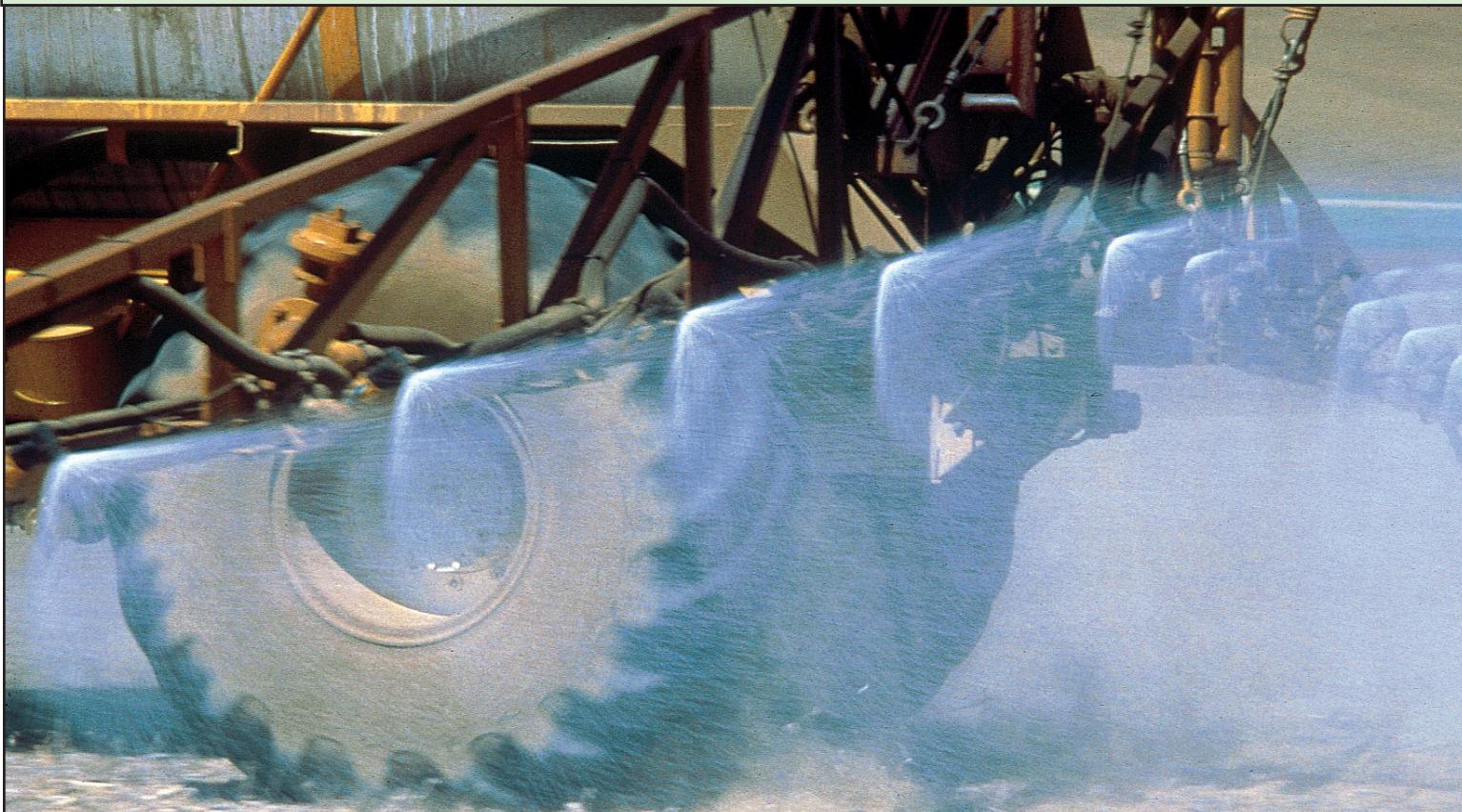


FFF Review: Tracking a Rich Legacy Using Fluid Technology for Next Generation of High Crop Yields

The innovation that brought us fluid fertilizers was given birth in the early '50s.

