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One Guy's Thoughts About Profitability & Resiliency

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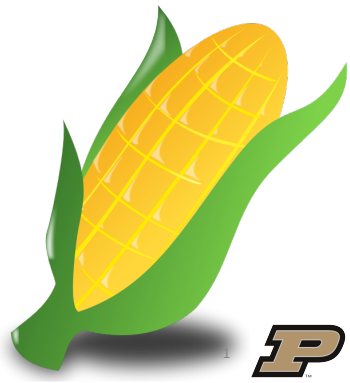

Presentation at the 2016 Fremont Corn Expo

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Nebraska Alumni image: www.huskeralum.org

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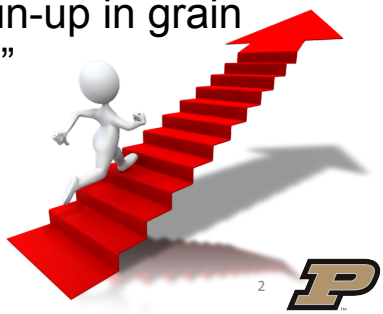
Profitability? What profitability?

- Grain prices half what they were during the ethanol boom not too many years ago.

Image source: looneytunes.wikia.com

- Variable input costs plus land values and cash rents followed the run-up in grain prices but remained "high" while grain prices declined.



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So, not just about grain prices…

Yield × Price − Var. Cost = Contrib. margin

Image source: www.completeaccounting.ca

What's left over to pay for fixed costs (land, machinery, labor, and family living)

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When faced with low contribution margins…

Yield × Price − Var. Cost = Contrib. margin

…we typically focus on reducing or eliminating variable costs, which increases contribution margins as long as yields are not reduced dramatically.

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Variable Input Costs: Typical "big ticket" items

- Fertilizer
  - Esp. N, P, K
- Seed
  - Seed cost & rate
- Pesticides

Approx. 70% of total variable costs for rotation dryland corn in Indiana

- Irrigation

© Purdue University

A resource for developing budgets

Look for it at CropWatch.UNL.edu

Nebraska University of Lincoln EXTENSION
Know how. Know now.

EC872
(Revised November 2014)

CROP BUDGETS
NEBRASKA – 2015

© Purdue University

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Cost-cutting options vary by…

- The particulars of a farm operation's crop production inputs and…
- The cash flow situation of the farming operation.
- Know your input costs and calculate your cost per bushel.

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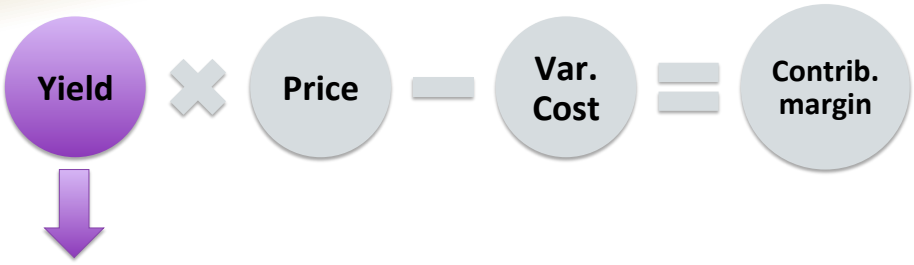
Another option is to…



…increase crop yield as long as the average variable cost per bushel remains roughly the same or lower. In other words, as long as you do not spend too much money to get the extra yield.

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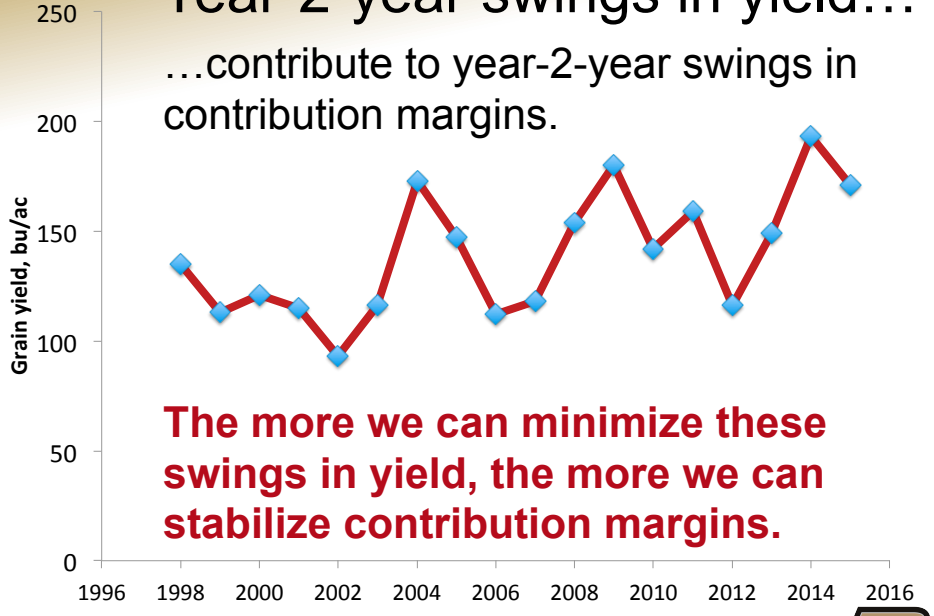
Year-2-year swings in yield…

…contribute to year-2-year swings in contribution margins.



The more we can minimize these swings in yield, the more we can stabilize contribution margins.

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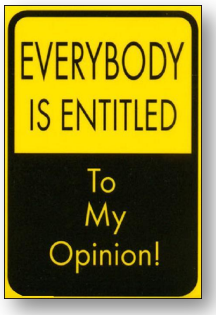
Our greatest agronomic challenge today is to stress-proof our crops against "normal" weather events.



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"Normal" Weather

"Normal" weather can be defined by an unpredictable number of unpredictable **extreme weather** events, each occurring unpredictably, with unpredictable severity.

Greater climate variability today = Higher frequency of extreme weather events

Image: http://www.keepbanderabeautiful.org/climate-change.jpg

v20151212 © Purd

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The unfortunate reality …

- Effects of unpredictable extreme weather on crop growth and yield are amplified by the existence of other yield limiting factors.
  - Excessive rainfall +
  - Poor soil drainage +
  - Compacted soil layers

Image source: Somewhere on the Web

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The opportunity…

Identifying and managing these other yield limiting factors can help improve the **resilience** of your crops against the uncertainty of Mother Nature.

