Climate Change and Crop Insurance in the United States

OECD-INEA-FAO Workshop on Agriculture and Adaptation to Climate Change

June 201(

Outline

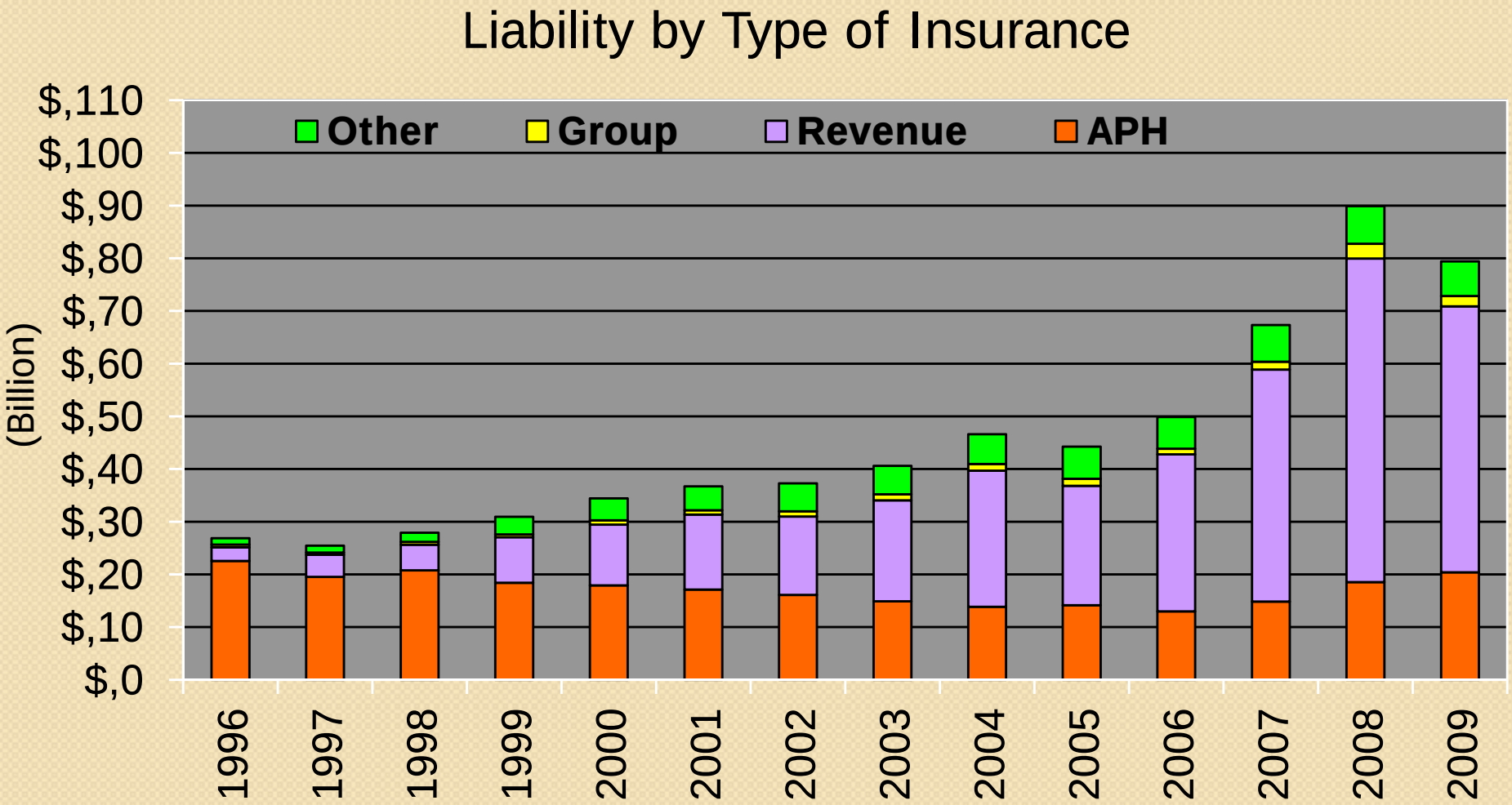
- Overview of U.S. crop insurance program
- Historical loss experience
- Impacts of climate change on crop insurance
- Crop insurance and adaptation

