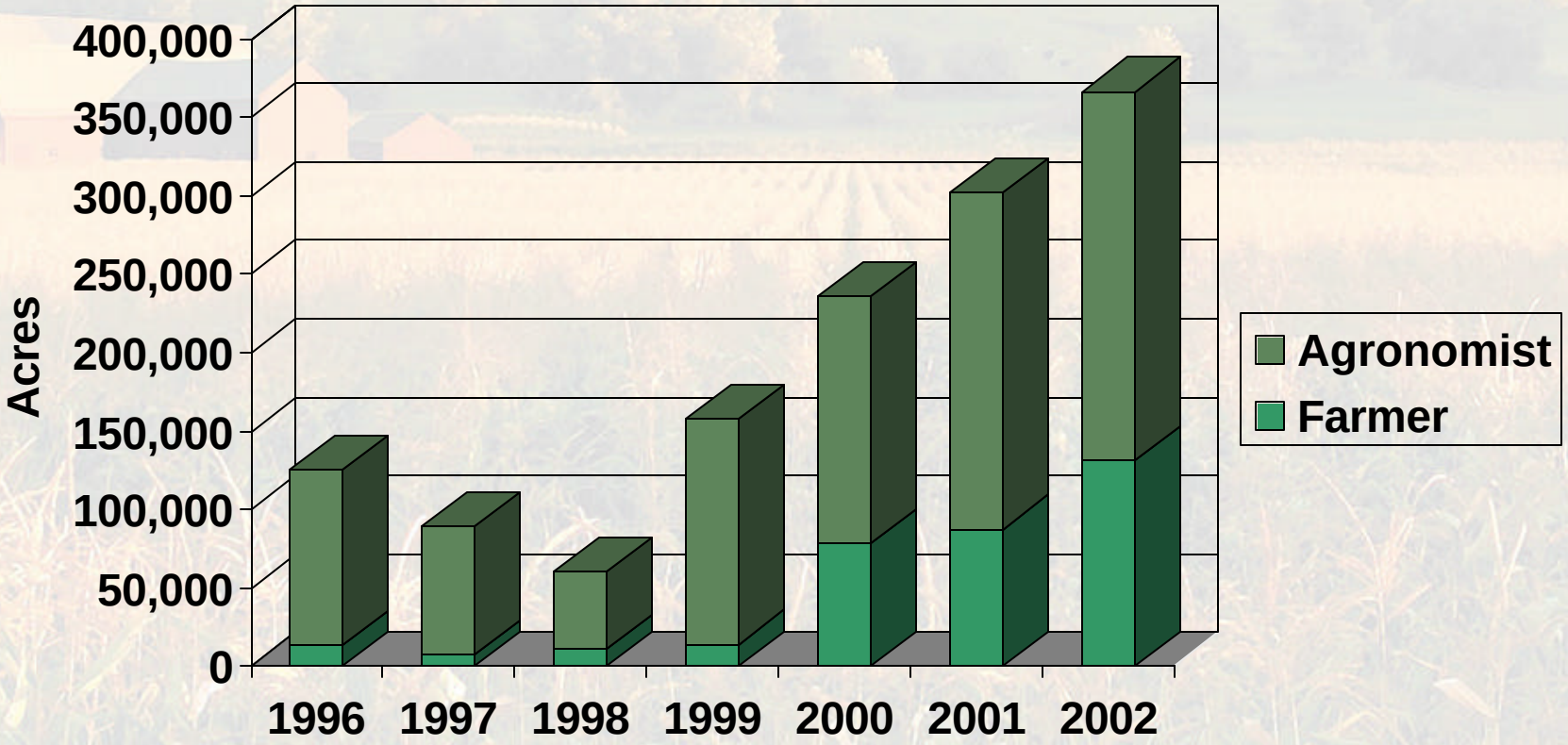
Training for Nutrient Management Planners (TNMP) Workshops

- Principles of NM, conservation planning, manure management, NM regulation requirements, mechanics of assembling a plan, plan writing exercise.
- Audience – Certified Crop Advisors (CCAs) and county-based soil conservation staff.
  - Over 400 participants to date
- Presented by: UWEX, NPM, DATCP, NRCS, DNR
- Financial support from: WI CCA Program and NRCS
- Workshops Completed: 2000 – 3, 2001 – 1, 2003 - 2