Image source: http://typesofpoetry99.blogspot.com/2010/01/mother-nature.html

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Grain yield is the product of the season-long development of four individual components of yield.

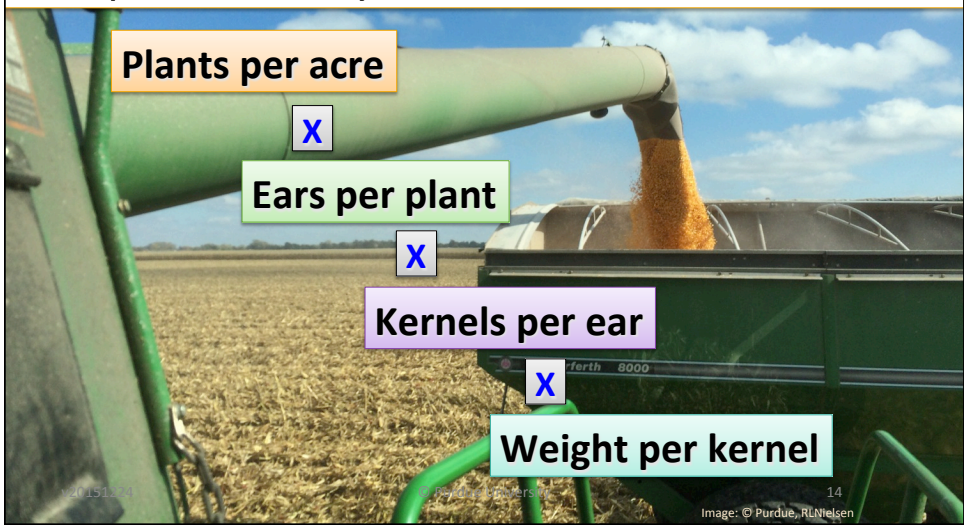

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Image: © Purdue, RLNielsen

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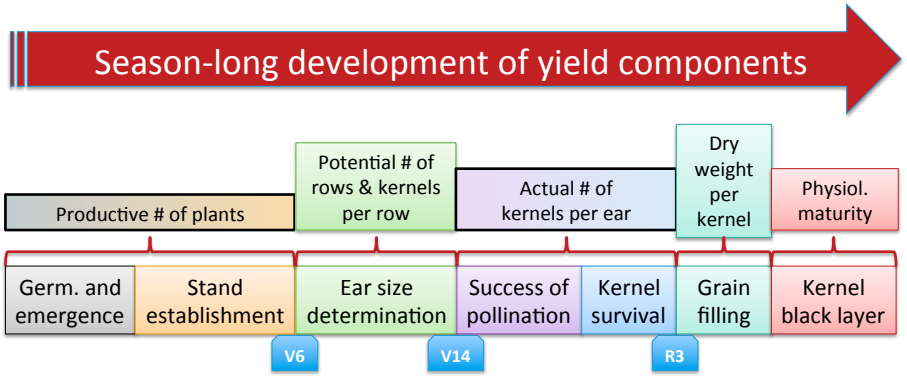
High yields require attention to detail all season long…



Source of graphic: Nielsen's imagination

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The key to **consistently** producing high-yielding corn...

…is the ability to accurately identify AND successfully mitigate the **Yield Limiting Factors (YLFs) specific to your farming operation**.

Image: RLNielsen

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The burden is on you…

- …to first identify the YLFs specific to your fields…
- … and then develop the strategies for attacking them.

v20151224 Image source: www.christart.com © Purdue University 20

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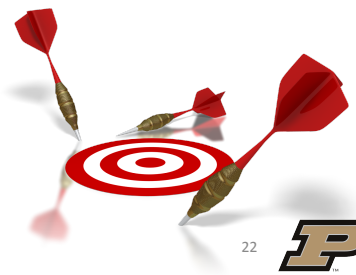
Low vs. high yielding areas…

- Some would say not to waste fertilizer dollars in the low-yielding areas.
  - When, in fact, maybe the area is low-yielding because it is deficient for soil nutrients and, therefore, actually needs more fertilizer than the higher-yielding areas.



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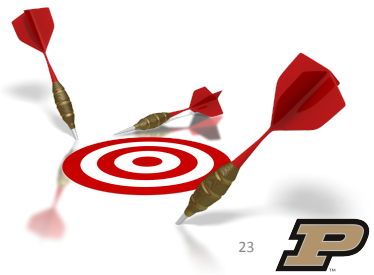
Low vs. high yielding areas…

- Some would say to simply position a "defensive" hybrid in those low-yielding areas to address the problem.
  - Unless you have identified the underlying causes of the low yields, you cannot smartly choose the appropriate set of "defensive" hybrid characteristics necessary to address the problem.



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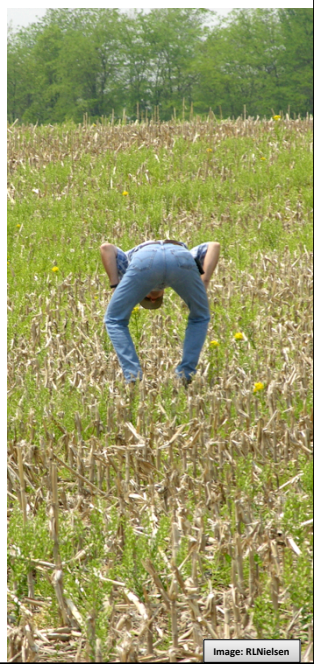
How to identify YLFs?

- Spend time with your crops.
  - Learn all you can about important yield limiting factors.
  - Ask for help from experts.
  - Walk your fields, scout for problems, and take extensive notes throughout the entire growing season.
  - Document every aspect of your crop production.



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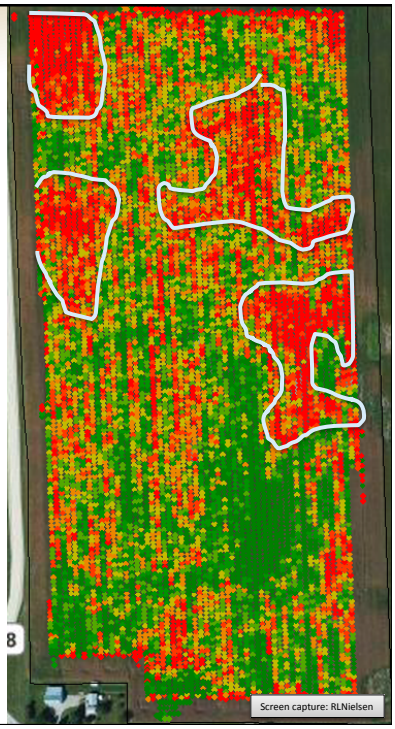
Use your yield monitor data…

…to help you visualize problem areas and then physically navigate to those areas using your handheld scouting "app" to begin the diagnostic process.