Crop Insurance Program

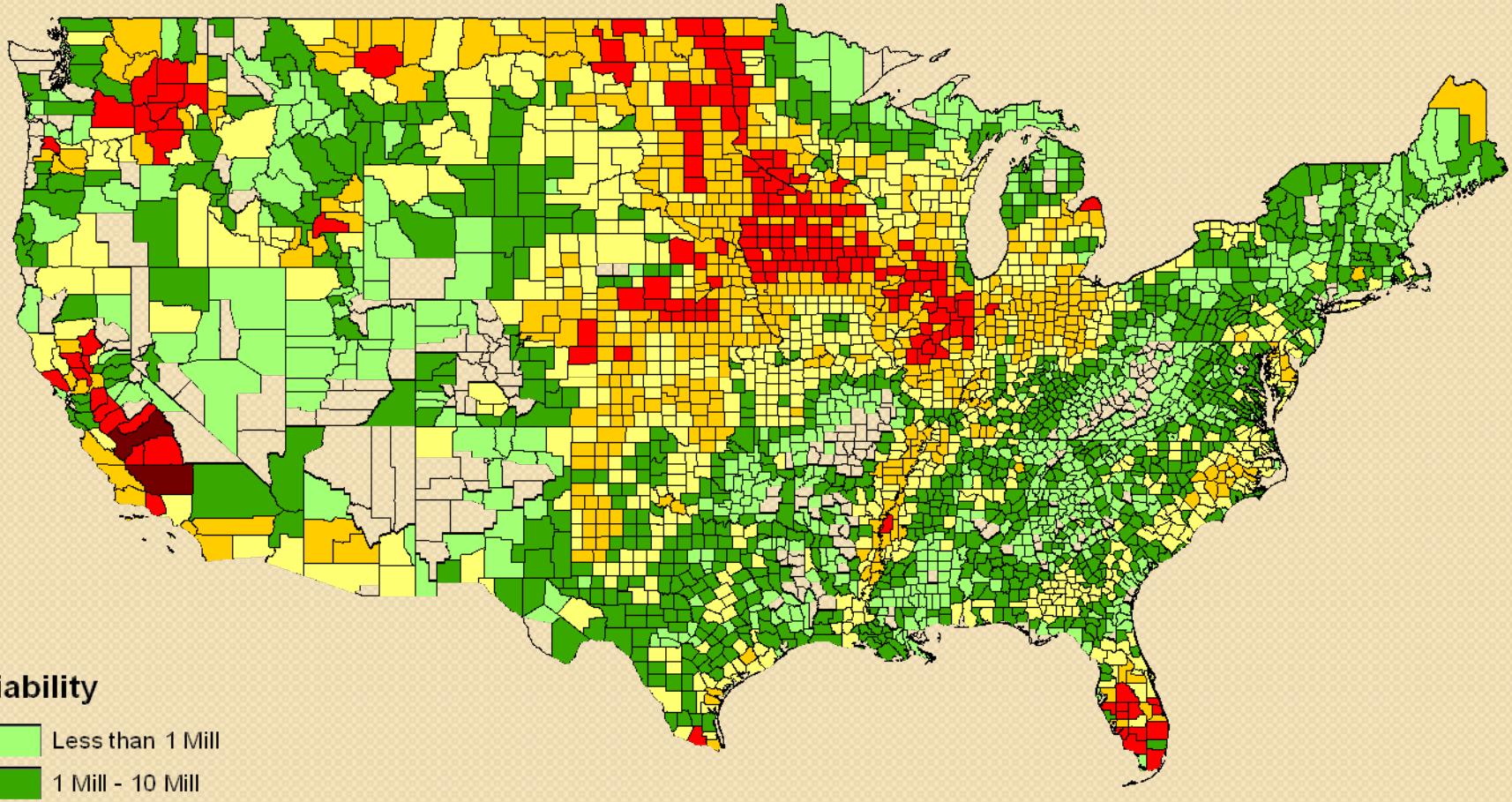
- Federal Crop Insurance Corporation (FCIC)
  - Develops or approves insurance policies
  - Generates premium rates
    - Premium rates are subsidized
  - Provides operating subsidy to crop insurance companies
  - Provides reinsurance to companies

- Crop Insurance Companies
  - Market and service insurance policies
  - Adjusts losses