Quality Assurance Team

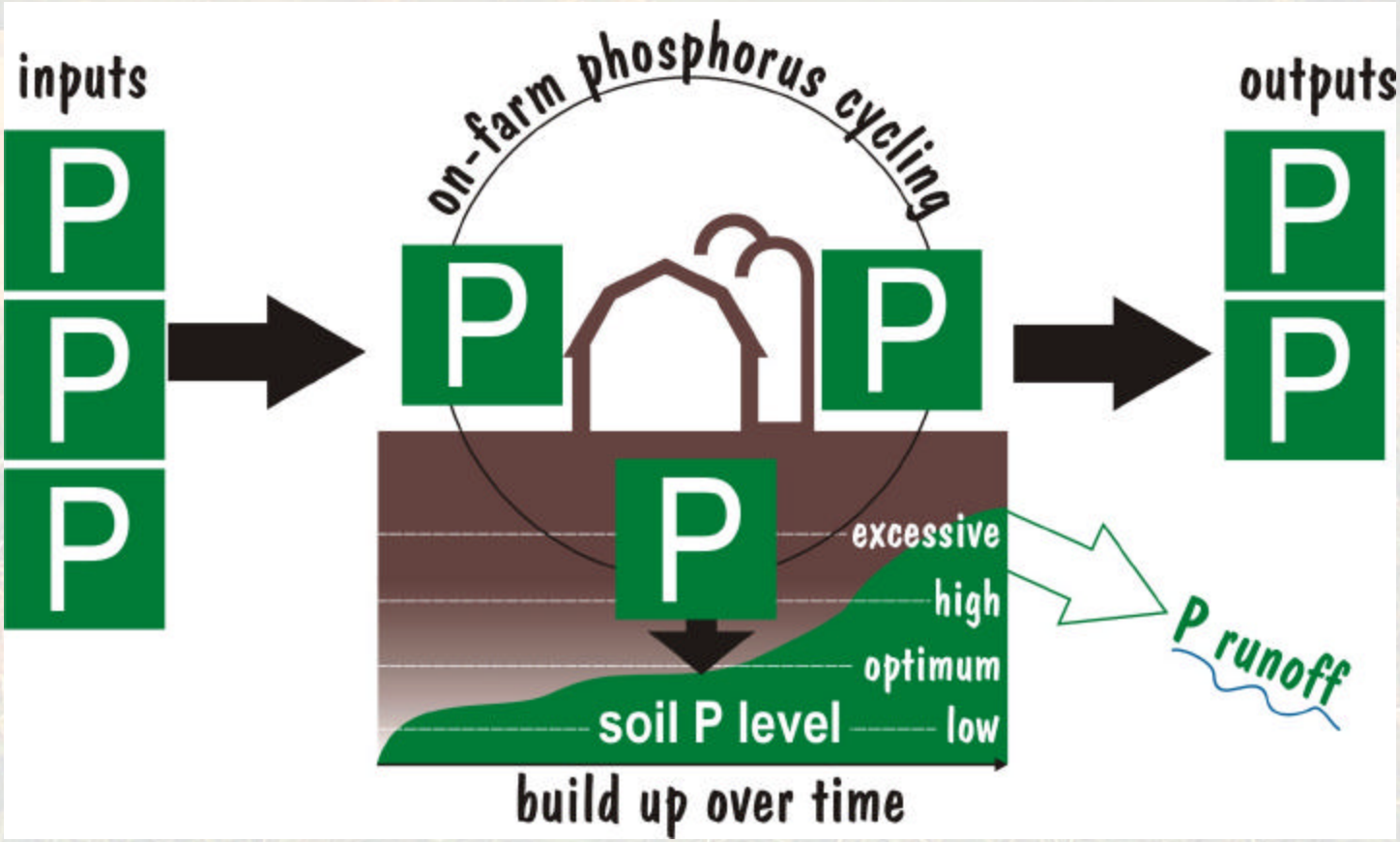
- Purpose: Annual review of the quality and content of nutrient management plans.
- Composition of Team: Agencies, university, tech college, ag industry, agronomists, soil testing labs, custom manure haulers.
- Review process: 15 plans randomly selected each year. Constructive review of individual plans.
- Feedback mechanism: Letter to planner identifying strengths / weaknesses of plan and suggestions for improving future plans.

Nutrient Management Plan Acres Reported: 1996-2002



4,018 plans reported on 1.3 million acres since 1995.