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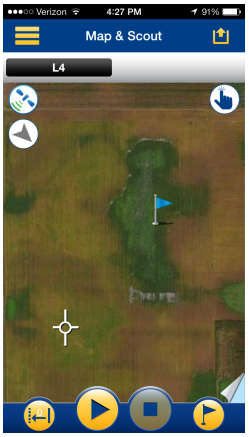
Take advantage of handheld GPS technologies to map, GPS-tag & document problem areas in your fields

- Crop scouting & mapping "apps"
- Simple note-taking "apps"
- Smartphone cameras
- Use with other GIS information to help diagnose possible causes of problems



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Remote sensing data…

- …supplements yield maps in identifying and locating problem areas within your fields.
- …can identify problem areas prior to harvest.
  - Earlier & more accurate crop problem diagnostics
  - Possible in-season mitigation of crop problems
- …does not, however, diagnose the causes of crop problems by itself.
  - E.g., light green corn is not always N deficient.

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Options for imagery / reflectance

- Equipment-mounted crop sensors
  - e.g., GreenSeeker®, OptRx®
- Satellite imagery
- Aerial imagery
  - Handheld cameras
  - Professional cameras
  - Unmanned aircraft systems (UAS)

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However, be sure to use Precision Ag technologies to supplement, not replace, old-fashioned "boots on the ground" technology

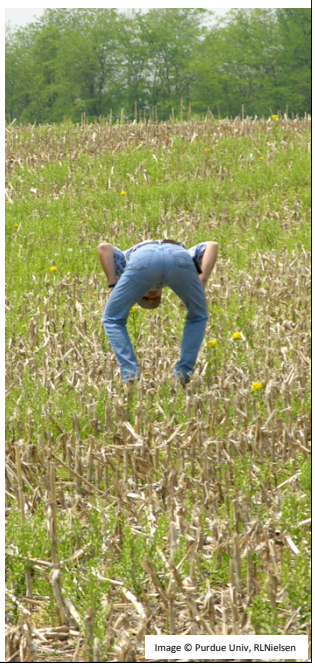

Image © Purdue Univ, RLNielsen

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Important Decision to Improve Crop Resilience

HYBRID SELECTION…

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Image source: Nebraska Historical Society

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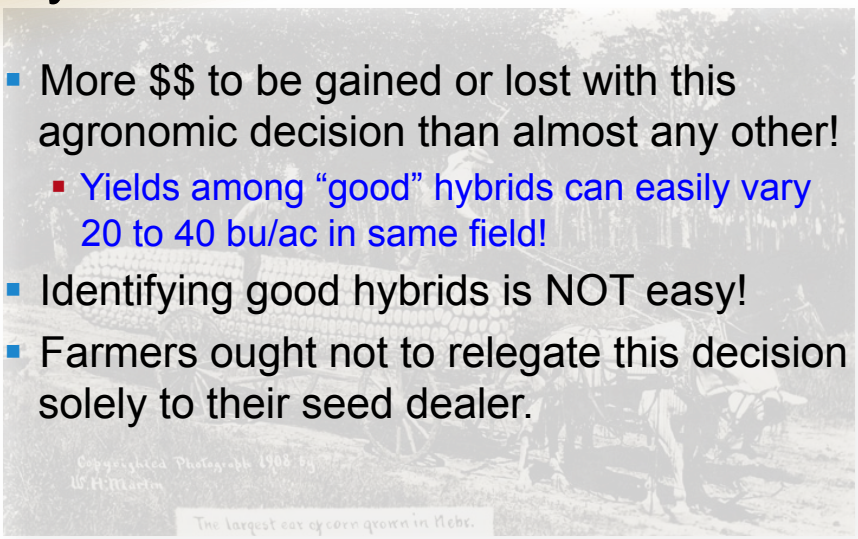
Hybrid selection…



- More $$ to be gained or lost with this agronomic decision than almost any other!
  - Yields among "good" hybrids can easily vary 20 to 40 bu/ac in same field!
- Identifying good hybrids is NOT easy!
- Farmers ought not to relegate this decision solely to their seed dealer.

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Not simply about yield potential

- But, also the ability of hybrids to perform consistently well across a wide range of growing conditions… because you don't know what next year will bring.
- The evidence lies in the results of variety trials conducted across a wide range of locations, because those represent a "sampling" of possible growing conditions.

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Hybrid trial data online…

Purdue University
Agronomy Department

The Chat 'n Chew Cafe

www.kingcorn.org/cafe

Timely agronomic news & information for the U.S. Corn Belt

In addition to asking for seed company results, look at university & other independent variety trial results online…

Variety Trial Results

Univ. of Kentucky
Univ. of Illinois
Iowa State Univ.
Michigan State Univ.
Univ. of Minnesota
Univ. of Nebraska
Ohio State Univ.
Penn. State Univ. (Corn)
Penn. State Univ. (Soy)
Purdue Univ. (Indiana)
Univ. of Wisconsin (Corn)
Univ. of Wisconsin (Soy)

Other states' variety trials (corn)
Other states' variety trials (soy)

Integrated Ag Services
F.I.R.S.T.

