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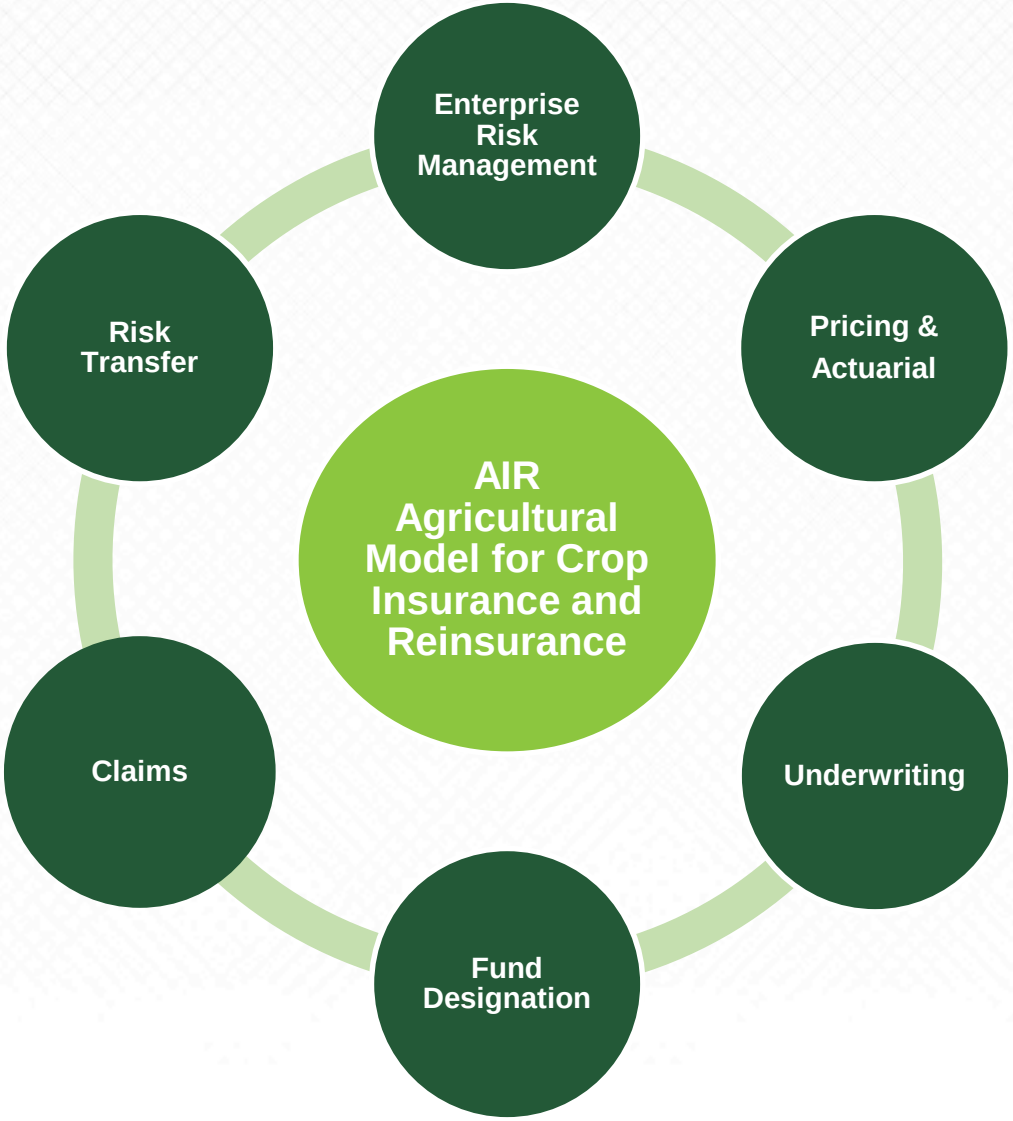
# Recap of U.S. Crop Insurance Industry Gains and Losses for the 2016 Crop Year

*Julia Borman, Ph.D. and Oscar Vergara, Ph.D.*

*Prepared for SCC-76 Conference, Pensacola, FL, March 31, 2017*

AIR WORLDWIDE®

# AIR Agricultural Model Applications





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# Weather Modeling is Key for Agricultural Risk Management

| | % Crop Loss |
|---|---|
| Drought & Heat | 37% |
| Excess Moisture | 33% |
| Hail | 13% |
| Cold, Frost & Freeze | 5% |
| Wind & Hurricane | 4% |
| Flood | 1% |
| **Subtotal – Directly related to weather** | **93%** |
| Disease | 5% |
| Insects & Wildlife | 1% |
| Other | 1% |
| **Subtotal – Other perils** | **7%** |
| **Total** | **100%** |


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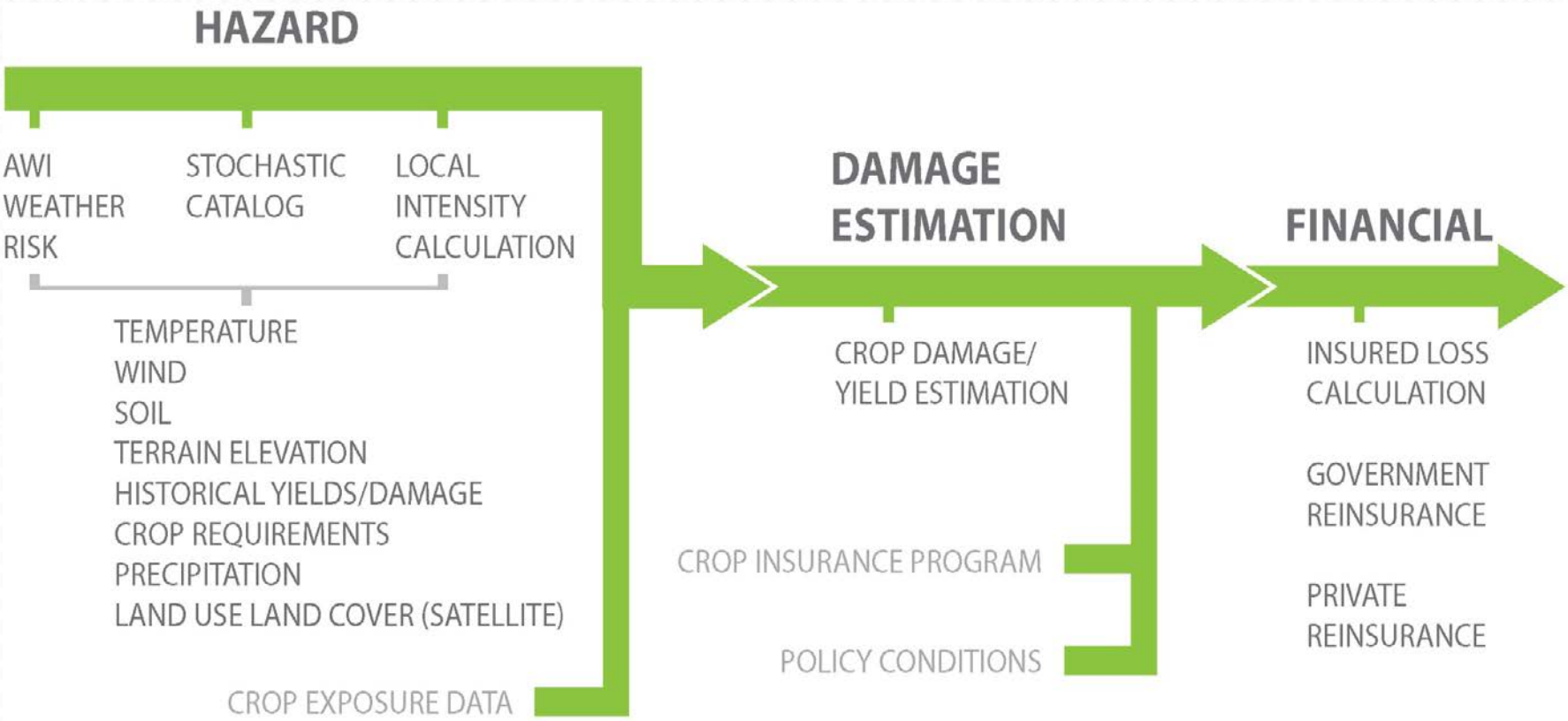
# AIR's Multi Peril Crop Insurance Models are Built from the Ground Up





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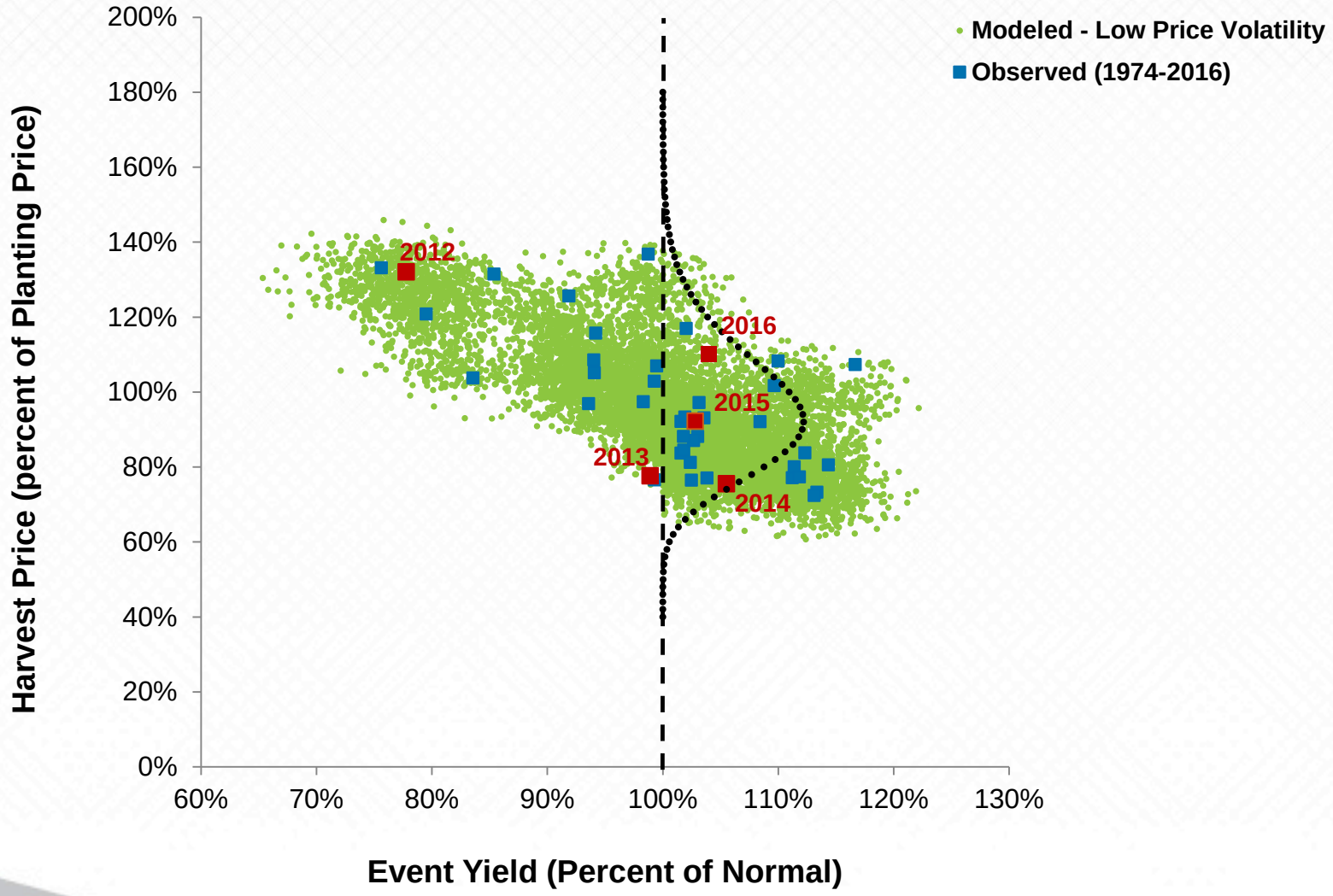
# Low Volatility Catalog





