



# Resilient Agriculture: Adapting to Changing Climatic Conditions

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Past President of NCGA  
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Ames, Iowa

# Lake Springfield City Water Light and Power Watershed



# Keep It in the Crop

1. Right Source
  2. Right Rate
  3. Right Time
  4. Right Place
- 
- International Plant Nutrition Institute's 4 R Stewardship System.











## USING THE FIELDVIEW® PLUS APP

Executing your FieldScripts® prescription with ease and confidence

1. Receive your FieldScripts® prescription via email or text message
2. Connect iPad® to the MyFieldSense® Reader
3. Choose the field you want to execute
4. Insert a seed tray for your intended crop
5. Set the seed and payload price
6. Start planting:
  - Turn each individual seed into data by the 20/20 SeedSense®
  - Control your seed delivery to control your seed rates















JOHN DEERE

NEW LEADER



McMurtry

NEW LEADER



# Nitrogen Uptake During the Season

Nitrogen uptake in 3 - 40 day cycles	200 units
1. First 40 days - > V9 uptake is 15%	30 units
2. Second 40 days – V10 – R2 65%	130 units
3. Third 40 days – Brown silk/Black Layer	40 units

Doesn't it make sense to feed the corn plant when it needs nitrogen the most, the second 40 days!

# 3 Applications of Nitrogen per Season *(instead of single anhydrous application)*

Increased corn yields 17.5 bu/acre...

$$17.5 \text{ bu/acre} \times \$4.00/\text{bu} = \\ \$70/\text{a.} - \text{appl. cost} = \$50/\text{a. extra profits}$$

This is with the same amount of N-application per acre per season





# Weather determines the Final Results

The final outcome of our adaptive practices are determined by the weather.

1. In general, early planting to beat pollination problems generate best results.
2. Feeding the plant at the appropriate time yields best results.
3. Scouting your fields pays big dividends.
4. Do appropriate agronomic practices and be prepared for what the season brings.

# Climate Basic – Climate Pro APP For your Computer/Phone



Field Weather					
Filter		Viewing 8 of 43 fields		Sort	
From All Users		Newest		Oldest	
Location	Description	Precip. 1hr	Precip. 24hr	Precip. 48hr	Precip. 72hr
Homestead	Dekab, IL	0.1 in	0.67"	60%	6.47"
Dads Farm	Dekab, IL	0.1 in	0.67"	60%	6.47"
Airport	Champaign, IL	0.1 in	0.67"	60%	6.47"
Joans Back 40	Dekab, IL	0.1 in	0.67"	60%	6.47"



# What is Sustainability?



- Decreasing soil erosion and use of pesticides, fertilizers, irrigation and fuel
- Yields continue to increase
- Farmer Profitability



# Lincoln Land FS, Inc.

701 HENRY ST. • P.O. BOX 667 • JACKSONVILLE, IL 62651-0667  
PHONE: (217) 243-6561 • TOLL-FREE: (888) 978-7637 • FAX (217) 243-6567

	CORN/CORN	CORN/BEANS	SOYBEANS	WHEAT
YIELD GOAL	190	220	60	80
PRICE/BUSHEL	\$4.70	\$4.70	\$12.25	\$6.00
GROSS \$ / ACRE	\$893.00	\$1,034.00	\$735.00	\$480.00

#### COST PER ACRE

NITROGEN	\$106.20	\$97.50	\$0.00	\$58.00
PHOS	\$43.54	\$50.41	\$30.39	\$28.94
POTASSIUM	\$21.80	\$25.25	\$33.15	\$25.50
CHEMICAL	\$45.00	\$45.00	\$48.00	\$12.00
INSECTICIDE	\$8.00	\$6.00	\$0.00	\$0.00
SEED	\$134.00	\$134.00	\$68.00	\$42.00
LIME	\$15.00	\$14.00	\$11.00	\$8.00
FUNGICIDE	\$16.00	\$16.00	\$16.00	\$16.00
OTHER	\$23.00	\$23.00	\$10.00	\$8.00
INSURANCE	\$30.00	\$30.00	\$25.00	\$0.00
TOTAL INPUT	\$442.54	\$441.16	\$241.54	\$198.44
INTEREST RATE	4.00%	4.00%	4.00%	4.00%
INTEREST	\$17.70	\$17.65	\$9.66	\$7.94
NET GROSS	<u>\$432.76</u>	<u>\$575.20</u>	<u>\$483.80</u>	<u>\$273.62</u>