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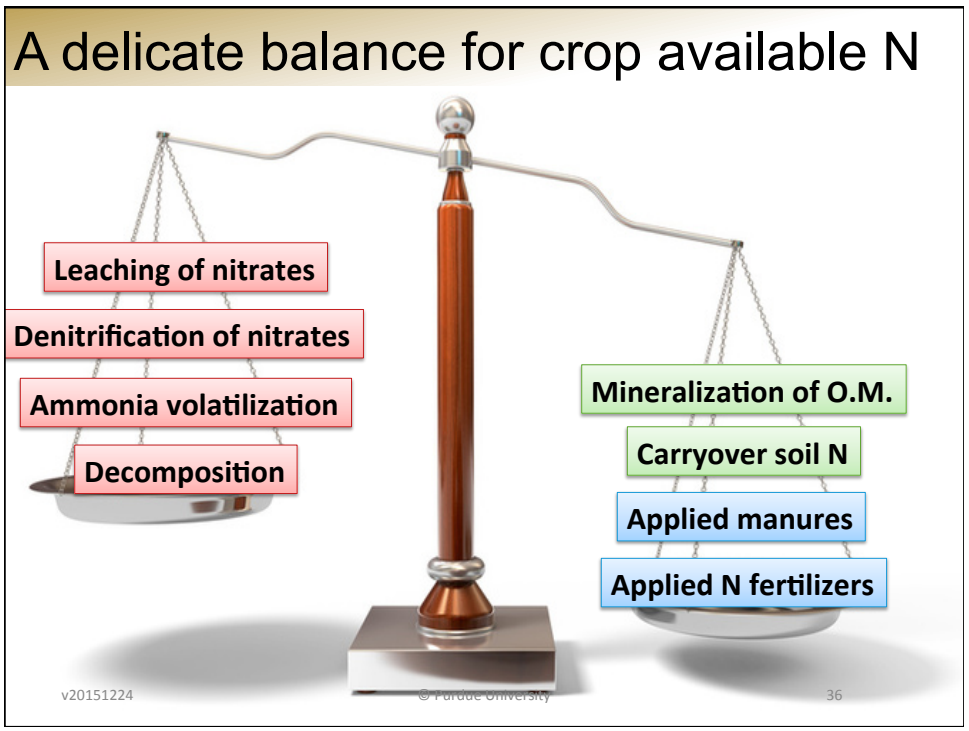
Searching for profits…

NITROGEN IS A CHALLENGING VARIABLE INPUT FOR CORN


A delicate balance for crop available N
Leaching of nitrates
Denitrification of nitrates
Ammonia volatilization
Decomposition
Mineralization of O.M.
Carryover soil N
Applied manures
Applied N fertilizers
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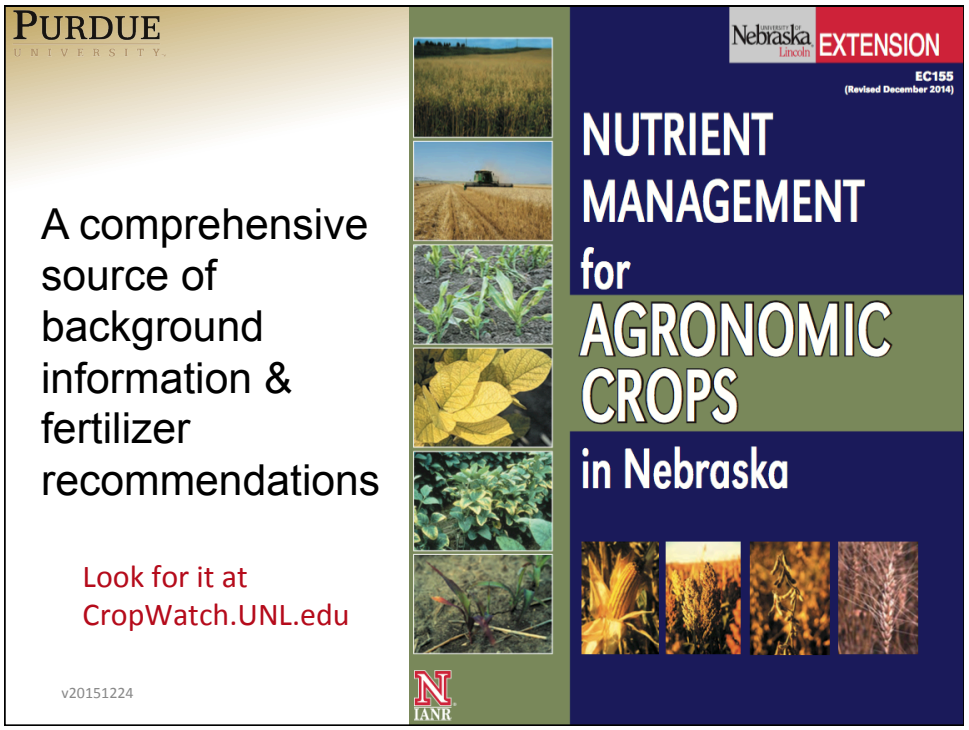
36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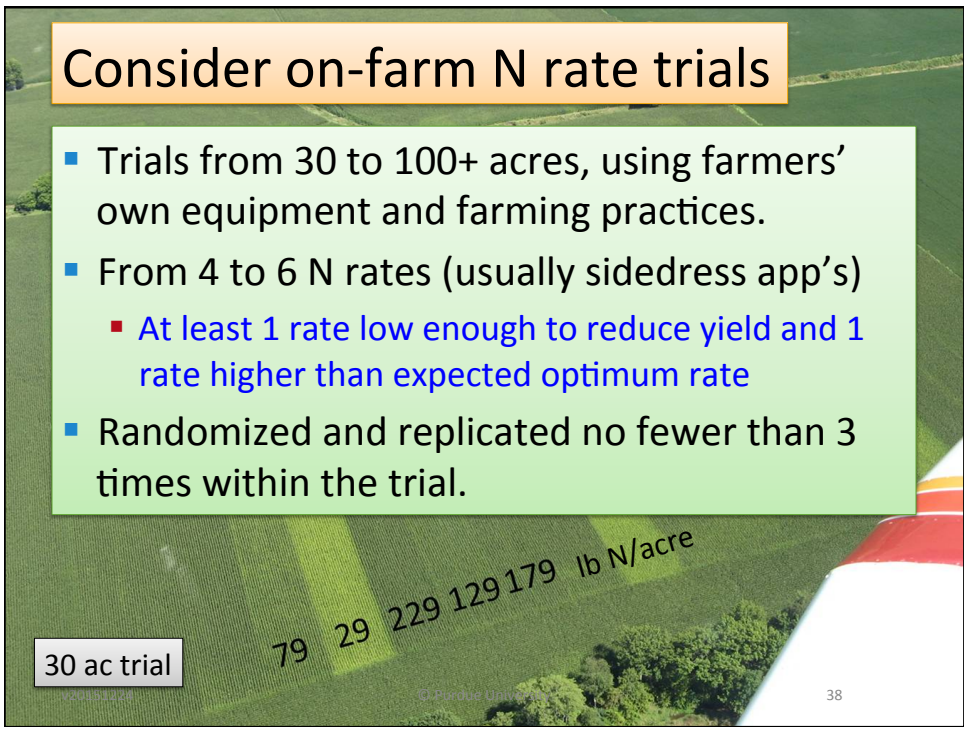
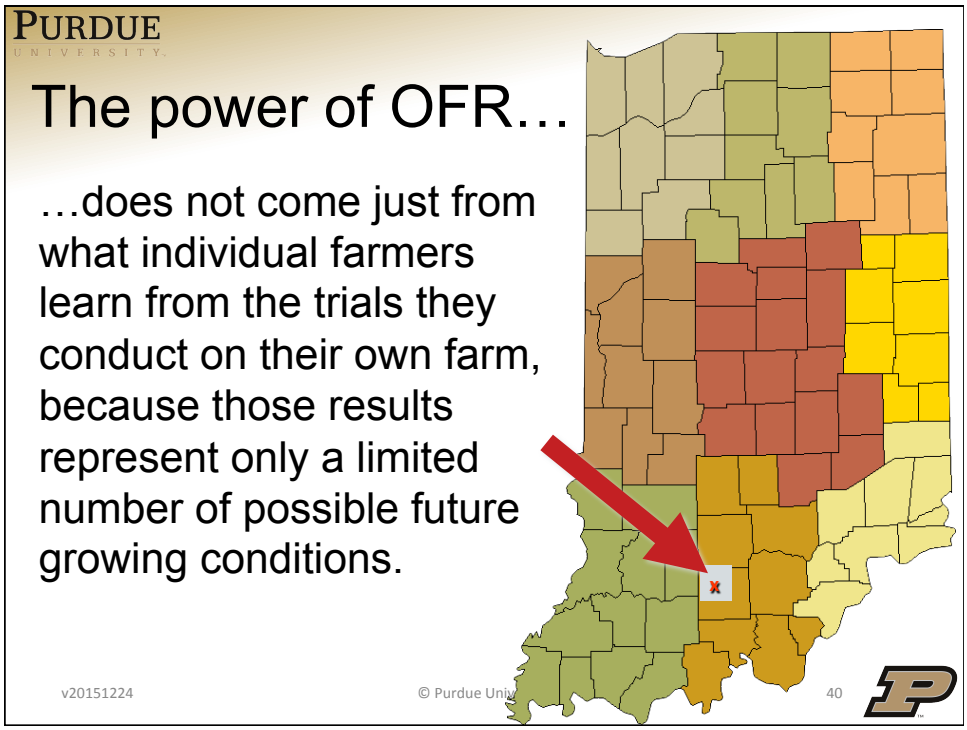
A comprehensive source of background information & fertilizer recommendations
Look for it at CropWatch.UNL.edu
v20151224
Nebraska Lincoln EXTENSION
EC155
(Revised December 2014)
NUTRIENT MANAGEMENT for AGRONOMIC CROPS in Nebraska
IANR