On-farm Phosphorus Balance

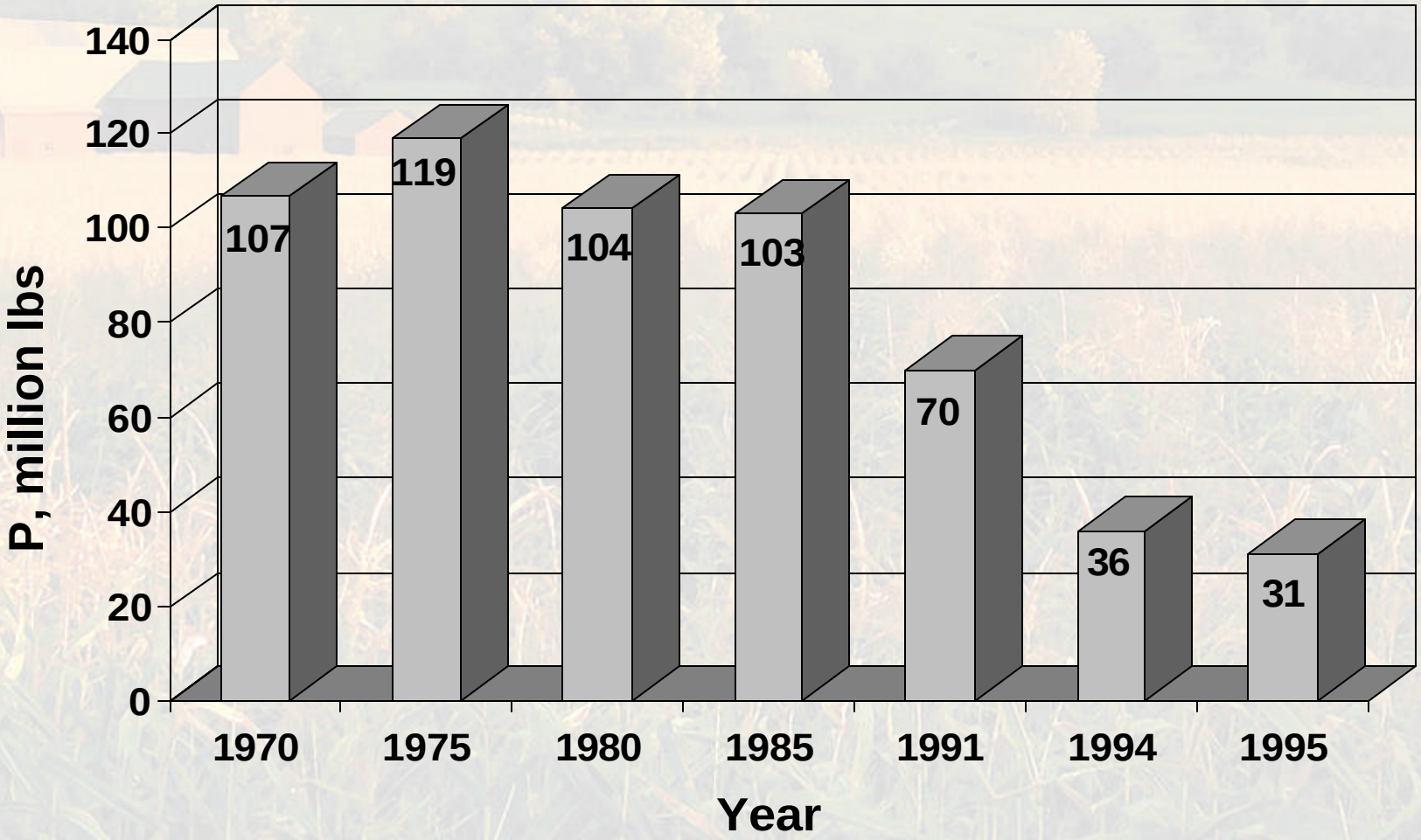


Implementing Phosphorus-based Nutrient Management

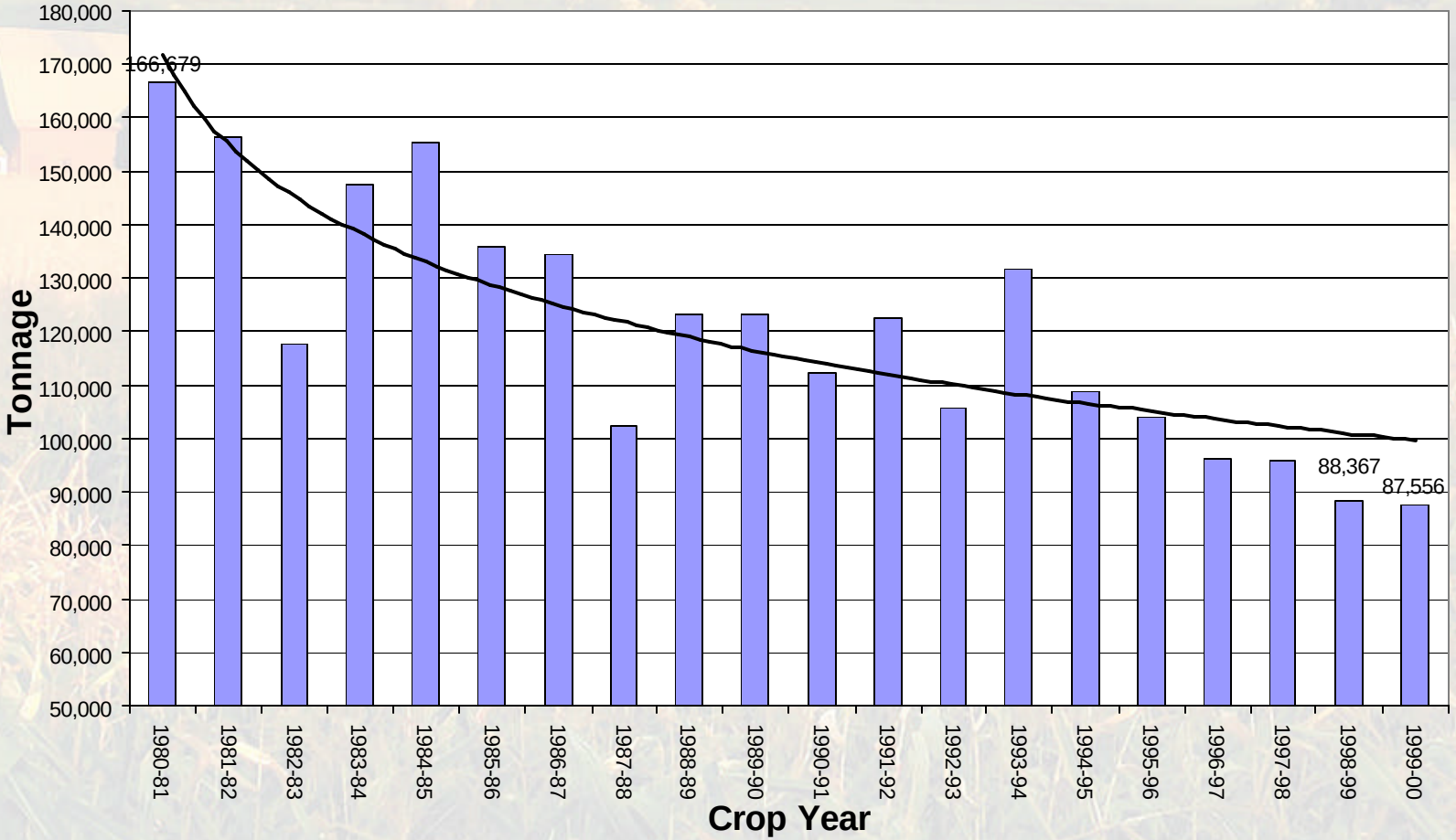
- Research-Awareness-Education Model
  - Research