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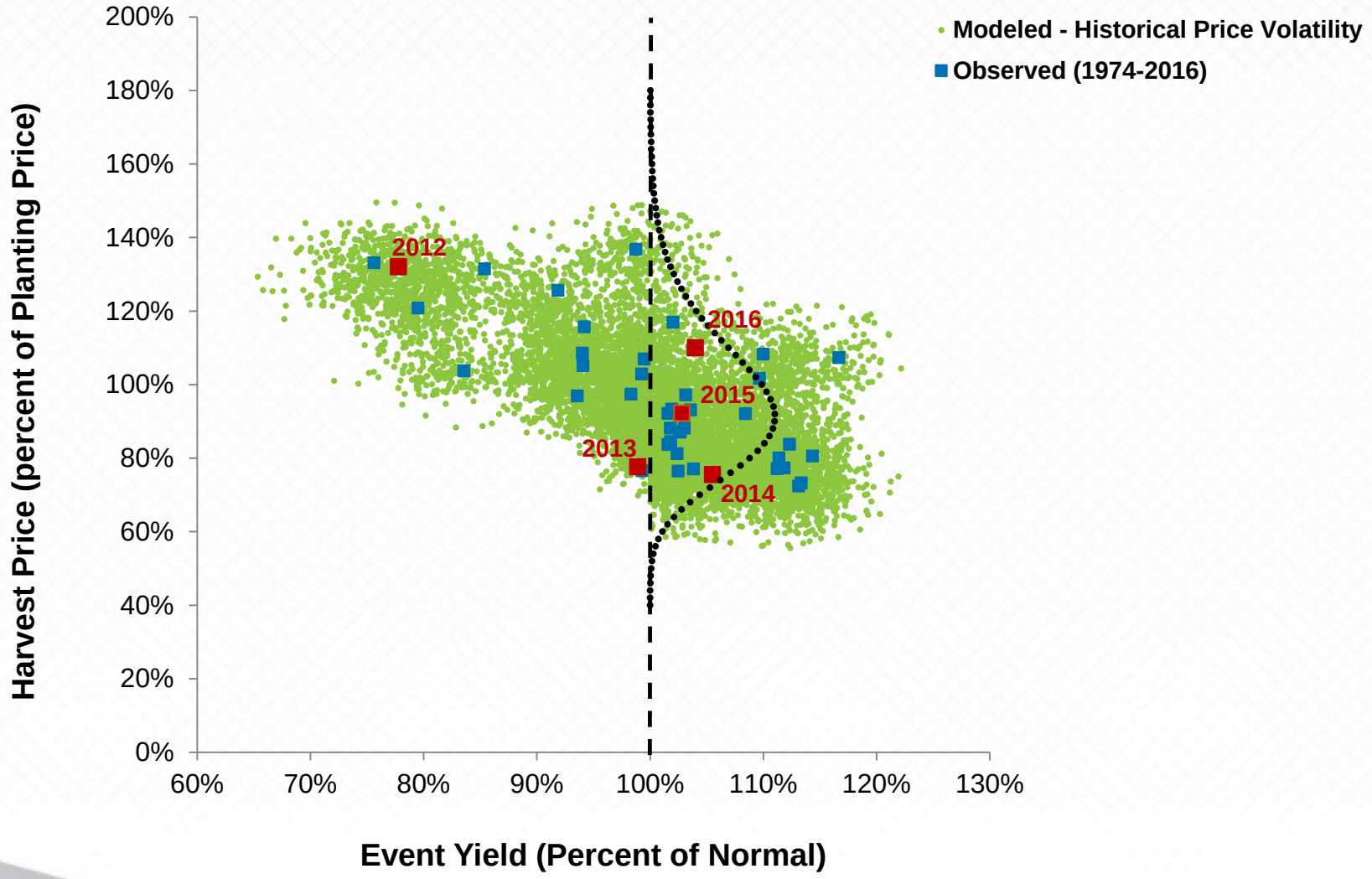
# Historical Volatility Catalog





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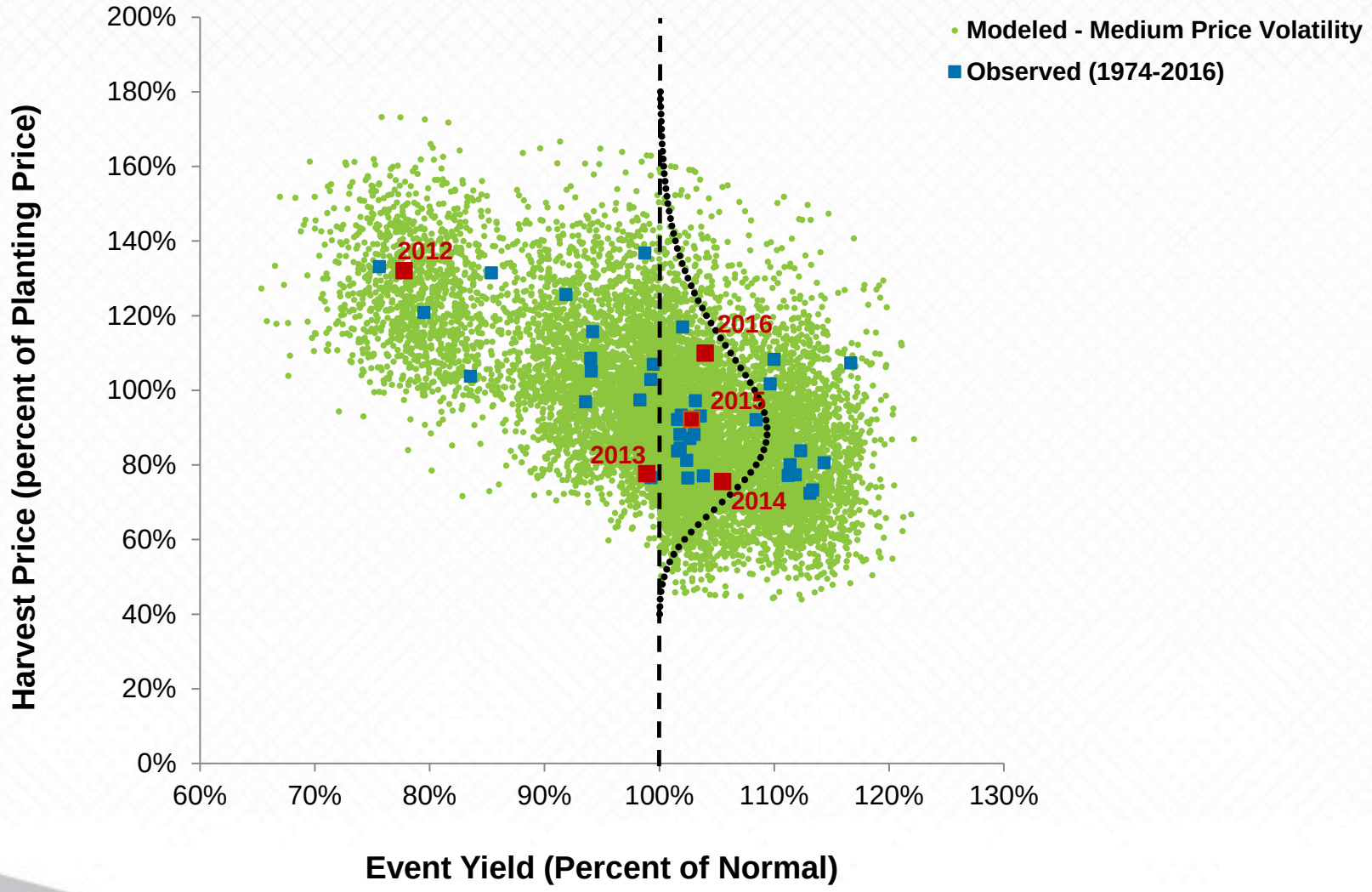
# Medium Volatility Catalog





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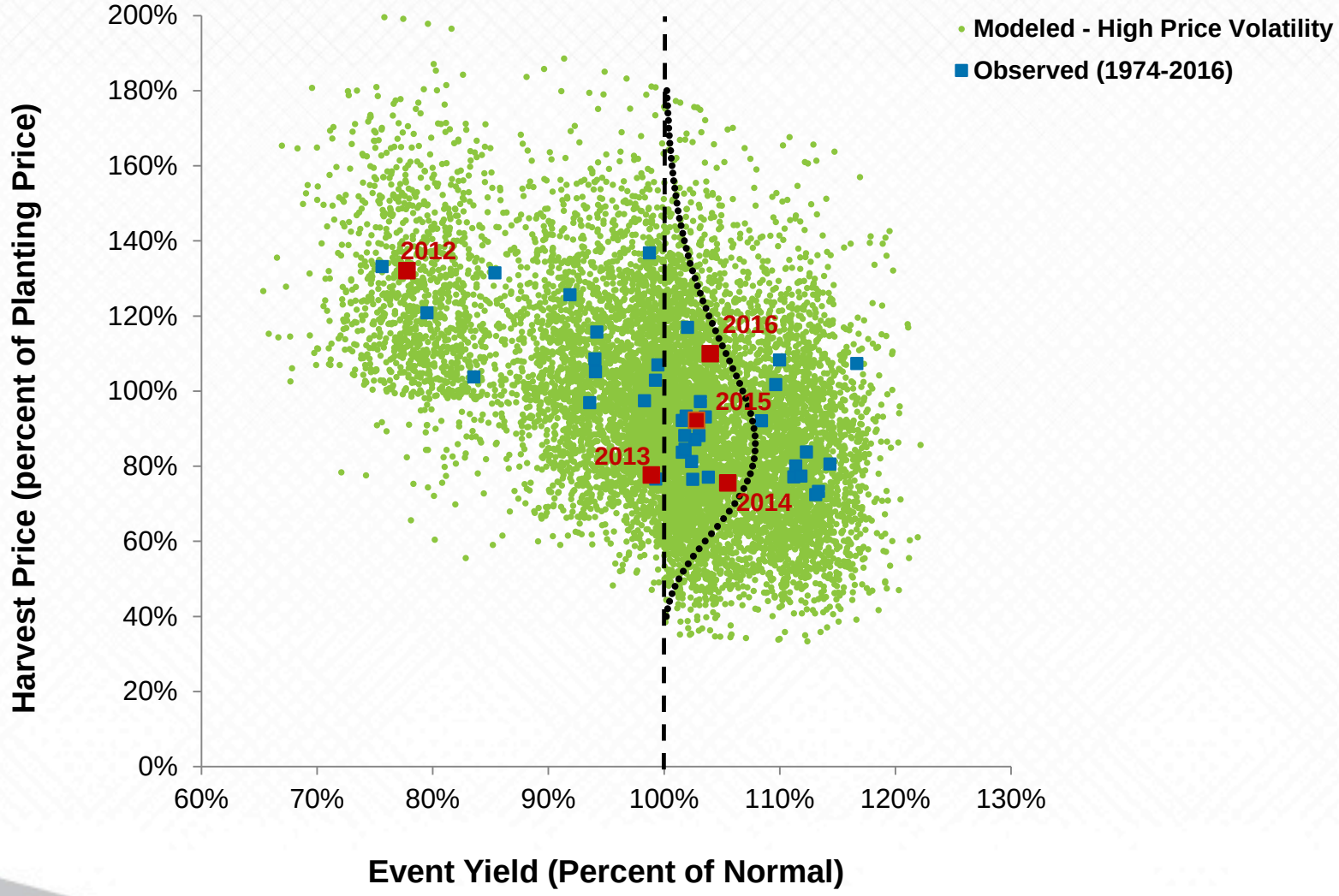
# High Volatility Catalog





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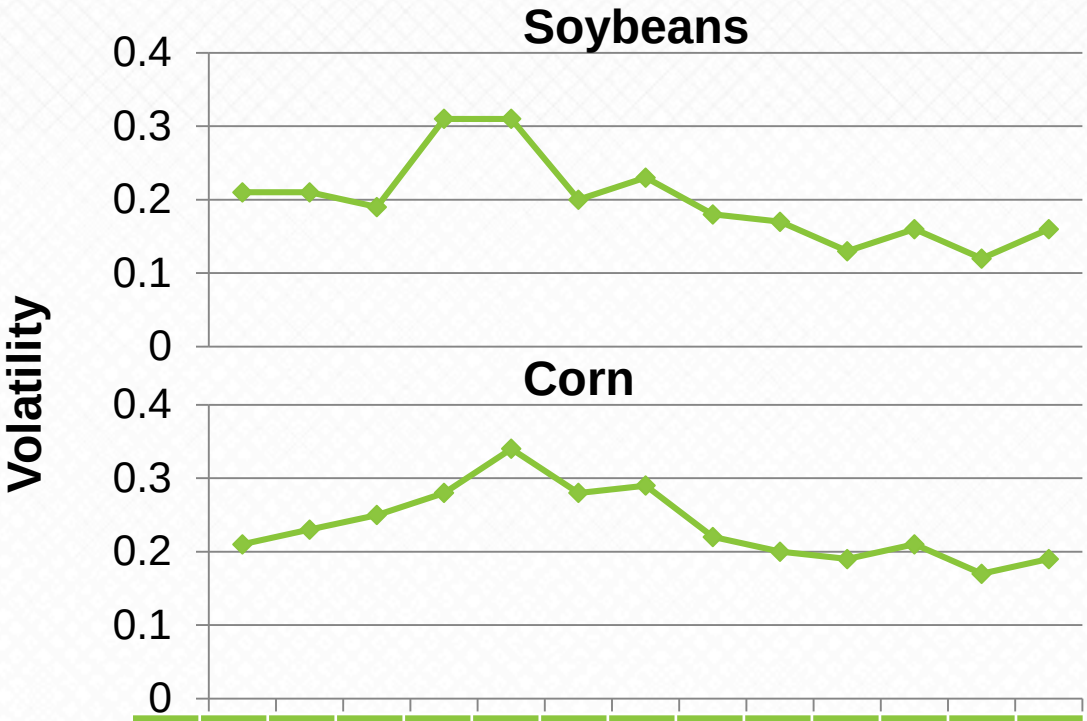
# Which Catalog Should We Use?