Consider on-farm N rate trials
Trials from 30 to 100+ acres, using farmers' own equipment and farming practices.
From 4 to 6 N rates (usually sidedress app's)
At least 1 rate low enough to reduce yield and 1 rate higher than expected optimum rate
Randomized and replicated no fewer than 3 times within the trial.
79 29 229 129 179 lb N/acre
30 ac trial
38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The power of OFR…
…does not come just from what individual farmers learn from the trials they conduct on their own farm, because those results represent only a limited number of possible future growing conditions.
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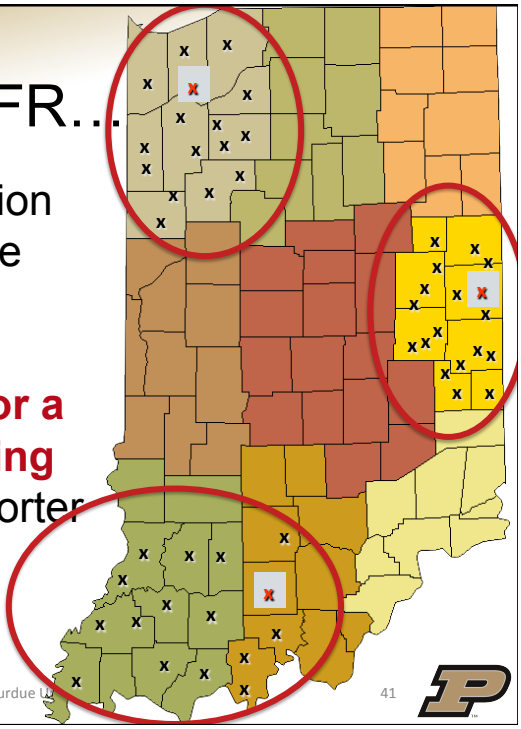
The power of OFR…

…lies in the aggregation of results from multiple trials that allows us to develop more reliable **recommendations for a broader set of growing conditions** over a shorter period of time.



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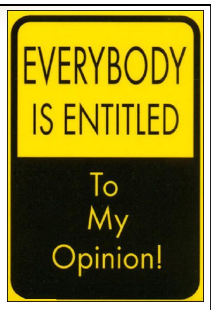
One more opinion…



- With quantitative inputs like nitrogen fertilizer or seeding rate, there is no way we can evaluate the effects of every single possible rate.
- Consequently, we evaluate a few rates in order to develop "yield response curves" that are then used to mathematically estimate the actual optimum rate.

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Yield Response "Curves"

- In order to accurately determine the true mathematical "shape" of a yield response curve, no fewer than 4 rates, and preferably more than that, are required.
- Failure to do that can lead to incorrect, and costly, conclusions.

