Using Information to Market Plant Nutrients

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Mosaic Agronomy

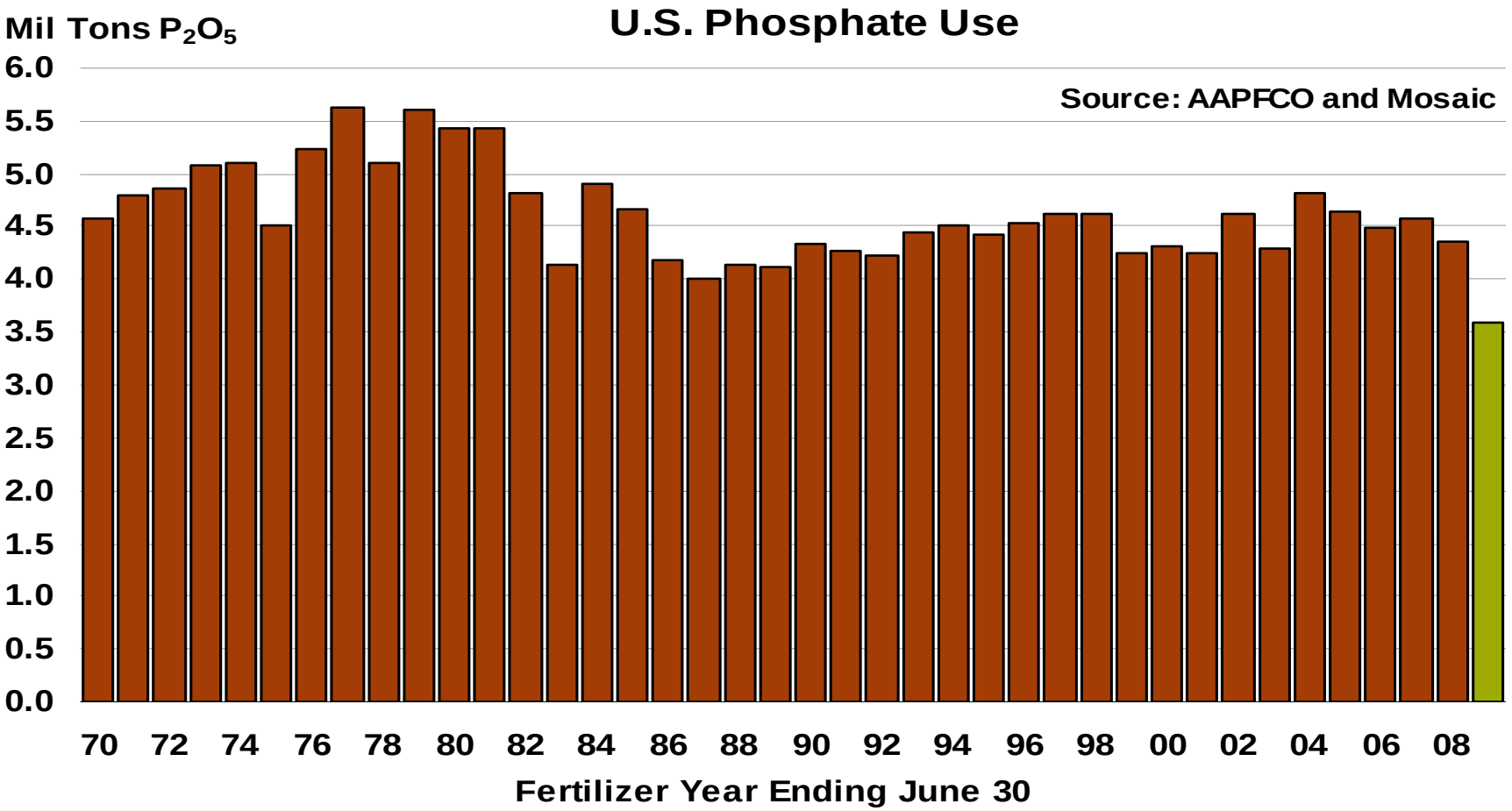
Fertilizer Industry Round Table

October - 2009

Fertilizer Marketing – (Past)

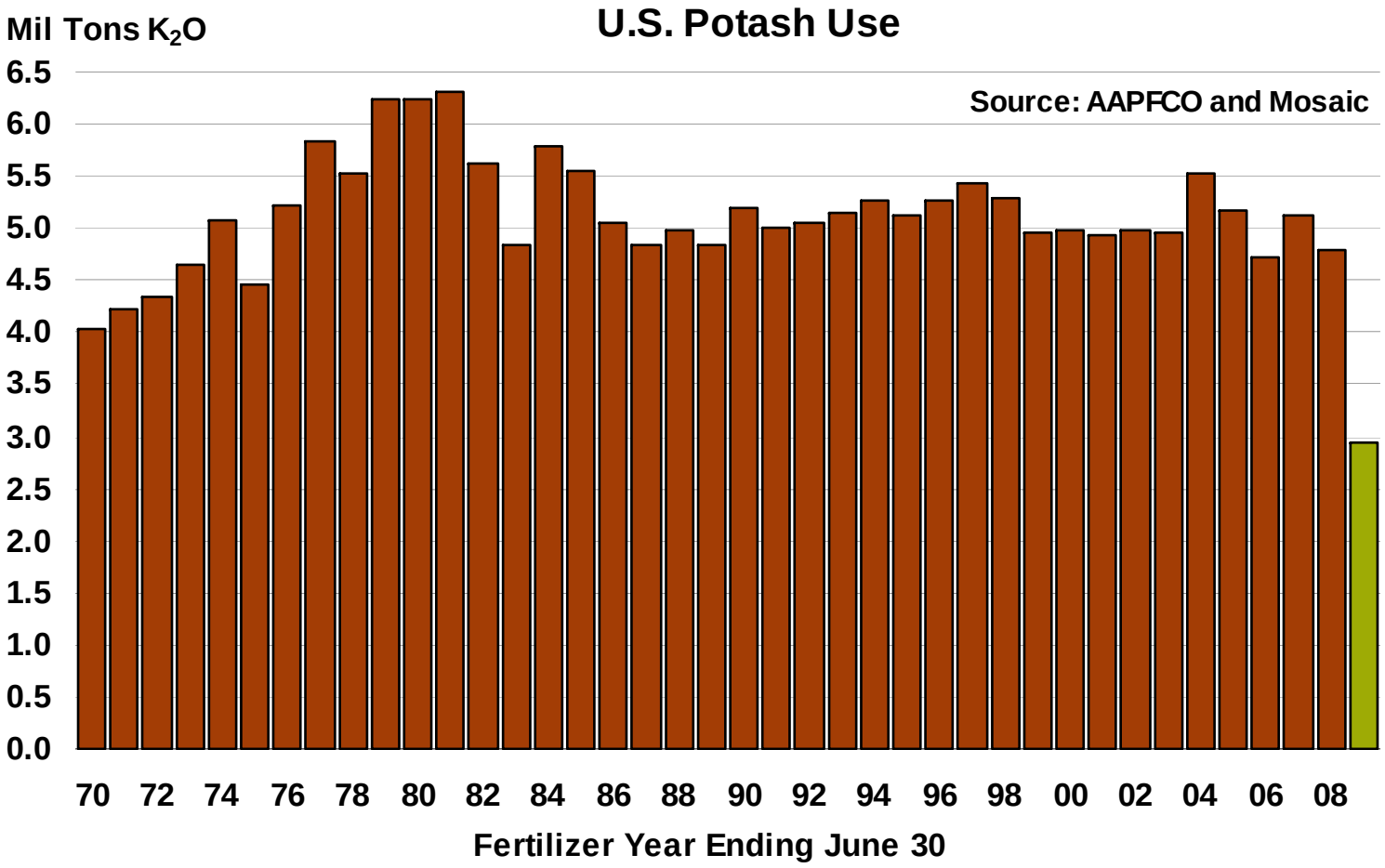
1. Basic fertilizer products same last 40+ years
2. Most view these products as commodities
3. Multitude of “free” information on using fertilizer from internet and universities
4. Farmers have been too comfortable on products, rates and economics of fertilizer management.
5. Dealer surveys indicate don’t need help selling this “commodity”.