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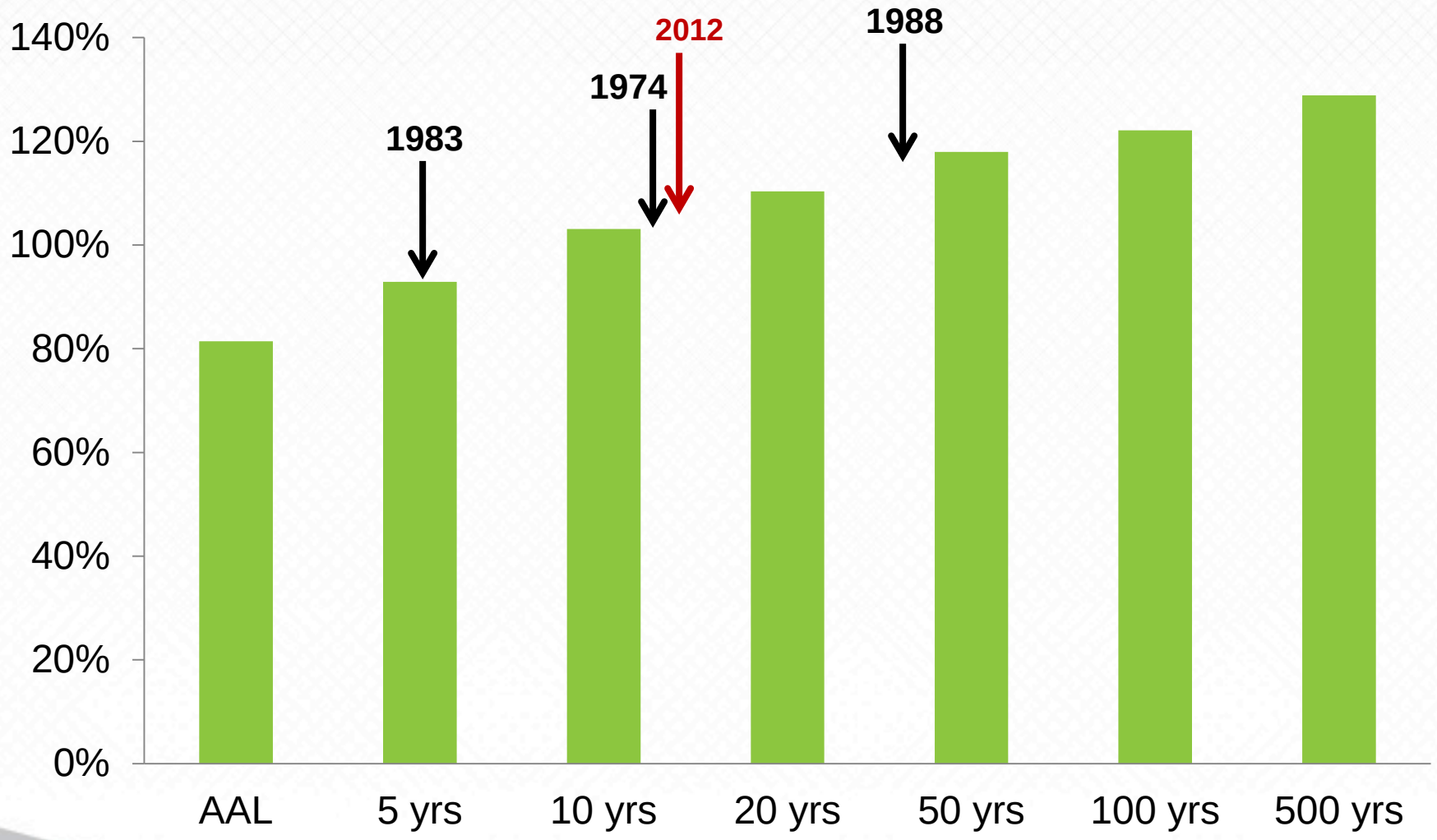
# Return Period of Important Historical Droughts For Industry





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# RMA Summary of Business Report - March 2016

**Federal Crop Insurance Corp**
**Summary of Business Report for 2014 thru 2017**
**As of March 20, 2017**
***(Net Acre and Dollars in Thousands)***

| Combined Business: | 2014 Crop Year To Date | 2015 Crop Year To Date | 2016 Crop Year To Date |
|---|---|---|---|
| Policies with Premium | 1,212,117 | 1,220,026 | 1,176,632 |
| Units with Premium | 2,541,360 | 2,549,138 | 2,441,336 |
| Net Acres Insured | 294,461 | 299,915 | 291,229 |
| Companion/Endorsed Acres | 0 | 6,526 | 5,176 |
| Liability | 109,893,460 | 102,511,135 | 100,453,145 |
| Total Premium | 10,072,221 | 9,764,410 | 9,313,337 |
| Subsidy | 6,214,623 | 6,086,815 | 5,855,940 |
| Indemnity | 9,130,532 | 6,301,043 | 3,499,462 |
| Loss Ratio | 0.91 | 0.65 | 0.38 |


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# AIR CropAlert Growing Conditions Report

AIR

# CropAlert® Growing Conditions Report

- Monthly publication from June to October
- AIR Baseline Yield Projections
- Forecasting adjustments from changing yield and price risks
- Program and Policy Analysis pieces


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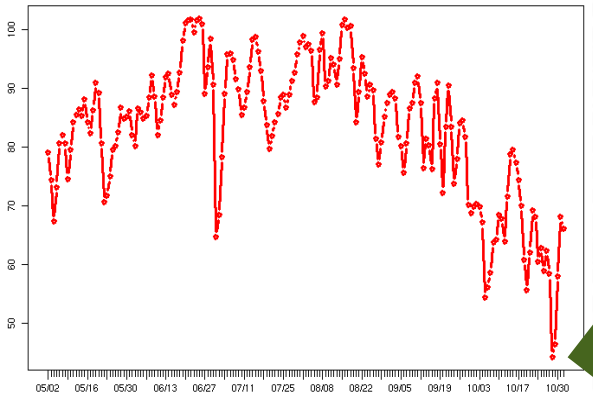
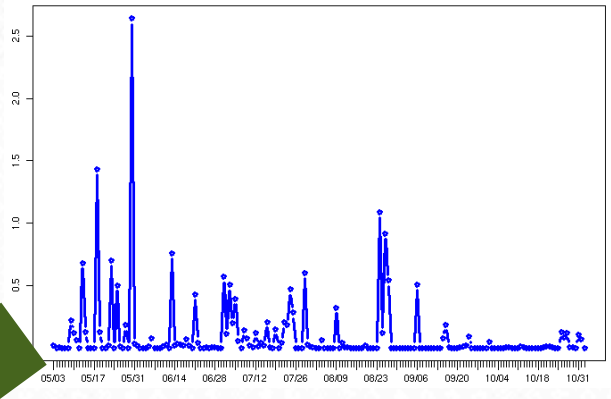
# AWI (Agricultural Weather Index™) Is a Measure of Yield Variability Due To Weather

**Daily Temperature**



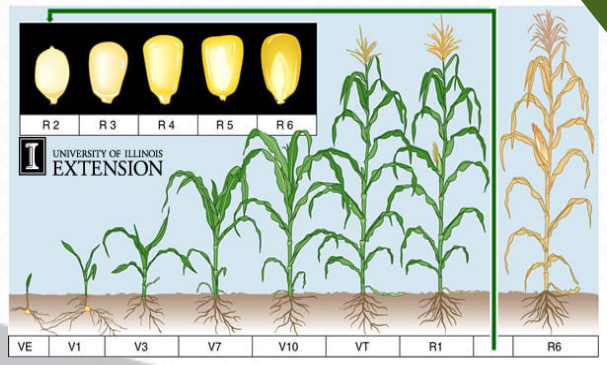

**Daily Precipitation**



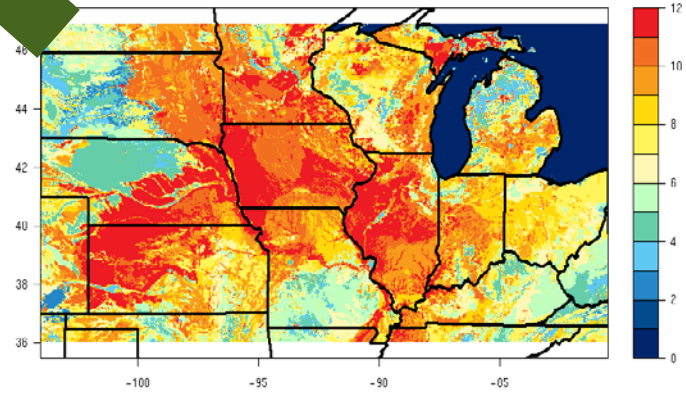

**County-Specific**

**AWI Index**

**Crop Specific Data**




**Available Water Capacity**





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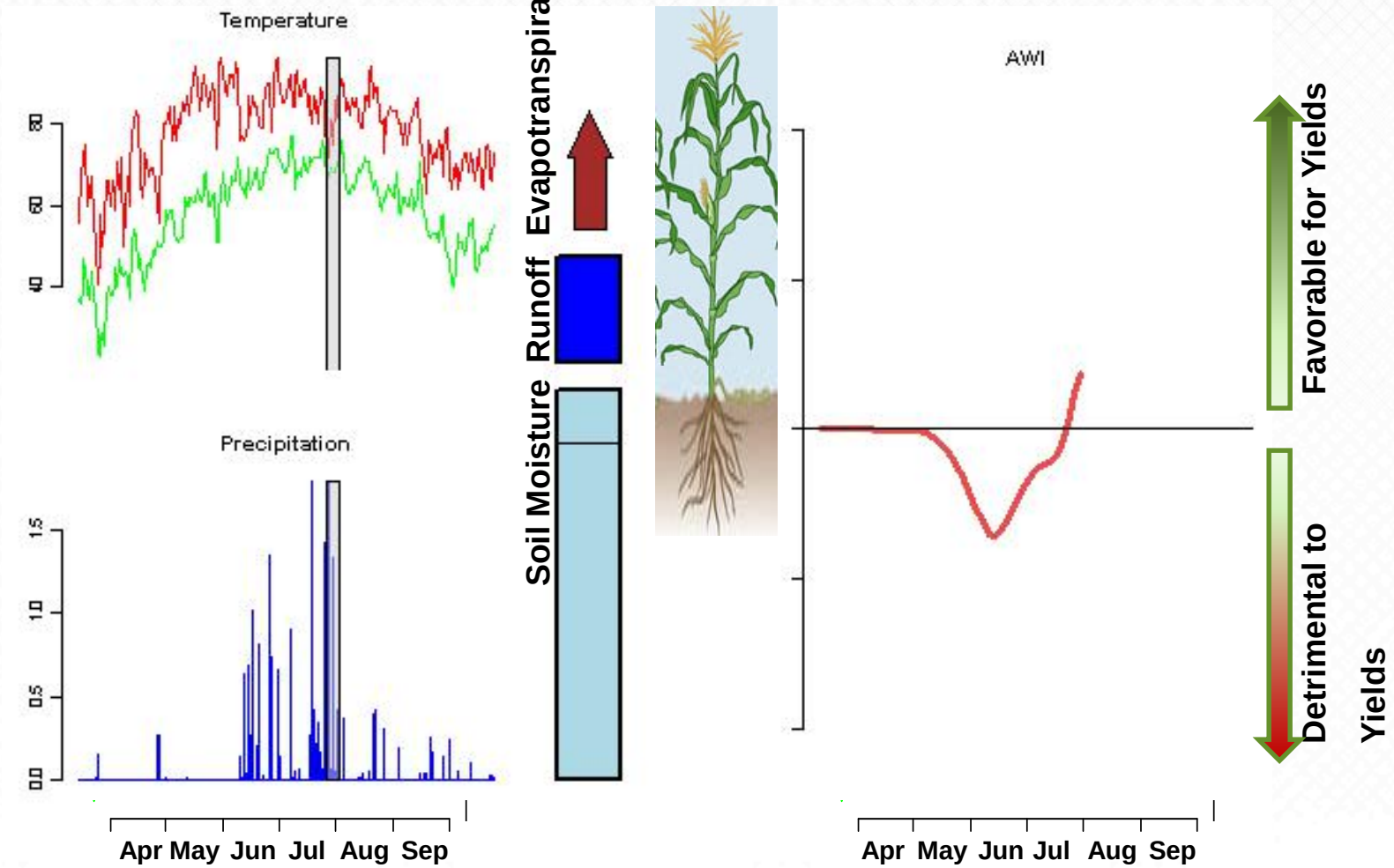
# In a Normal Year, Water Supply and Water Requirements Are Balanced and AWI Indicates Positive Yield Outcome