Types of Insurance



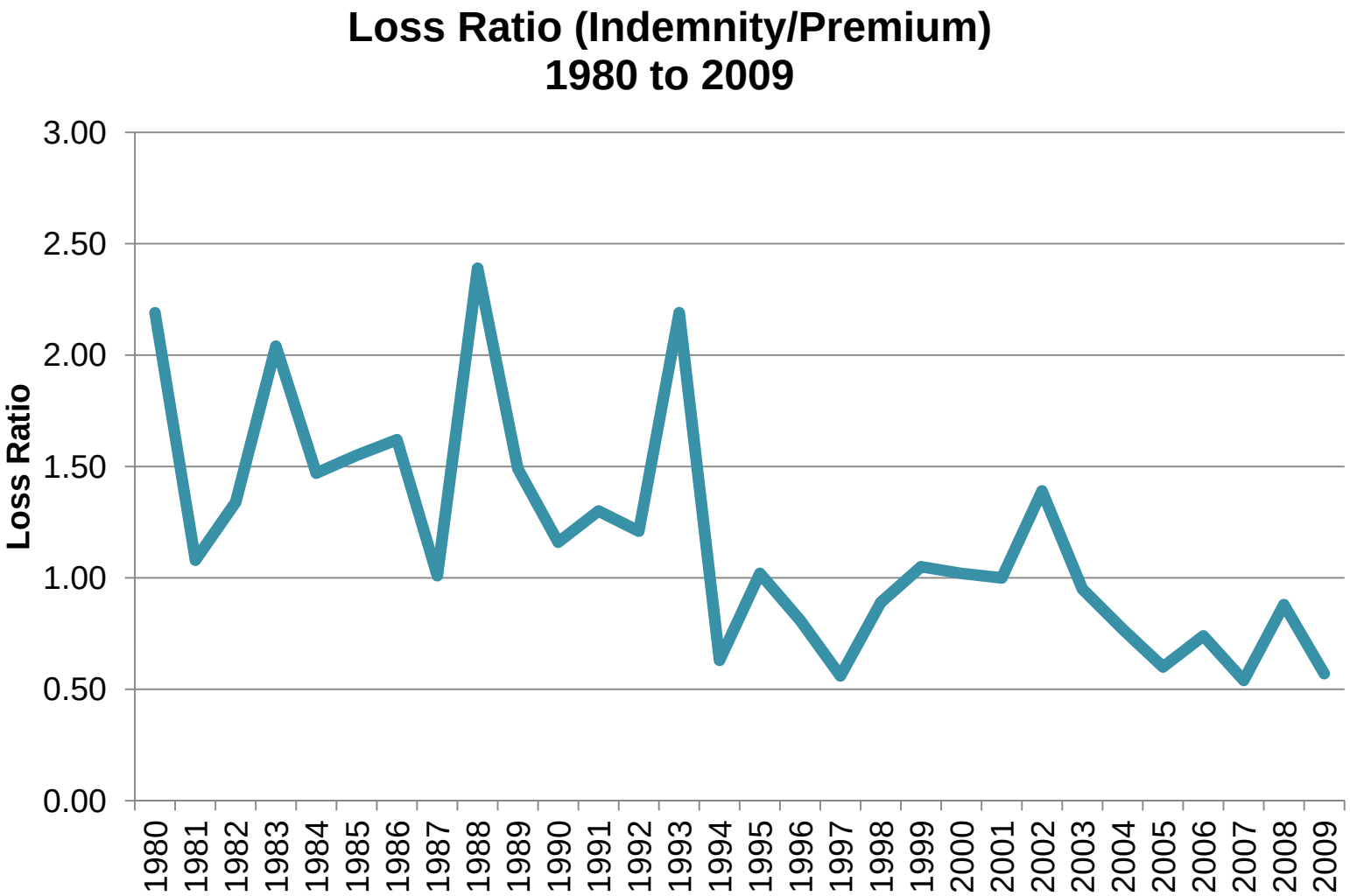
2009 Total Liability All Crops



Cause of Loss

- Drought 40%
- Excess Moisture 25%
- Hail 5-10%
- Hurricane 5%
- Excess Heat <5%
- All Other Causes 20%

Historical Loss Experience



Climate Change and Insurance

- Study of climate change and crop insurance
  - Research Triangle Institute (RTI)
  - Potential financial impact of climate change on crop insurance companies and FCIC

Overview of Model

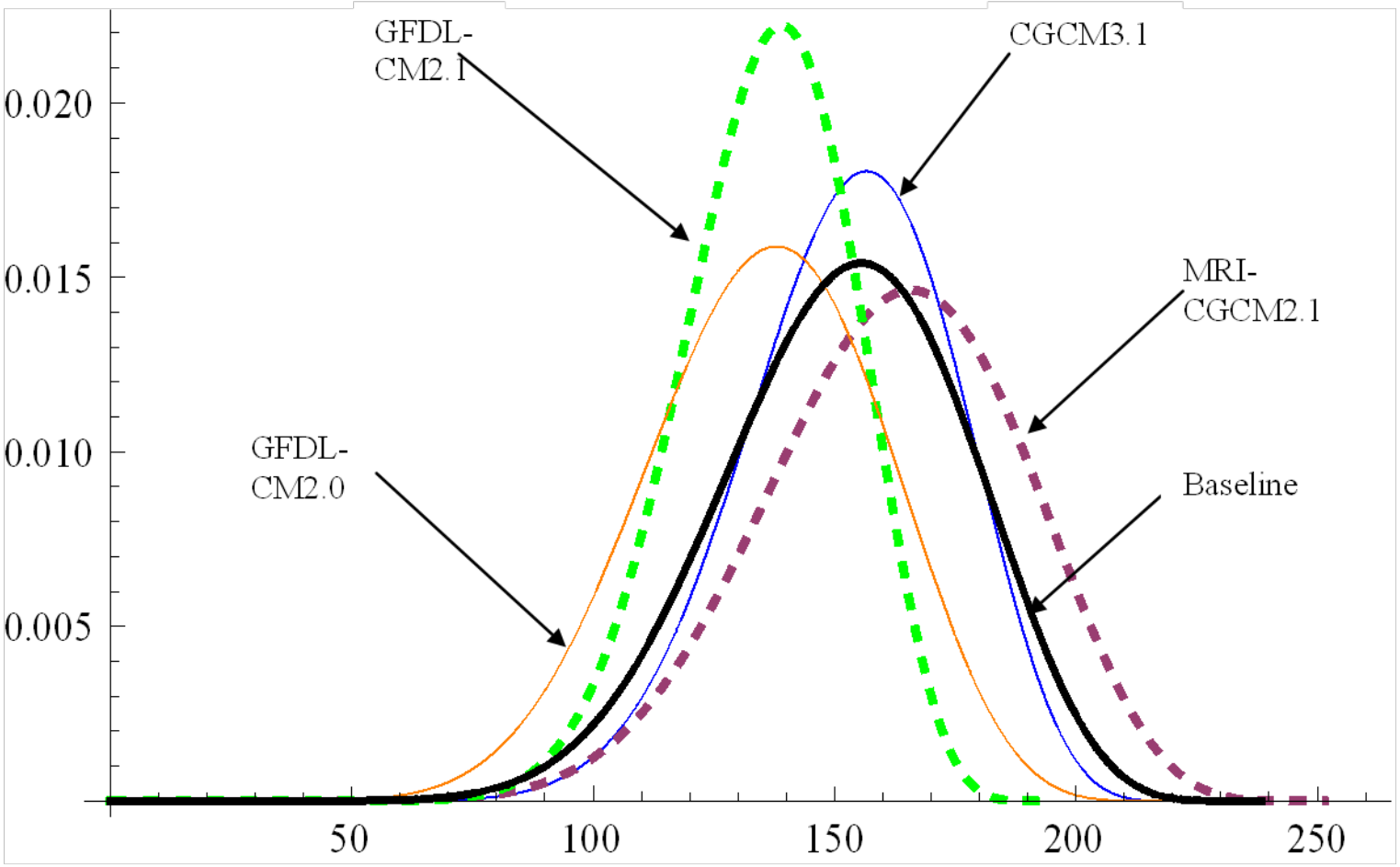
- IPCC Climate Scenario A1B
  - Rapid economic growth and technological improvements
  - Balanced growth in energy use across alternative energy sources
- Global Circulation Models
  - GFDL-CM2.0 and GFDL-CM2.1 models developed by the Geophysical Fluid Dynamics Laboratory (GFDL), USA
  - Coupled Global Climate Model (CGCM) 3.1 developed by the Canadian Centre for Climate Modeling and Analysis, Canada
  - Meteorological Research Institute (MRI) coupled atmosphere-ocean General Circulation Model (CGCM) 2.2 developed by the Meteorological Research Institute, Japan Meteorological Agency, Japan

