

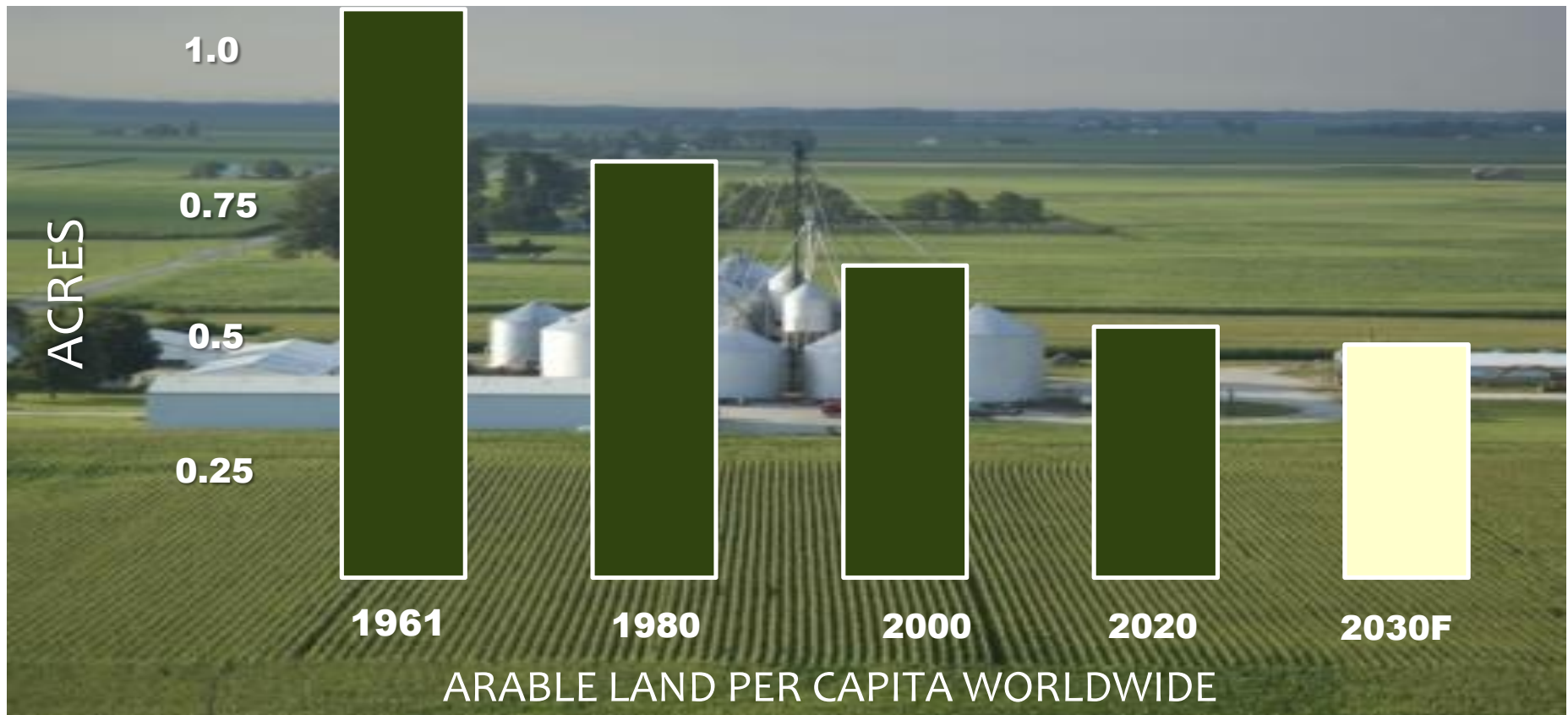


# Fall Line Farms

Dec 11, 2012

# Land is the limiting resource to production

*Shrinking arable land per capita*



*“In order to keep up with population growth, farmers will have to grow more wheat and maize over the next 40 years than was grown in the previous 500.” – The Economist, Feb 2011*



# Fall Line Business Model/Principles

*Pure play land investment with active improvement strategy*

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- View that land is limiting resource in grain production
- Highly fragmented and competitive supply chain allows pure plays at every segment; we prefer farmers who are true craftsmen
- Passive farmland owners in combination with one-year leases lead to a lack of investment in farmland improvements
- With a team that has rented most of our farmland as operators, we are sensitive to the farm budget and can craft supportive leases
- Highly variable stewardship has added to land variability, which isn't currently considered in farmland underwriting
- Good stewards add land value which is underappreciated in the current marketplace