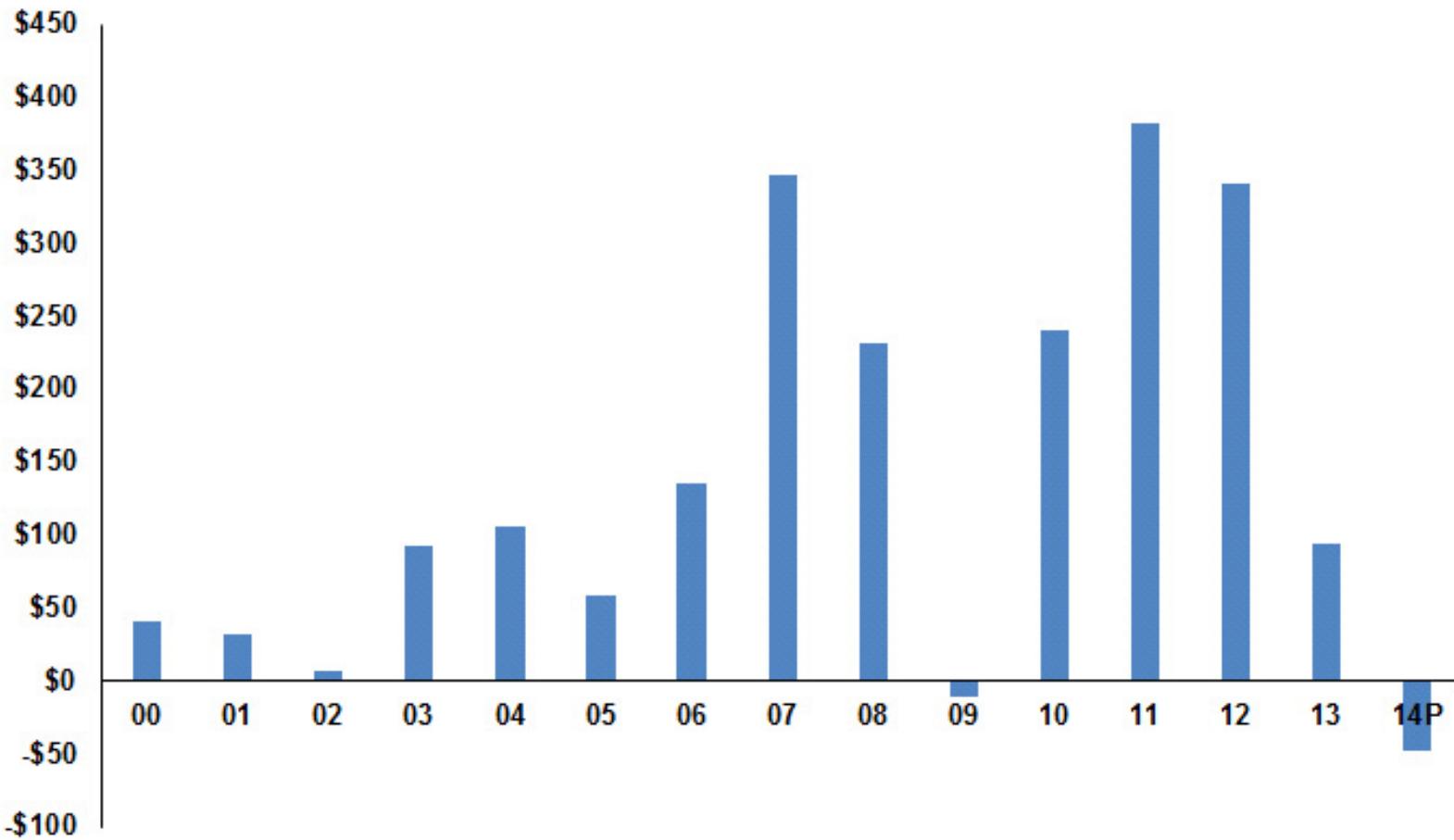
HARVEST	\$38.00	\$38.00	\$32.00	\$32.00
TRUCKING	\$22.80	\$26.40	\$7.20	\$9.60
PLANTING	\$13.00	\$13.00	\$15.00	\$15.00
CHISEL	\$18.00	\$15.00	\$15.00	\$0.00
FIELD CULT./DISK	\$20.00	\$10.00	\$10.00	\$10.00
N APP	\$13.50	\$13.50	\$0.00	\$7.00
DRY APP	\$6.00	\$6.00	\$6.00	\$6.00
CHEM APP.	\$14.00	\$14.00	\$14.00	\$7.00
GRAIN CART	\$7.60	\$7.60	\$6.30	\$6.30
OTHER	\$10.00	\$10.00	\$10.00	\$9.00
MACHINERY COSTS	<u>\$162.90</u>	<u>\$153.50</u>	<u>\$115.50</u>	<u>\$101.90</u>
NET PROFIT	<u>\$269.86</u>	<u>\$421.70</u>	<u>\$368.30</u>	<u>\$171.72</u>