Overview of Model

- Environmental Policy Integrated Climate (EPIC) model
  - Uses GCM output to estimate crop yield effects
- Forest and Agricultural Sector Optimization Model (FASOM)
  - Assess market outcomes given yield effects
- Actuarial Model
  - Assess change in yield distributions

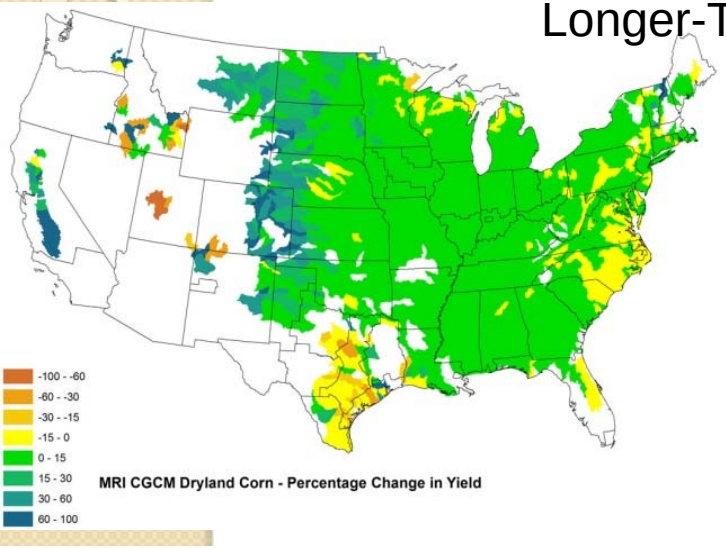
Overview of Model

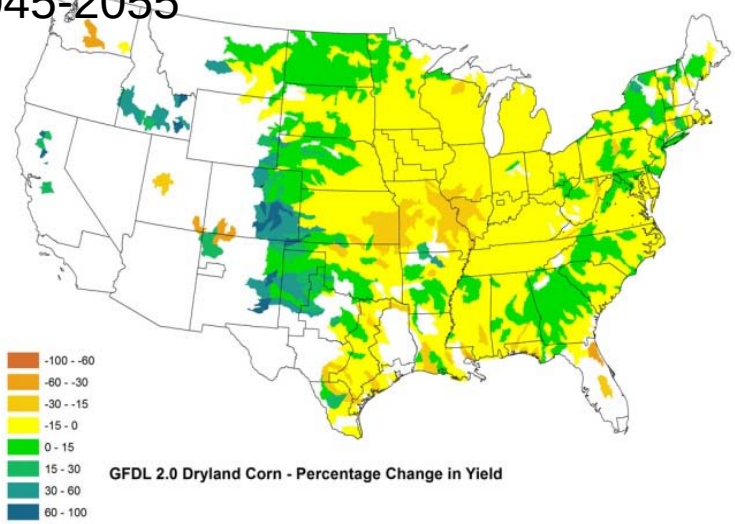
Simulated Changes in the Yield Distribution of Corn in Woodbury County, IA under Climate Change Scenarios Considered