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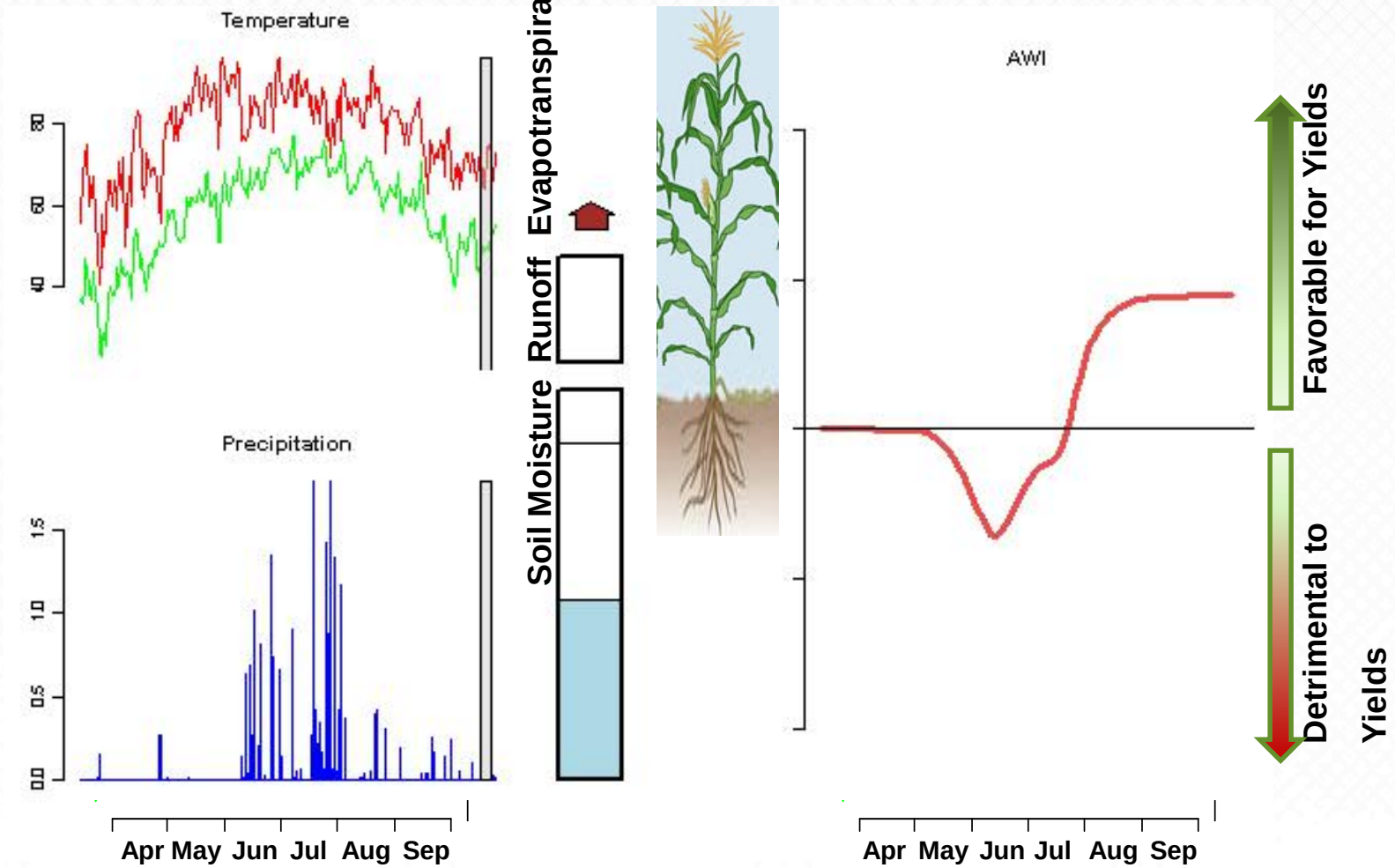



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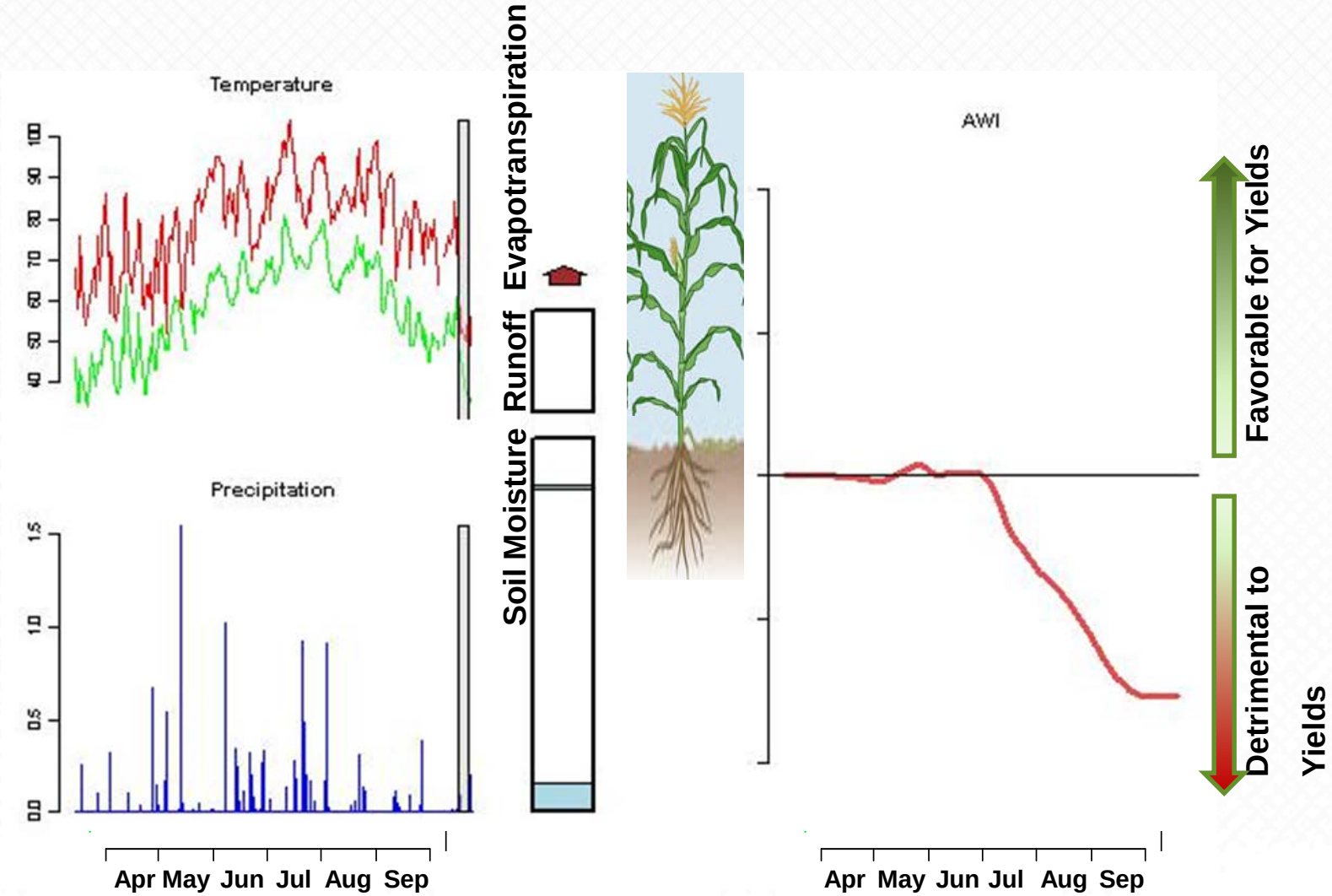
# In a Drought Year, Water Requirements Exceed the Water Supply and AWI Indicates Plant Damage





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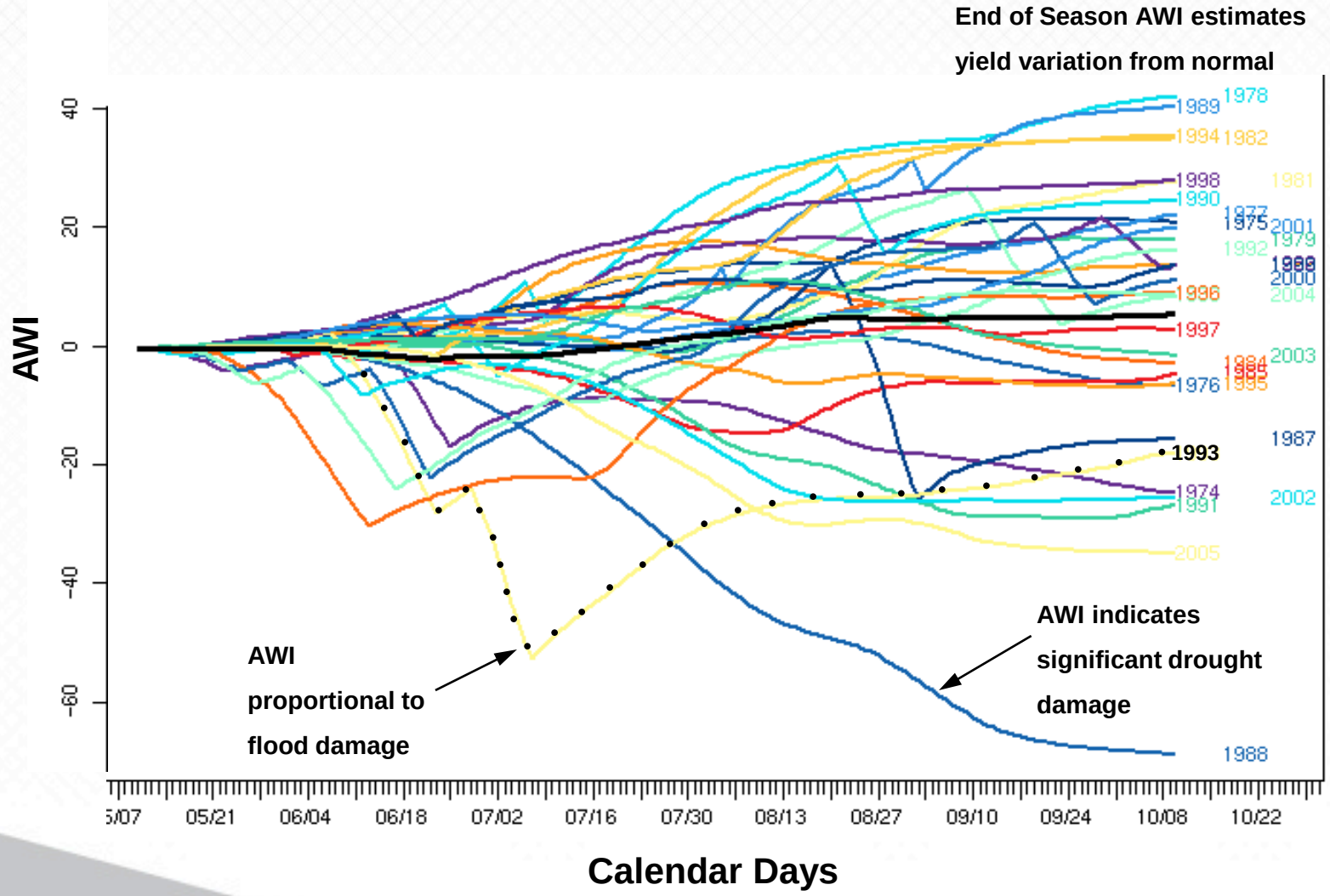
# AWI Indicates County-level Crop Performance During the Season