US Phosphate Use



Mosaic Market Analysis & Strategic Planning

US Potash Use



Mosaic Market Analysis & Strategic Planning

Fertilizer Marketing Since Sept. 2008

1. “Normal” pricing trends, supply and use of commodity fertilizer in state of flux.
2. Farmer buying habits based on economic, trust, agronomic and historical decisions have changed with world economics.
3. Record crop again with large nutrient removal amounts and flat to reduced fertilizer applications
4. Market has returned asking for help in selling commodity fertilizers

Information As A Differentiator

1. Customize information for each farm unit goals and soils
2. Turning information / data into management / risk tools
3. People skills by retailer staff
4. Value to retailer: If you are the hub/source of crop nutrition information, databases, response curves and crop models for customers, why would they go to a competitor

Information Challenges

1. Free Issue
2. Getting Paid
3. Farmer recognizing value
4. Updates – speed of change
5. Mass amounts

Three Examples Today

1. GIS nutrient balance

2. Fertilizer recommendation and soil draw downs

3. Multiple factor recommendations model

Why Nutrient Budget Maps

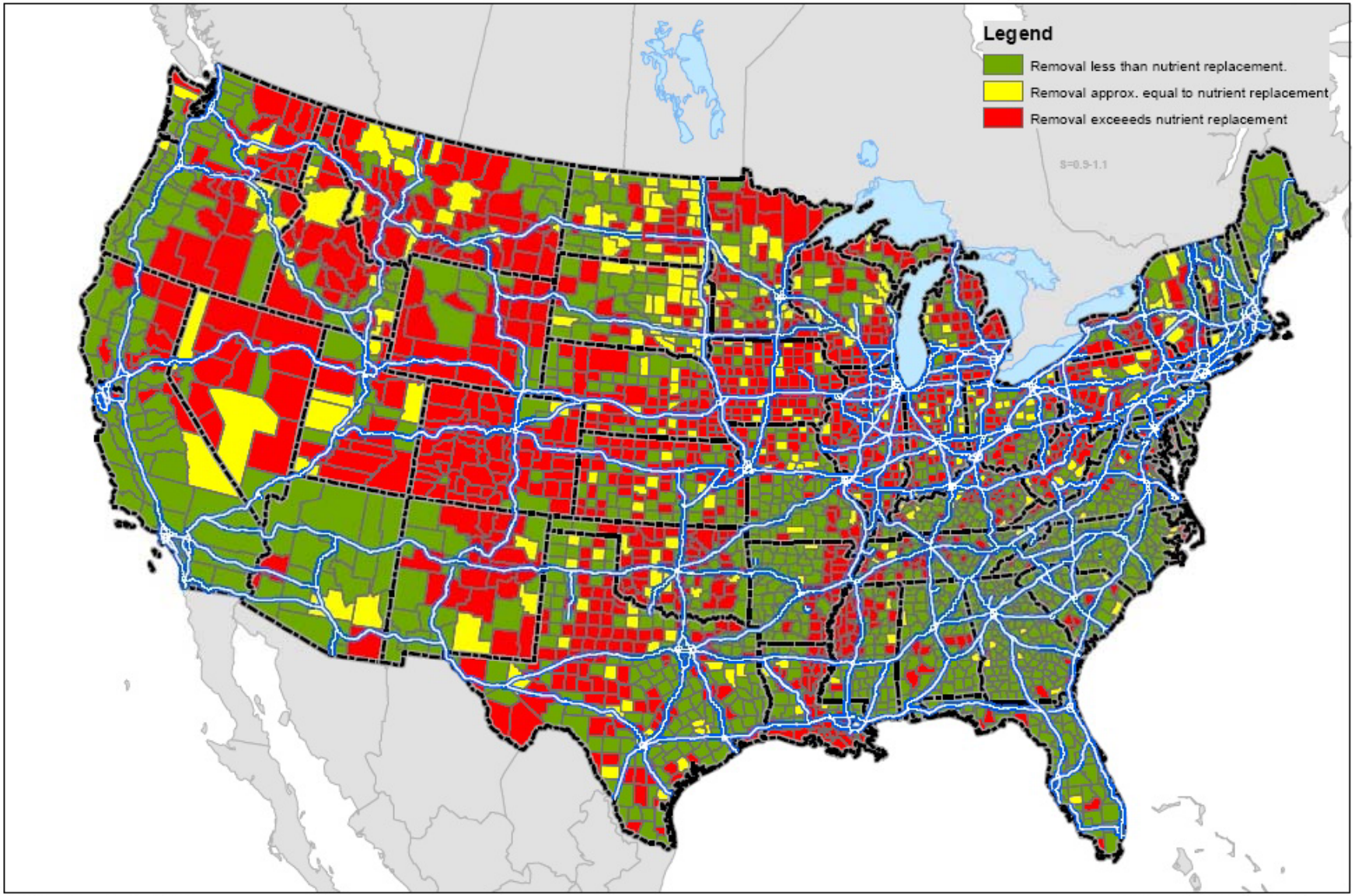
- Removal can be combined with soil tests, yield goals and economics to develop superior fertilizer recommendations.