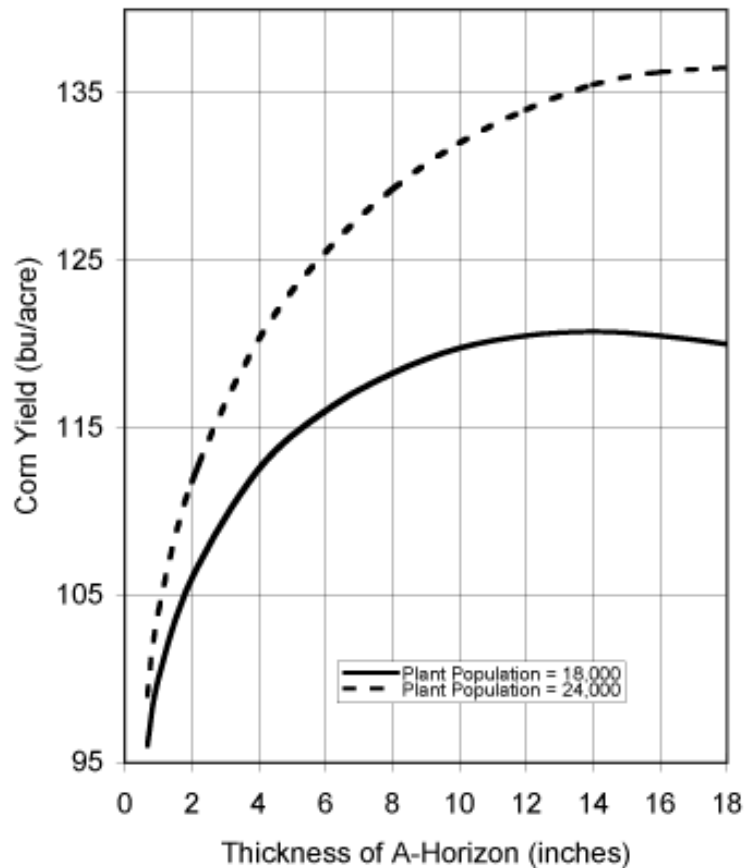


# Stewardship: Soil Erosion

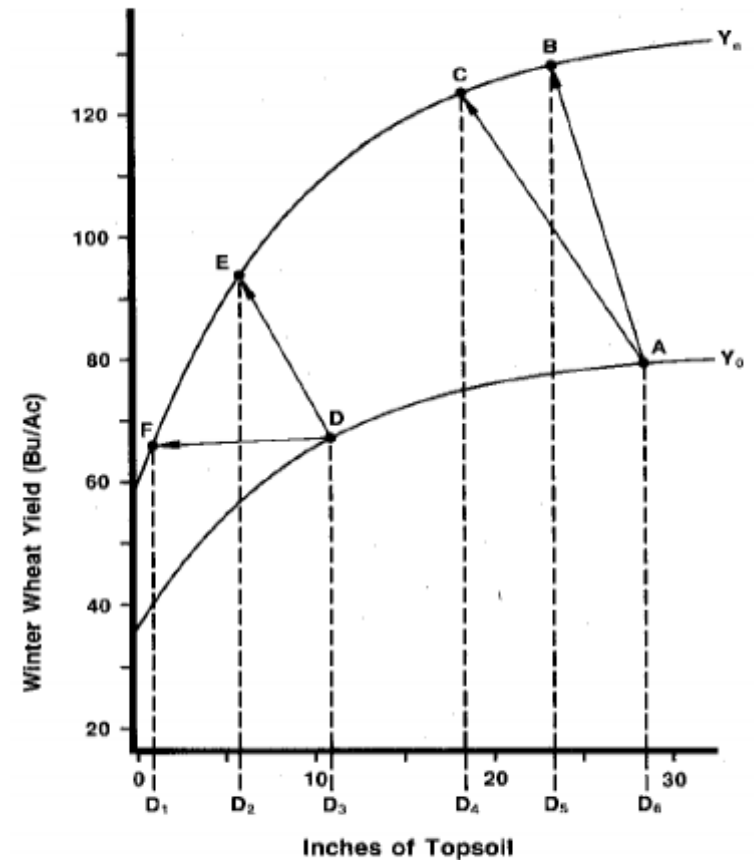
# Topsoil depth is productivity

*Curves vary by crop and region, but show the same concavity*

## Iowa corn



## Palouse wheat



**Figure 1. Yield-Topsoil Depth and Technological Progress Interaction.**

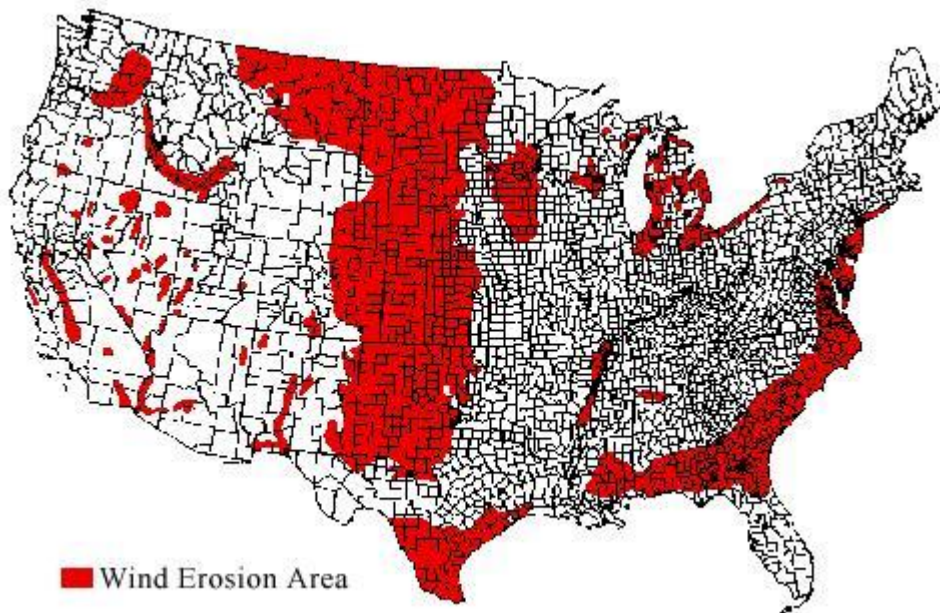


# Half of America's topsoil has been lost

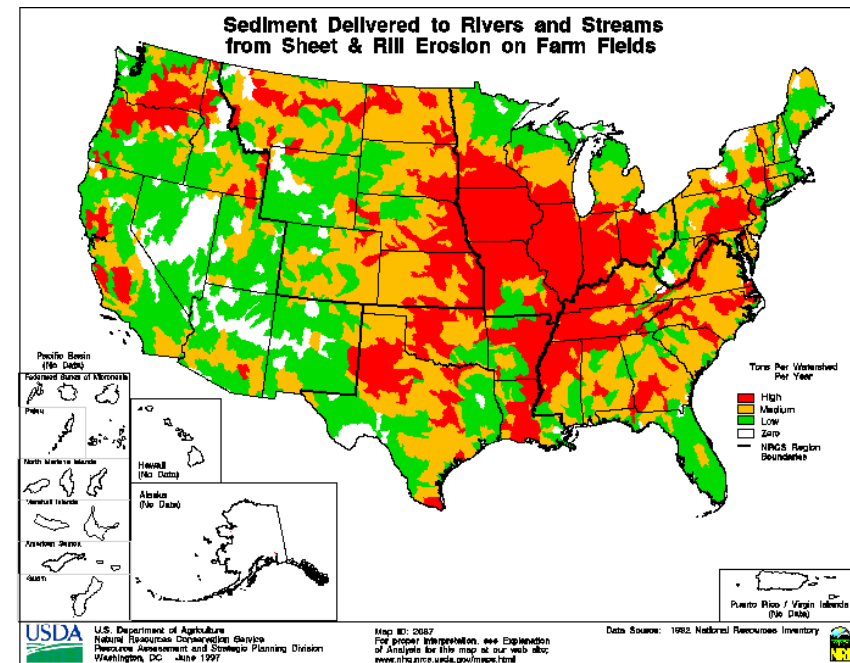
*The best farmland is degrading at unsustainable rates*

Productive farmland is racing to scarcity, with soil losses that will be overwhelming to the countervailing gains from biotech and production technology.

- Wind erosion areas



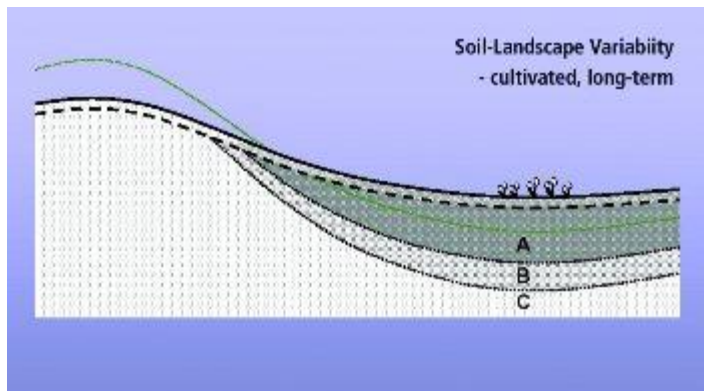
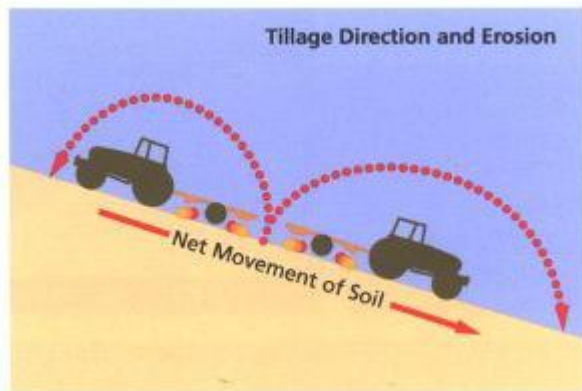
- Water erosion areas



