

The Revised Arkansas Phosphorus Index

Presented By:

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Arkansas Phosphorus Index (API)

- What is the API?
- What is the API based on?
- Who uses the API?



Reasons for the API Revision

- New methods for soil test P
- New methods of measuring soluble P in manure
- Other sources of P were included such as biosolids and liquid manure



Who was Involved

- Arkansas Natural Resource Commission
- USDA NRCS
- USDA ARS
- University of Arkansas
- Arkansas Association of Conservation Districts
- Arkansas Department of Environmental Quality
- Tyson Foods
- Arkansas Farm Bureau
- Watershed Conservation Service Center



How the API is Structured

- The revised API has the same basic structure as the original API and is multiplicative in nature. The P index assigns a risk value for P loss in runoff as follows;
- $P \text{ Index} = P \text{ Source Potential} * P \text{ Transport Potential} * \text{BMPs}$
- $P \text{ Index normalized} = (P \text{ Index}/1.8)*100$

The API includes Seven Site Characteristics

- These are grouped into either P Source or P Transport categories.

-P Source Potential Characteristics are:

- (1) soil test P
- (2) soluble P application rate

-P Transport Potential characteristics are:

- (1) soil erosion
- (2) soil runoff class
- (3) flooding frequency
- (4) application method
- (5) timing of P application



Phosphorus Source Potential

- Original API soil sample depth 0 - 6 inch
- Revised API soil sample depth 0 - 4 inch
- Melich III soil test method was changed from a 1:7 to 1:10 extraction ratio
- Revised P source coefficients
- Water extractable P (WEP) in manure will be determined by using the current national standard for WEP analysis (Sera-17, 2009)

Calculating P Source Potential 2001 Index

Soil Test P Rating STP (lbs P/acre) x 0.000666

Manure P Rating Litter WEP (lbs P/acre) x 0.404

Soil Test P = Mehlich III P using 1:7 method

Litter WEP uses 1:10 method

$PSP = \text{Manure WEP} * 0.404 + 0.000666 \text{ STP}$

Calculating P Source Potential Revised Index

Soil Test P Rating STP (lbs P/acre) x 0.0019

Manure P Rating Litter WEP (lbs P/acre) x 0.1062
P mineralization (litter TP – WEP)

Soil Test P = Mehlich III P using 1:10 method

Litter WEP uses 1:100 method

$PSP = 0.1062 * (WEP + MNRL * (TP - WEP)) + 0.0019$

MNRL = 0.05 for normal litter & 0.005 for alum treated litter

Phosphorus Transport Potential

- Five Mechanisms for Calculating Phosphorus Transport Potential
 1. Soil Erosion
 2. Soil Runoff Class
 3. Flooding Frequency
 4. Method of Application
 5. Application Timing

P Transport = soil erosion + runoff class + flooding frequency + application method + application timing

Soil Runoff Class

2001 API

Cover Type	Hydrologic Condition	Soil Hydrologic Group			
		A	B	C	D
Pasture Grazed	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Hayland Not Grazed		30	58	71	78

Soil Runoff Class

Revised API

Pasture use	Soil Hydrologic Group			
	A	B	C	D
Continuously grazed >0.75 AU	68	79	86	89
Continuously grazed <0.75 AU	49	69	79	84
Rotationally grazed	39	61	74	80
Hayland	30	58	71	78

Flooding Frequency

2001 API

Flooding Frequency	None	Occasional	Frequent
	0	0.1	2.0

Revised API

Flooding Frequency	None to rare	v.	Rare	Occasional	Frequent
	0		0.2	0.5	2.0

Application Timing

2001 API

Application timing	June - Oct 0.1	March - May 0.2	Nov - Feb 0.5
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2008 API

Application timing	July - Oct 0.1	March - June 0.25	Nov - Feb 0.6
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BMPs – Supplemental Management Value

Practice	Assigned effectiveness %	
Diversion	5	POND – estimate percent of field draining into pond
Terrace	10	
Pond	20 or 30	Higher values if fenced to limit animal access
Filter strip	20 or 30	
Grassed waterway	10	FENCING – only to limit animal access; not associated with pond or buffer
Fencing	30	
Riparian forest buffer	20 or 30	
Riparian herbaceous buffer	20 or 30	
Field buffer	10	

Site Interpretations

- Based on the site ratings, fields are assigned a P index risk class of low, medium, high or very high
- Low potential = $<.6$ lbs P/acre or <33 normalized
- Medium potential = 0.6 to 1.2 lbs P/acre or $33 - 66$ normalized
- High potential = $1.2 - 1.8$ lbs P/acre or $67 - 100$ normalized
- Very High = >1.8 lbs P/acre or >100 normalized

Thank You
Questions?