- Tool used to re-energize P and K markets

- Get ready for “300” bu/ac challenge

- Reverse soil mining trend

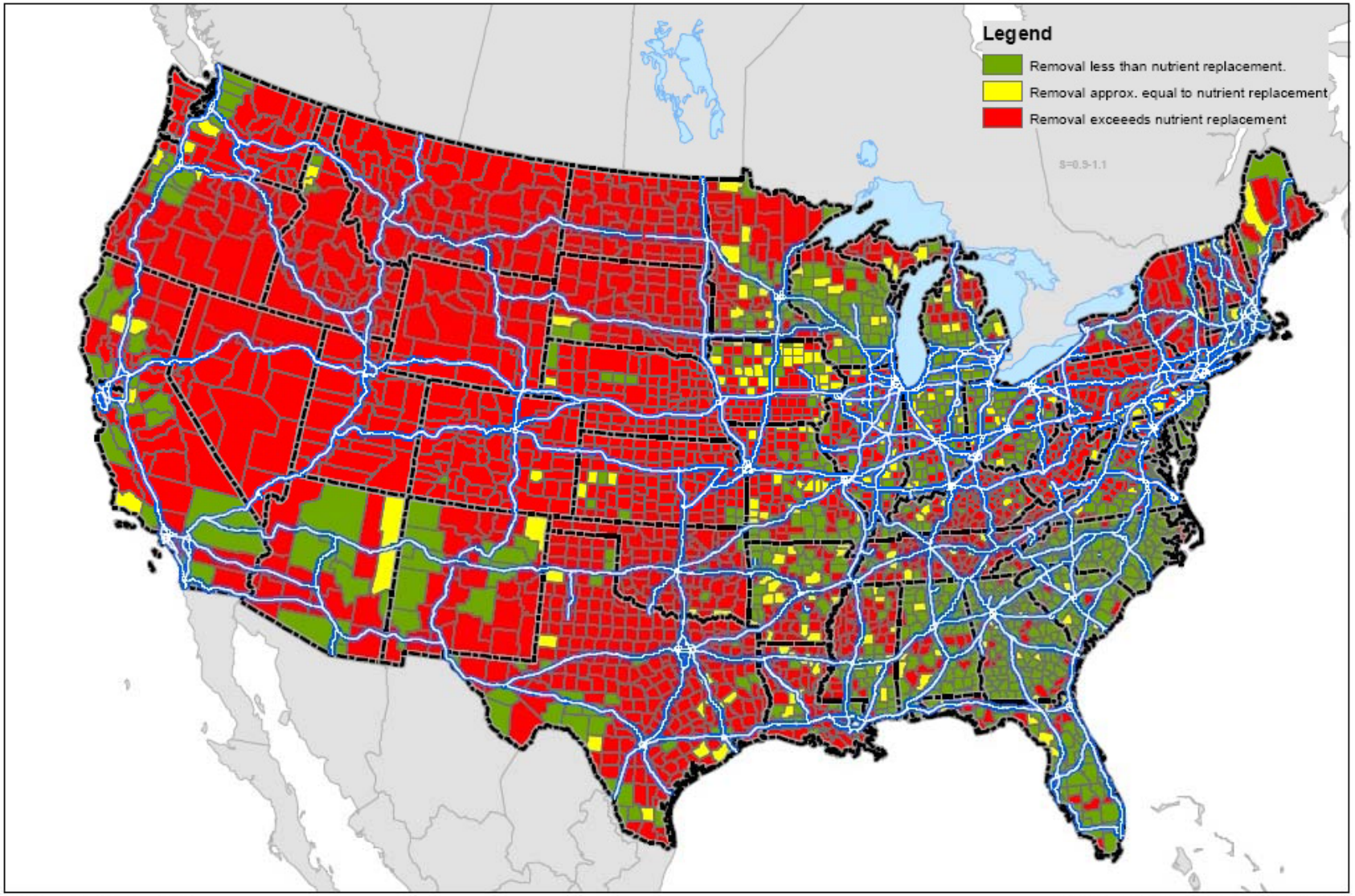
P Nutrient Balance Uptake Map



Nutrient inputs for 2007
Nutrient removal average of 2006, 2007, and 2008

Source: IPNI and PAQ - NuGIS Project
August 2009

K Nutrient Balance Uptake Map



Nutrient inputs for 2007
Nutrient removal average of 2006, 2007, and 2008

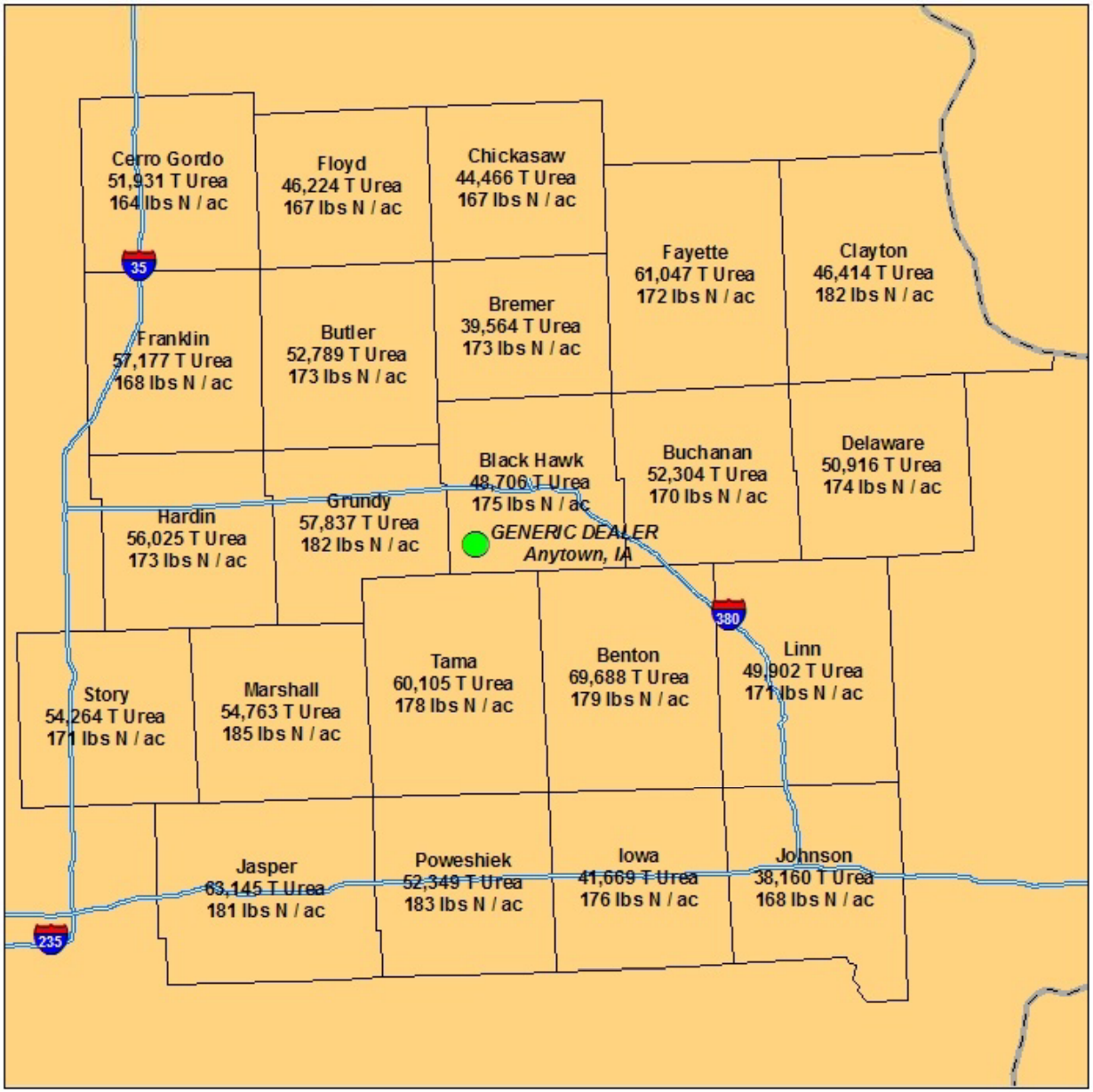
Source: IPNI and PAQ - NuGIS Project
August 2009

How the Maps Were Created

- Data Sources: USDA, ESRI, NASS, AAPFCO and IPNI
- Data base developed and supported by IPNI
- Yields from ’06 – ’08
- 5 crops / county
- Dealer maps send to 1100 dealers in corn belt
- 1500 U.S. nutrient maps to influencers (bankers, crop consultants, farm managers)

N Removal 2006-2008 Avg Yield

GENERIC DEALER - Anytown, IA



Labels represent total removal by county in tons of Urea and pounds per acre of N from harvested cropland.
Table below is a summary of all counties labeled on this map.