Cropland P Budget Findings

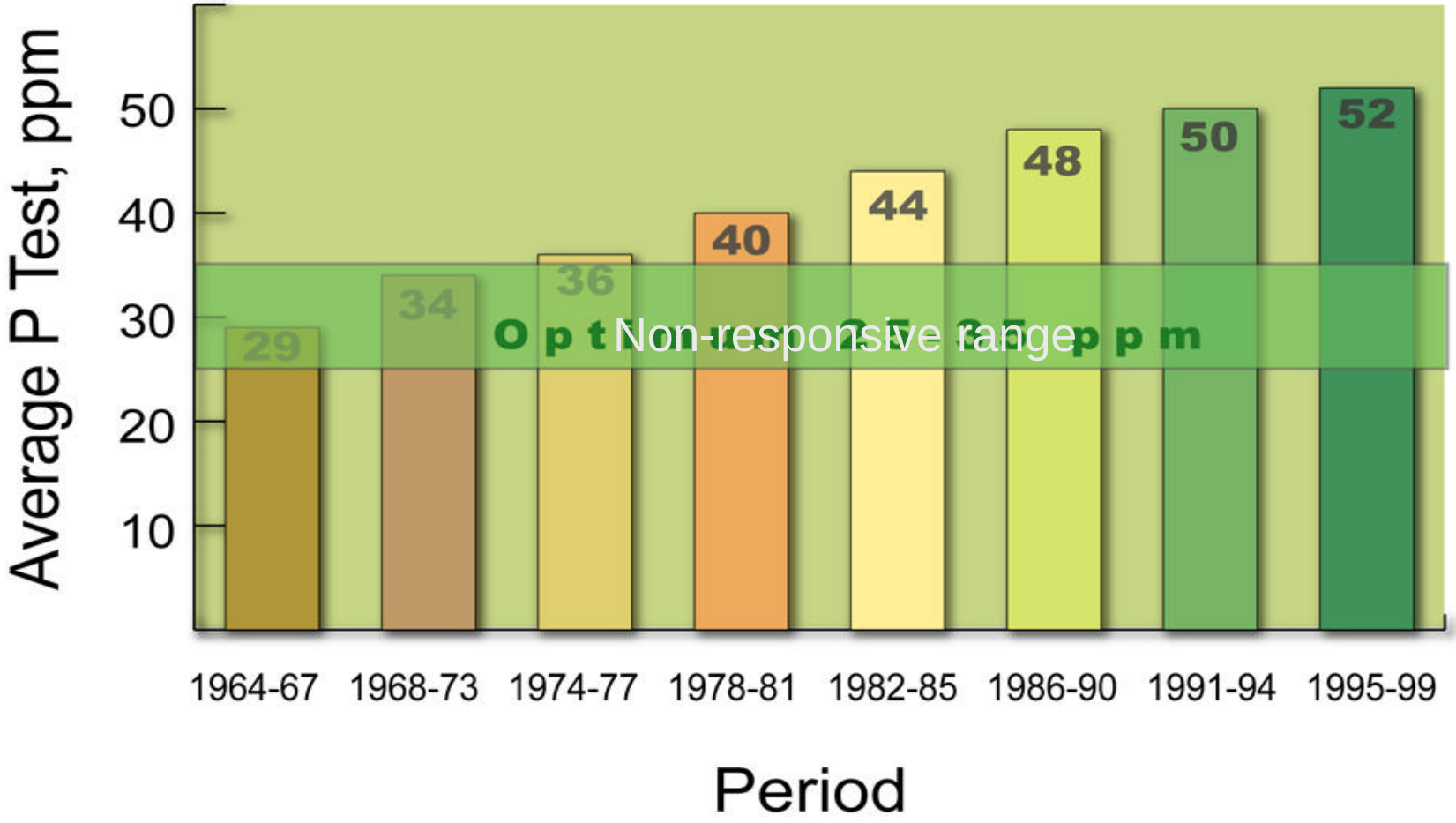
Change in phosphorus soil storage from 1970-1995.