LAND COST	\$360.00	\$360.00	\$360.00	\$360.00
NET PROFIT AFTER	<u>(\$90.14)</u>	<u>\$61.70</u>	<u>\$8.30</u>	<u>(\$188.28)</u>

Know your cost  
of Production

# Profitability may be tough in 2014

Figure 1. Farmer Returns for Cash Rent Farmland, Corn, Central Illinois, High-Productivity Farmland.



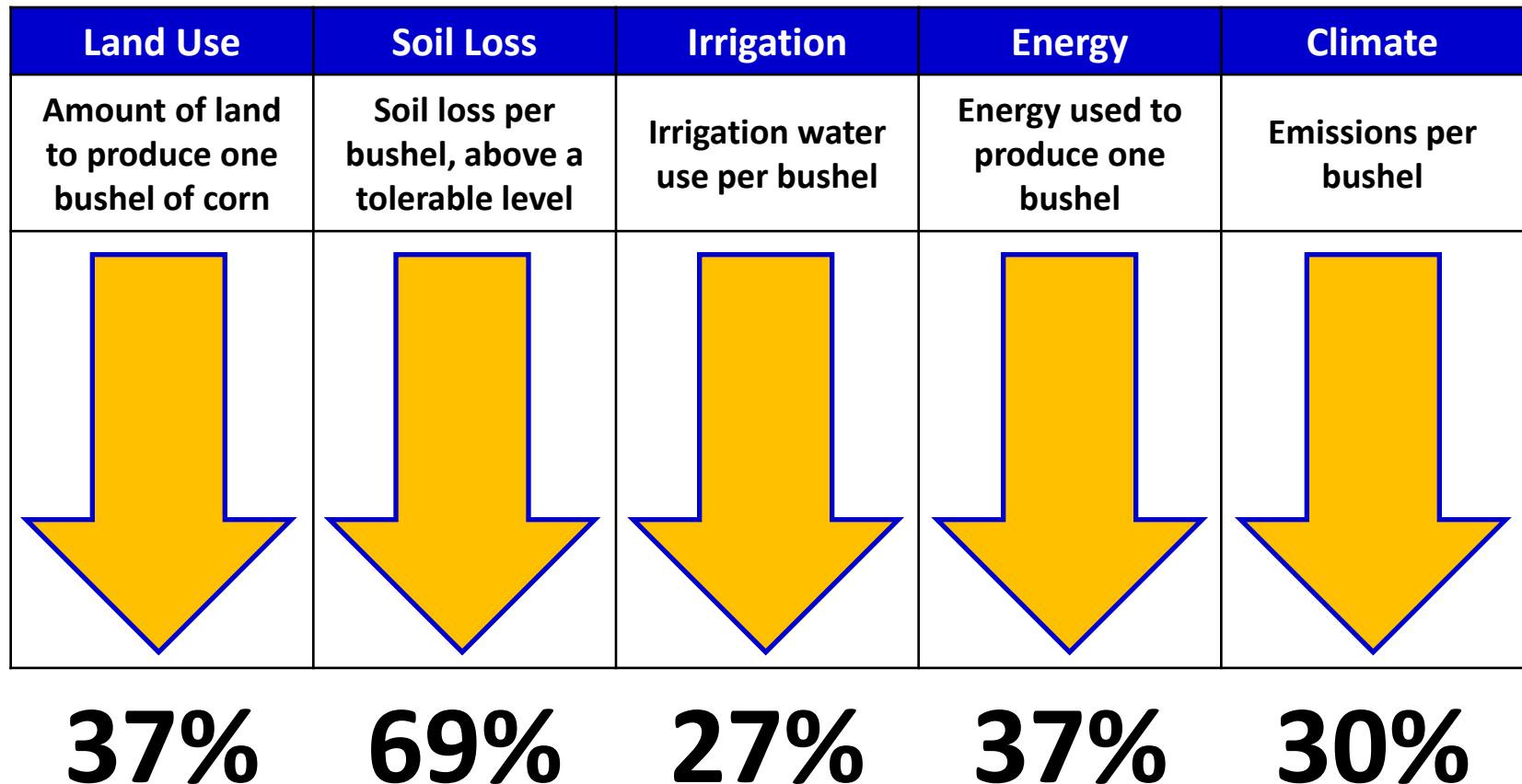
**Table 1. Corn Revenues and Costs, Central Illinois -- High Productivity Farmland,**Actual for 2006 through 2013 Projected for 2014.<sup>1</sup>