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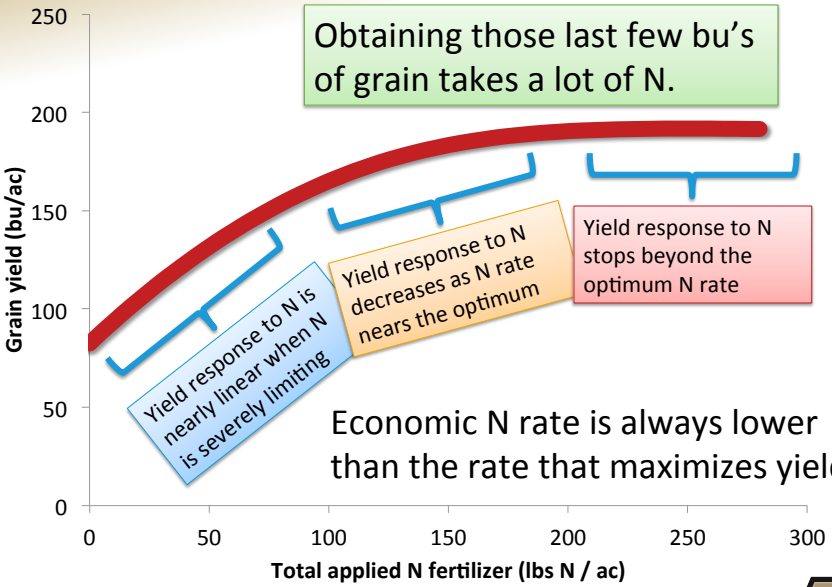
Yield response to N is not linear



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University of Nebraska Lincoln

Corn Nitrogen Calculator for Nebraska

Look for it at CropWatch.UNL.edu

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	Enter field-specific information in columns E to H			**1 Example**
1	Yield goal	5-yr avg. yield + 5-10%	bu/acre	165
2	Soil texture			Med./Fine
3	Soil organic matter (OM)	in 0-8" depth	%	2.6
4	Soil test nitrate-N	Effective rooting depth	inches	36
		Soil layers sampled	no.	3 Layers
		Layer 1 bottom	inches	8
		Layer 2 bottom	inches	24
	select nitrate unit in box	Layer 3 bottom	inches	36
	ppm	Layer 1 nitrate	ppm	12.5
		Layer 2 nitrate	ppm	7.1
		Layer 3 nitrate	ppm	1.7
5	Previous crop			02 Soybean
6	Irrigation	Water amount	inches	
		Water nitrate-N	ppm	
7	Manure	Type		
		Terms (unit for application)		
		Amount (tons or 1000 gal/acre)		
		Ammonium N	lb/unit	
		Organic N	lb/unit	
		Year applied		
		Application method		
8	Nitrogen management program			3 Fall
9	Expected corn value		$/bu	$3.30
10	N applied since harvest		lb/acre	0
	do not enter anything below			
	UNL N recommendation		**Unit**	**1 Example**
A	N algorithm components	Crop N requirement	lb/acre	233
		SOM credit	lb/acre	60
		Soil nitrate-N credit	lb/acre	40
		Legume N credit	lb/acre	45
		Irrigation N credit	lb/acre	Water?
		Manure N credit	lb/acre	Manure?
B	**Recom. N amount (unadjusted)**		**lb/acre**	**88**
C	Average nitrogen price		$/lb N	$0.34
D	Corn price : N price ratio			9.8
E	**Recom. N amount (adjusted for time and prices)**		**lb/acre**	**100**
F	Total N application cost		$/acre	$8.0
G	Total cost of N fertilizer + N application		$/acre	$41.6

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Purdue plant population trials…

- Since 2008, we've conducted over 80 trials around Indiana.
  - All field-scale, majority are on-farm research.
  - Trials range in size from 30 to 100 acres.
- For what it's worth, harvest populations in the low 30's appear to be optimal for yield levels ranging from 140 to 250 bu/ac.

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INDIANA CORN Marketing Council

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IANR NebGuide University of Nebraska Lincoln

University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

Know how. Know now.