Commercial Phosphate Consumption in Wisconsin

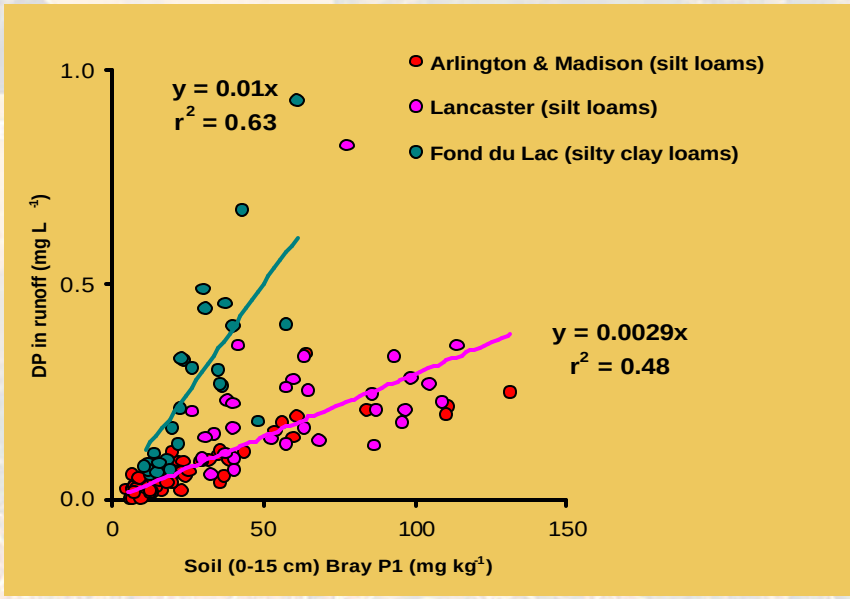


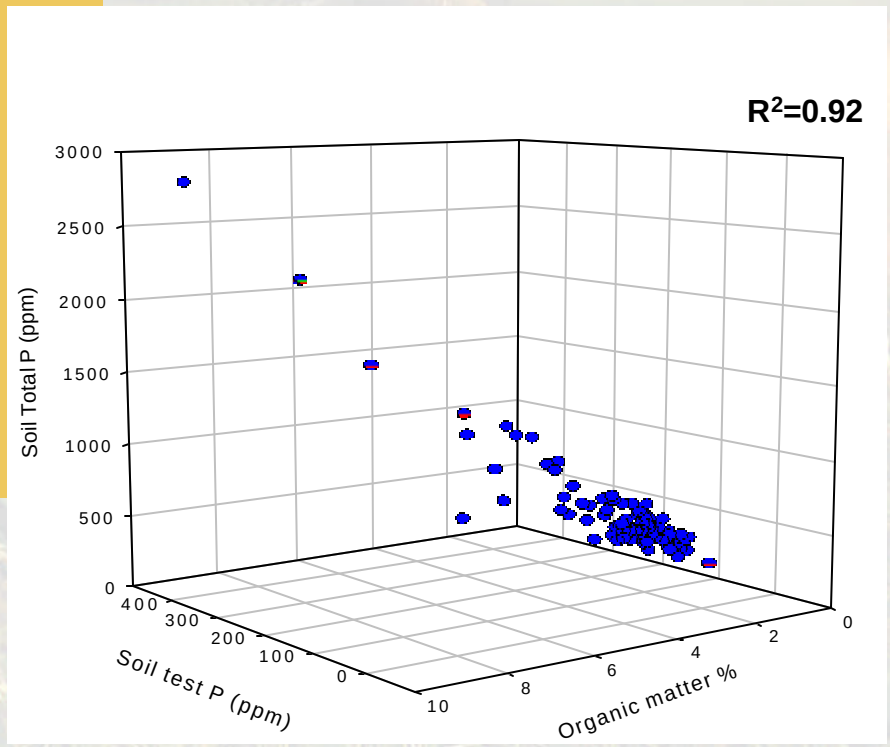
Average soil P levels of Wisconsin cropland fields over time.