Total Harvested Acres
6,070,841

Total Tons of Urea Removed
1,149,444

Total Lbs of N Removed / Harvested Acre
174

0 10 20 30 40 Miles

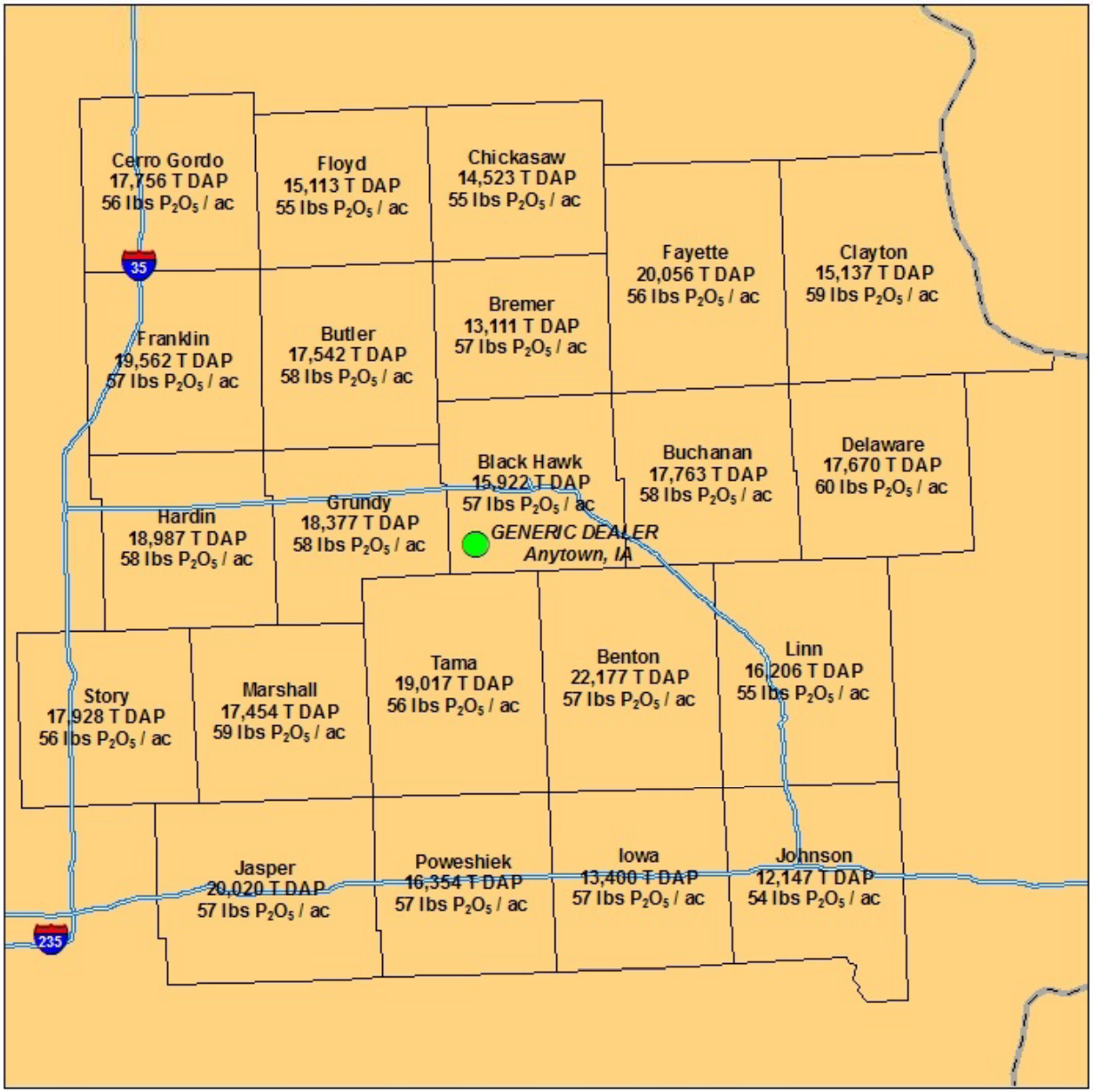
Map Code: 9000001_5000904_01

Sources: IPNI and PAQ Interactive - NuGIS Project

Oct 22, 2009

P Removal 2006-2008 Avg Yield

GENERIC DEALER - Anytown, IA



Labels represent total removal by county in tons of DAP and pounds per acre of P_2O_5 from harvested cropland.
Table below is a summary of all counties labeled on this map.