	Year							
	2007	2008	2009	2010	2011	2012	2013	2014P
Yield per acre	201	199	192	168	174	126	197	196
Price per bu	\$4.12	\$4.07	\$3.62	\$5.07	\$6.24	\$6.93	\$4.65	\$4.20
Crop revenue	\$828	\$810	\$695	\$852	\$1,086	\$873	\$916	\$823
ARC/PLC or ACRE	0	0	8	0	0	0	0	10
Direct payments	25	25	24	24	24	24	22	0
Crop insurance proceeds	0	22	5	32	23	295	61	0
<b>Gross revenue</b>	<b>\$853</b>	<b>\$857</b>	<b>\$732</b>	<b>\$908</b>	<b>\$1,133</b>	<b>\$1,192</b>	<b>\$999</b>	<b>\$833</b>
Fertilizers	90	124	185	122	159	200	193	163
Pesticides	40	46	52	44	50	49	66	60
Seed	55	67	90	95	96	108	114	119
Drying	9	19	38	22	19	16	24	23
Storage	8	11	14	13	8	7	8	5
Crop insurance	20	27	25	18	30	25	27	27
<b>Total direct costs</b>	<b>\$222</b>	<b>\$294</b>	<b>\$404</b>	<b>\$314</b>	<b>\$362</b>	<b>\$405</b>	<b>\$432</b>	<b>\$397</b>
Machine hire/lease	8	8	9	8	8	10	11	11
Utilities	4	4	4	4	4	5	5	5
Machine repair	16	17	18	17	17	22	22	24
Fuel and oil	18	22	13	17	18	23	24	24
Light vehicle	2	2	1	2	1	2	2	2
Mach. depreciation	23	29	35	38	39	55	63	66
<b>Total power costs</b>	<b>\$71</b>	<b>\$82</b>	<b>\$80</b>	<b>\$86</b>	<b>\$87</b>	<b>\$117</b>	<b>\$127</b>	<b>\$132</b>
Hired labor	9	11	12	13	14	14	16	17
Building repair and rent	4	5	5	4	5	8	6	7
Building depreciation	4	5	5	6	6	9	5	6
Insurance	9	10	7	8	8	9	10	10
Misc	6	7	7	8	8	8	8	8
Interest (non-land)	18	14	14	13	13	11	11	11
<b>Total overhead costs</b>	<b>\$48</b>	<b>\$52</b>	<b>\$50</b>	<b>\$52</b>	<b>\$54</b>	<b>\$59</b>	<b>\$56</b>	<b>\$59</b>
<b>Total non-land costs</b>	<b>\$341</b>	<b>\$428</b>	<b>\$534</b>	<b>\$452</b>	<b>\$503</b>	<b>\$581</b>	<b>\$615</b>	<b>\$588</b>
<b>Operator and land return</b>	<b>\$512</b>	<b>\$429</b>	<b>\$198</b>	<b>\$456</b>	<b>\$630</b>	<b>\$611</b>	<b>\$384</b>	<b>\$245</b>
Land costs	166	197	209	215	248	270	290	293
<b>Farmer return</b>	<b>\$346</b>	<b>\$232</b>	<b>-\$11</b>	<b>\$241</b>	<b>\$382</b>	<b>\$341</b>	<b>\$94</b>	<b>-\$48</b>