Tillage, Manure, & Timing Interactions on P Loss

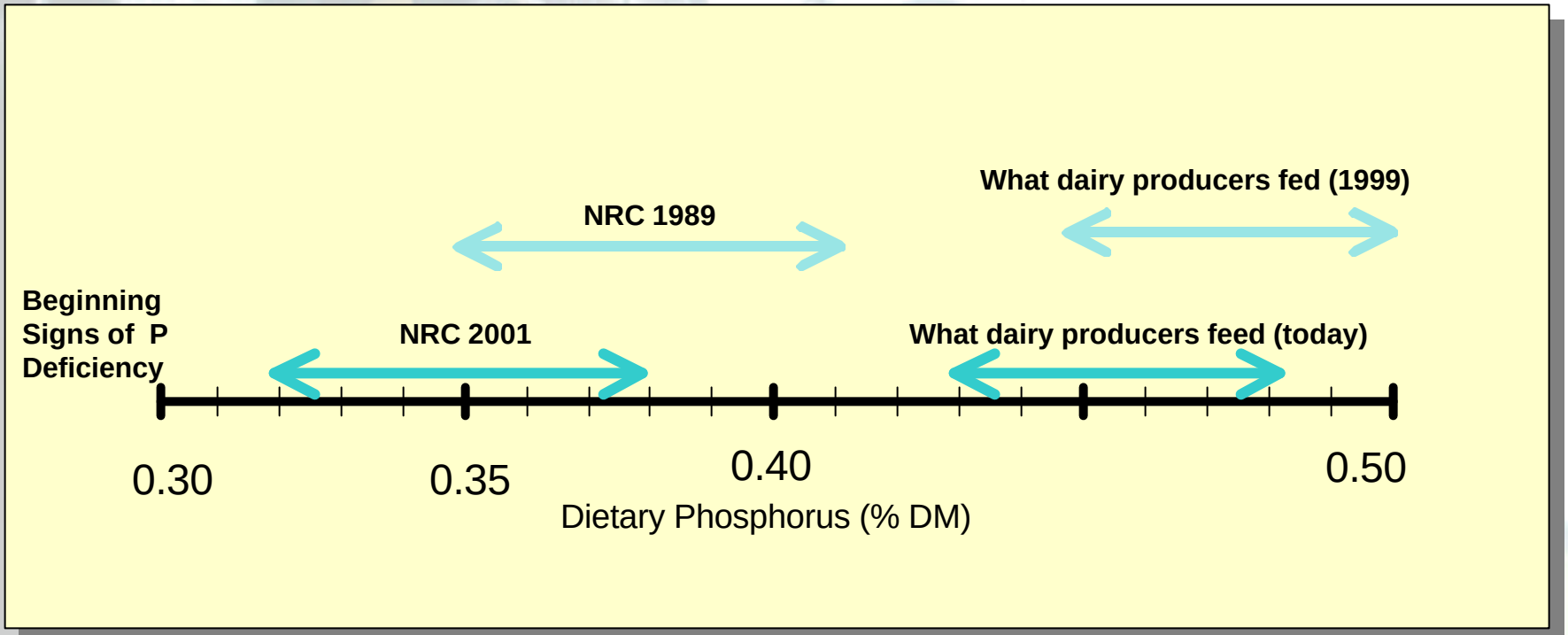
Relationships of Soil Test P to the P Content of Runoff





Soil Total P = -77.8 + 170 (OM%) + 2.5 (Bray P)

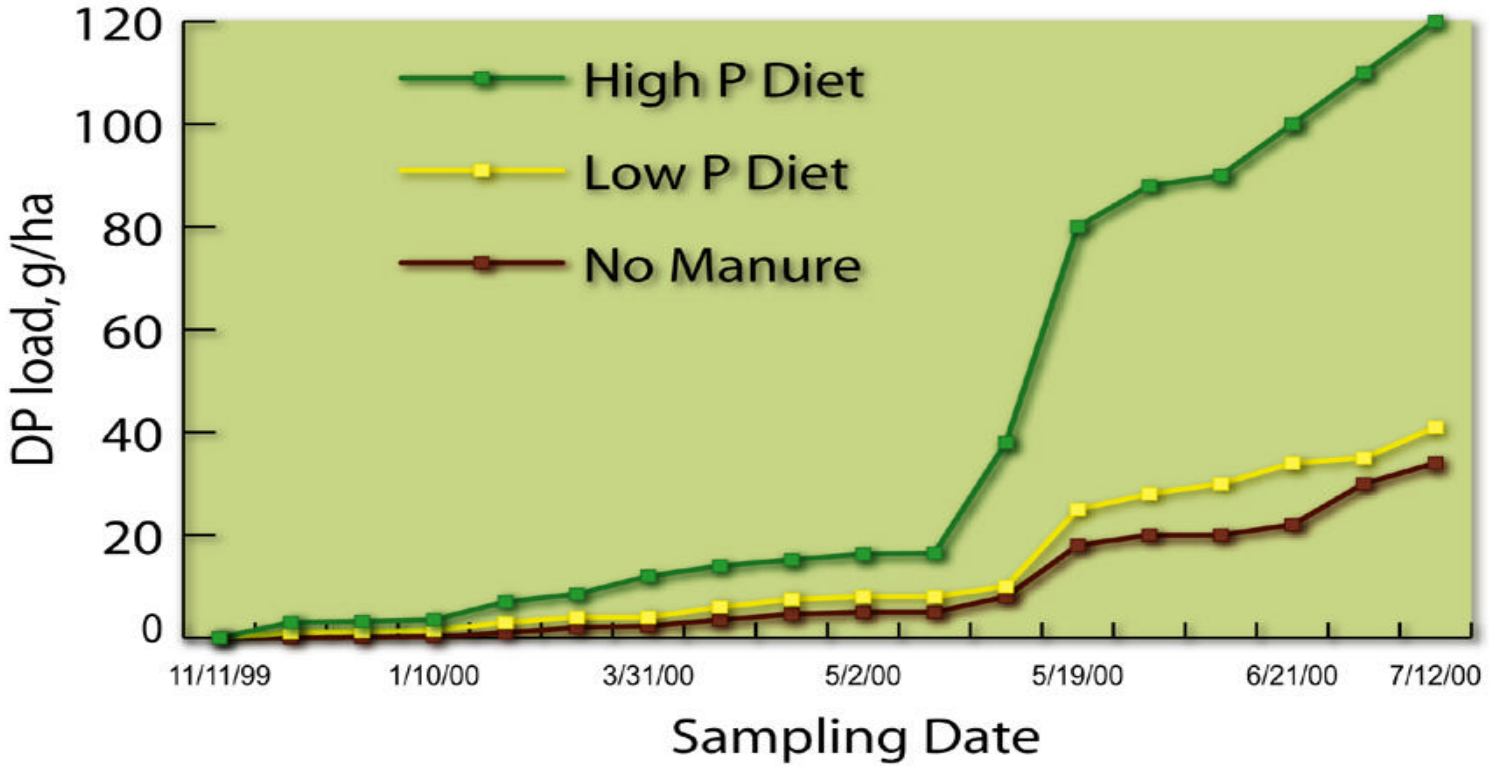
How Much P is Being Fed?