Total
Harvested Acres
6,070,841

Total Tons of
DAP Removed
376,222

Total Lbs of P_2O_5 Removed / Harvested Acre
57

0 10 20 30 40 Miles

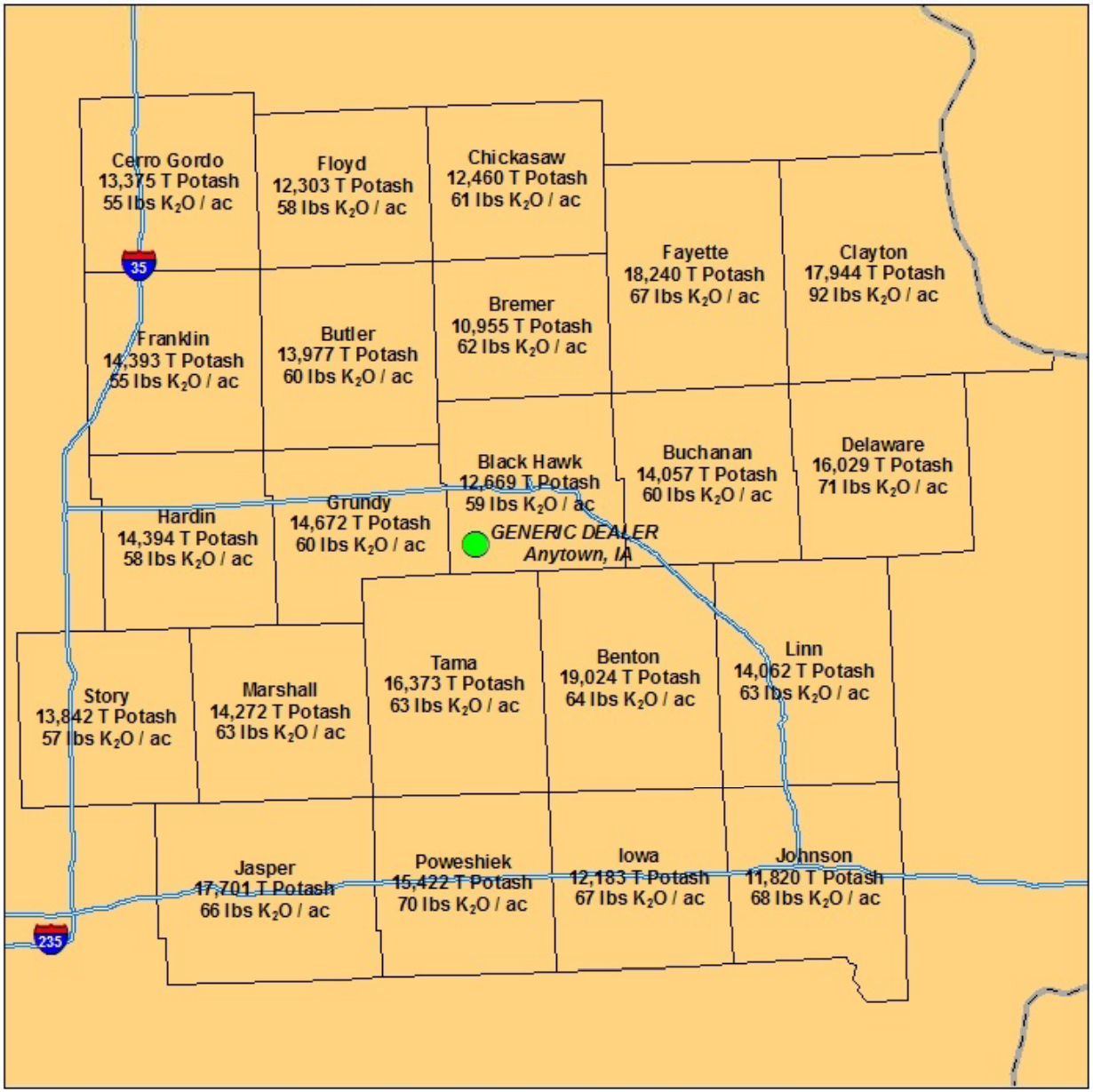
Map Code: 9000001_5000904_02

Sources: IPNI and PAQ Interactive - NuGIS Project

Oct 22, 2009

K Removal 2006-2008 Avg Yield

GENERIC DEALER - Anytown, IA



Labels represent total removal by county in tons of Potash and pounds per acre of K_2O from harvested cropland.
Table below is a summary of all counties labeled on this map.