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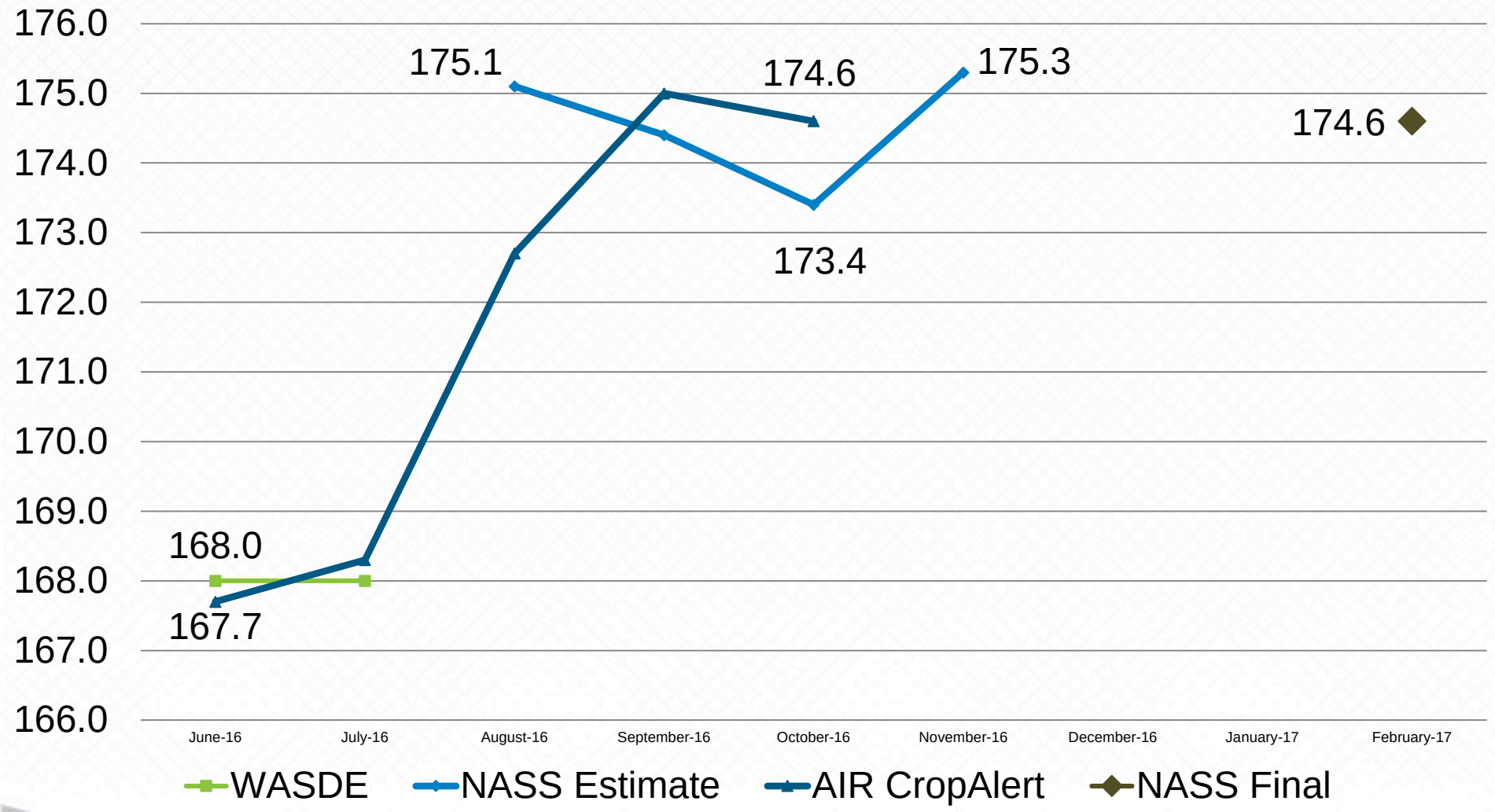
# Comparison of Corn Estimates Over the 2016 Season from AIR, WASDE and NASS





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# In the October 2016 CropAlert Publication AIR Published Yield Estimates for the Season

| Yields | Corn | Soybeans |
|---|---|---|
| AIR Baseline Yield (June, 2016) | 167.7 bu/acre | 46.5 bu/acre |
| AIR Final Estimate (October, 2016) | 174.6 bu/acre | 49.1 bu/acre |
| NASS Initial Yield (August, 2016) | 175.1 bu/acre | 48.9 bu/acre |
| NASS Final Yield (February, 2017) | 174.6 bu/acre | 52.1 bu/acre |


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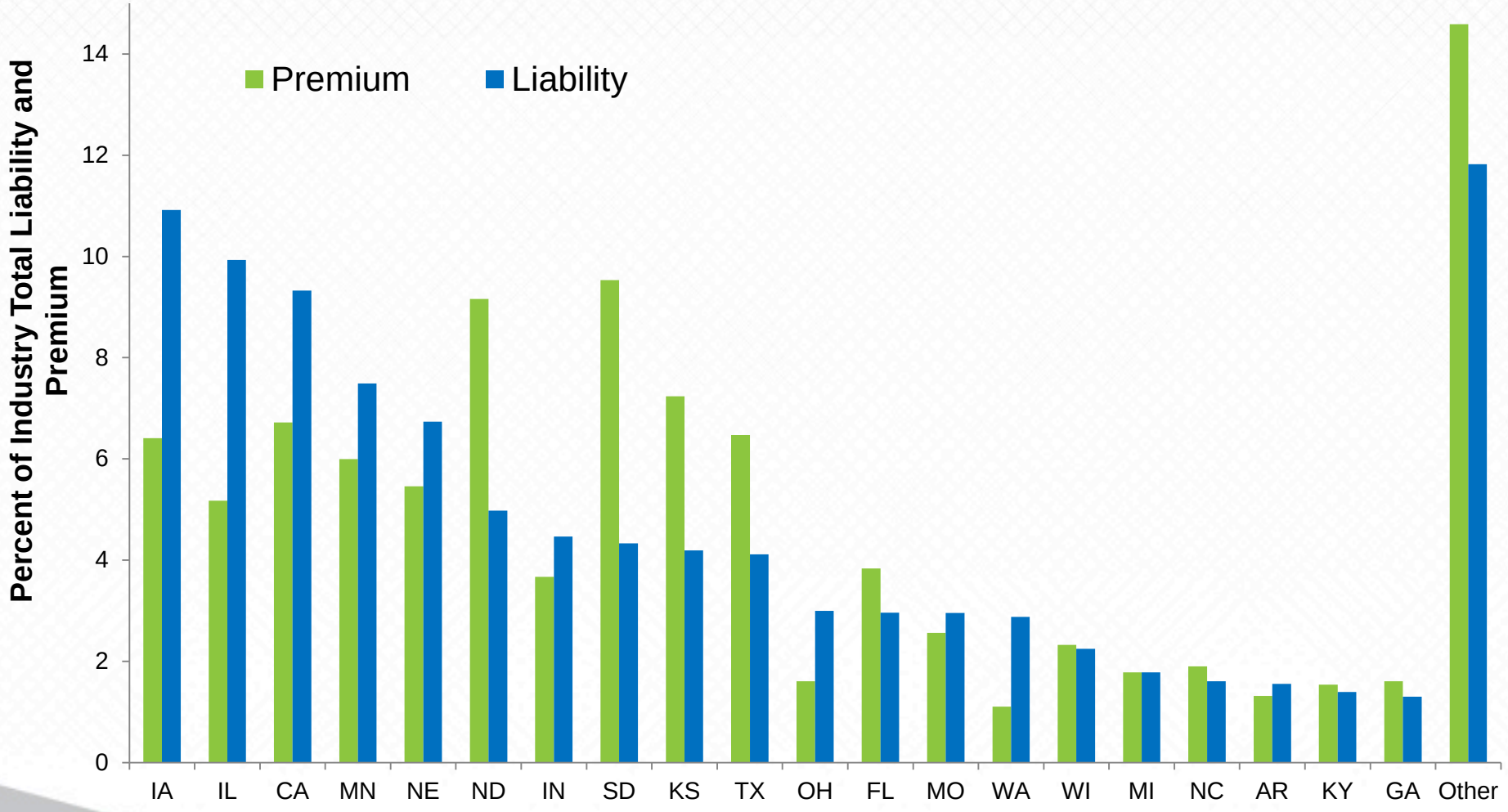
# RMA Rate Changes from 2016 to 2017

AIR

# 2016 Breakdown of Industry Liability and Premium Reveals Overall Crop Risk by State

**Total Industry Liability: $100.4 B**

**Total Industry Premium: $9.3 B**





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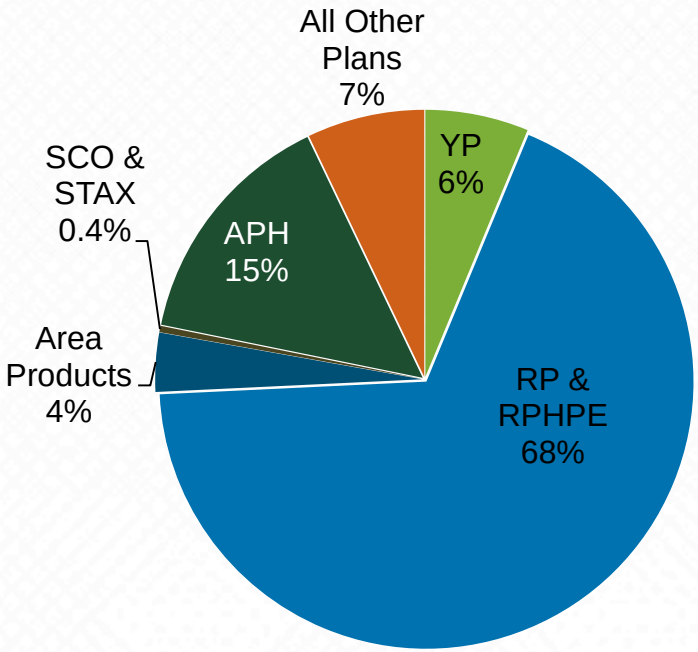
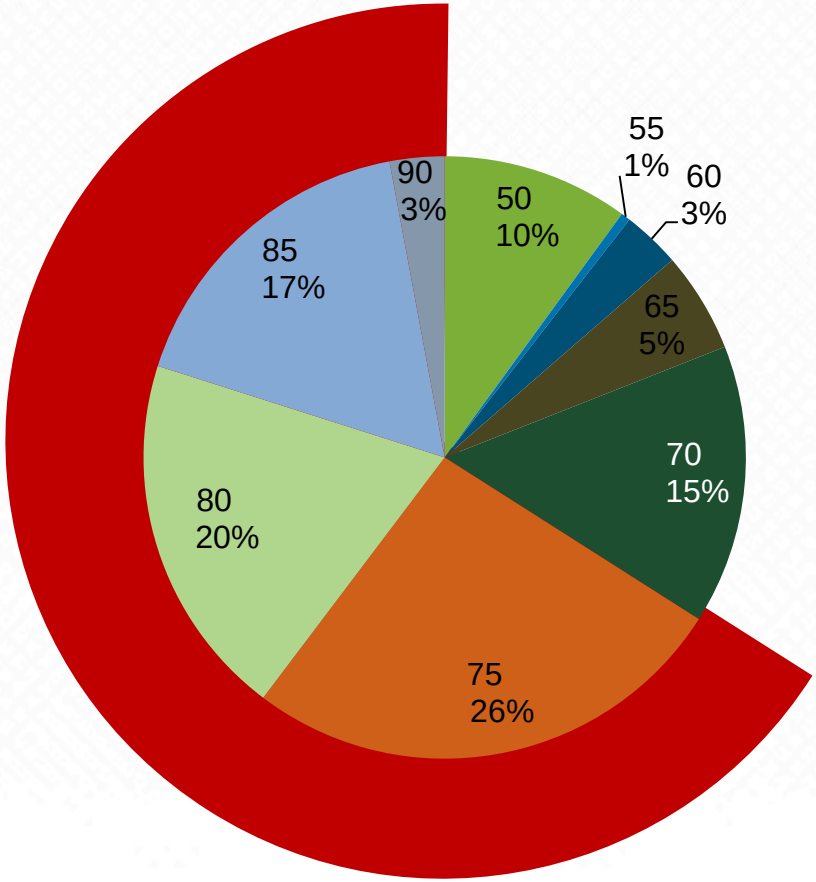
# Revenue Products with Coverage Levels of 75% and Greater Are the Majority of Industry Premium in 2016