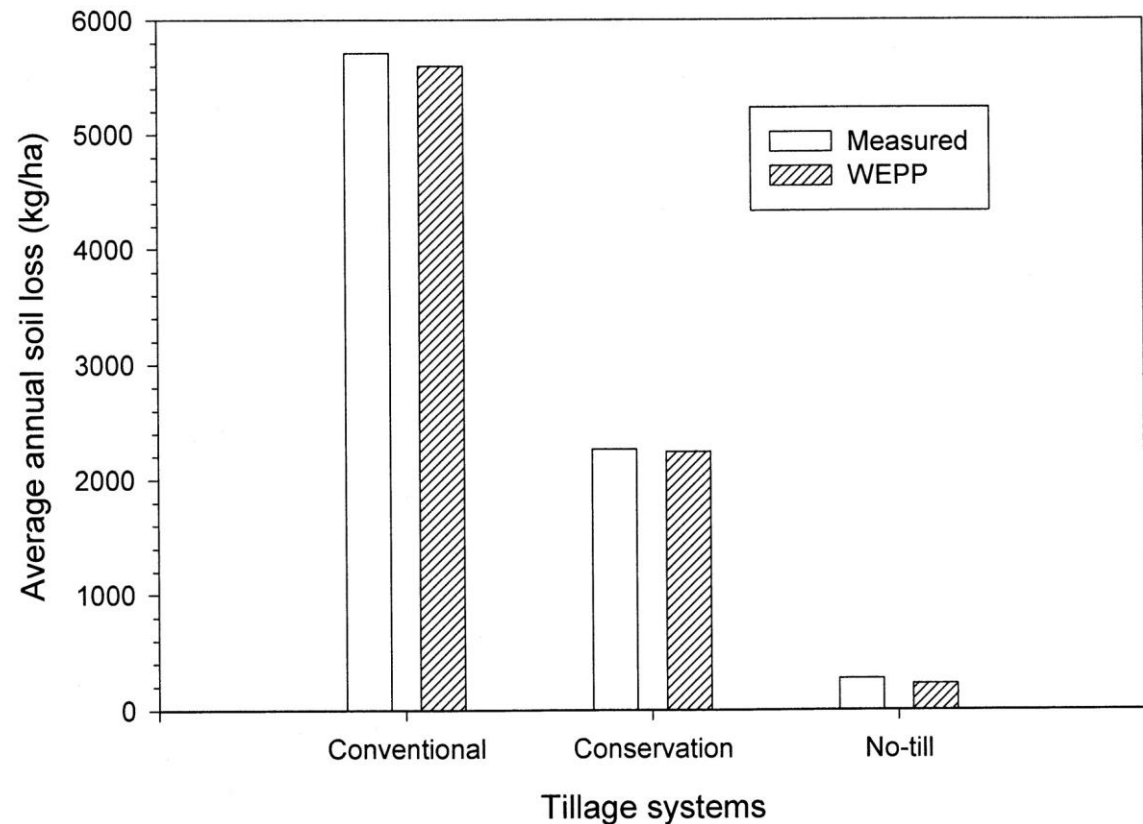
# Soil Loss is Manageable

*Neighboring fields can differ in orders of magnitude in erosion*

## Translocation during tillage



## Tillage management effects on water erosion







# Tillage Erosion

*Dorian Grey effect*

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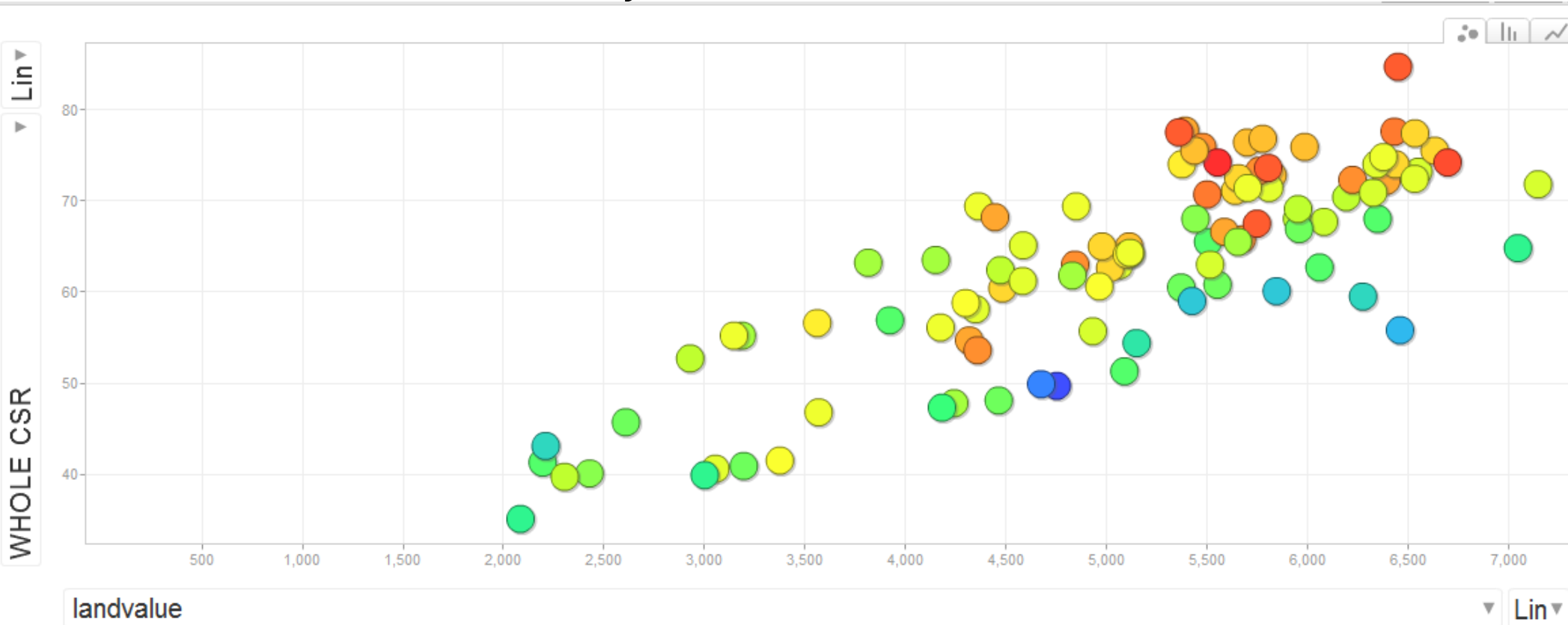




# Static soil surveys determine land value

Even though corn suitability rating is a poor predictor of yield, it is still the proxy that investors implicitly agree to use for land valuations

## County CSR vs Land Value





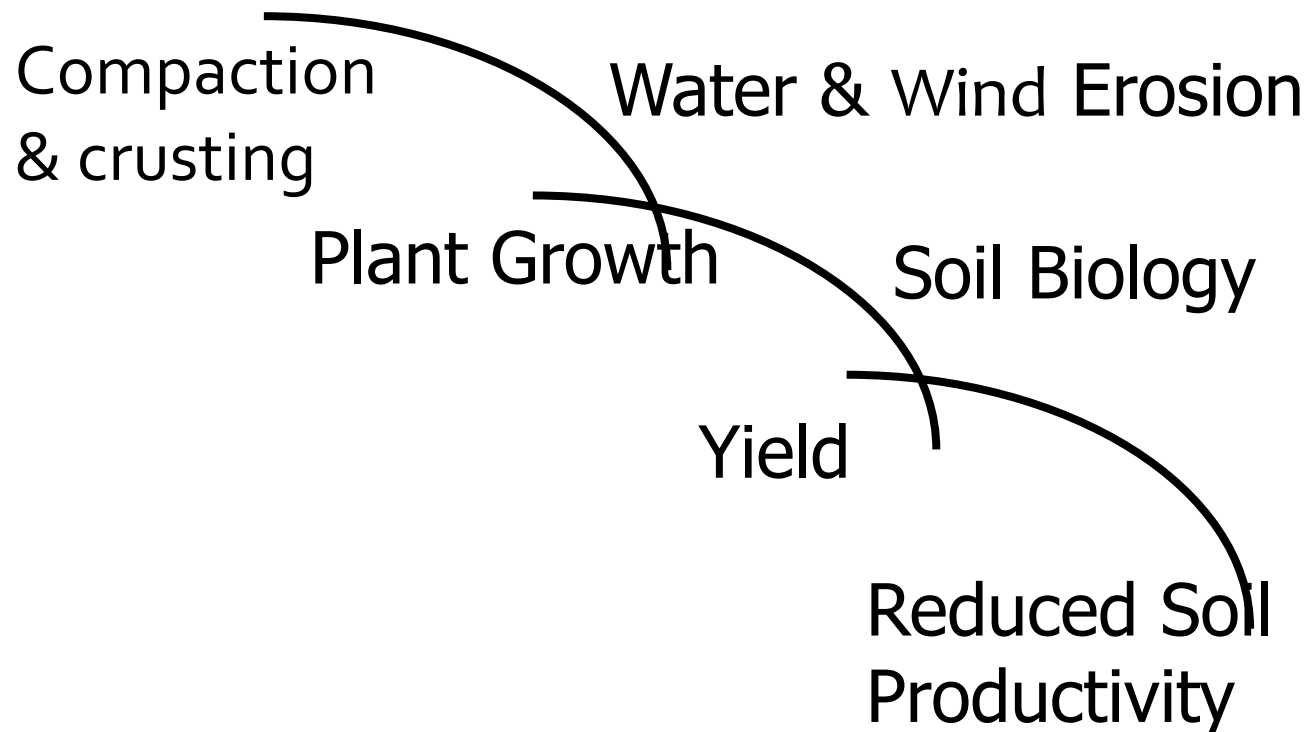
# Land Degradation Spiral

*Acceleration of productivity loss*

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## Poor Land Management

### Aggregation Degradation

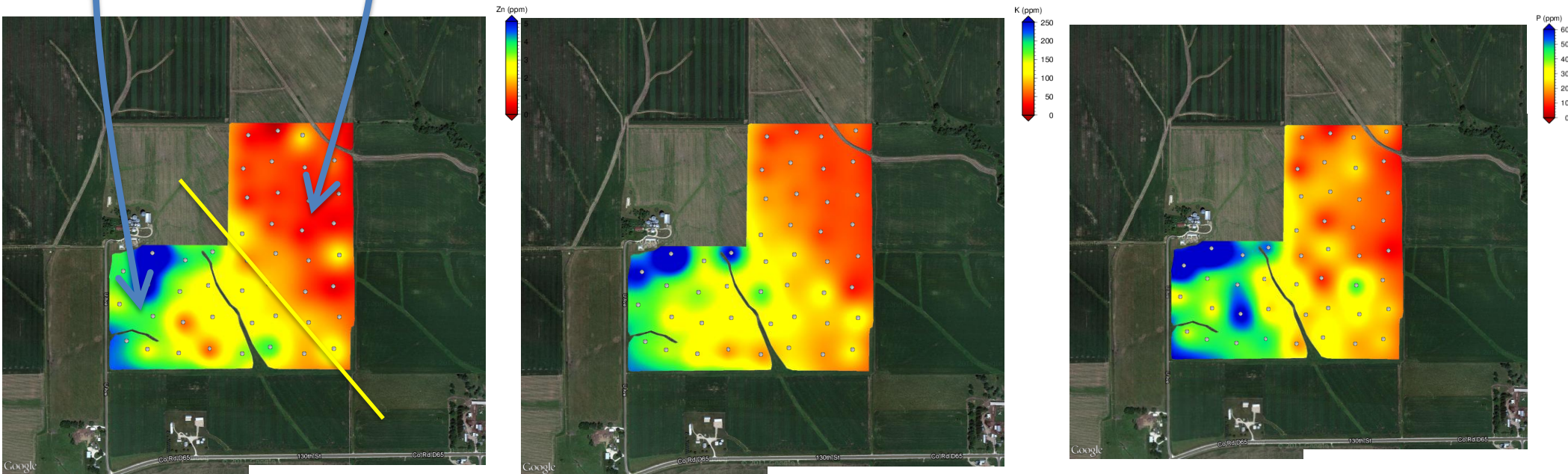


# Soil health x Tenant

High rent farmer

Low rent farmer

All measures of fertility and soil health were worse on land that had been under the long-term care of the lower-rent farmer.



# Kick It Up to Battle Cornstalks & Compaction



MAR 2012  
**FARM  
INDUSTRY  
NEWS**  
PRODUCTS. TECHNOLOGY. TRENDS.

Better N for better yields  
Team FIN tests smart dryer  
Head start on spring weeds  
Handling heavy residue  
Weathering the weather

**TILLAGE**  
KICKING IT UP A NOTCH

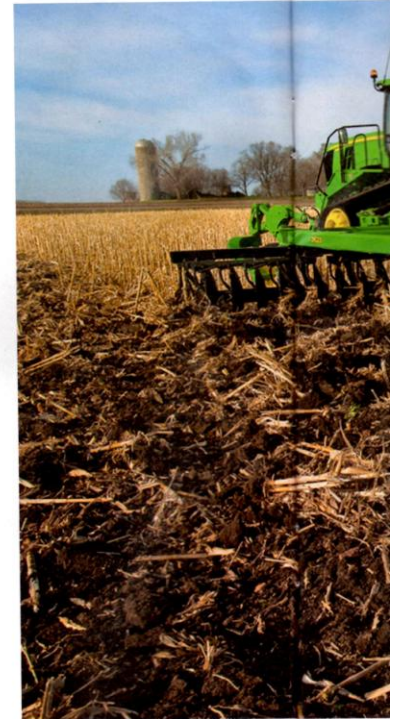
A PENTON MEDIA PUBLICATION

SEE NATIONAL FARM MACHINERY SHOW  
VIDEOS AT FARMINDUSTRYNEWS.COM

BY JODIE WEHRSPANN

## TILLAGE GAINS GROUND

Manufacturers of tillage equipment forecast another record year in sales with a whole new generation of tools to battle cornstalks and soil compaction



**T**illage, once the standby for killing pests and weeds on crop farms, is once again gaining ground, following a 10-year slump in sales.

