



Biofuels and Climate Change: Farmers' Land Use Decisions

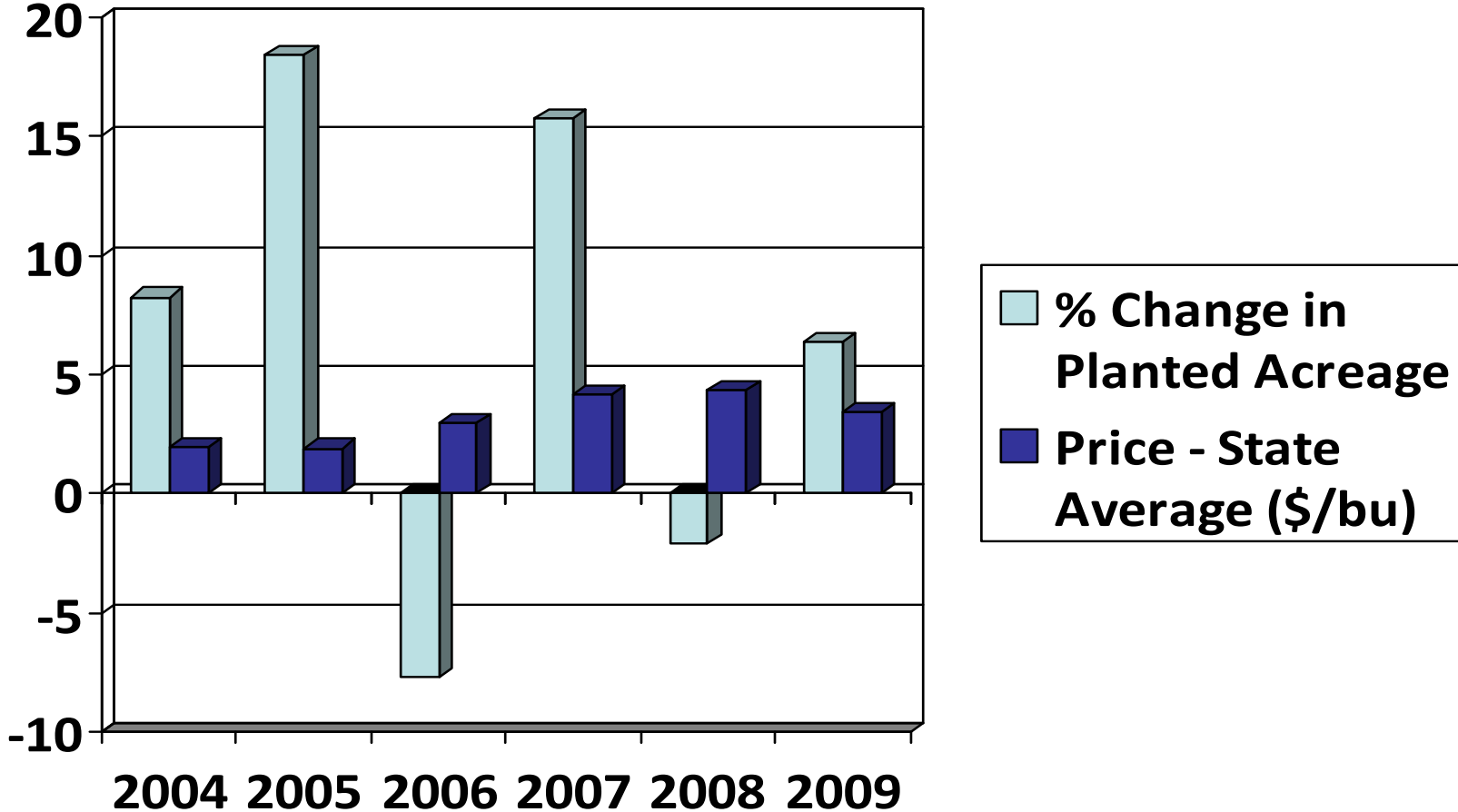
Motivation

- Adaptation to changing climate conditions
 - recently chosen strategies
 - not optimal future strategies
- Cultivation of biofuel crops partially to mitigate climate change