## By Insurance Plan




## By Coverage Level





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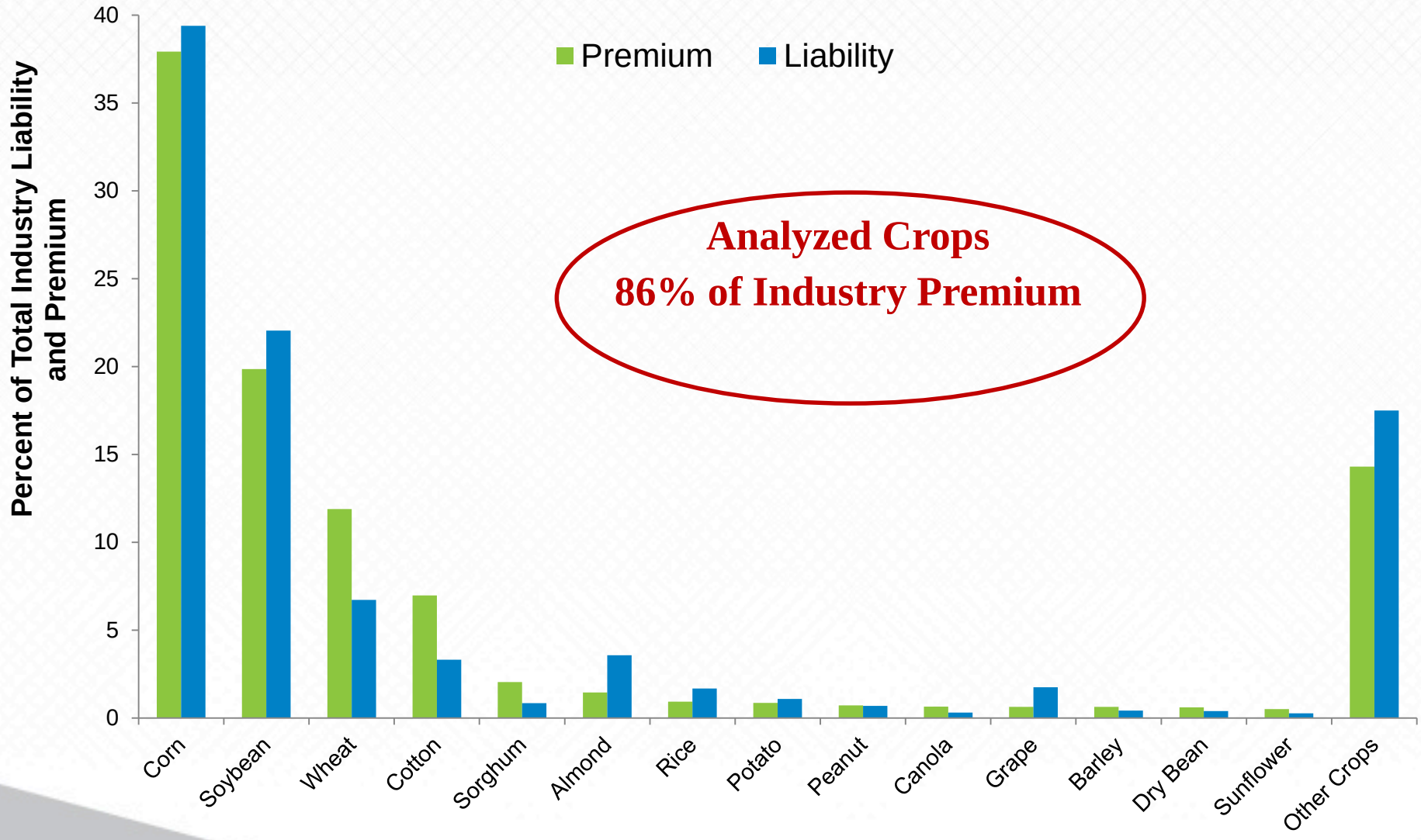
# Rate Study Performed on Top 14 Crops Covers 86% of Total Industry Premium





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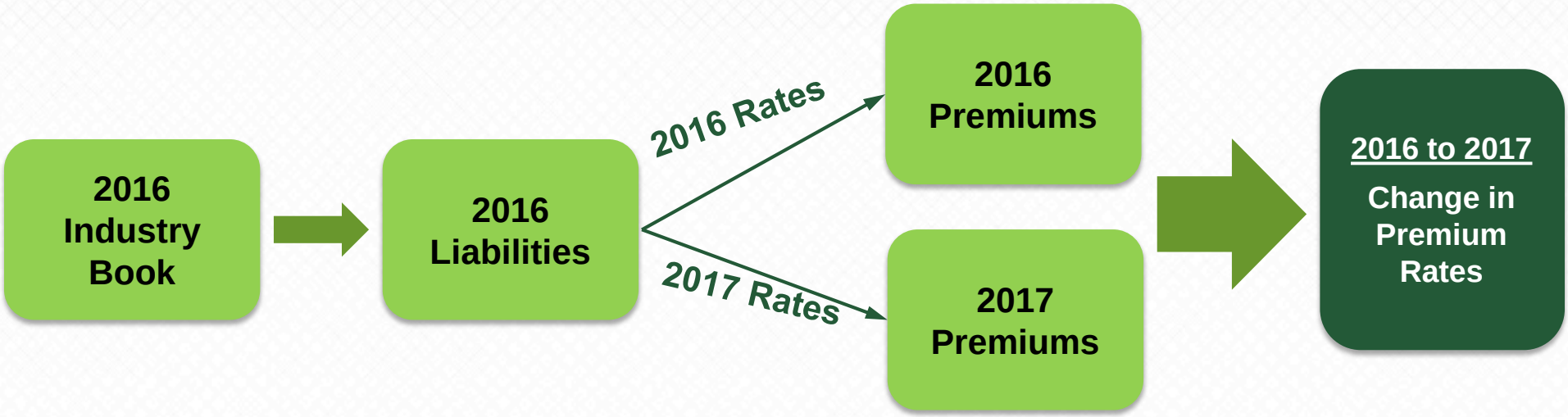
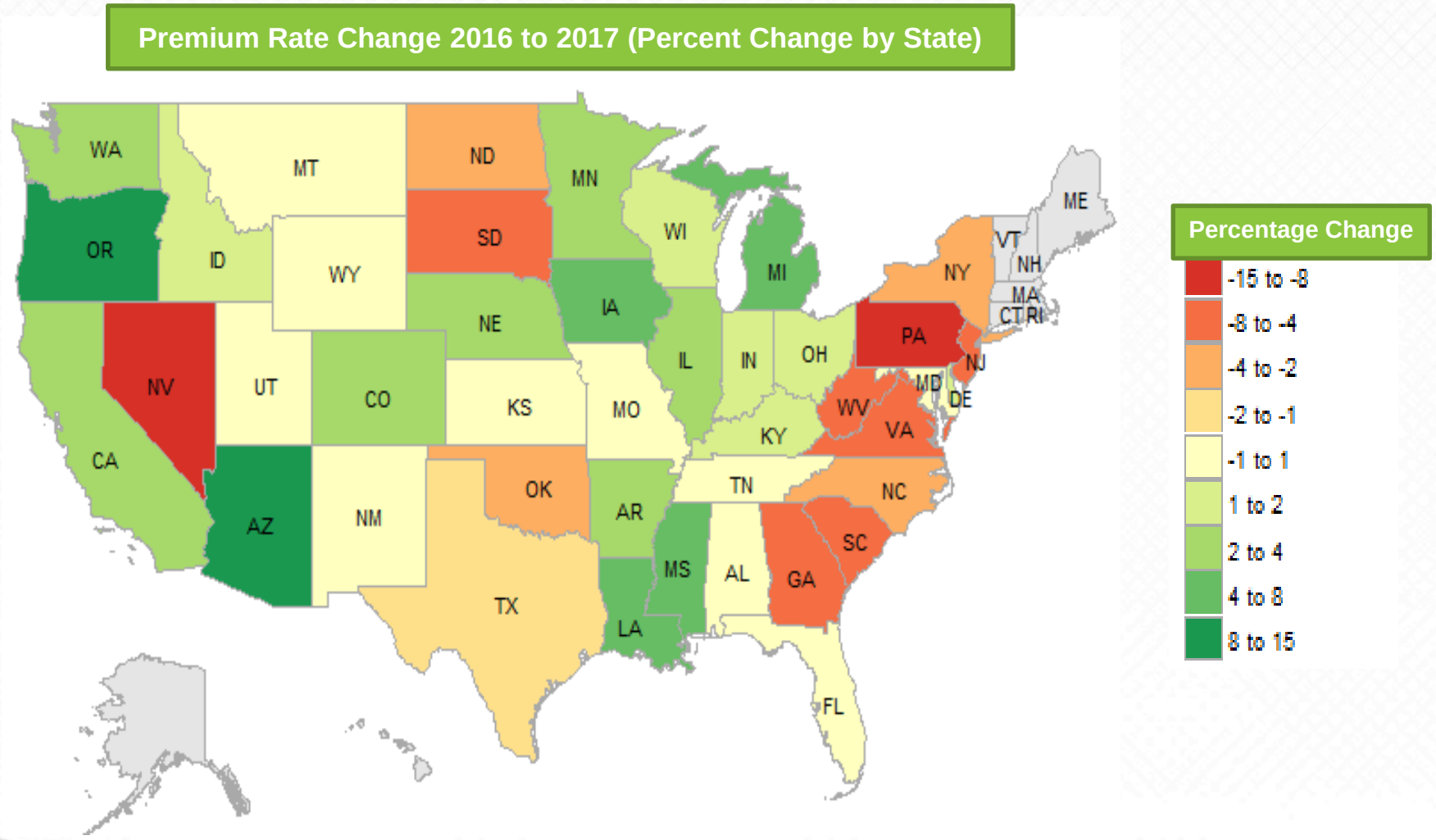
# Keeping Liabilities, Prices, and Volatility Constant Allows Pure Rate Change Analysis




- Fourteen major crops:  corn, soybean, wheat, cotton, sorghum, almonds, barley, grapes, potatoes, peanuts, rice, sunflowers, canola, dry beans
- Hypothetical industry book of business: all insurance policies that were written in 2016
- Constant “price” and “volatility”: focus on pure change in “premium rates”
- Assumptions were made about “type,” “practice,” “unit structure,” and “insurance option” to build the industry book: the actual result for a specific company could be different
- “Unit structure” and “insurance option” assumed based on available historical experience