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The golden years of fluid fertilizers began in the early '50s via the imagination and inventiveness of its early pioneering disciples and continue to this day through more than five decades of offering farmer customers the finest in technologies for growing more productive crops. The number of fluid dealers has grown nationwide, offering quality clear liquids, suspensions, and bulk blends. And the inventiveness did not just stop with the fertilizer itself. Floater applicators were conceived, designed, manufactured and supplied to provide swift, accurate, and efficient ways to apply fluids to both large and small fields. To unify and direct the new rising technology, its founders formed a central headquarters to spread the word, hold grower meetings, and help the industry market its fertilizer and soil fertility concepts. That central body is known today as the Fluid Fertilizer

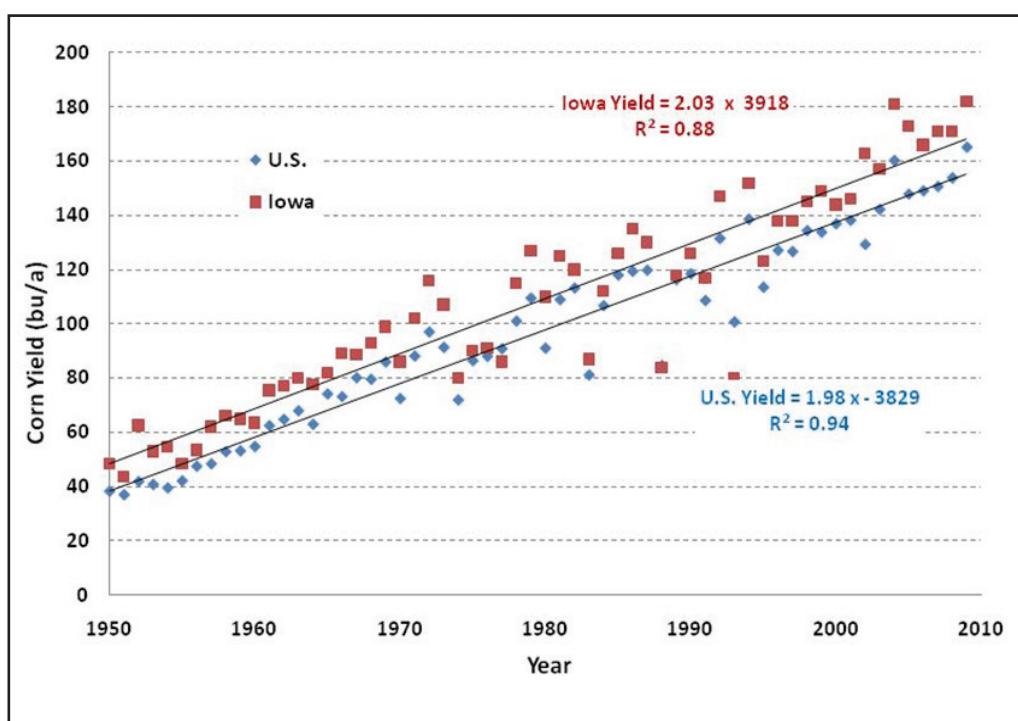


Figure 1. U.S and Iowa corn yields - 1950-2009

P Nutrient Balance Map

Mosaic

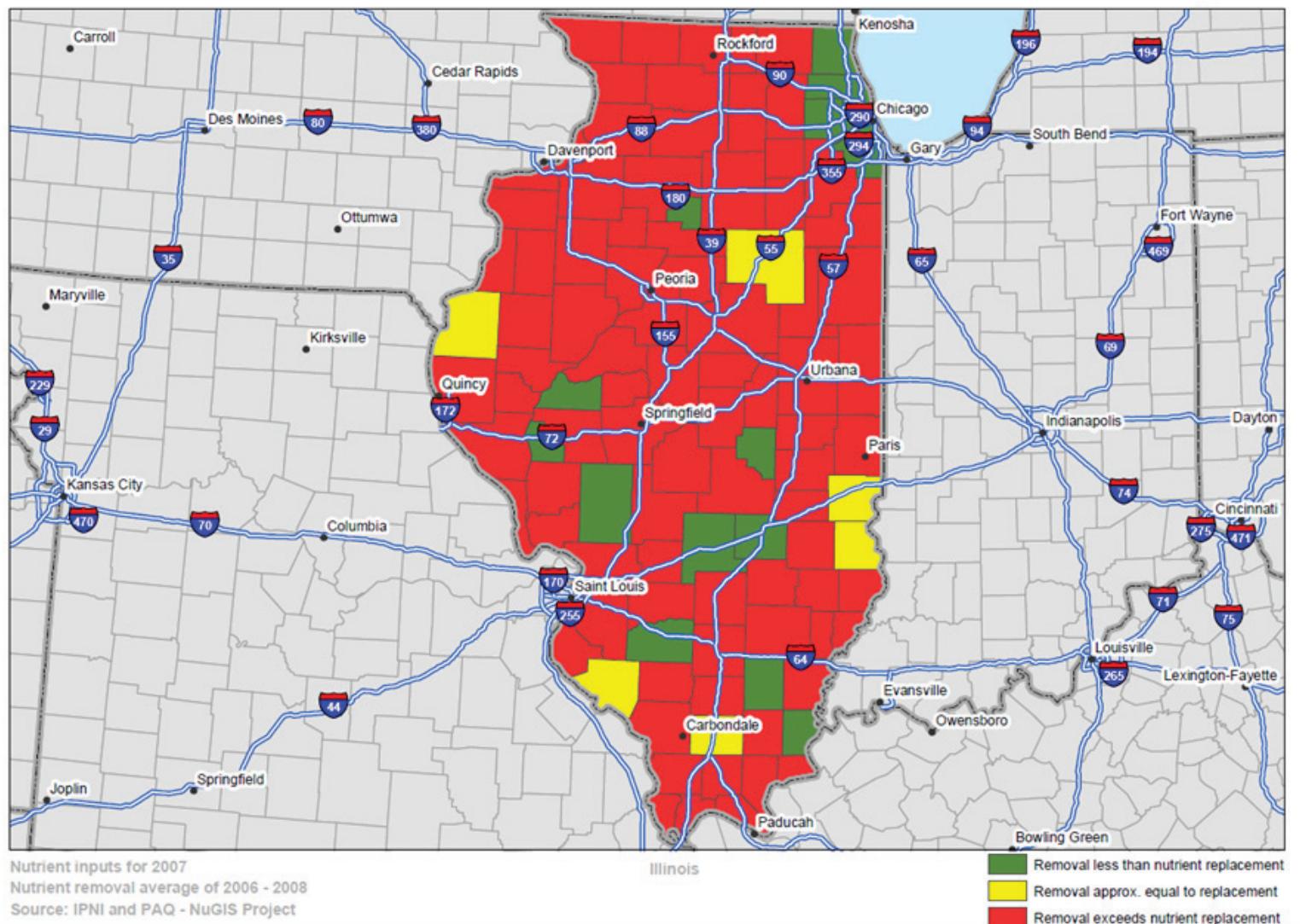


Figure 2. P Nutrient balance map, Illinois.

Treatment		Corn yield
Plants 1,000/A	Planter fertilizer rate in lbs/A	bu/ A
55	250 lbs	301.2
45	250 lbs	294.7
55	125 lbs	264.0
45	125 lbs	263.8
35	125 lbs	261.1
35	250 lbs	252.1
45		243.0
35		232.6
55		221.9

Note: Preplant rates of NPK applied based on soil tests and crop removal amounts.

Table 1. Yield vs. treatment overview, Minnesota.