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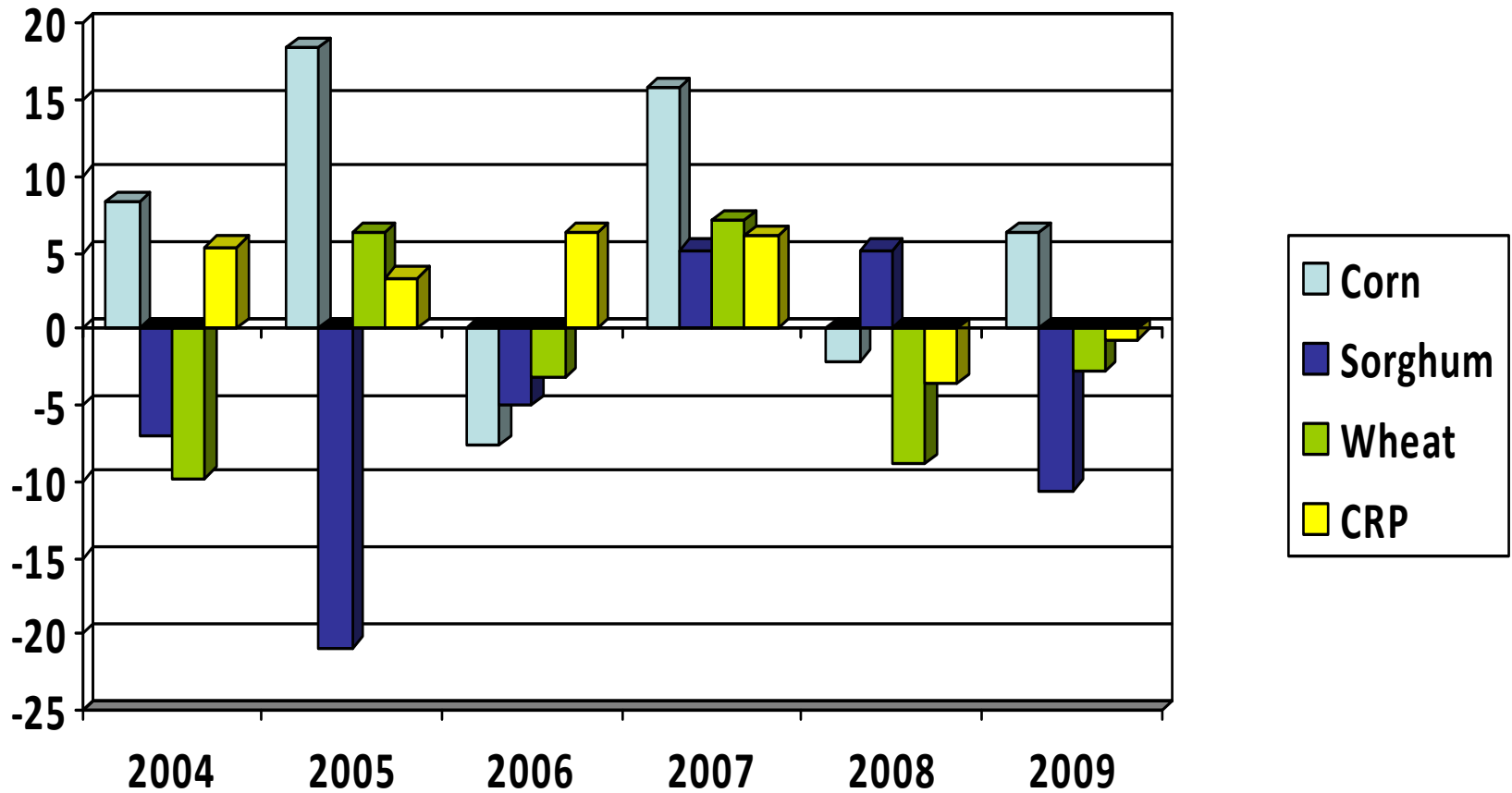
Year-to-Year % Change in Corn Acres, Price Level