Although no figures are available publicly, those in the industry tell us that tillage sales are up considerably, reaching their highest volumes in 10 years. Strong sales are reported across most categories of tillage equipment, particularly vertical tillage implements, primary tools such as disks, and combination tools, including disk rippers and disk chisels.

"Obviously, the tillage industry is seeing substantial growth, well beyond historical volumes," says Patrick Sikora, tillage marketing manager for John Deere. "Last year the industry saw record demand, and this year might even top that. With

the recent increase in rainfall in the northern plains, along with increasing crop residue that's making it tougher to manage, we're seeing tillage come into areas that have been no-till or minimum-till for several decades."

Other companies report the same demand, which they expect will continue through 2012. And buyers coming back will have a whole new generation of tools from which to choose.

### Drivers of demand

So why the sudden run on tillage equipment? Experts cite a variety of reasons. One is a buildup of crop residue, a by-product of higher plant populations and high-yielding biotech hybrids. These crops, once harvested, leave behind a blanket of

stalks an

Soil c

weather

the rise i

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their cr

Tillage h

root gro

Final

possible:

equipme

off the l

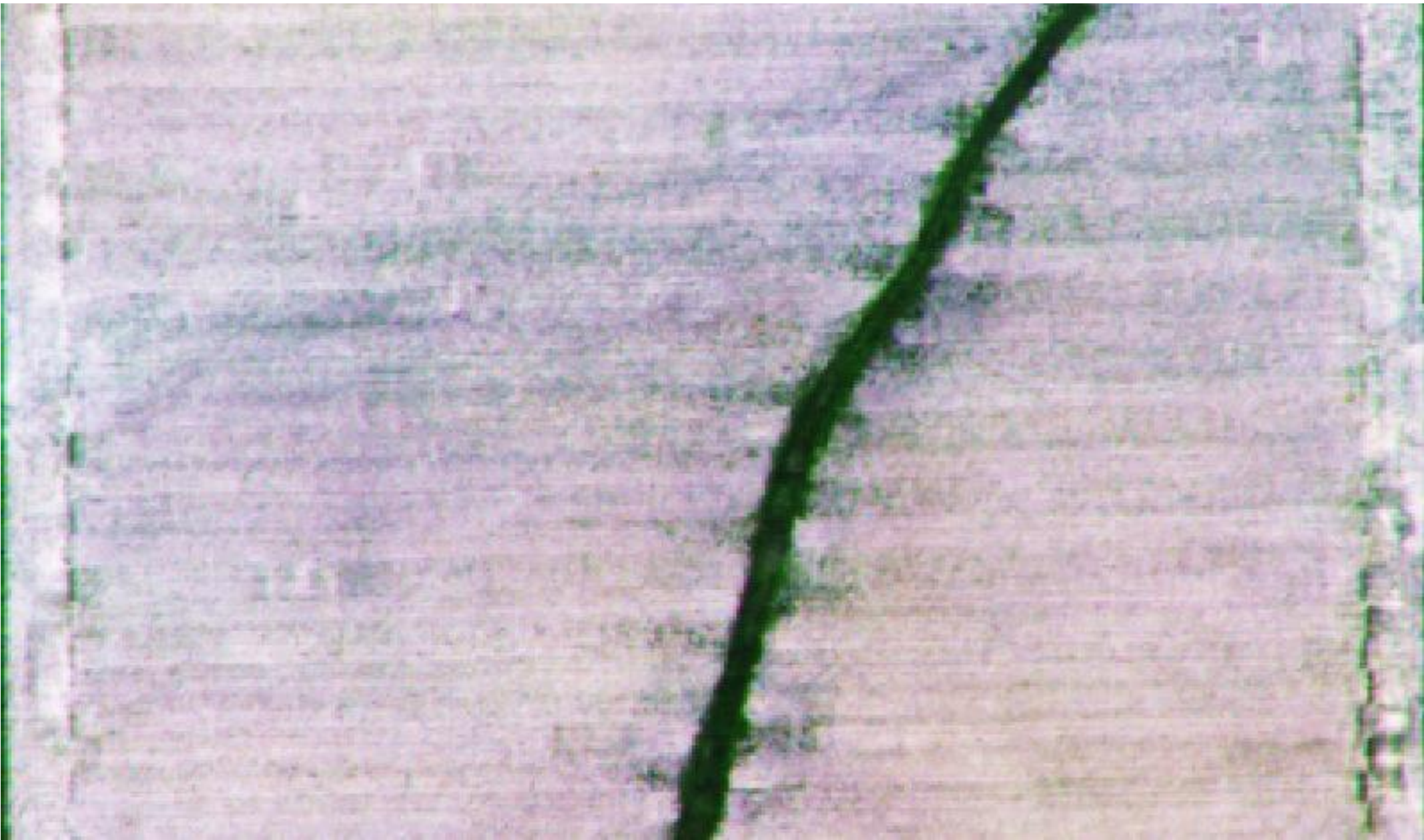
tight sup



# Stewardship: Weed Resistance



# Machine-Width Pattern





Giant Ragweed *Ambrosia trifida*



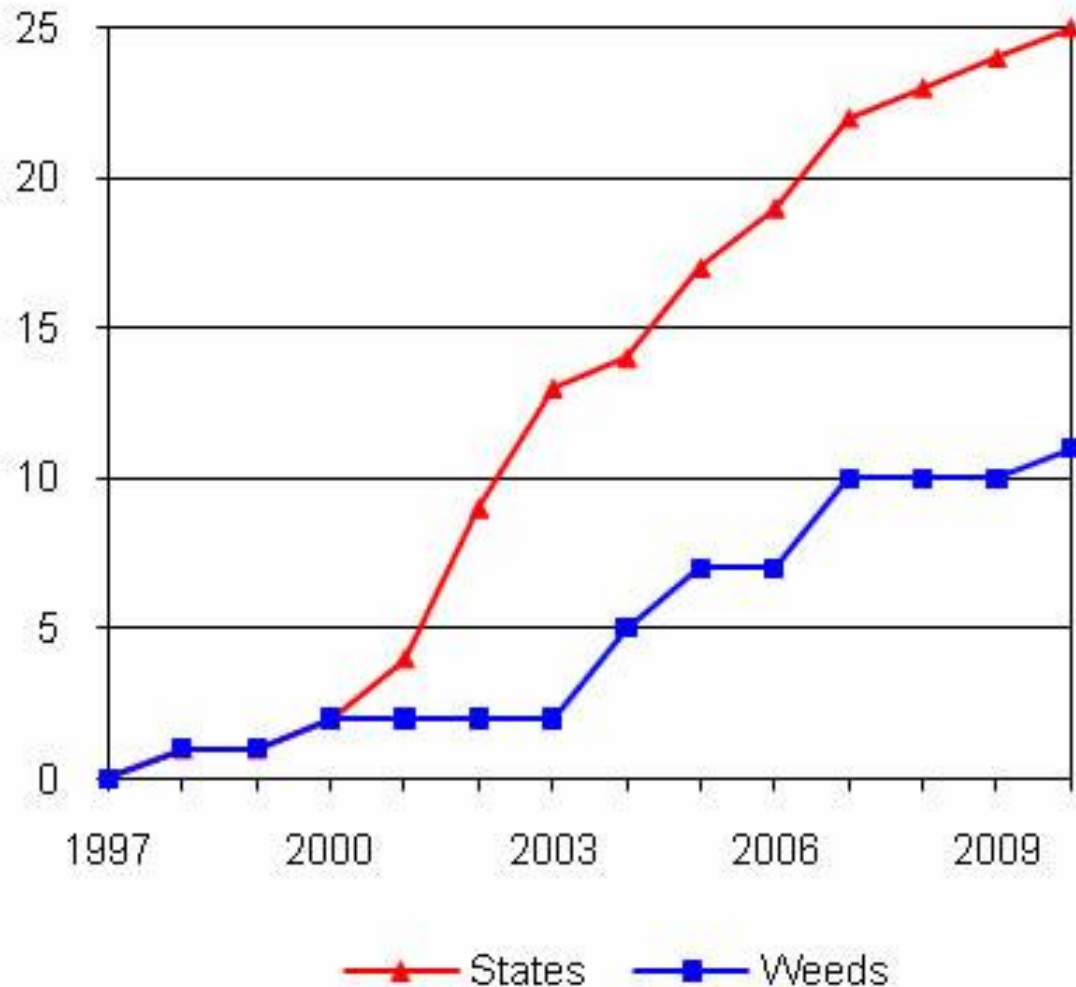




# American Hedgerows



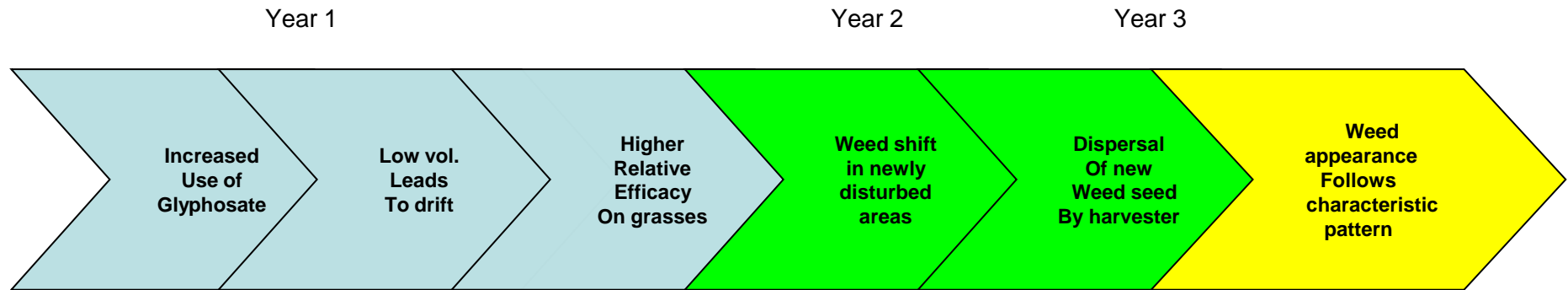
# Weeds developing resistance to Glyphosate?