Total
Harvested Acres
6,070,841

Total Tons of
Potash Removed
320,167

Total Lbs of K_2O Removed / Harvested Acre
64

0 10 20 30 40 Miles

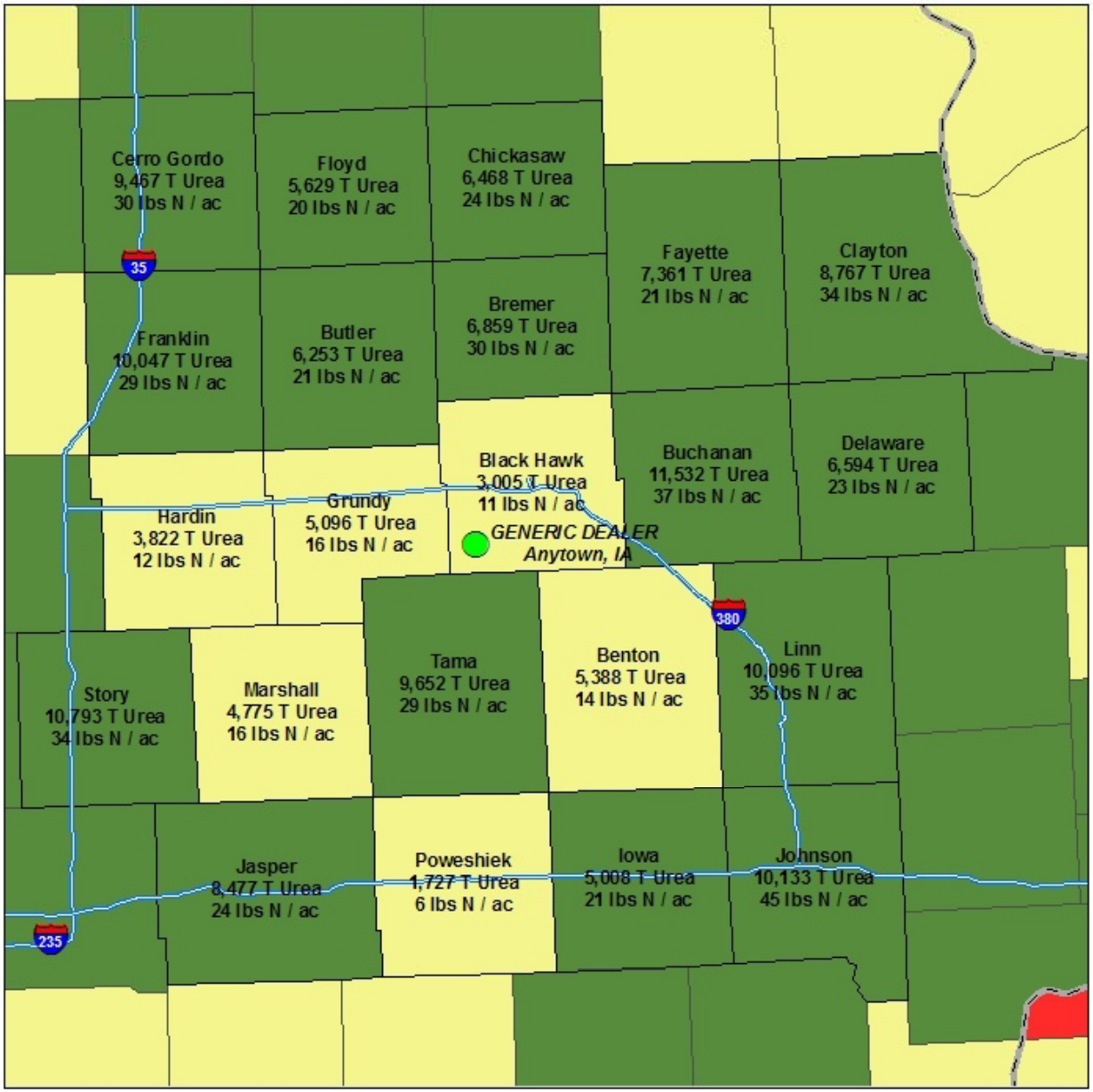
Map Code: 9000001_5000904_03

Sources: IPNI and PAQ Interactive - NuGIS Project

Oct 22, 2009

N Budget 2006-2008 Avg Yield

GENERIC DEALER - Anytown, IA



Labels represent the net budget of Urea in Tons and N in pounds per acre, remaining from inputs after removal by harvested crops. Table below is a summary of all counties labeled on this map.

Total Harvested Acres
6,070,841

Net Tons of Urea
156,949

Net Lbs of N / Harvested Acre
24

Removal less than nutrient replacement
Removal approx. equal to replacement
Removal exceeds nutrient replacement