Foundation, located in Manhattan, Kansas. Annually, it gathers its dealer members, researchers, suppliers, and manufacturers--domestically and overseas--to assemble at its Fluid Forum in Scottsdale, Arizona, to learn about

the latest advances in research and technology.

Tri decades

The first near tri decade (1953 - 1980) of innovation and development led to the second near tri decade (1980 - 2011) of

fine tuning fertilizer application rates for NPK, new concepts for weed and feed, free lunch meetings for growers to learn about the latest chemicals on the market, the introduction of precision agriculture: variable rate application, G.P.S. systems, yield monitors, bio tech, and new higher-yield hybrids.

Dramatic jump

The jump in corn yield over a period just short of sixty years (see Figure 1) is nothing less than dramatic and fluids have played a significant role in this increase. Back in the fifties, 40 bu/A of corn was considered the norm. Since then the adrenaline is readily apparent. From the '70s to the year 2,000, corn yields jumped at the rate of 1.9 bu/A each year. Over the next nine years it jumped at the rate of 3 bu/A each year. The goal by 2030? Estimates range from 250 to 300 bu/A per year or

at the increase rate of 6 bu/A/yr over the next 20 years. Table 1 shows high yields vs. treatments overview for a 300 bu/A yield plot in Minnesota in 2010. With a geometrically increasing world population and increasing use of world grains for other uses, these types of yields will need to be common in the future.