More than half of Wisconsin dairy farmers over-feed phosphorus relative to National Research Council recommendations.*

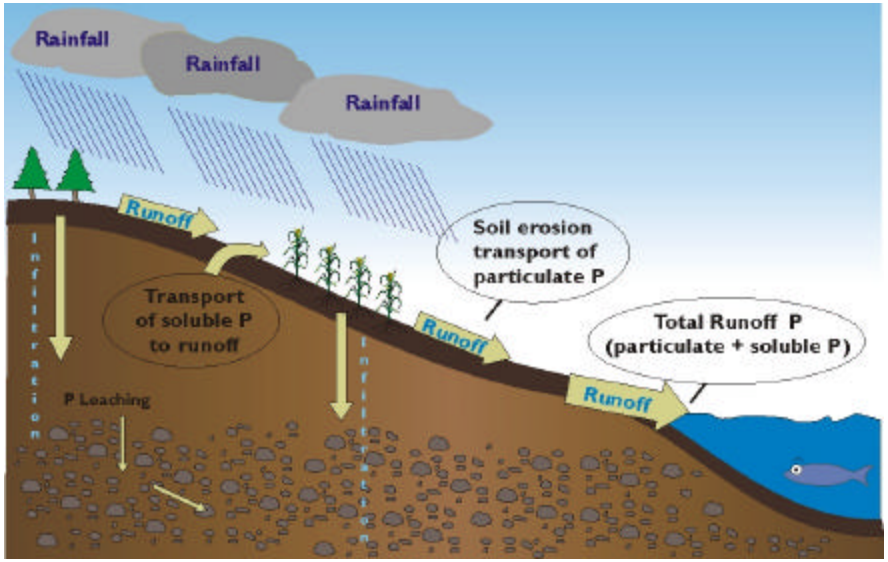
** Source: Powell et al, 2002 survey of 93 farms.*

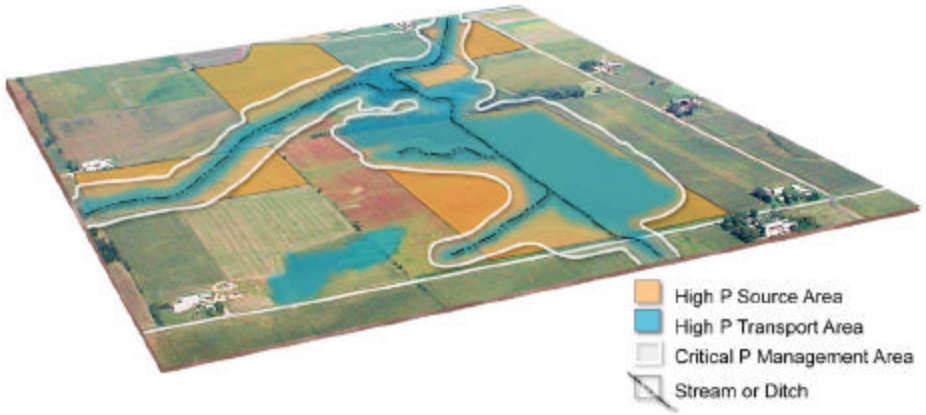
Effect of Dietary-P Intake on P Losses in Runoff over Time



The Wisconsin P Index

L. G. Bundy, L. Ward Good, and W.M. Jarrell
Dept. of Soil Science - University of Wisconsin-Madison





PI = PP + SP

http://wpindex.soils.wisc.edu

Implementing Phosphorus-based Nutrient Management

- Research-Awareness-Education Model
  - Research
  - Awareness

Revised 590 Nutrient Management Standard–2002

- USDA-NRCS Technical Guide Standard.
- Developed by multi-agency and multi-disciplinary committee.
- Includes options for P-based nutrient management plans.
  - Soil test P
  - Wisconsin P index