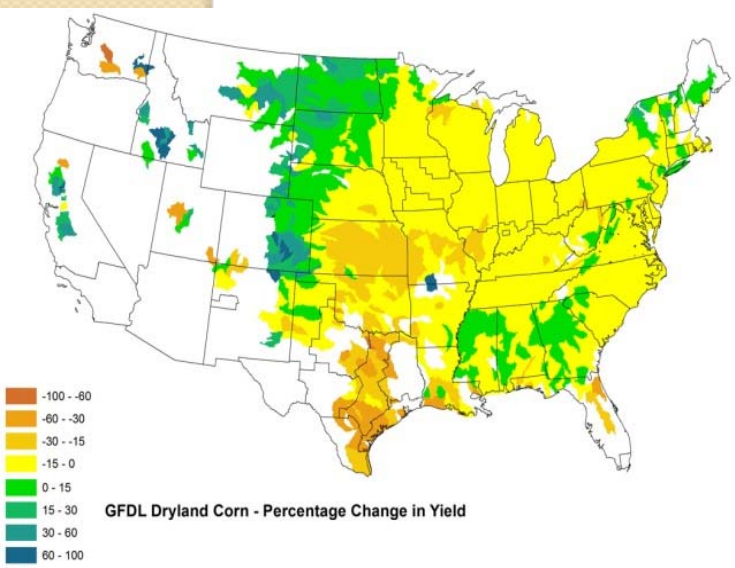


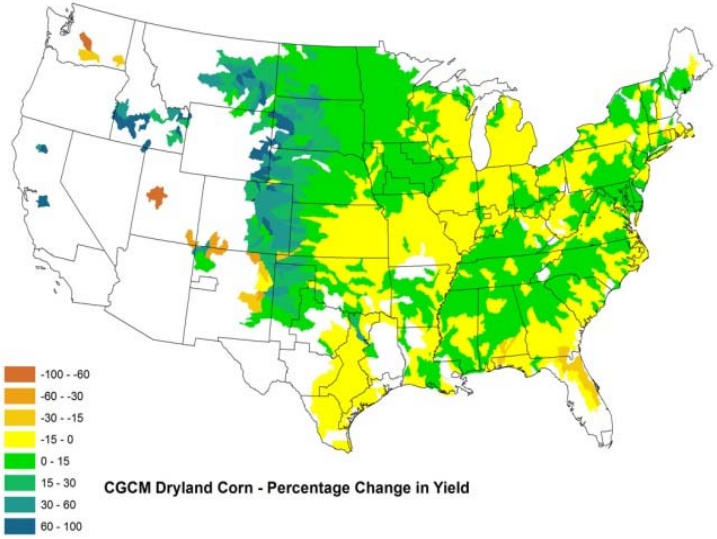
Impacts of Climate Change

Percentage Change in Dryland Corn Yields under the GCMs Simulated for the Longer-Term Using EPIC, 2045-2055



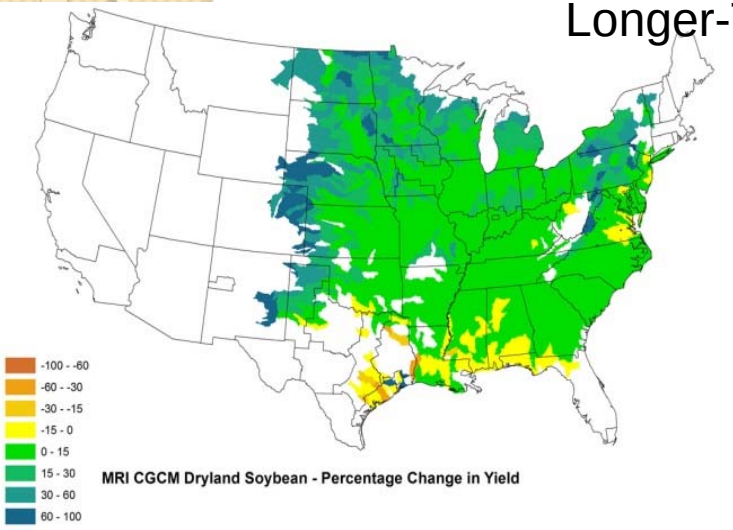


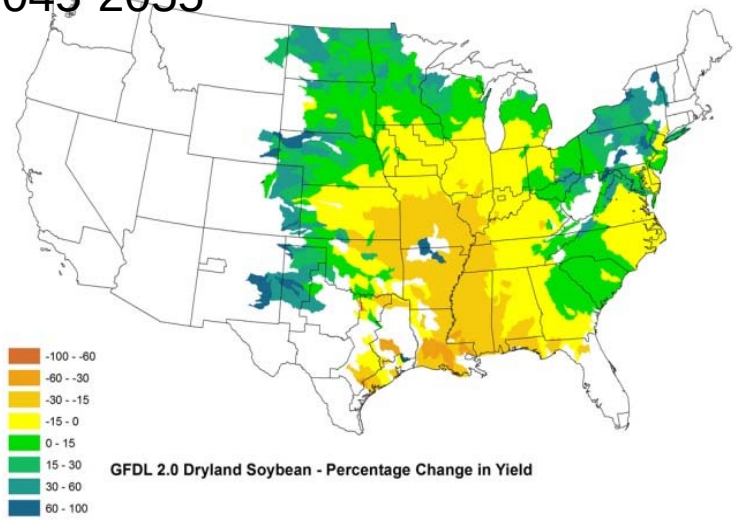


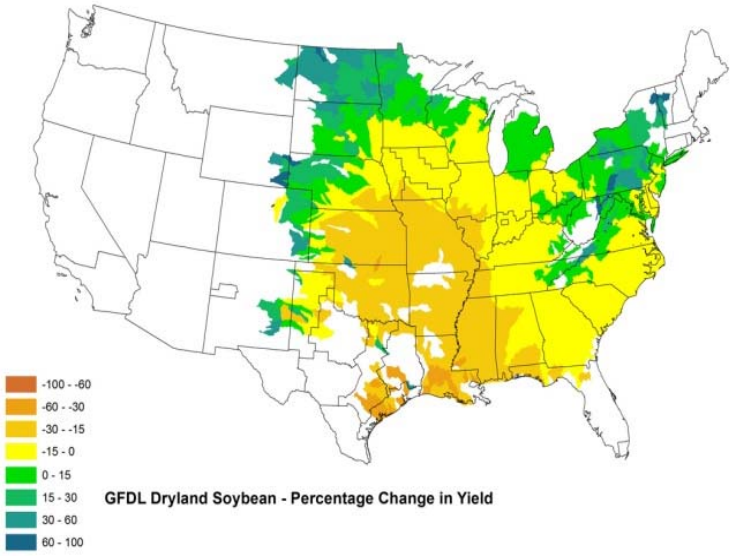


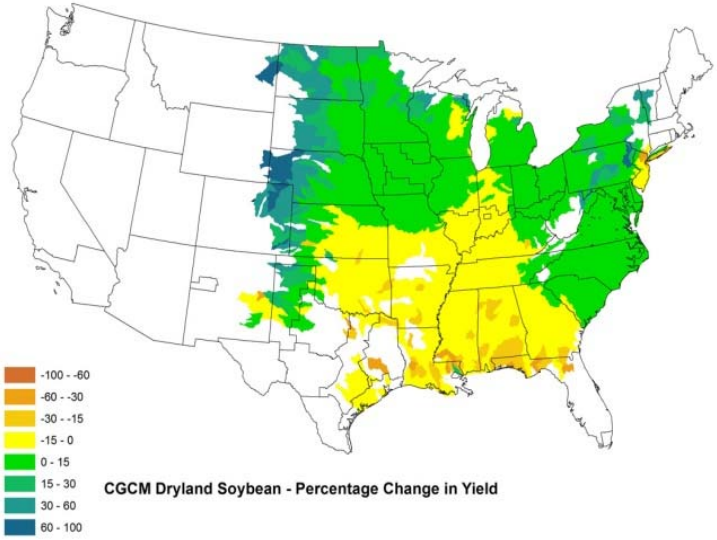
Impacts of Climate Change

Percentage Change in Dryland Soybean Yields under the GCMs Simulated for the Longer-Term Using EPIC, 2045-2055