# Resilient Agriculture

- 1. Sustainable Intensification
- 2. Adaptive Management Practices
- 3. Utilize Proactive Farmer Practices to Protect the Environment during Changing Climates  
Impacts with the use of :
  - Buffers
  - Timing of applications/ multiple applications
  - Sequestering GHG with cover crops

# Corn's Impacts, 1987-2011



# Cover Crops with Mike Plummer

## Resolves Soil Problems

1. Soil Microbial Issues
2. Soil Compaction
3. Erosion Issues
4. Improve Organic Matter and Soil Structure Issues
5. Improves water quality





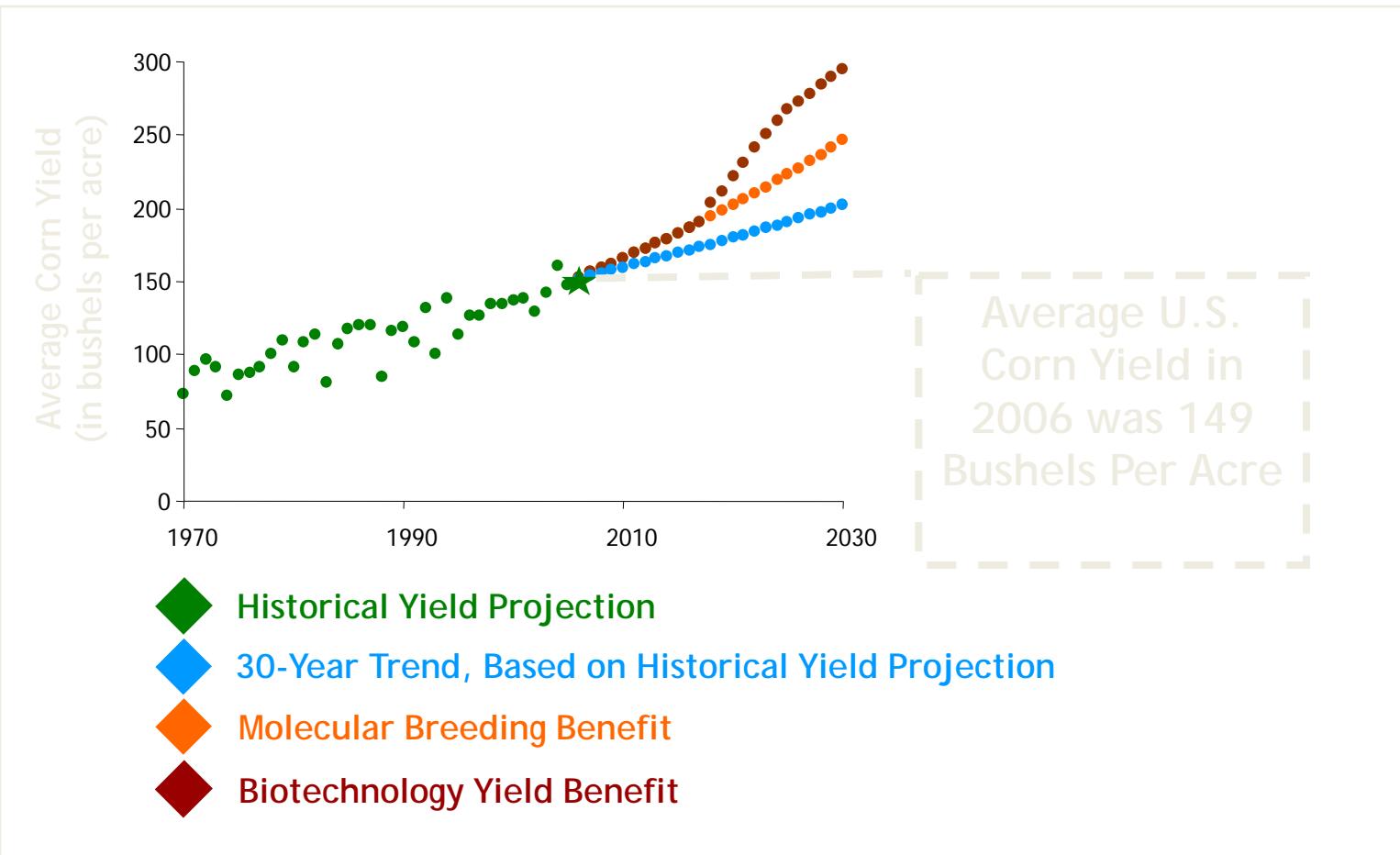
# The Basics of Cover Crops

- Oats and radishes are the preferred cover crop
- Plant 30-45 days before a killing frost
- Cereal Rye is next level up for management
- Cereal Rye is generally used before soybeans because it offers a yield increase if there is a cyst nematode problem in that field. 40-80 % reduction and a 3 – 10 bushel yield increase.
- Cover crops sequester nitrogen left over in the soil profile from previous crops.