0 10 20 30 40 Miles

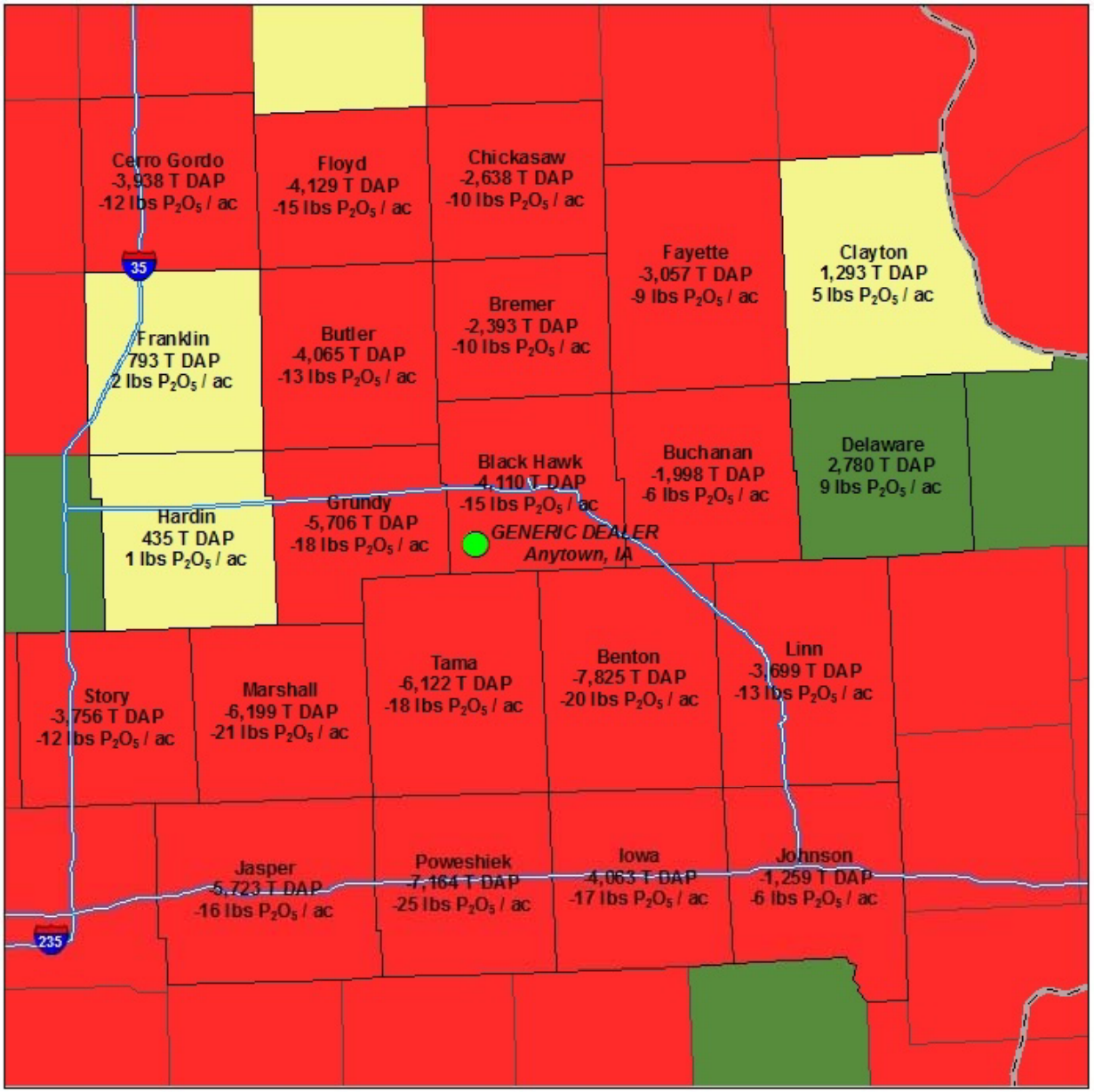
Map Code: 9000001_5000904_07

Sources: IPNI and PAQ Interactive - NuGIS Project

Oct 22, 2009

P Budget 2006-2008 Avg Yield

GENERIC DEALER - Anytown, IA



Labels represent the net budget of DAP in Tons and P_2O_5 in pounds per acre, remaining from inputs after removal by harvested crops. Table below is a summary of all counties labeled on this map.

Total Harvested Acres
6,070,841

Net Tons of DAP
-72,545

Net Lbs of P_2O_5 / Harvested Acre
-11

Removal less than nutrient replacement
Removal approx. equal to replacement
Removal exceeds nutrient replacement

0 10 20 30 40 Miles

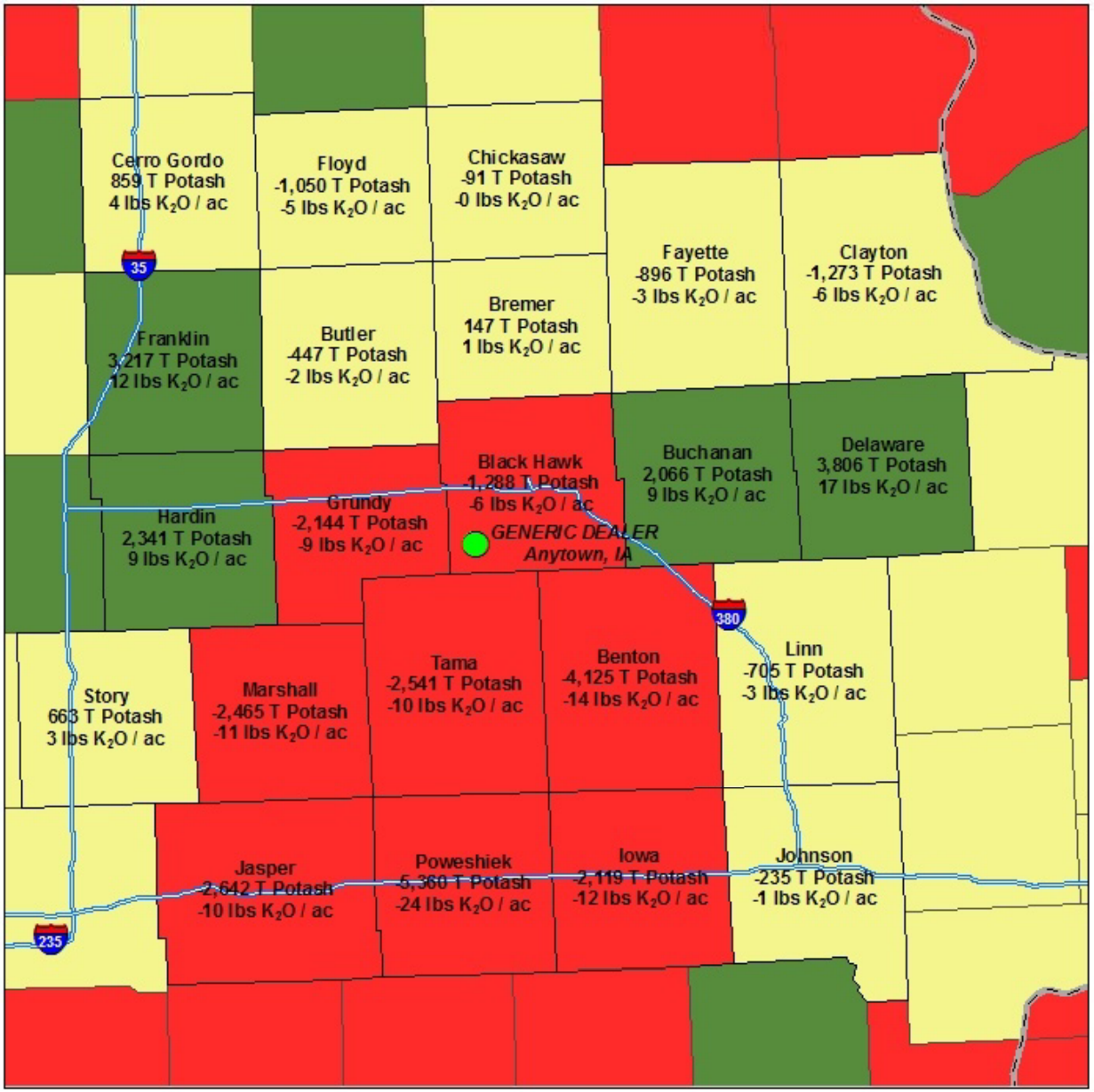
Map Code: 9000001_5000904_08

Sources: IPNI and PAQ Interactive - NuGIS Project

Oct 22, 2009

K Budget 2006-2008 Avg Yield

GENERIC DEALER - Anytown, IA



Labels represent the net budget of Potash in Tons and K_2O in pounds per acre, remaining from inputs after removal by harvested crops. Table below is a summary of all counties labeled on this map.