Summary of Results

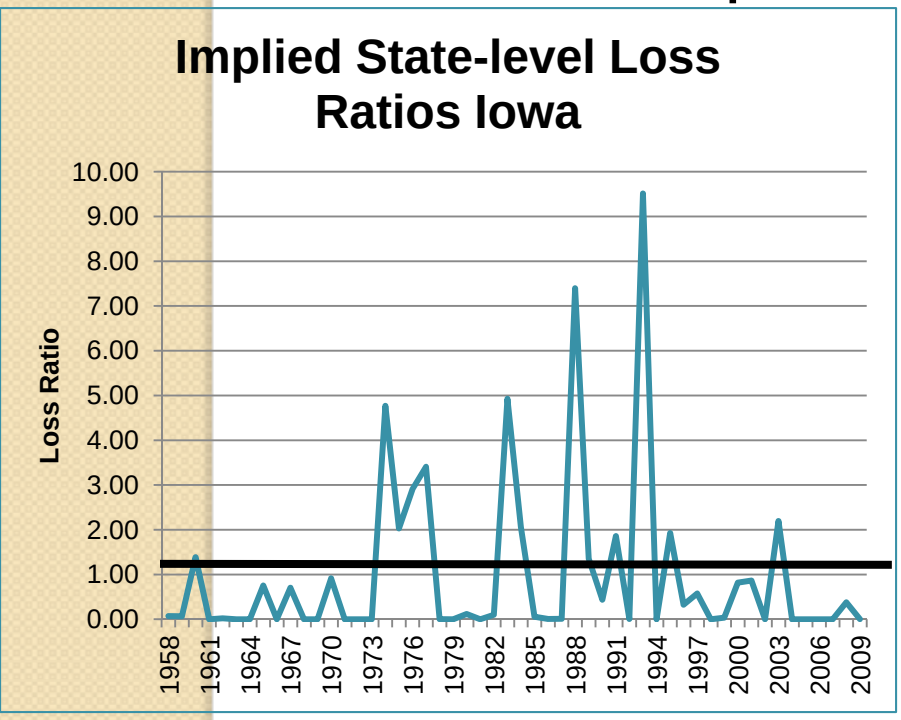
- Relatively small yield effects at a national level
  - Decreases in Central and South
  - Increases in North and West
  - Consistent with other studies

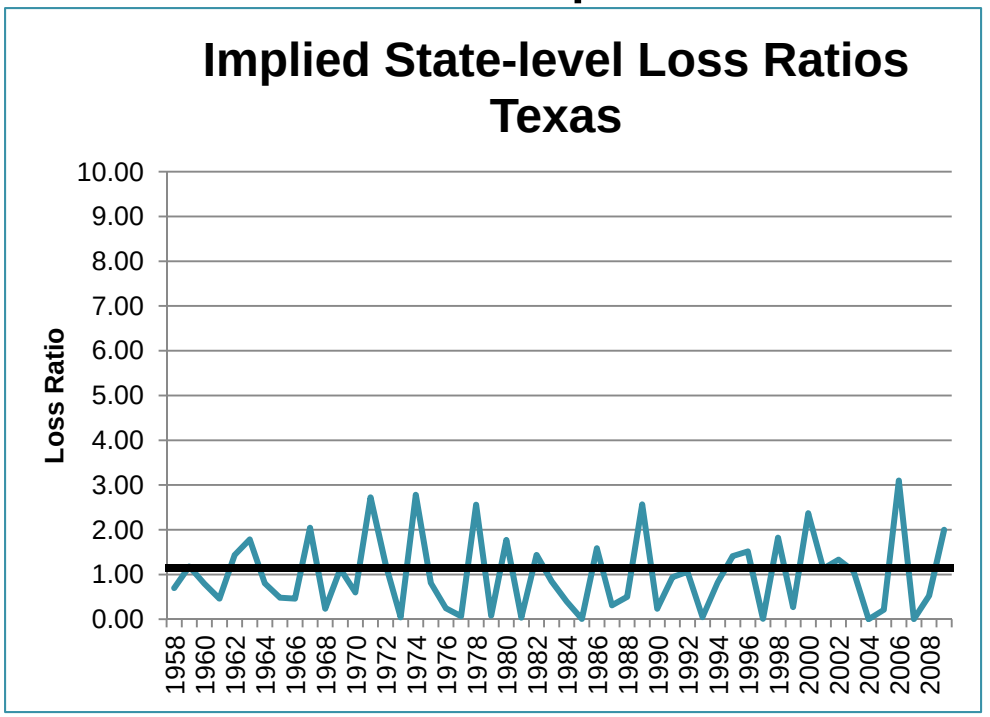
Summary of Results

- Overall small financial impacts for insurance companies at national level
  - Range: +3.1% to -1.2% around baseline
  - Readjustment of yield guarantees
  - FCIC Reinsurance
- Greater variability for FCIC
  - Range: +26.8% to -14.4% around baseline