# Premium Rate Change by State from 2016 to 2017 Reveals Geographic Pattern





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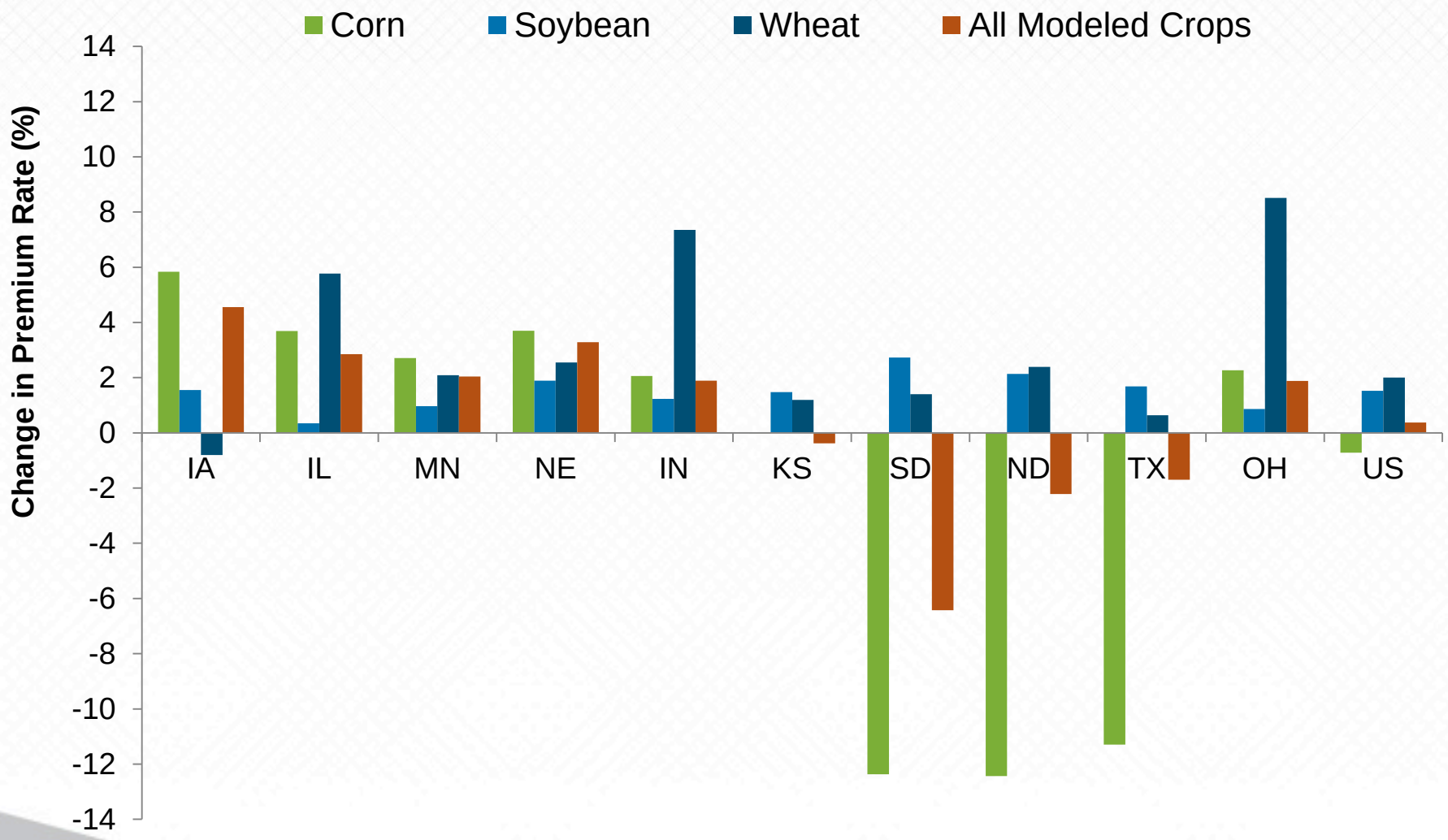
# Premium Rate Change by State from 2016 to 2017 Reveals Crop-Specific Pattern





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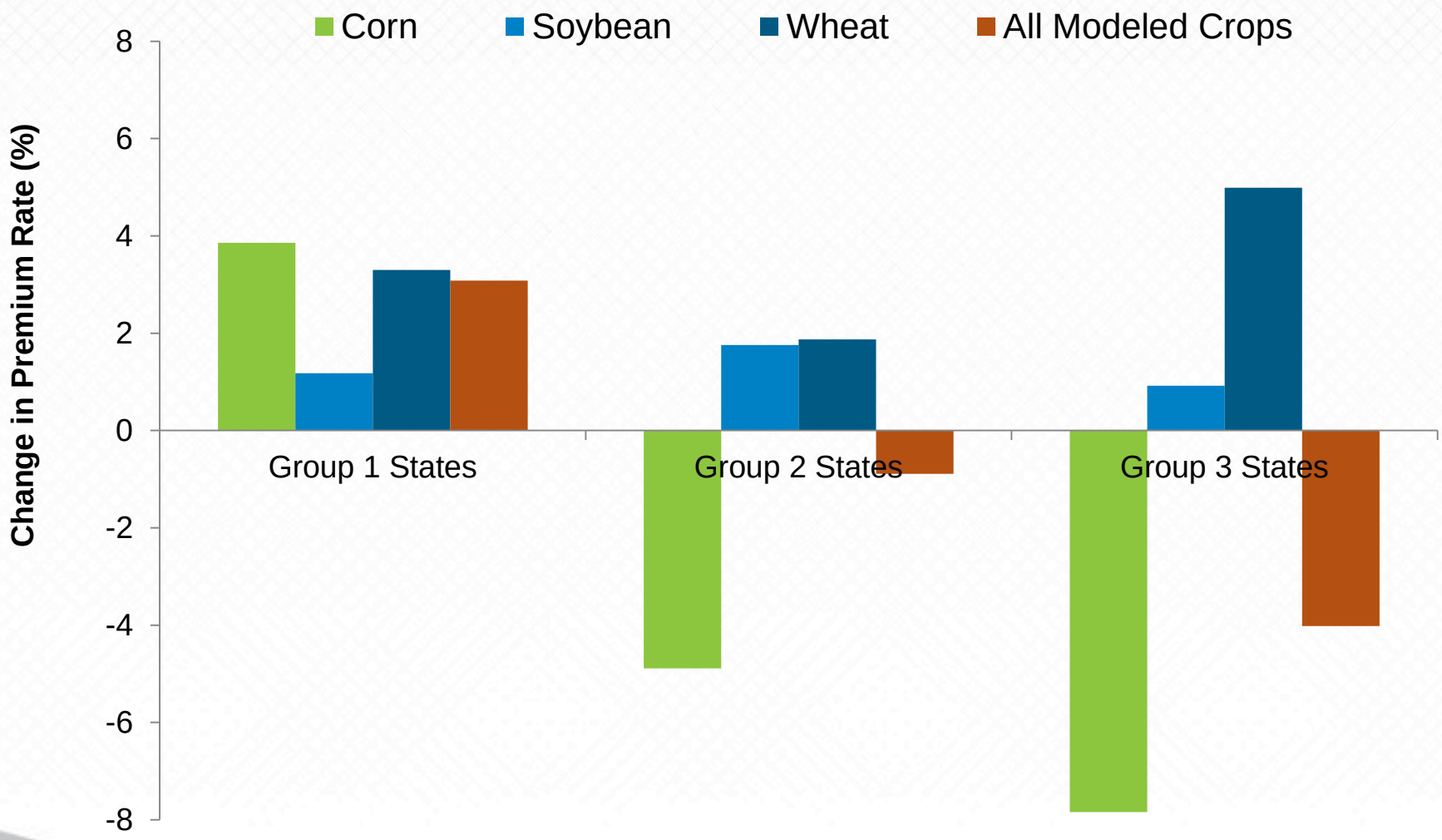
# Group 2 and 3 States Have Significant Rate Reductions for Corn





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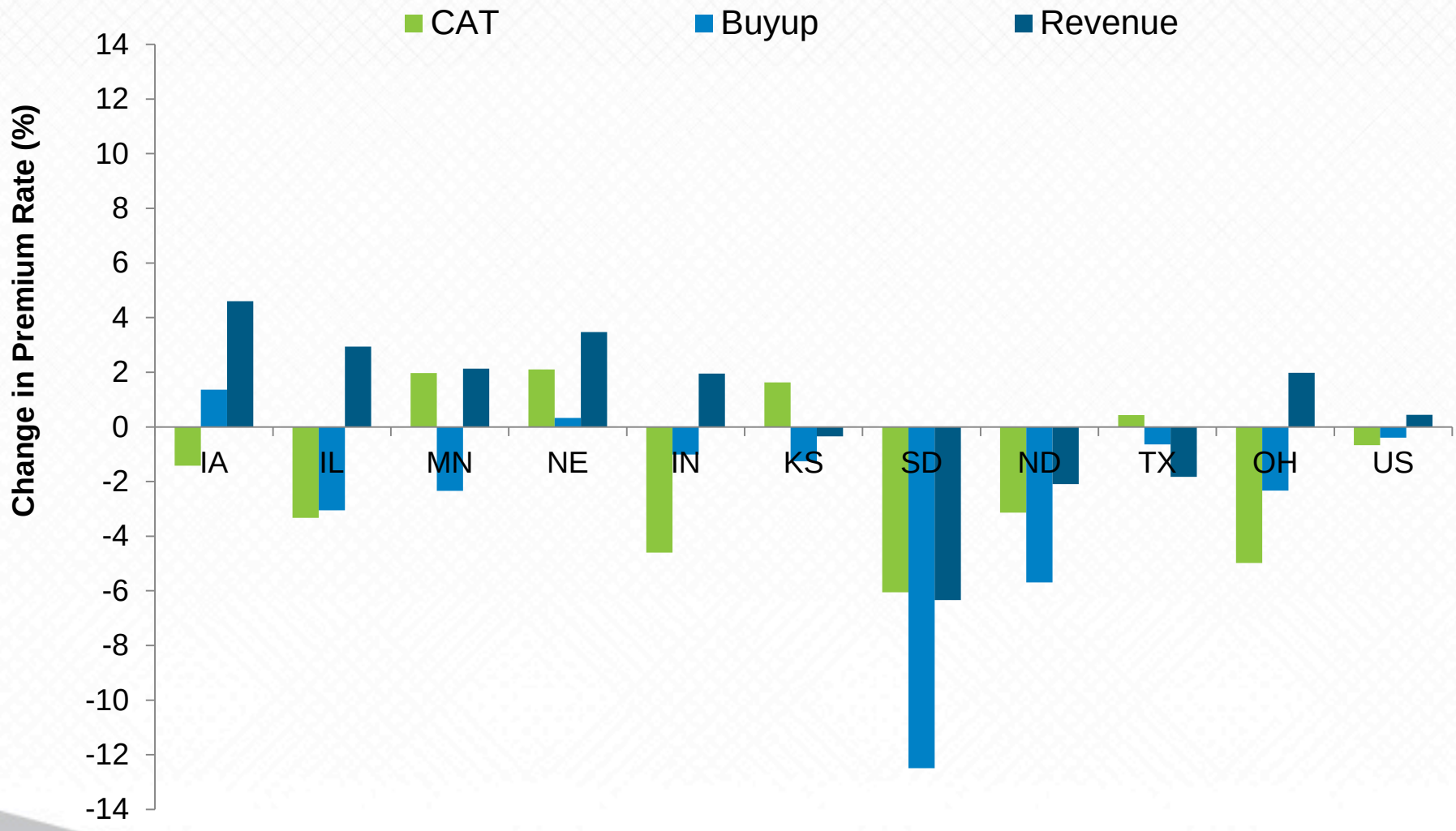
# The Dakotas Experienced Major Rate Reductions for Buyup





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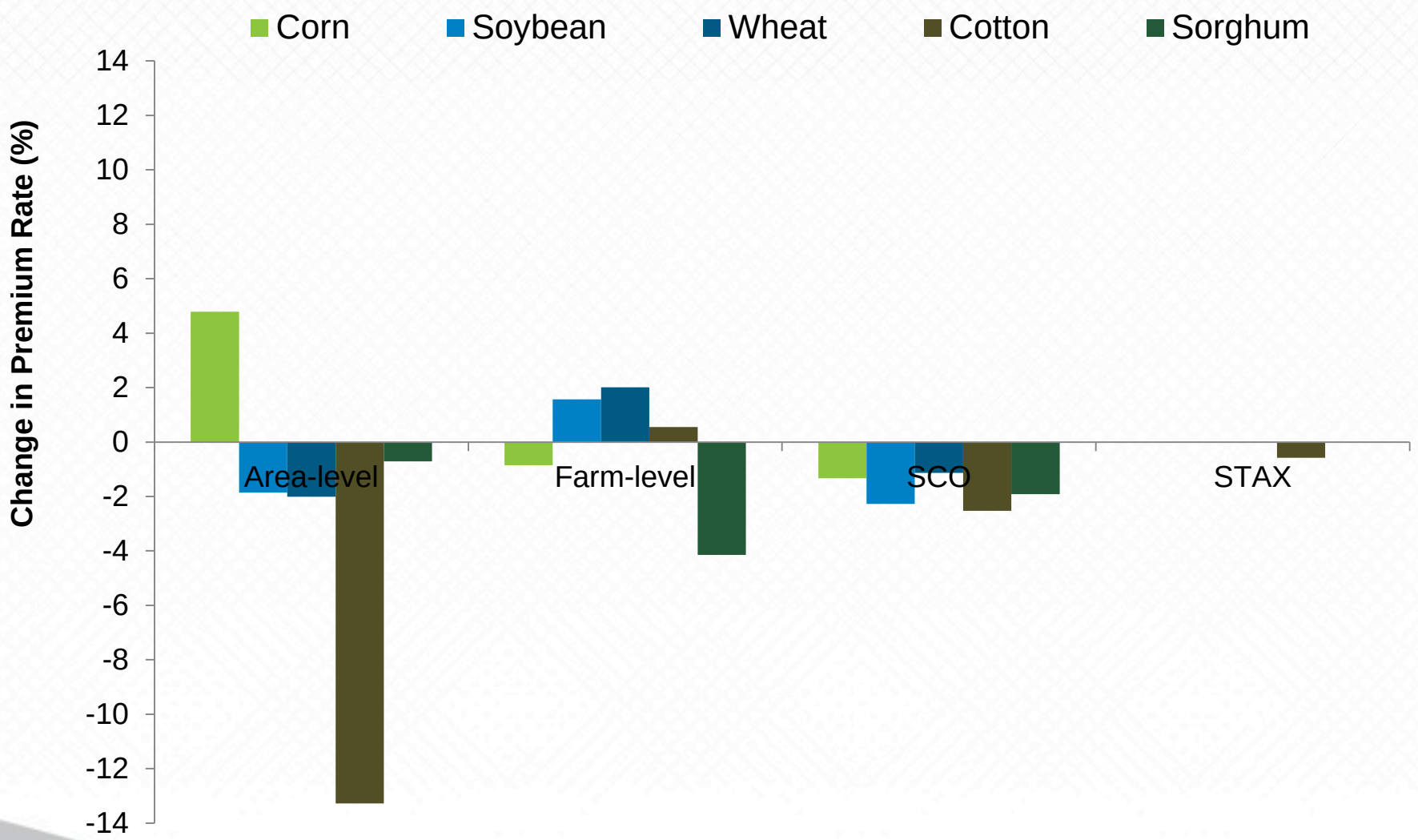
# Premium Rates Have Increased for Area-Level Corn Products, Decreased for SCO and STAX