Total Harvested Acres
6,070,841

Net Tons of Potash
-14,284

Net Lbs of K_2O / Harvested Acre
-3

- Removal less than nutrient replacement
- Removal approx. equal to replacement
- Removal exceeds nutrient replacement

0 10 20 30 40 Miles

Map Code: 9000001_5000904_09

Sources: IPNI and PAQ Interactive - NuGIS Project

Oct 22, 2009

Mosaic Custom Nutrient Recommendation System

Today, fertilizer recommendations are:

- ✓ *Art*
- ✓ *Science*
- ✓ *Guess*
- ✓ *Sales Tool*
- ✓ *Very Accurate*
- ✓ *Soil Lab Service*
- ✓ *Too complex*
- ✓ *Fast*
- ✓ *Pain*
- ✓ *Fun*

Objectives of Mosaic's Custom Nutrient Recommendation System

1. Improve farmer profitability with custom recommendations.
2. Develop a continued trust and business link between farmer and dealer using Mosaic program.
3. Fast and flexible.
4. Incorporate other factors beyond crop and soil test levels.
5. Protects the environment from excess nutrients
6. Science based and provides recommendations that can be justified based on sound management principles.
7. Moves making fertilizer recommendations to a new level and approach.

Equation Inputs

- ✓ Yield “potential”
- ✓ Available Capital
- ✓ Soil tests
- ✓ Relative soil buffer
- ✓ Target soil test level
- ✓ Build rates
- ✓ Fertilizer costs
- ✓ Accept return on investment
- ✓ Nutrient recovery rates
- ✓ Land tenure

Example 1

Equation Inputs: Land tenure - Variable
Corn / Corn – 200 bu/Ac
100 bu w/o Nitrogen
10 soil test P
110 soil test K

Results:

Land Tenure (Years)	Mosaic Recommends	Univ of MN
1	182+97+58	139+70+58
2	182+102+109	139+70+58
5	182+116+166	139+70+58
10	182+130+198	139+70+58
15	182+130+200	139+70+58

Customer Name:	Dean Fairchild
Field ID:	Pivot 13-A
Location:	Pheasant Farm

Fertilizer Economics Decision Support Tool

Corn

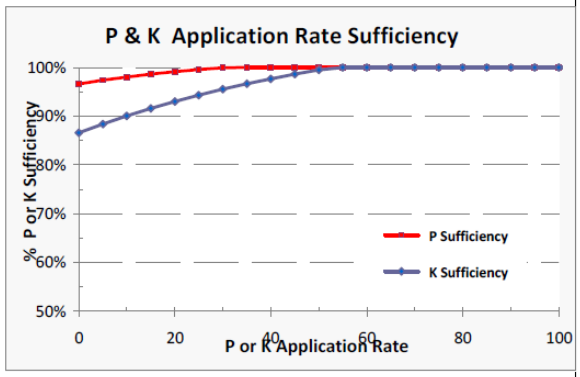
The Mosaic Company
www.mosaicco.com

October 22, 2009

Field Details

Acres	1		
Yield Potential	200	Bu/A	
Estimated Yield Without N	100	Bu/A	(50.0%)
Bray P1	22	ppm	(96.6%)
Exch. K Soil Test	122	ppm	(86.5%)
Corn Price	$4.00	per Bu	
Fertilizer N Cost	$0.32	per Lb N	
Fertilizer P Cost	$0.34	per Lb P_2O_5	
Fertilizer K Cost	$0.65	per Lb K_2O	
Total Budget Available	$94.00		
Previous Crop	1	(1=Corn, 2=Sbean)	
P and K Build Years	4		

Phosphorus and Potassium Sufficiency



Customer Rates

N Application	200	Lb N/Acre
P_2O_5 Application	0	Lb P_2O_5/Acre
K_2O Application	0	Lb K_2O/Acre
Expected Yield Potential	167	Bu/A
Total Fertilizer Cost	$64.00	
Estimated Marginal Return	$204.93	

Economic Optimum Rates

Expected Yield	200	Bu/A
N Recommendation	169	Lb N/Acre
P_2O_5 Recommendation	31	Lb P_2O_5/Acre
K_2O Recommendation	53	Lb K_2O/Acre
Total Fertilizer Cost	$98.95	
Estimated Marginal Return	$301.05	

Limited Dollars Rates

Expected Yield	198	Bu/A
Adjusted N Application	166	Lb N/Acre
Adjusted P_2O_5 Application	24	Lb P_2O_5/Acre
Adjusted K_2O Application	50	Lb K_2O/Acre
Adjusted Fertilizer Cost	$93.89	
Estimated Marginal Return	$298.13	

Sufficiency Rates

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Mosaic

Long Term Effects on Soil Test Levels

Phosphorus

	Years Following Management Program				
	Initial	1 Year	3 Years	5 Years	10 Years
	- - - - - Estimated Bray P Soil Test (ppm) - - - - -				
Sufficiency	22	19	14	9	5
Limited Dollars	22	19	13	8	5
Customer Rates	22	18	11	5	5
Economic Optimum	22	19	14	9	5
Local Custom	22	22	22	22	22
University of Illinois	22	23	26	29	35

Potassium

	Years Following Management Program				
	Initial	1 Year	3 Years	5 Years	10 Years
	- - - - Estimated Exchangeable K Soil Test (ppm) - - - -				
Sufficiency	122	121	120	118	114
Limited Dollars	122	121	119	117	112
Customer Rates	122	116	105	94	66
Economic Optimum	122	121	120	118	114
Local Custom	122	129	143	157	192
University of Illinois	122	129	142	155	188

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Summary

1. Opportunity is there for crop nutrition business to "market" fertilizer.

2. Need to reverse flat application rates of past 30 years.

3. 300 bu/A goals.

4. 40 – 60% of yield increases are result of crop nutrition.