Summary of Results

- Uncertainties
  - Variation across GCM's
  - Mitigation effects
  - Catastrophic events not well captured





Crop insurance and Adaptation

- Premium rates
  - Based on historical losses
  - Adapts to gradual changes in risk
    - Challenge: Non-linear/sudden changes
  - Revenue rates based on forward looking expectations of commodities markets

Crop insurance and Adaptation

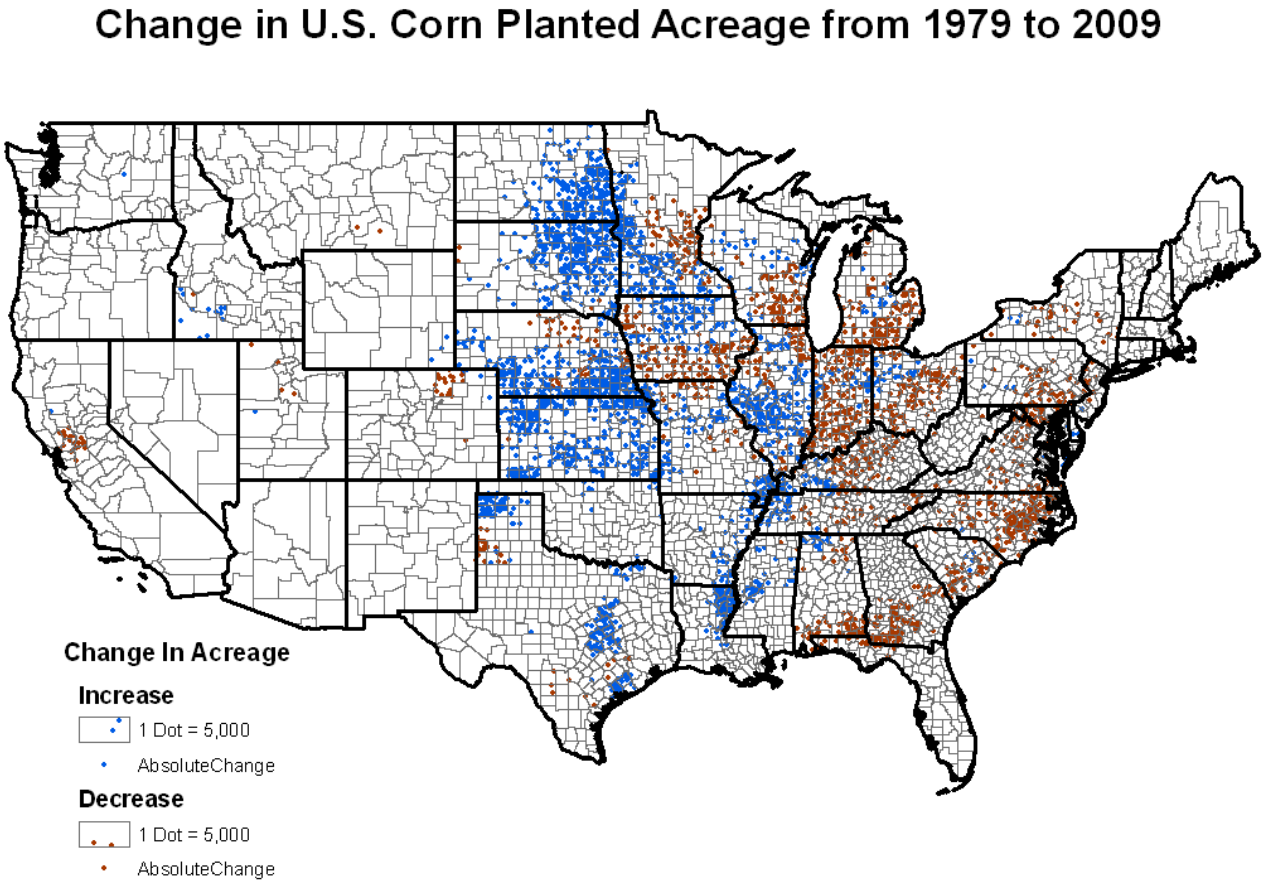
- Incentives
  - Premium rates can act as a price signal to grower about risk and the value of mitigation or adaptation
  - Moral hazard – deductible, adaptive yield guarantee, loss adjustment process
    - Crop insurance designed such that grower is better off with a good crop than a bad one
    - Grower shares in substantial portion of risk
  - Significant incentives to mitigate risk

Crop insurance and Adaptation

- Accommodate adaptive/mitigation responses by growers
- Revise program/policies to reflect evolving agronomic practices