Phosphorus Research Roundtables

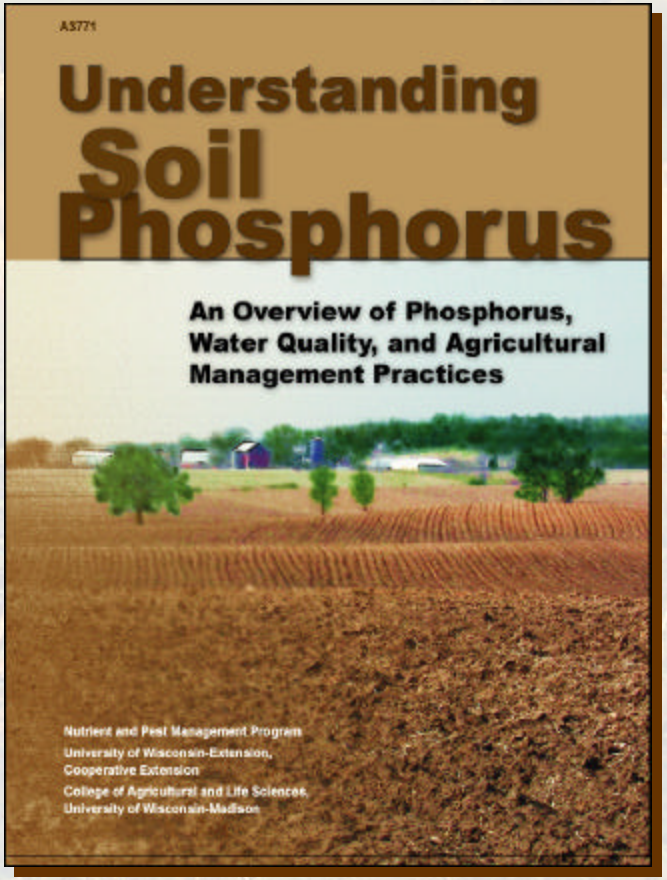
- Focused, multi-disciplinary discussions of P and P management.
- PowerPoint presentations, abstracts, discussion minutes, summary documents (conclusions, issues to resolve, research/information needs).
  - 13 topics
- http://www.soils.wisc.edu/extension/p_roundtables/title.htm or link from UW Soil Science Extension website.

Implementing Phosphorus-based Nutrient Management

- Research-Awareness-Education Model
  - Research
  - Awareness
  - Education

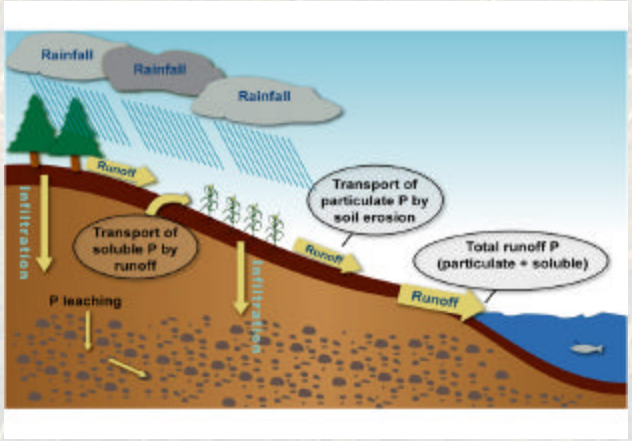
Understanding Soil Phosphorus

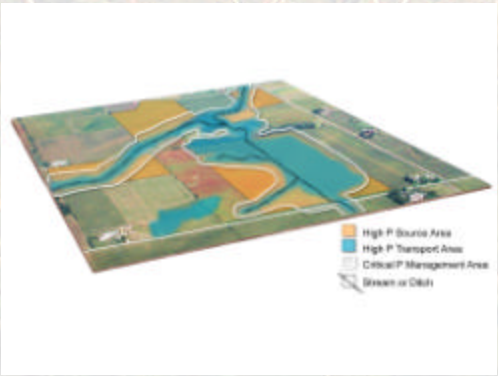
- Summary Publication:
  - Water Quality
  - P Cycle
  - P Sources & Land Use
  - P Transport
  - P Terminology
  - Ag Management Practices
- Printed in April, 2002
  - Requested and funded by state natural resources and agricultural agencies



Understanding Soil P: Spin-offs

- Dietary P Considerations for Dairy Management
- P Management on High Testing Soils
- When & Where to Apply Manure
- The Wisconsin P Index
- Others to follow . . .





Balancing Dietary Phosphorus series

Phosphorus Balancing: The in's and out's

Recent surveys and research on Wisconsin dairy farms indicate that:

1. Phosphorus (P) inputs are often greater than outputs.
2. When inputs are greater than outputs, P will build up in the soil over time.
3. The potential for P runoff increases when soil P is built up to excessive levels.

Phosphorus in runoff causes excessive algae growth in surface waters, which can reduce water quality of streams and lakes.

Phosphorus Balancing: Optimizing Dietary P Levels

Recent surveys indicate that more than one-half of Wisconsin dairy cows are over fed dietary phosphorus (P)!

Phosphorus Balancing: Dietary P and Spreadable Acres

DIETARY PHOSPHORUS (P) FACTS:

- The maximum dietary P level that is needed for high milk production is 0.38% according to the National Research Council.
- Recent surveys indicate that more than one-half of Wisconsin dairy cows are fed over 0.38% dietary P!
- High dietary P = high manure P.

SPREADABLE ACRES FACTS:

- Your land may be subject to new and proposed regulations that target P applications to cropland.
- In general, you will need more spreadable acres if you have a phosphorus-based nutrient management plan.
- High manure P = more acres needed to spread manure (according to new/proposed regulations).

Flip the card to see the relationship between dietary P and spreadable acres ➡

Phosphorus Balancing: Purchasing Supplements

You many be purchasing supplements for their protein or energy values, but did you know that they contain varying amounts of phosphorus (P)?

Dairy Dietary Curriculum

- Content:
  - Importance
  - Nutrient inputs, outputs, and balance
  - Phosphorus issues
  - Nitrogen issues
  - Potassium issues
  - Case study
- Released March, 2003