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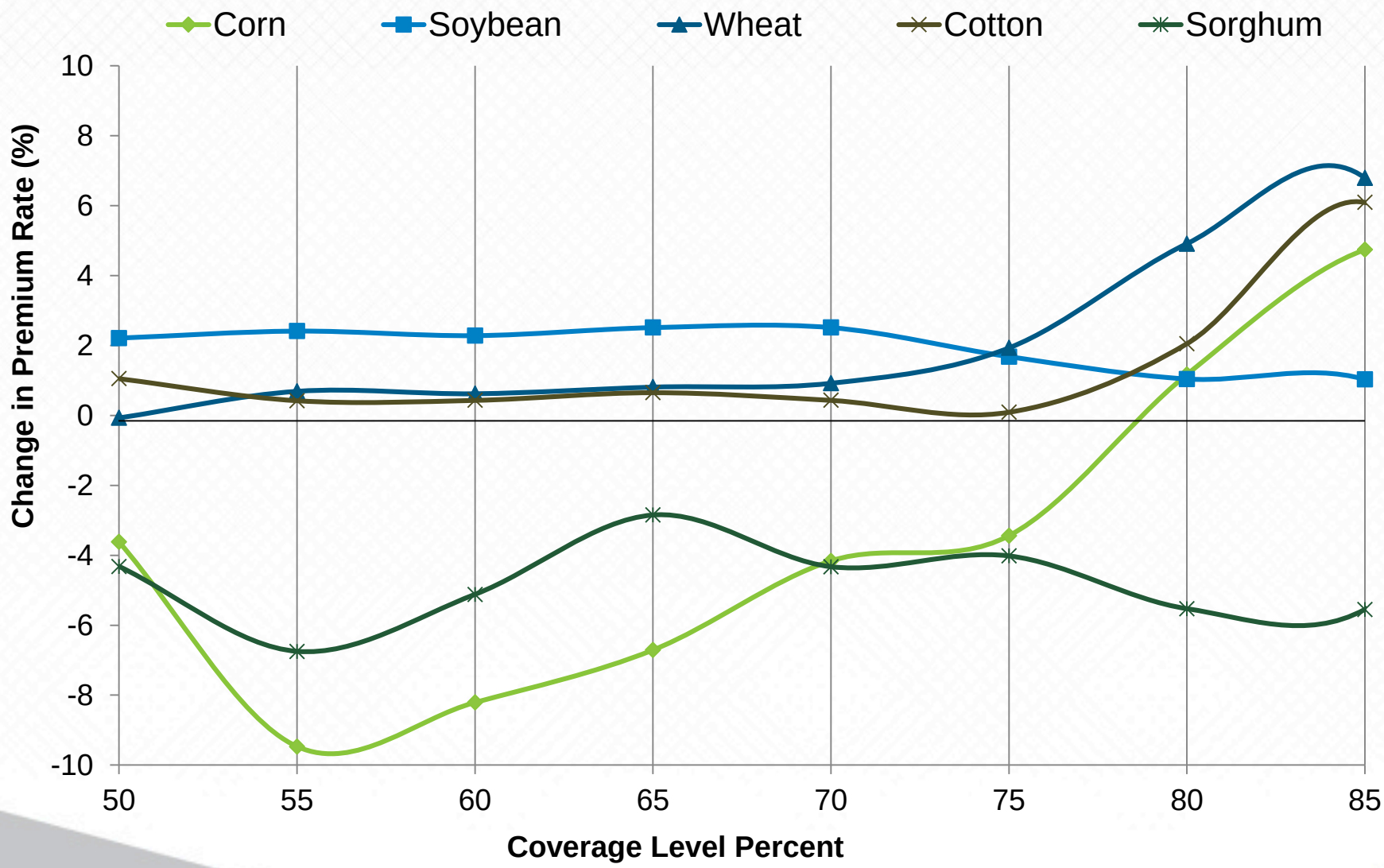
# Corn and Sorghum Premium Rate Reduction is More Significant at Low Coverage Levels





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# Other External Factors Affect the Change in Final Premium Rates

- Price volatility
- Change in producers' choices of coverage level
- TA and YE options → higher "effective" coverage levels
- Unit structure → EU vs. OU/BU
- Crop rotation and varying acreage over time


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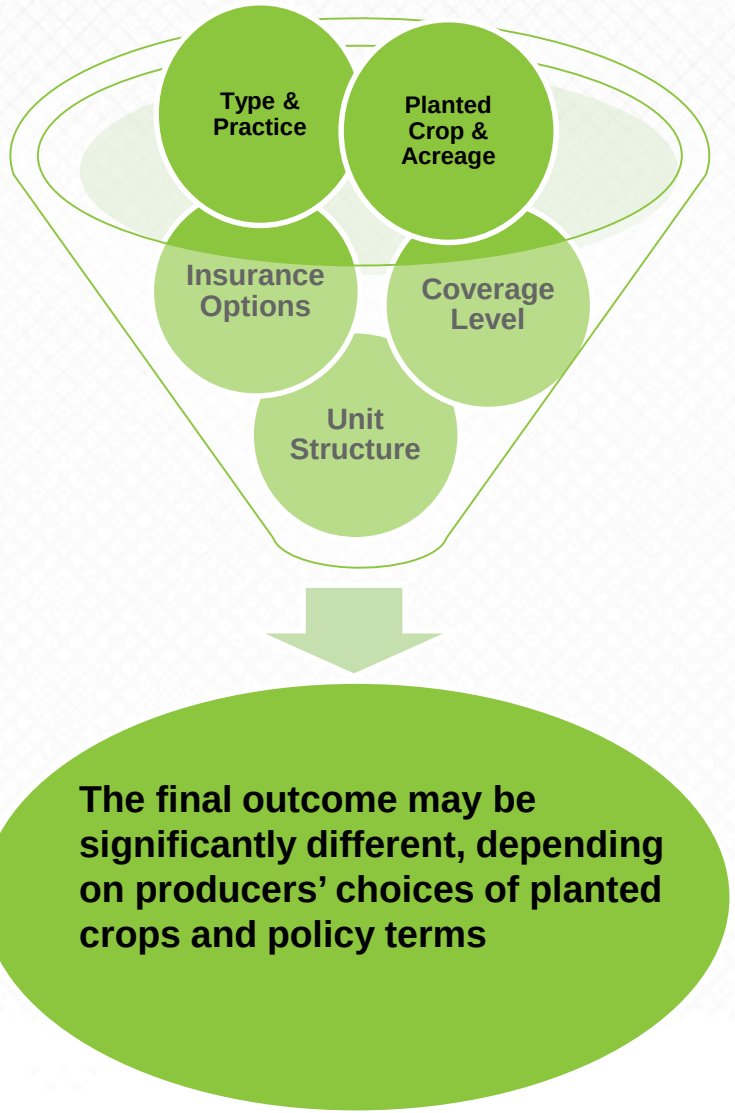
# Rerating Summary

- The analysis assumed no change in exposure, price, and volatility from one year to another
- The results of this analysis can be used to estimate changes in profitability
- Everything else remaining the same, the rate changes are expected to slightly reduce the overall industry gross loss ratio for the selected crops by about 0.4%





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# Summary

- The Industry performed well in 2016
- Corn and soybean yields were record highs. Prices were still favorable, although corn saw a price decrease.
- AIR CropAlert will continue to track and estimate final yields from current growing conditions in 2017. Look for more research discussion on what is happening for both yields and prices.
- Premium rerating was favorable with an aggregate estimated impact of 0.4% on the gross loss ratio under 2016 assumptions.


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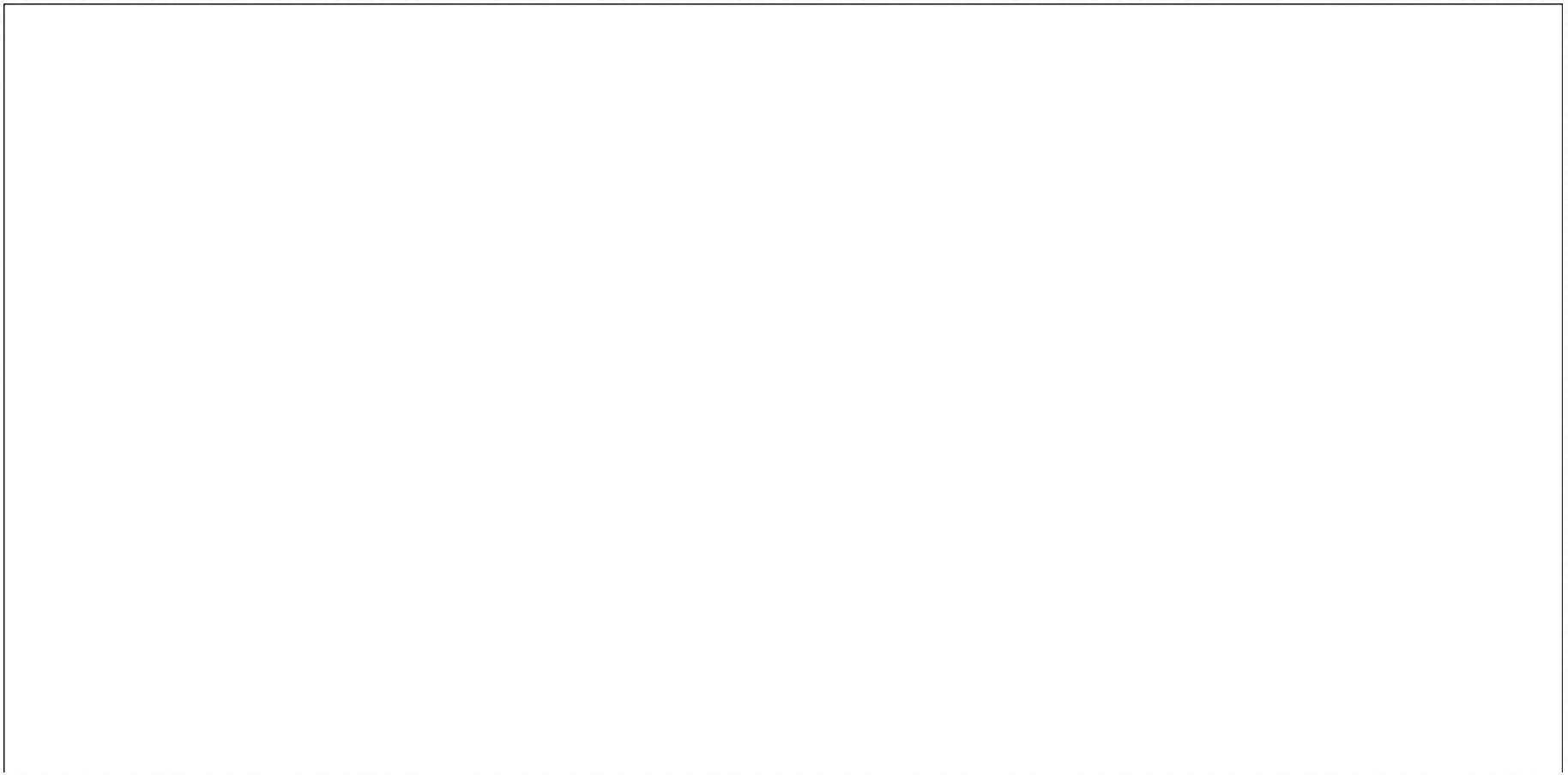
# Provisional Roadmap for Crop Models

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**http://airww.co/CropSymp17**