Farmer dollars

The economic world for farmers is different today. They experience higher expenses, cash flows, risk, and equipment is more sizable and expensive. Because of this, higher yields become an imperative in keeping the

The Economic World Market for Farmers is Different Today

head above water, or better yet, maybe even to reaching higher profits. Table 2 shows the impact of a 55 bu/A increase in corn yield on gross dollars per acre in what has become a different economic world today--an increase most sorely needed by the grower during inflationary times. These increased grower revenues also provide significant opportunities for dealers to assist in developing new yield goals for customers.

Soil test levels

A look at Figure 2 (shown as "P Nutrient Balance Map") demonstrates how P removal rates are exceeding P application rates in Illinois. For the K picture in another state, however, note how K nutrient balance levels for Indiana are significantly improved (Figure 3). This is why it is important for dealers to have a soil testing program to determine PK balance for customer fields. The increase in bushels when adequate Soil Test Phosphorus (STP) exists (Table 3) shows the economies of high P levels. The various tools involved in getting this message to farmers include:

- Combine systemic soil testing and yield maps to create nutrient balance maps, by field, for customers
- Tell the story:
 1. farm call topic

- 2. newsletters
- 3. e-mail alerts
- 4. on-farm plots
- 5. provide training and equip sales/ marketing staff
- Offer tools to cover objections of cost in soil building and land tenure issues
- Understand the issue will take a team effort of sales and marketing to tell the story.

Weeds

The curse of agriculture. Little needs to be said here. There should be no surprise at the rapid trend we've seen back to preplant/pre-emerge weed control to supplement Glyphosate programs. The formula is simple: weed/feed with UAN; weed/feed with NPK suspensions. A couple of good ways to say "goodbye" to weeds.

Fluids key

Bottom line? Fluid fertilizers and high yields have an affinity for each other:

- Placement and timing become very

important + FLUIDS

- Need to go beyond NPK + FLUIDS
- High plant population results in high stalk yields and potential nutrient immobilization + N and S FLUIDS
- Starters with big planters + FLUIDS
- Late-season applications + FLUIDS
- Increase of total nutrient uptake and amounts/day + FLUIDS.

Beyond NPK

While fluid NPK products have worked to significantly increase crop yields, their combination with other elements is greatly beneficial in increasing crop yields even more. We'll look at a few.

Sulfur. The use of sulfur (S) in soils has worked to increase crop yields (note Table 4). It also promotes N/S, P/S interactions. In addition, S becomes a critical nutrient in decomposition of high stalk yields.

Zinc is another element that is beneficial in improving crop yields. In an International Plant Nutrition Institute (IPNI) survey, 37 percent of soil samples

1990s:	150 bu/A of corn	
	Price/bu:	\$1.90
	LDP: \$.15	
	Gross/A:	\$307.50
	1,000 acres:	\$307,500.00
2010:	205 bu/ A of corn	
	Price/bu:	\$4.60
	Gross/A:	\$943.00
	2,000 acres:	\$1,886,000.00

Table 2. Comparison of farmer dollars, 1990s vs. 2010.

	Low STP	VH STP	Yield Difference	Economics of high STP
P ₂ O ₅ prior to corn	50 lbs/A	50 lbs/A		
Corn Yields (3 yr avg.)	167 bu	193 bu	26 bu	\$117.00
Soybean yields (3 yr avg.)	39 bu	49 bu	10 bu	\$97.50
Corn @ \$4.50/bu Soybean @ \$9.75/bu				

Table 3. Soil test P level impacts, Randall, U of Minn.

Treatment	Corn yield (bu/A)
Check	137
N	187
N + P	243
N + P + K	256
N + P + K + S	265
Kansas State University study	

Table 4. Yield benefits from applying NPK plus S to crops.