- Glyphosate is extremely important for no-till farming & crop diversification.
- Now 11 resistant weed species in 25 States.
- Impact can make no-till impossible and limit cropping options
- Weed control costs can double or even triple. Yields can be reduced up to 93%

Heap, I.M. (2011). *International survey of herbicide resistant weeds* [online dataset]. Accessed January 12, 2011, from <http://www.weedscience.org/>.

# Breaking the Weed Resistance Cycle



Drift of spray into non-cropland border areas is well known as drift measurements under normal conditions vary from 1-15% of target application at 1m from the last spray nozzle. While shown to be highly predictable, drift is also highly variable because of dependence on droplet size in addition to wind speed and release height. While a 1000 micron droplet drifting 4.7 feet in a 3mph wind from a release height of 10 feet, a 5 micron droplet will travel 3 miles under the same conditions







# Weed Resistance

## CAN YOU TAME SUPERWEEDS?

REWRITE YOUR WEED-CONTROL STRATEGIES DUE TO HERBICIDE RESISTANCE.

BY LARRY STALCUP

**Y**ou know the villains – waterhemp, marestail, pigweed and other pilferers of water and soil nutrients. They're the plants you spend \$50/acre to kill, yet they zestfully return, especially given that these prolific seed producers like waterhemp are allowed to spread 300,000 herbicide-resistant seeds per plant at harvest.

Aaron Hager, University of Illinois Extension weed specialist, says no-till, strip-till, minimum-till and conventional-till systems all face weed-resistance problems. And it's not just to glyphosate. Here are some common weeds that give growers fits:

- **Waterhemp** can drown out any profit potential for corn or soybeans if it gets out of hand. It can nullify no-till profits or good returns from strip-tillage.

"Waterhemp pretty much grows wherever it wants," Hager says. "It has resistance to six different herbicide families. That includes glyphosate, triazine, ALS inhibitors, PPO inhibitors, HPPD inhibitors and most recently, synthetic auxins

in Nebraska."

Determining which herbicide chemistries that waterhemp is resistant to can be a chore. "The big problem is waterhemp's 'stacked' resistance to two or more of the herbicide families," he says. "Recent reports indicate it is showing resistance to 2,4-D in the western Corn Belt. If you intend to plant a conventional or Roundup Ready variety, waterhemp can be very hard to control once it comes out of the ground."

**THE NEBRASKA HPPD** waterhemp resistance was announced in December. Earlier in the year the 2,4-D resistance was discovered, according to Stevan Knezevic, University of Nebraska Extension weed specialist.

Mike Owen, Iowa State University (ISU) Extension weed specialist, says that just like Illinois, "Iowa has everything but the 2,4-D resistance that Nebraska has reported. We have the stacked resistance for waterhemp just like Illinois." (To learn more about herbicide families and weed resistance, check out ISU's 2012 herbicide guide <http://bit.ly/jryV29>.)

Marestail/horseweed can be as difficult to control as waterhemp and has growers juggling herbicides. "Horseweed may be more challenging in no-till systems, especially if it's not adequately controlled before planting," Hager says.

With the increasing prevalence of horseweed, fall herbicide applications may prove more efficient than spring applications. "Glyphosate alone may not provide adequate control when applied in either fall or spring, but a fall application timing provides an opportunity to utilize higher application rates of products like 2,4-D than are feasible to use in spring," Hager says.

- **Velvetleaf:** With its larger seed, no-till growers have a better chance of dodging resistant velvetleaf problems. But more conventional corn and bean producers had better watch out.

"The two selective forces, tillage or lack thereof, have as big an impact on the weed as the herbicide," Owen says. "But the herbicide has to be adapted to the tillage system. So you can throw velvetleaf out of the mix on no-till or strip-till. Waterhemp and marestail are more prominent in that environment."



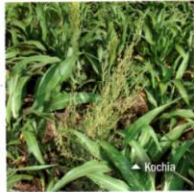
Waterhemp



Velvetleaf



Giant Ragweed



Kochi

# Tillage Solution?



## WILL RESISTANT WEEDS DRIVE TILLAGE?

### REBOUND IN TILLED CORN ACRES MAY SPREAD.

BY KENNA RATHAI

**H**erbicide-resistant marestail and waterhemp have caused Illinois grower Funk to work the ground during his three-year rotation of soybeans, corn and wheat.

Historically, weed control was a key reason for tillage, but that justification hasn't existed for quite a while due to herbicide effectiveness.

right now the best option for weed control and improved yields on our land is tillage," he says. "I believe I'm giving up yield potential if I no-till corn, but I haven't seen yield drag on our no-till beans."

Funk, who farms with his father, brother-in-law and two sons, is also trying more vertical tillage with success.

Vertical-tillage tools lightly till the soil and chop crop residue with

damage but still break up compaction and get good seed placement."

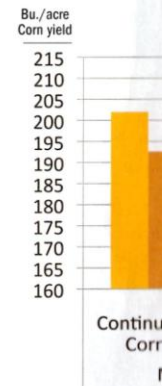
If you would have asked Nafziger about the future of no-till when he started working in Illinois in the early 1980s, his answer might surprise you now.

"The world was going no-till," he says. "I thought at some point farmers would only need a tractor, planter and combine, and the tractor would only have to be big enough to pull the planter."

But tractors keep getting bigger.

says. "When it dried out after harvest, farmers needed to get into fields with a ripper and reintroduce the air that was squashed out when they drove heavy equipment over the fields."

**COMPACTION RELIEF IS** one of the two reasons Nafziger believes we do tillage at all — to improve the root zone so the roots reach deeper to extract water and nutrients. The second reason is to improve seedbed conditions and seed-to-soil contact.



▲ Tillage response in continuous 2010. No-till plots yielded 5% more than continuous and no-till yielded about 10% more.

"In fact, tractor horsepower continues to increase, and the use of primary tillage," he says. "Rippers and other methods of heavy, soil-compacting operations can be considered conventional tillage."

No-till remains popular, especially for soybeans, because of its conservation benefits. It reduces soil erosion, increases water infiltration, and reduces runoff, and the remaining crop residue conserves moisture and reduces evaporation. Not to mention, it also promotes wildlife diversity and soil carbon sequestration.

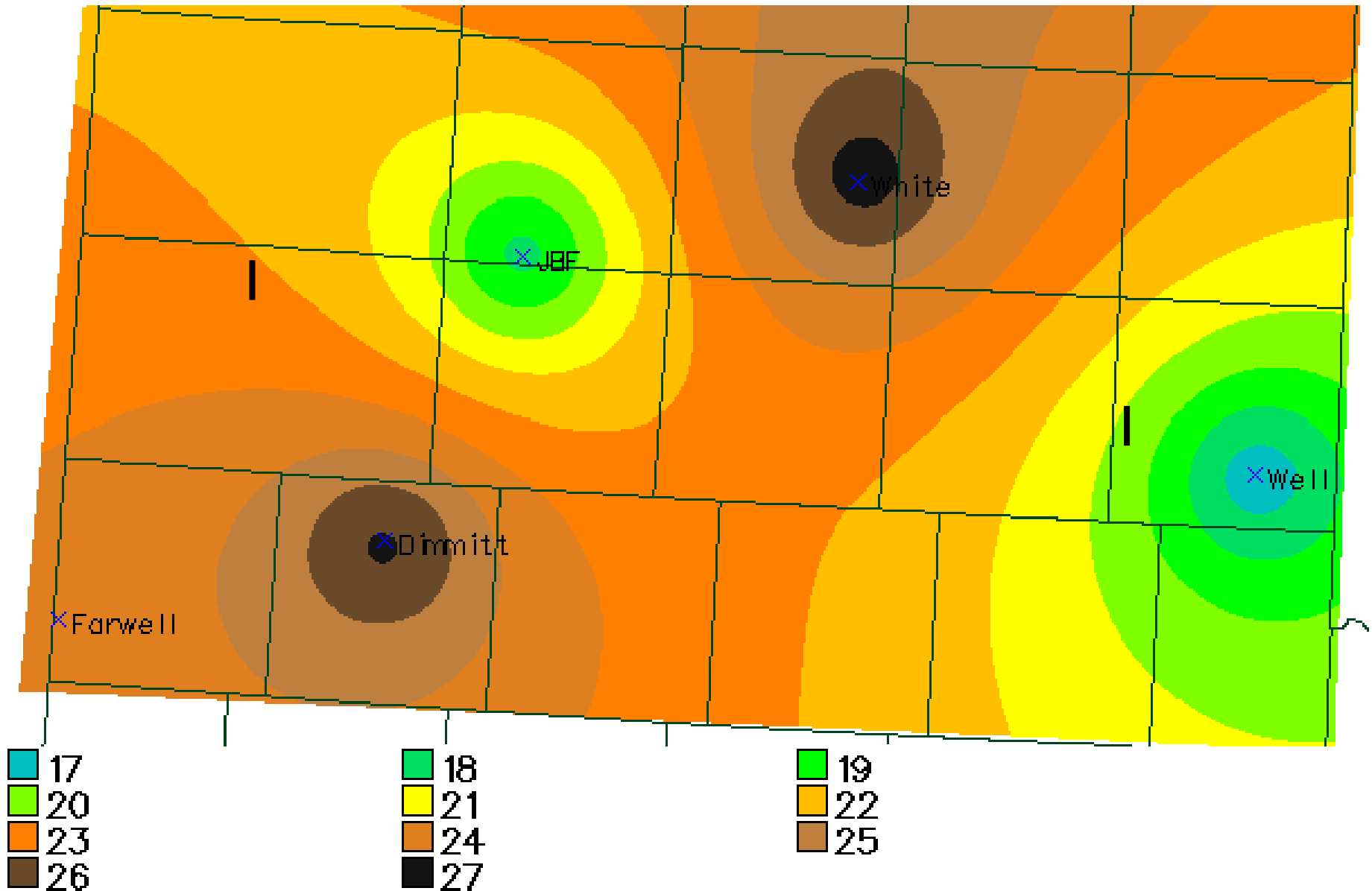
The soil is not the only thing that benefits from no-till. Farmers can see economic advantages in the form of less fuel, less equipment production costs, less