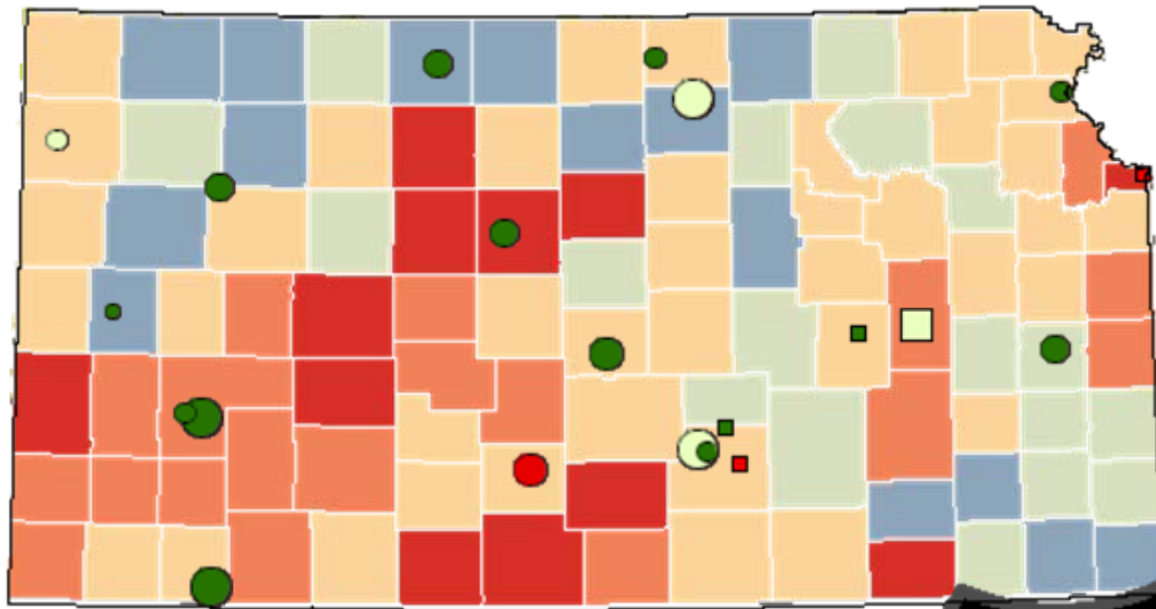


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Year-to-Year % Change in Acres

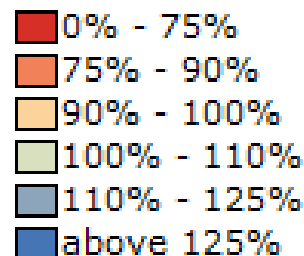


2006 Corn Acreage and Current Bio-Refineries in Operation or Under Construction

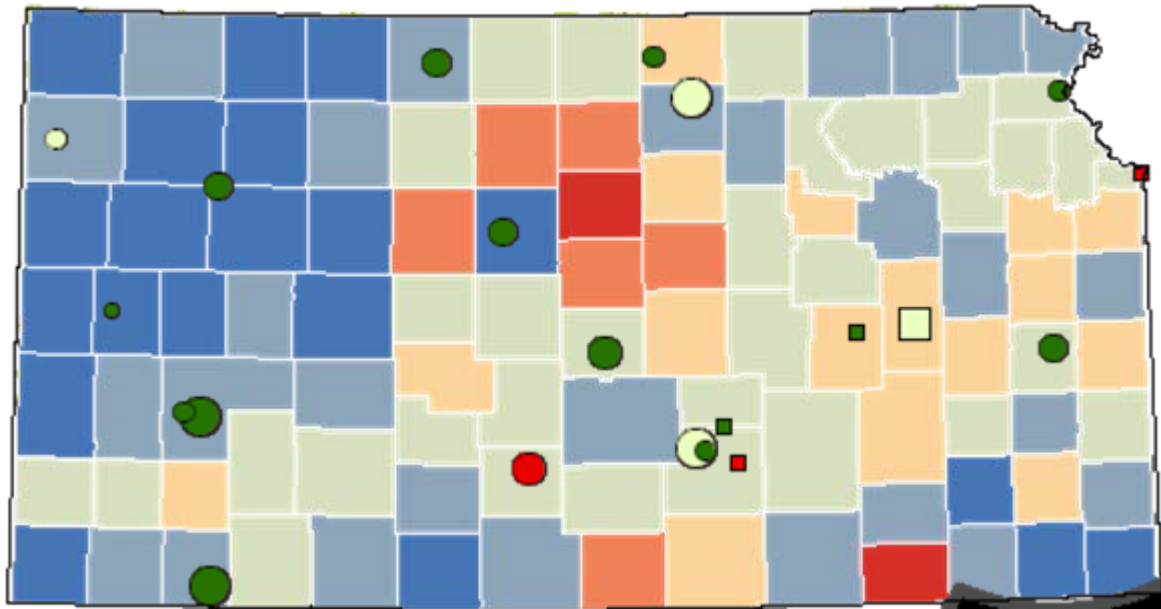


- Avg Price \$2.98/bu.
- Avg county acreage lower than 2000-2009 mean.