K Nutrient Balance Map

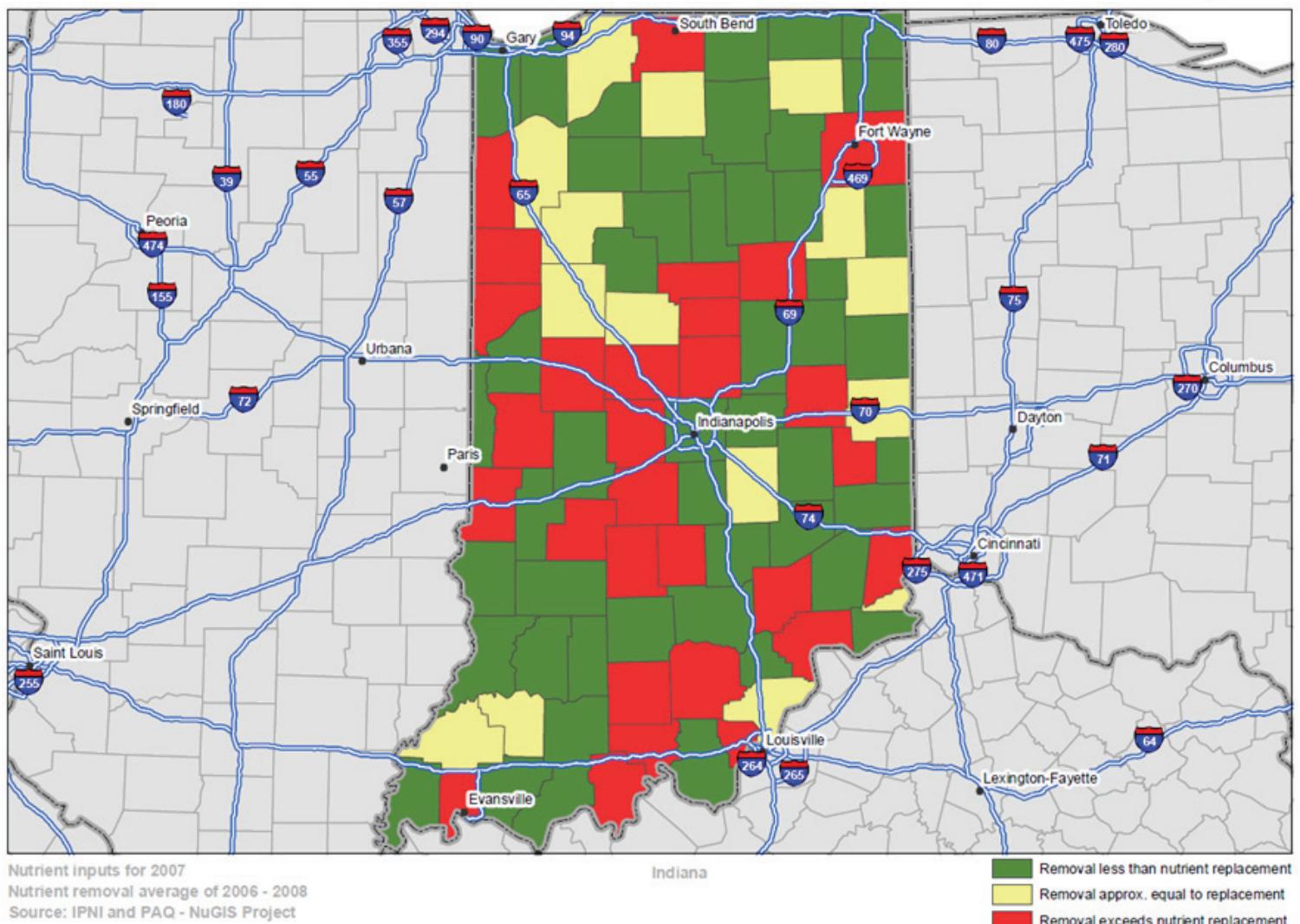


Figure 3. K Nutrient balance map, Indiana.

were below the critical level in zinc (Zn).

Liquids/micros. Taking us to the next step of the right sources, fluid products have an advantage in coverage, placement, and timing in the application of secondary and micronutrients.

Beware assumptions

It is a fatal trap that can instill complacency and dilute a commodity fertilizer program rather than reinforcing

it. Here are a few deadening false assumptions you should stay clear of:

- Dad was well trained in the '70s on fertility so there's nothing new to learn, since new farm decision-makers already understand all there is needed to know about soil fertility and fertilization
- Soil testing for field average is fine
- It's simply too hot a time in the corn

growing season to collect plant tissue samples

- My customers are fine with 160 to 180 bu/A corn yields
 - High yield clubs are for the '80s and '90s
 - Farmers will not pay for helping transform information and data into crop production decisions.
- We could go on and on and on. Enough said.

This article is a paraphrase from a presentation given by Dean Fairchild, Mosaic agronomist, at the December 10, 2010 FFF TECHNOLOGY Conference. Since this article is written from a presentation the bullet points may not always be explained in detail. This presentation's goal was to generate enthusiasm for plant nutrition and fluid fertilizer product roles in high yield programs. For your use, please add your knowledge and experience to this article.