PHOTO: SUSAN WENDLER



# Productivity: Quality Control

# Investigating Variability

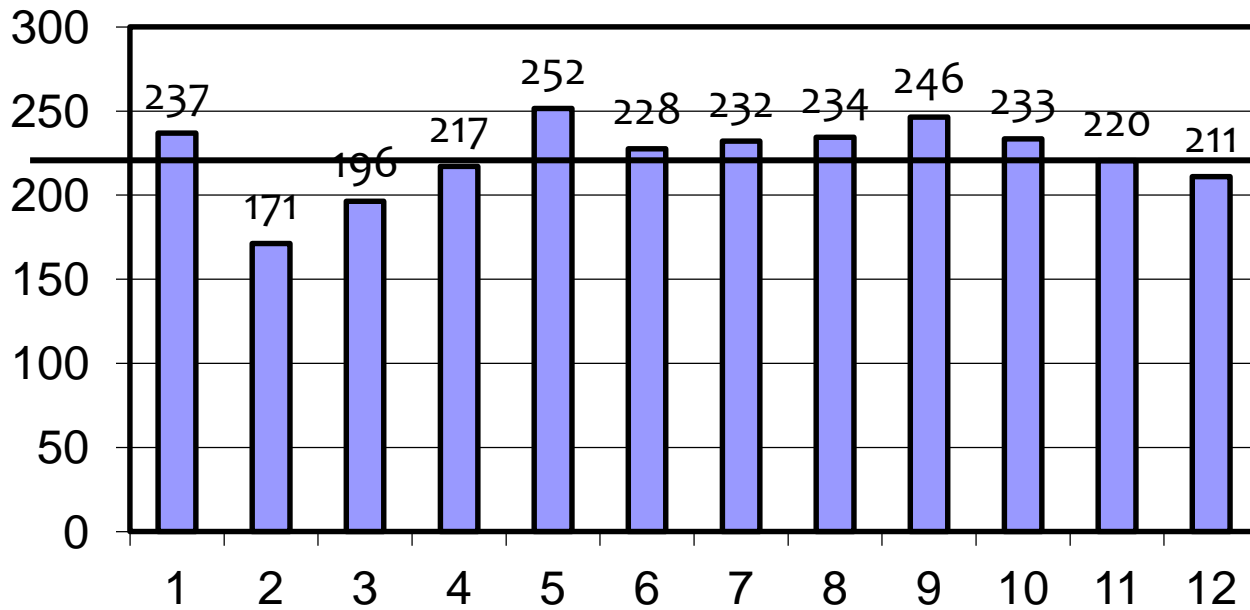


# Single Row Yield Mapping

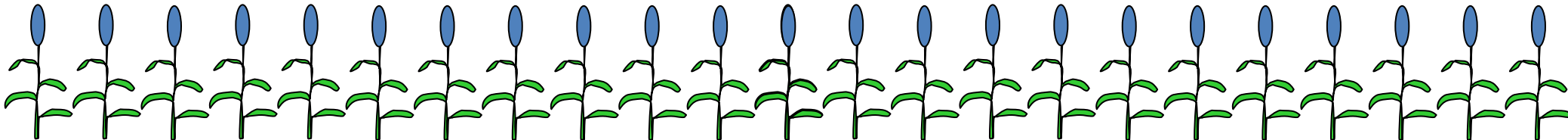


- Relatively Light Combine
- Empty Tank
- Calibrated for Low Flow
- GPS Mapping by row
- Individual weight by row

# CT Corn, Single Variety



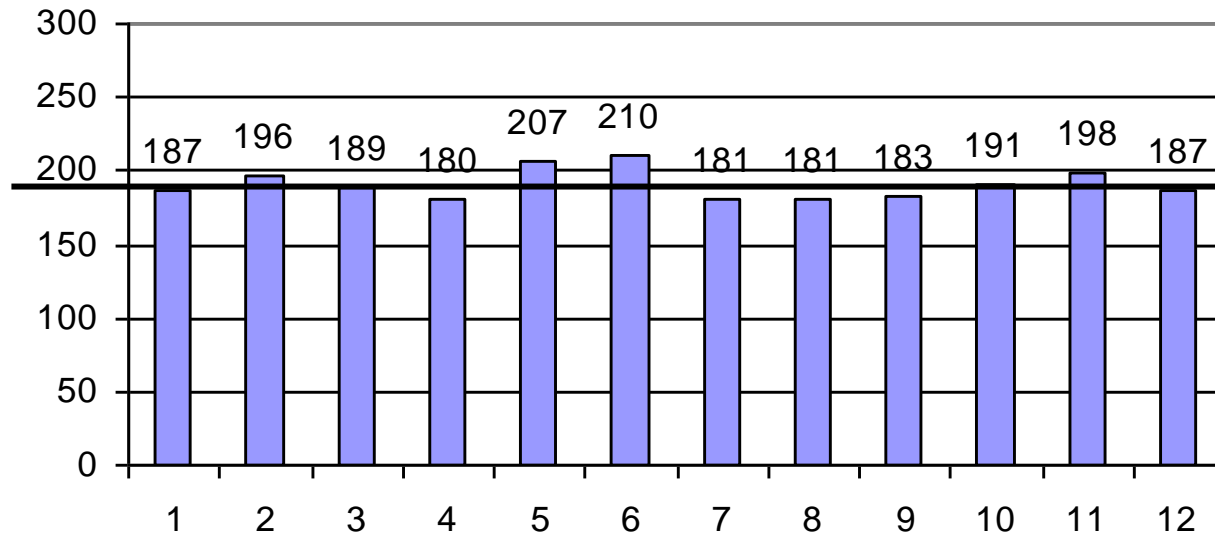
Plot Avg  
223.2 bu/a  
Std Dev=22.3  
Delta=81



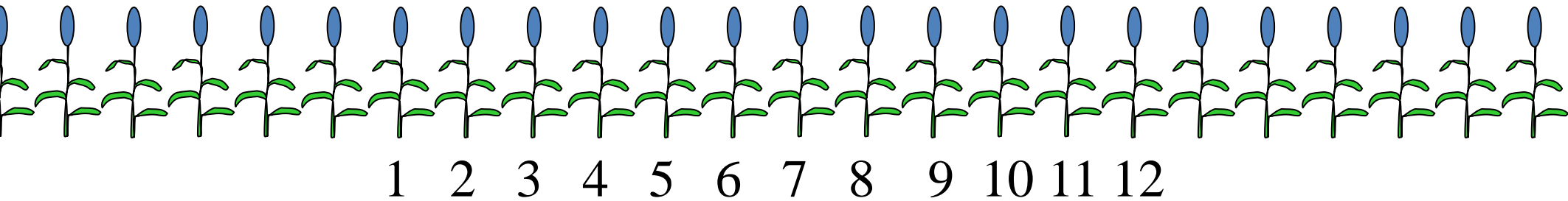
1	2	3	4	5	6	7	8	9	10	11	12
237	171	196	217	252	228	232	234	246	233	220	211