G2216

Row Spacing and Seeding Rate Recommendations for Corn in Nebraska

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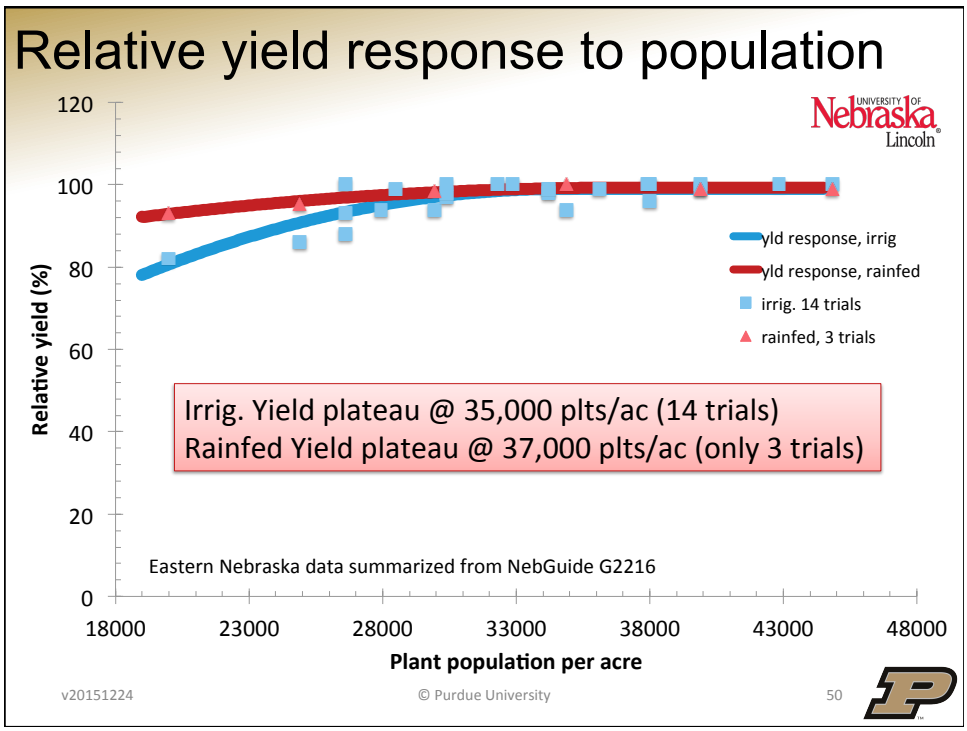
Relative yield response to population
Nebraska Lincoln
120
100
80
60
40
20
0
Relative yield (%)
yld response, irrig
yld response, rainfed
irrig. 14 trials
rainfed, 3 trials
Irrig. Yield plateau @ 35,000 plts/ac (14 trials)
Rainfed Yield plateau @ 37,000 plts/ac (only 3 trials)
Eastern Nebraska data summarized from NebGuide G2216
18000
23000
28000
33000
38000
43000
48000
Plant population per acre
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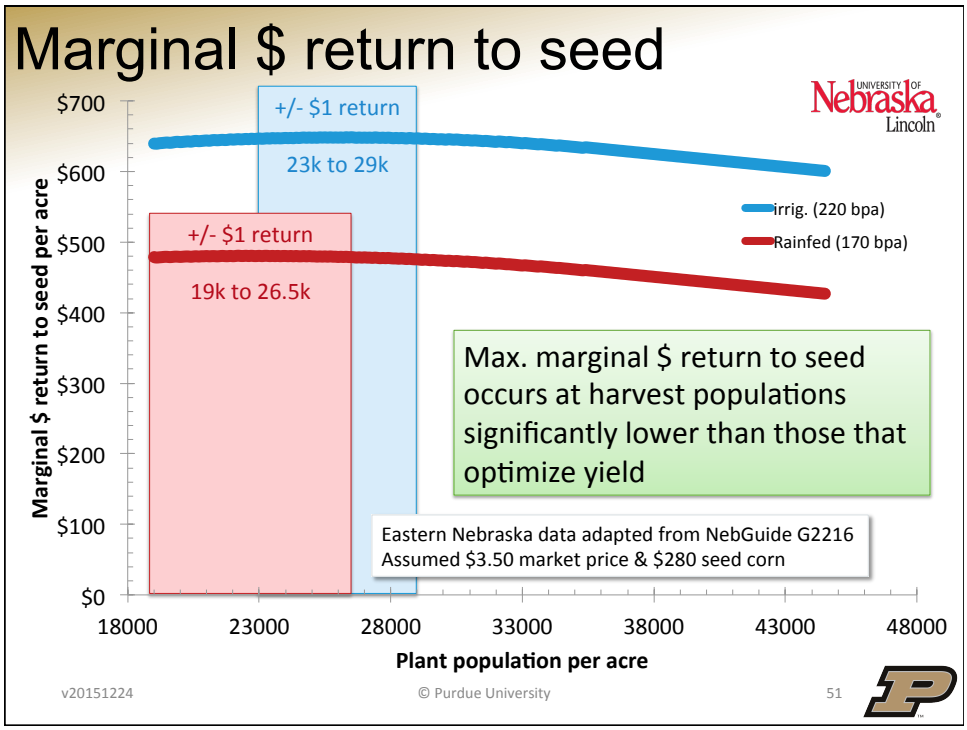
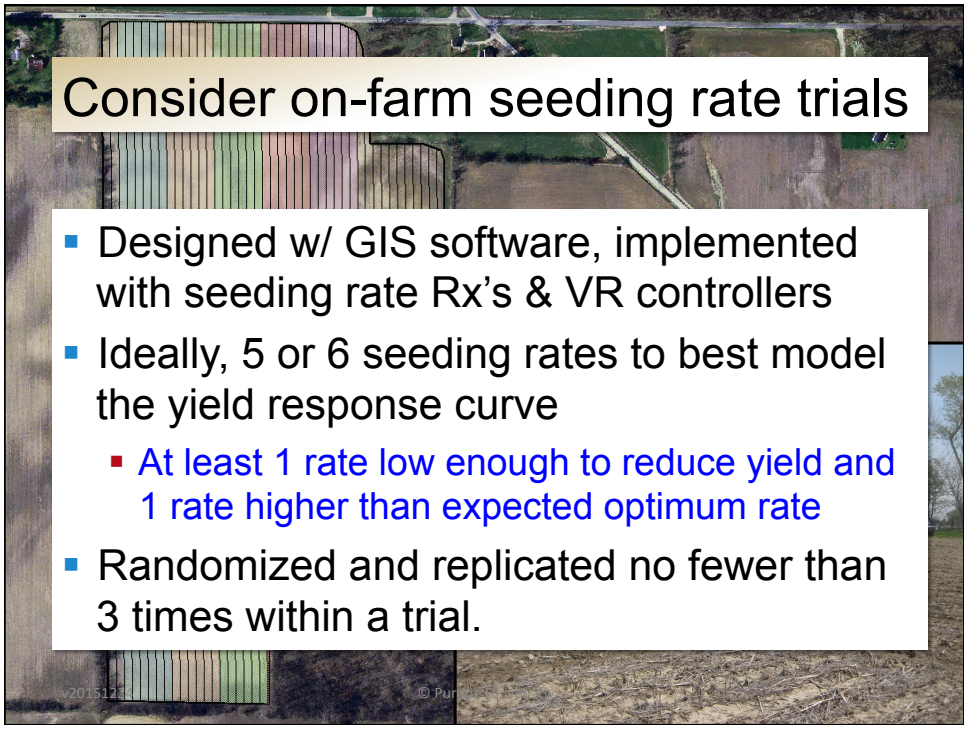
© Purdue University
50


Marginal $ return to seed
Nebraska Lincoln
$700
$600
$500
$400
$300
$200
$100
$0
Marginal $ return to seed per acre
+/- $1 return
23k to 29k
+/- $1 return
19k to 26.5k
irrig. (220 bpa)
Rainfed (170 bpa)
Max. marginal $ return to seed occurs at harvest populations significantly lower than those that optimize yield
Eastern Nebraska data adapted from NebGuide G2216
Assumed $3.50 market price & $280 seed corn
18000
23000
28000
33000
38000
43000
48000
Plant population per acre
v20151224
© Purdue University
51



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Some inputs are "crop insurance"

- Especially when applied without evidence of the crop's need for them.
  - Micronutrients
  - "Extra" seed treatments
  - Foliar insecticides
  - Foliar fungicides
  - "Too good to be true" products

- When not needed, are wasted $$
  - Use common sense when $$ are limited.