# New Technology, Drought Resistant Corn by 2016

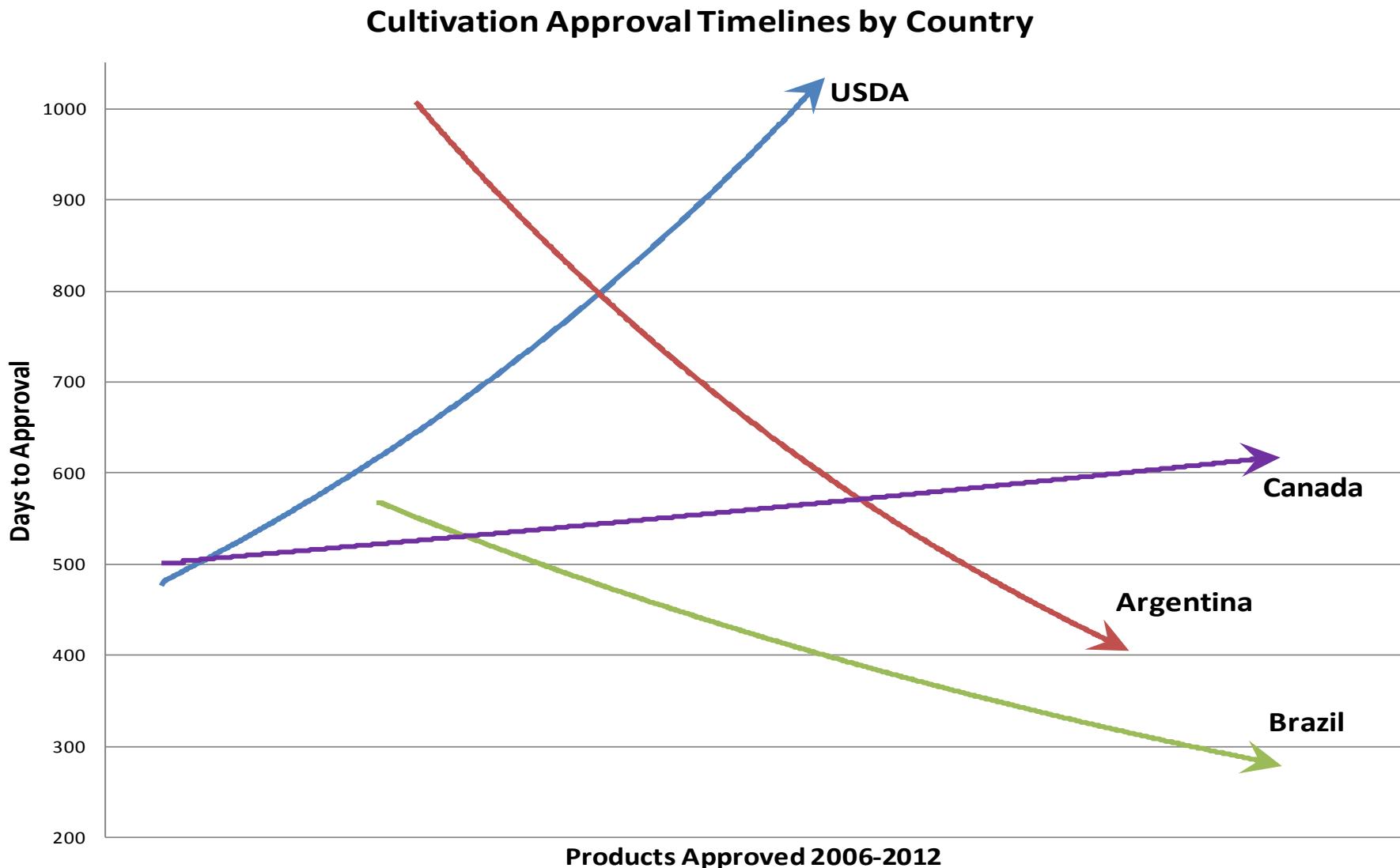


# Step-Changes in Corn Potential



Source: Monsanto

Trends in Approval Timelines (2006-12). The time to approve a GE crop for cultivation increased significantly in the U.S., while approval timelines in other exporting countries decreased or stayed the same.





Flooding is a major springtime problem in Central Illinois







## **Tile shut off design to keep water in the pattern tile**

The design allows water to go thru the tile during flooding and then can automatically be shut down after the excessive water has been released in a pattern tiling design to keep water in the system for the growing crop.



Imbibitional Chilling – Germination problems in cool soils during first 24-36 hours after planting.



# RFS is the most effective U.S. Policy on Greenhouse Gases

Biofuels are the best and most successful way to address climate change. Biofuels like ethanol last year alone reduced CO<sub>2</sub> equivalent GHG emissions from U.S. transportation by 37.9 million metric tons. A Life Cycle Associates study found that corn ethanol reduces GHG emissions by 32 per cent compared to petroleum emissions in 2012, including hypothetical land use change emissions. We need to reinstate the RFS to continue to reduce GHG emissions and curb future climate change.

**BIG Bull Markets  
are followed by  
BIG Bear Markets....**

July 1996