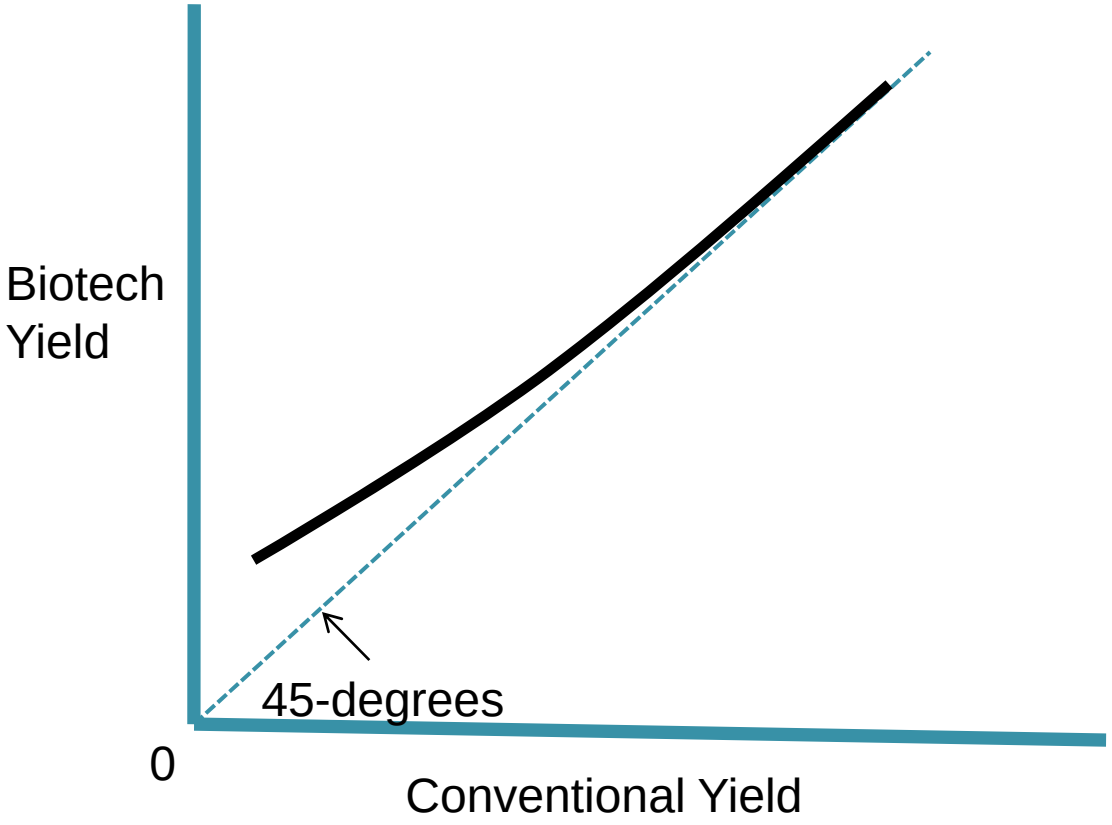
Crop Insurance and Adaptation

- Location



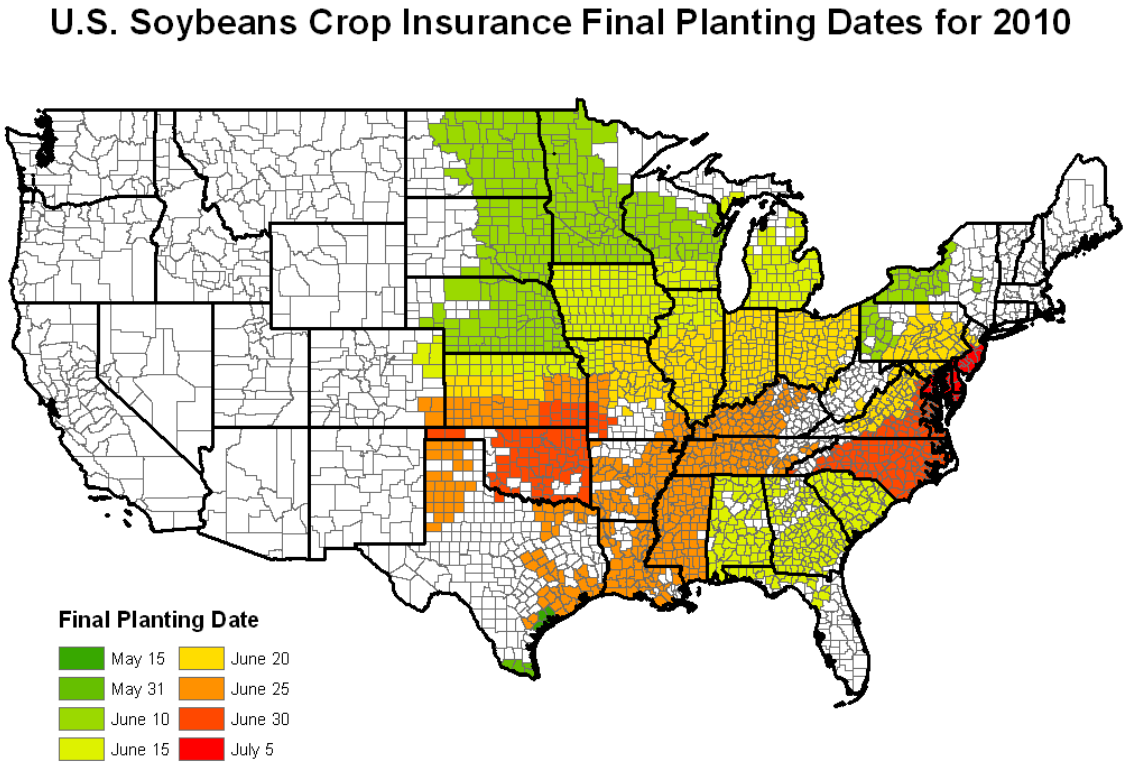
Crop Insurance and Adaptation

- Biotech
  - “Biotech Endorsement” discount



Crop Insurance and Adaptation

- Final planting dates
  - Revise to reflect changing agronomics



Note: Reflects the latest final planting date across the types and practices insured in the county.

Source: United States Department of Agriculture (USDA) Risk Management Agency (RMA)

Crop Insurance and Adaptation

- Establishment of new practices for new areas/crops
  - Irrigation
  - Limited Irrigation
  - Skip Row
  - Organic
- Insurance offer: “Good Farming Practice”

Crop Insurance and Adaptation

- Effective crop insurance policies provide financial stability for growers
  - Frequently required by lenders
  - Financially stable growers more likely to invest in new growing practices to adapt to climate change