# Min Till Corn, Traditional

7021



Plot Avg  
190.8 bu/a  
Std Dev=10.0  
Delta=30



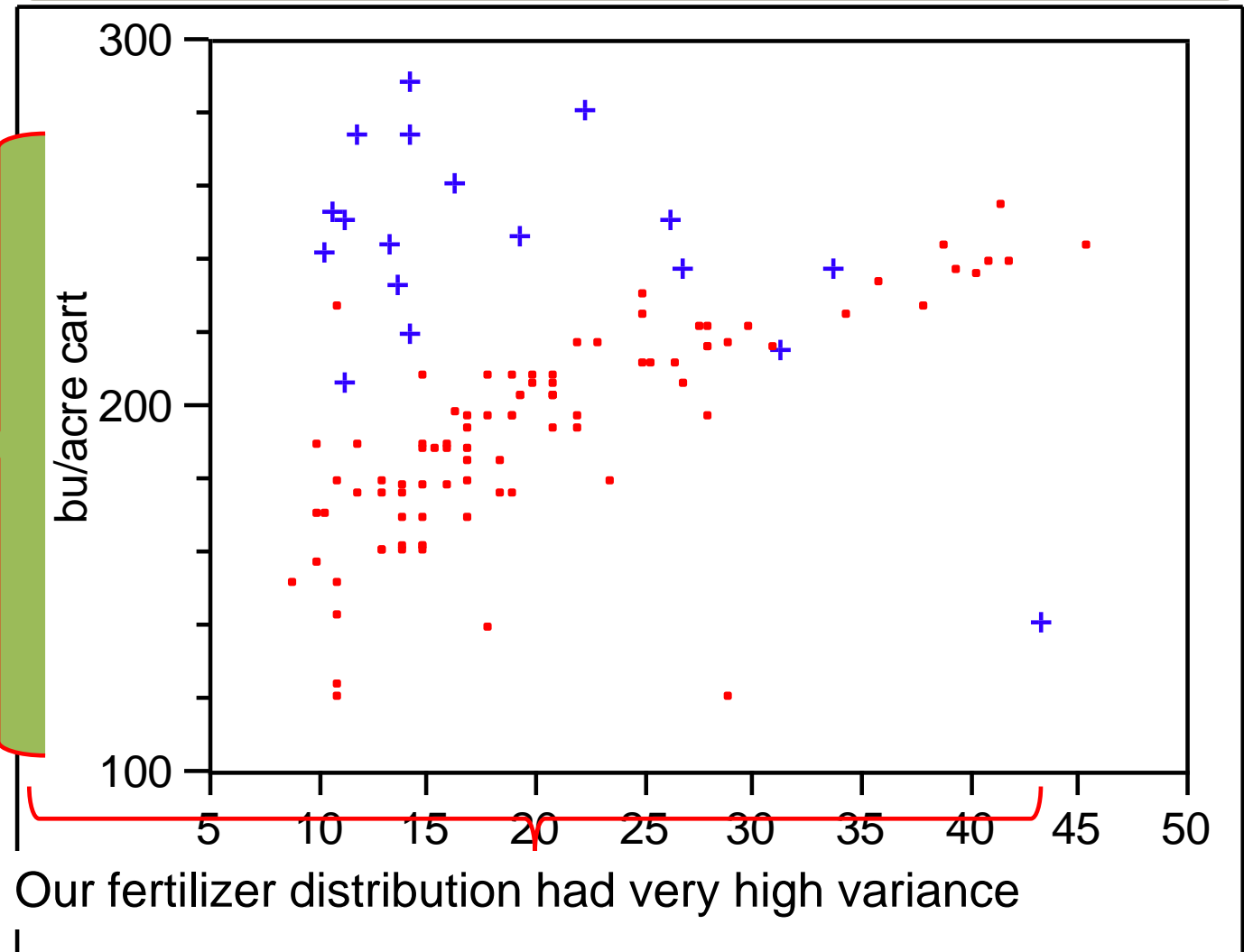




# Root Cause Analysis

## Bivariate Fit of bu/acre cart By ppm M3P

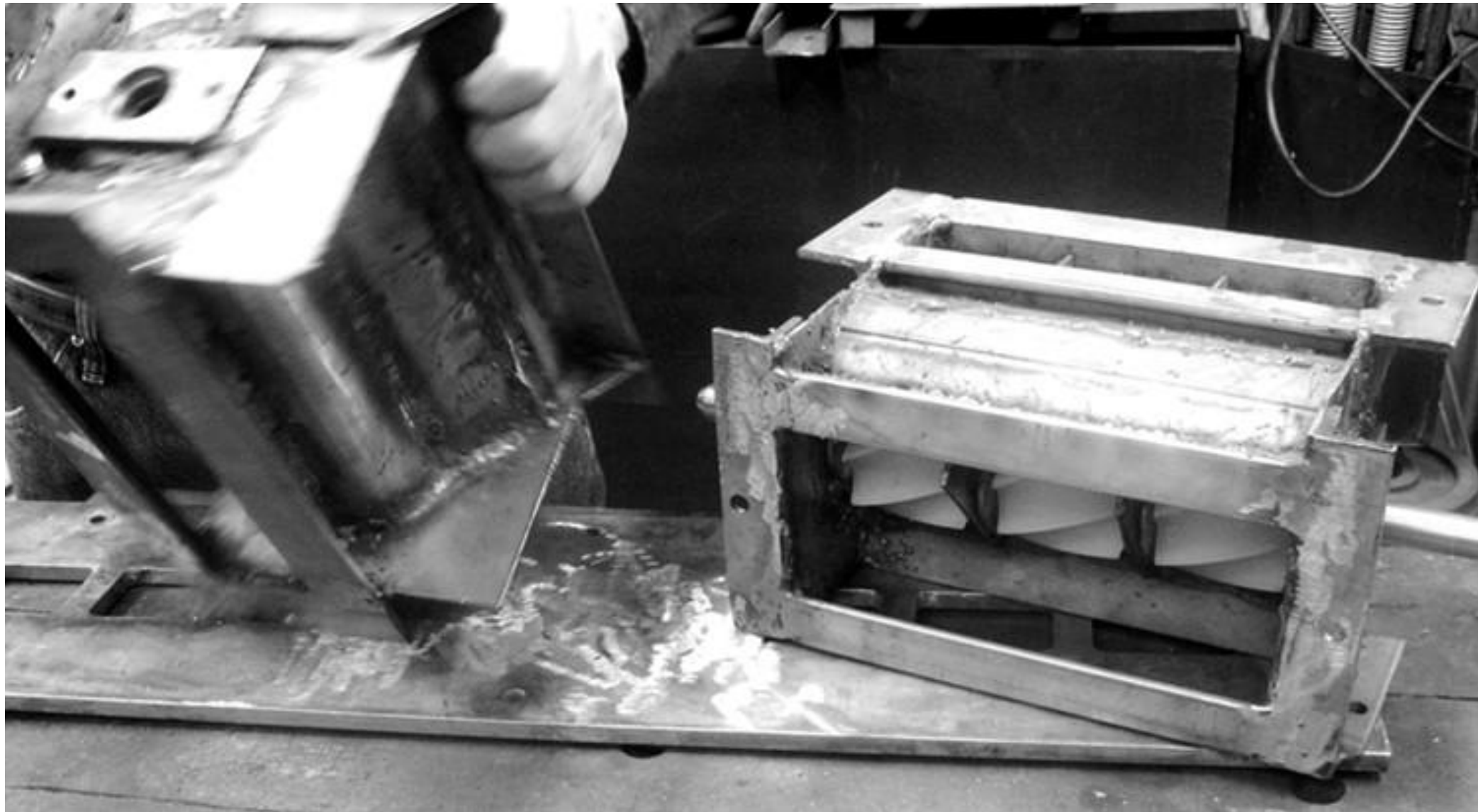
Poor  
distribution  
hurt yield



# Underperforming Fertilizer Meters



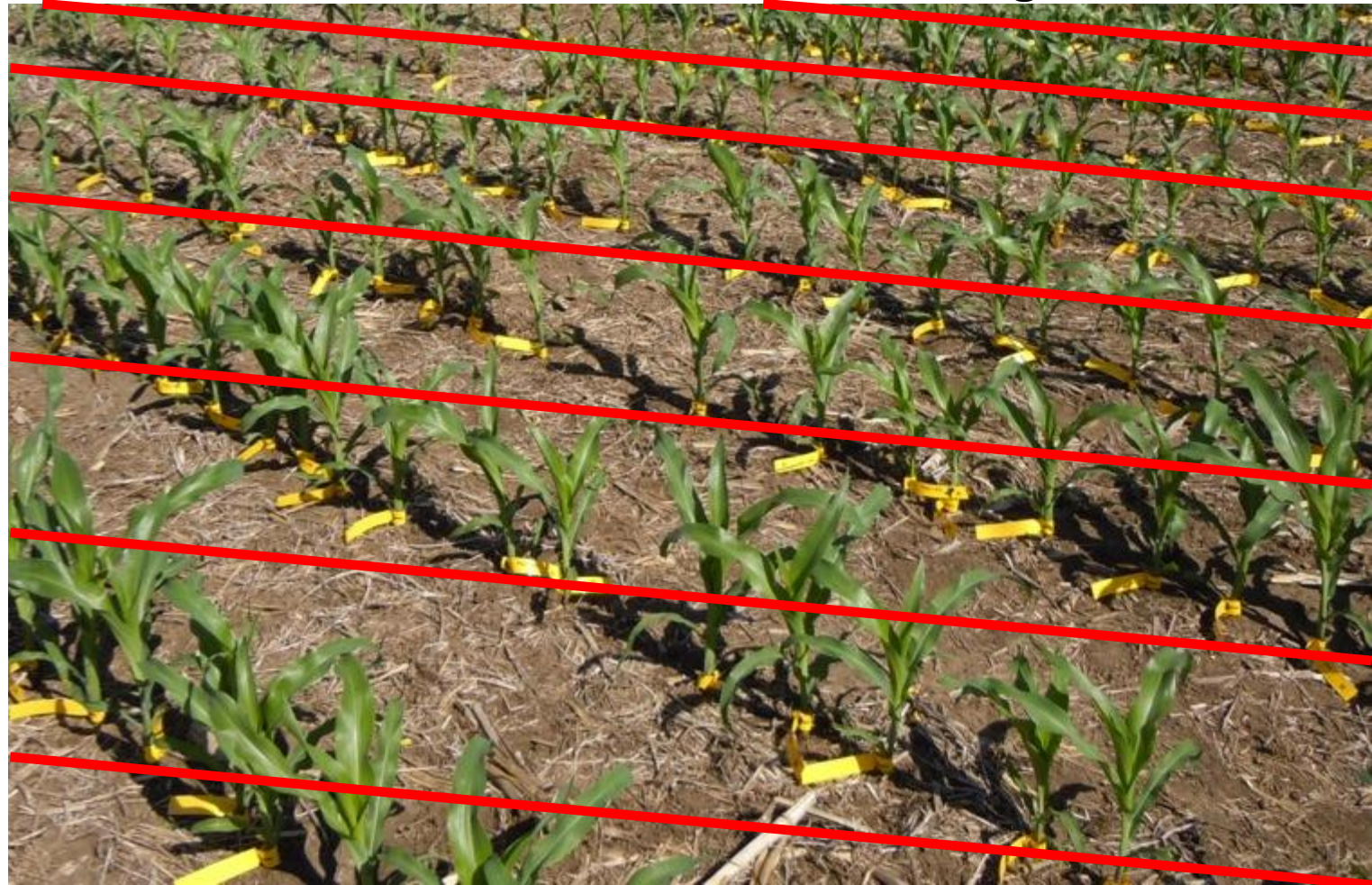
# New Fertilizer Meters



# Plant-by-Plant Analysis

Over 1200 plants bar coded and tracked through the year.  
For growth stage, photosynthesis, stalk diameter, and yield.