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Weed Management

- Know which weeds you are dealing with and which herbicides control them
- Be timely with herbicide applications relative to weed size
- Recognize & identify resistant weeds
- Do not rely solely on post-emergence herbicide applications

Image © Purdue Univ; RLNielsen

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Mix / match herbicide activity

https://goo.gl/VdWofU

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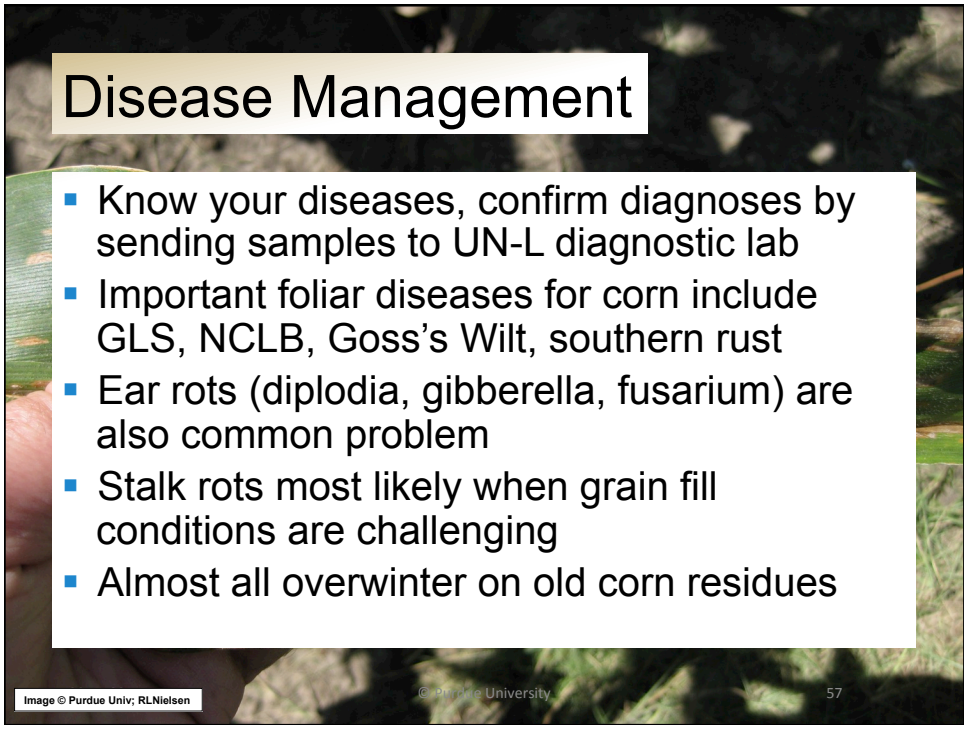
Disease Management
Know your diseases, confirm diagnoses by sending samples to UN-L diagnostic lab
Important foliar diseases for corn include GLS, NCLB, Goss's Wilt, southern rust
Ear rots (diplodia, gibberella, fusarium) are also common problem
Stalk rots most likely when grain fill conditions are challenging
Almost all overwinter on old corn residues
Image © Purdue Univ; RLNielsen
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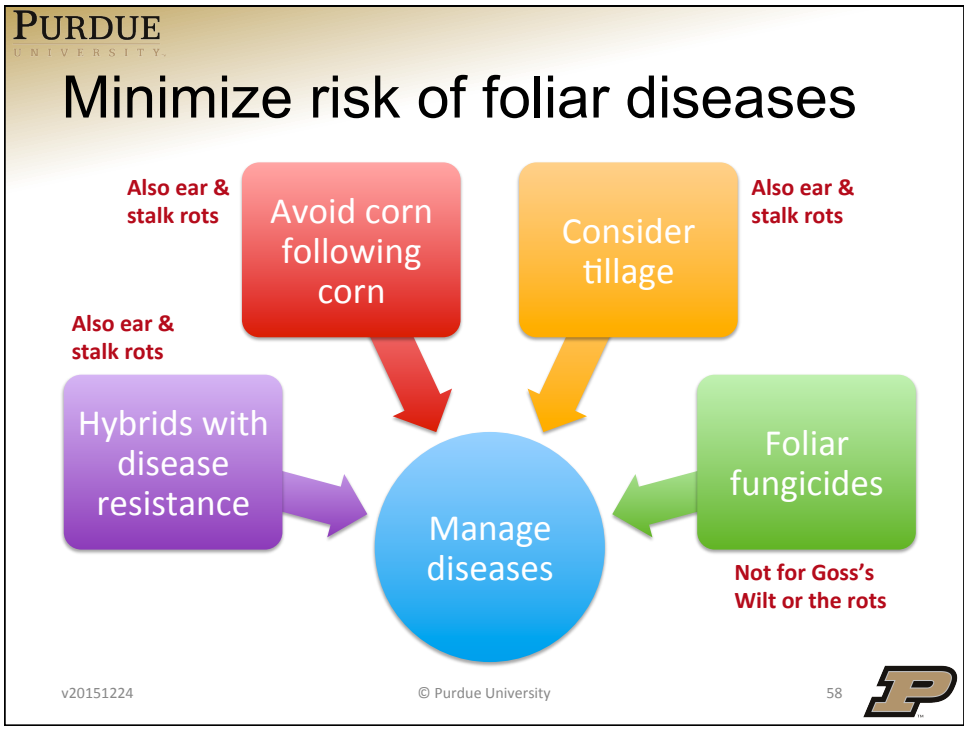
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Minimize risk of foliar diseases
Also ear & stalk rots
Avoid corn following corn
Consider tillage
Also ear & stalk rots
Also ear & stalk rots
Hybrids with disease resistance
Manage diseases
Foliar fungicides
Not for Goss's Wilt or the rots
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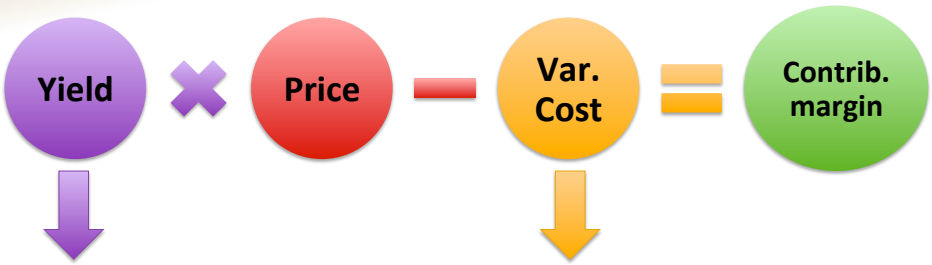
Improve Contribution Margins



- Increasing yield or decreasing costs can help increase the contribution margin when faced with low grain prices.
- Be judicious implementing either option.

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Focus on the fundamentals

- We all need to sharpen our focus on the agronomic fundamentals of growing corn.
- There are no "silver bullets" or "one size fits all" solutions to improving corn yields.
- Use today's technologies to supplement your agronomic decision-making, not replace it.

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