-66%

July 2000

June 2008

-62%

$$\begin{aligned} \$8.44 \text{ minus} \\ 64\% = \$3.04 \end{aligned}$$

Sept 2009

Nov Jun 1997 Aug Mar Oct May Dec Jul Feb Sep Apr Nov Jun 2004 Aug Mar Oct Nov Dec Jul Feb Sep Apr Nov Jun 2011 Aug May Oct

# Conclusions-Adaptive Practices

- Many different practices including mechanical, timing of application, variable fertilizer rates, tiling and other farmer practices including prescription population and spacing
- Cover Crop technologies available for application.
- New Commercial technologies coming on line.
- Sustainability begins with farmer profitability from the land with proper management.
- In general, one size regulations does not fit every farm.
- Therefore, more cooperative research is necessary including University and On the Farm testing.
- Weather and markets have the final say as to profits.
- Effective Policies such as the RFS are critical to profitability.



American farmers make up less than 2% of the world's population...

**AG DAY**

...but they keep 317+ million Americans fed, and help to feed the rest of the world's 7 billion people.

Ultimately you have to deal with  
the weather cards that you are  
dealt using Adaptive Management





- **Resilient Agriculture: Adapting to Changing Climatic Conditions**
- **August 5-7, 2014 Ames, Iowa**
- **Sustainable Corn. Org Crops, Climate, Culture and Change**

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