Ammonia banded at 15 degrees





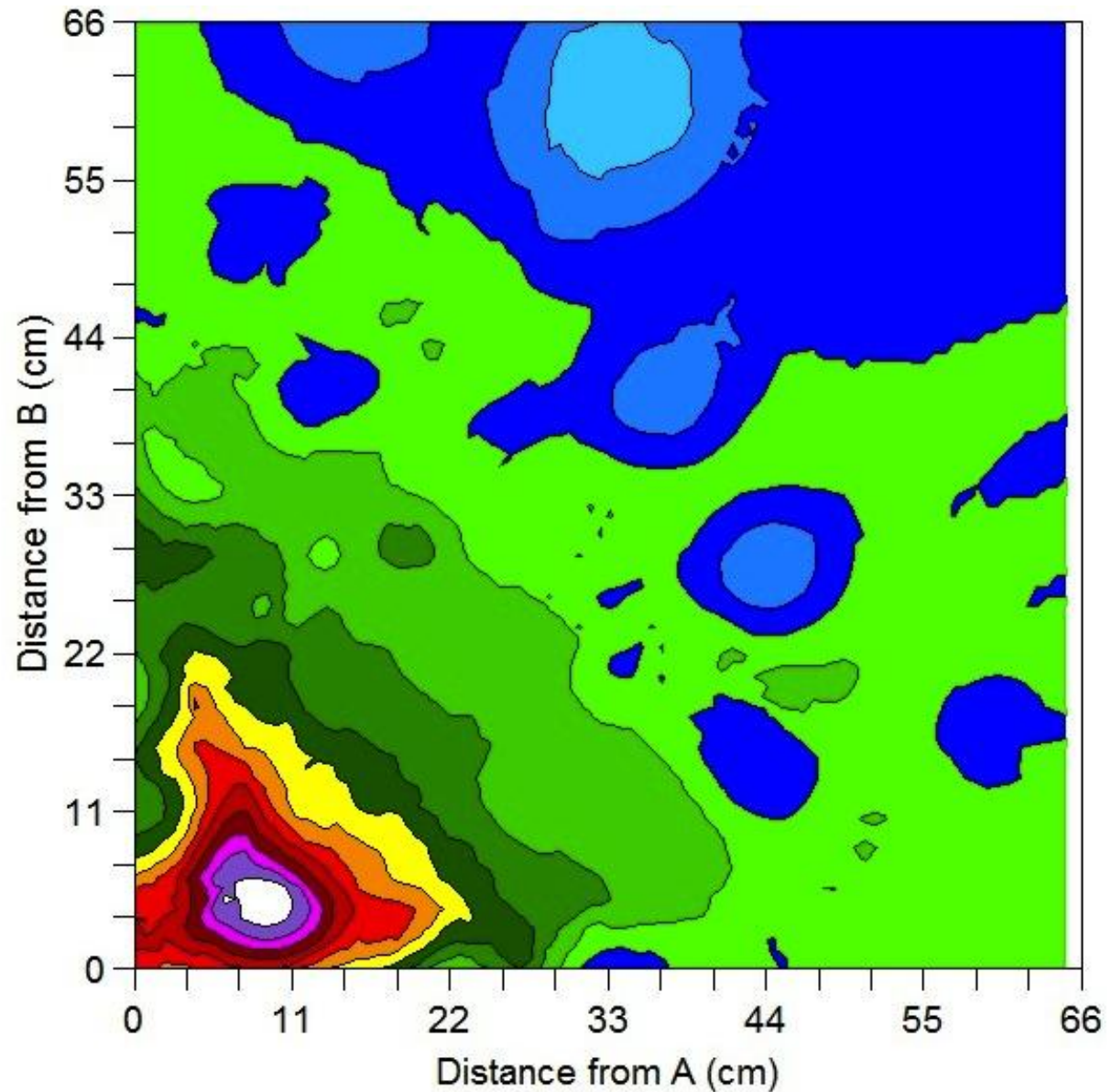
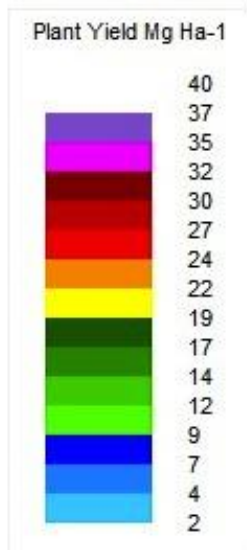
# Plant-by-Plant Analysis



# Harvest Measurements



# Importance of Plant Evenness





# Importance of Competitive Supply Chain



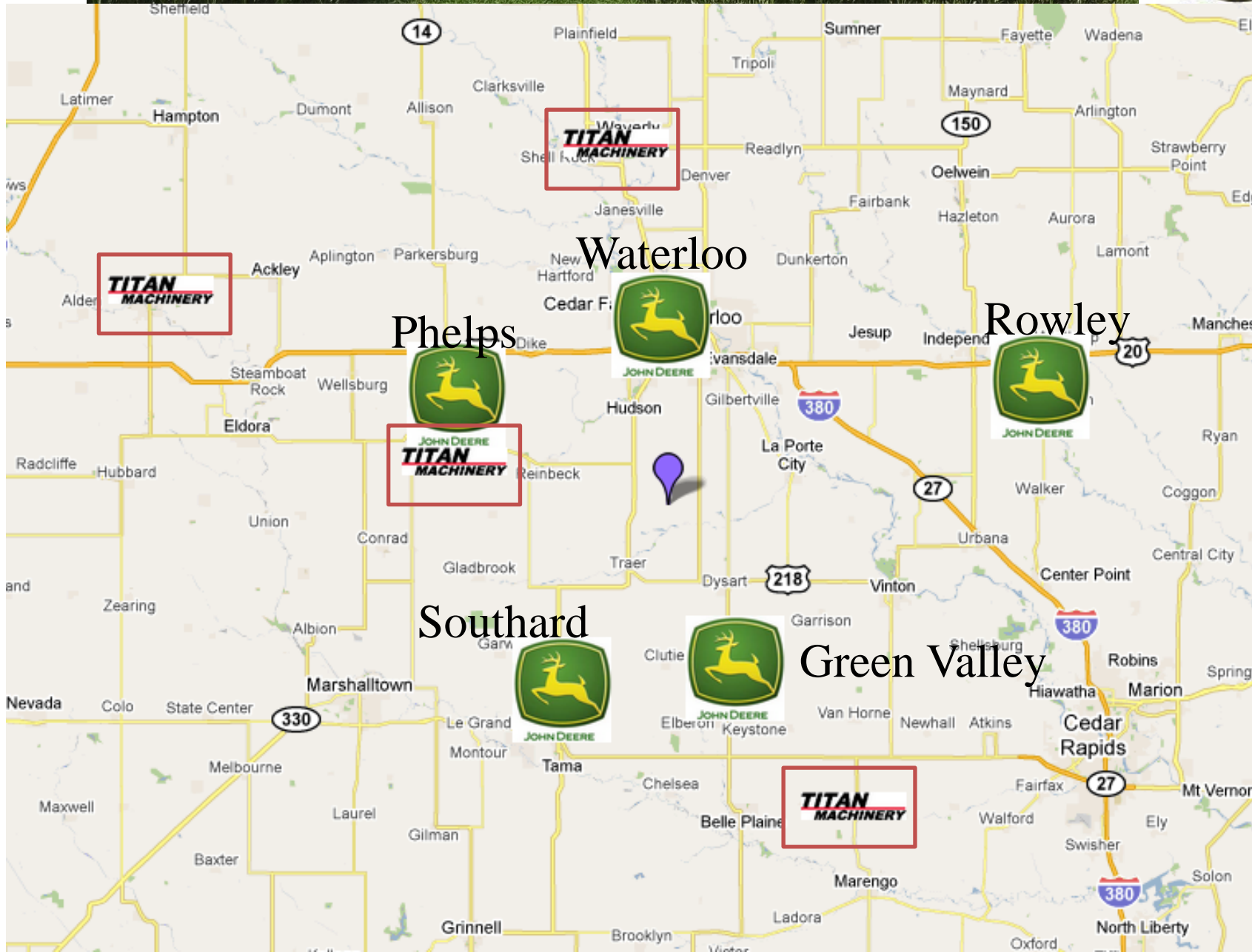


# How does this map change the relationship?



## Deere Customer

## Titan Customer



# Effect of Dealer Consolidation

Low supplier concentration to farm concentration ratio

Low supplier switching costs relative to farm switching costs



Using Porter, SWOT, or any other business strategy framework, farmers will work to avoid dependence on monopolistic suppliers.