Ratio: 2006 Corn Acreage
to Mean Corn Acreage
b/n 2000-2009

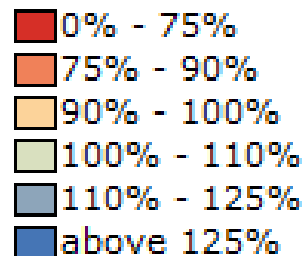


2007 Corn Acreage and Current Bio-Refineries in Operation or Under Construction



- Avg Price increased to \$4.14/bu.
- Congress passed Energy Independence and Security Act of 2007, mandating increase in biofuel production.
- Dryland acreage increased 14%, irrigated acreage increased 19%.

Ratio: 2007 Corn Acreage
to Mean Corn Acreage
b/n 2000-2009





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Research Objective

Employ qualitative and quantitative analysis to understand farmers'

- **decisions to cultivate biofuel crops**
- **responses to changing climate**



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Field-Level Analysis: Land-use/land-cover data I

Using satellite remote sensing,
land use/land cover data
to create a 250-m resolution annual dataset for KS



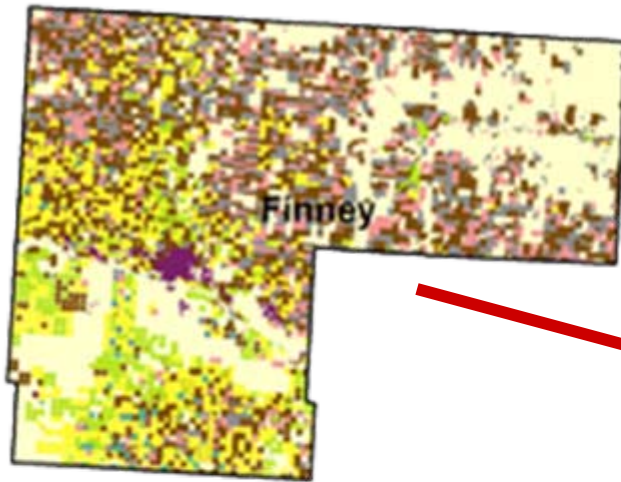
Christopher Brown
KU Geography



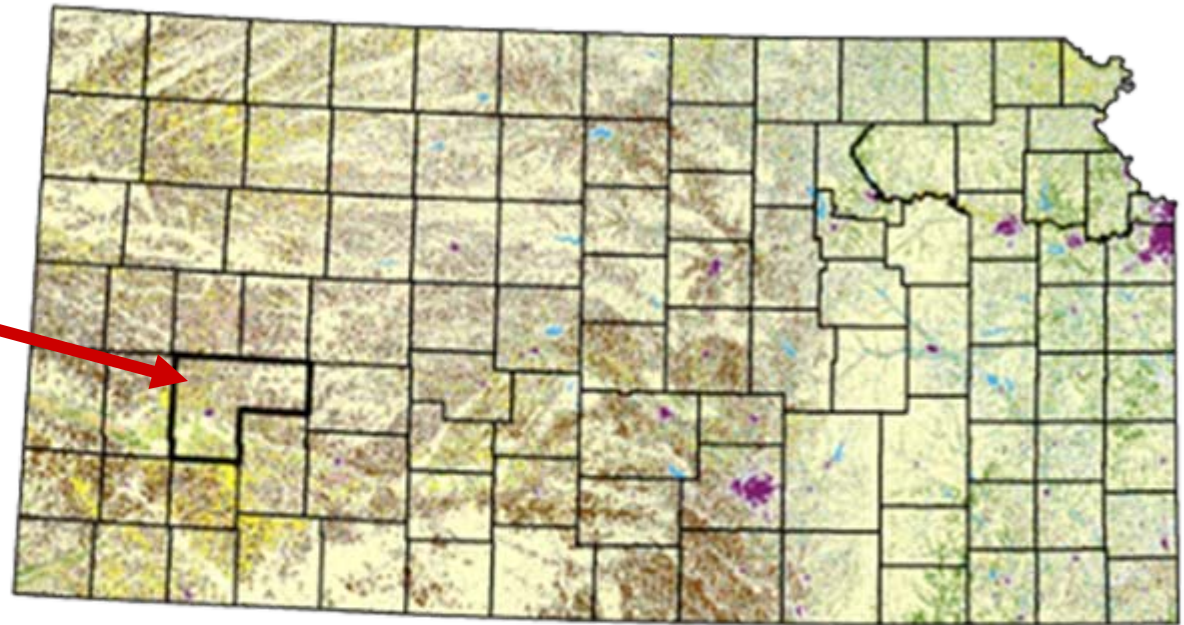
Stephen Egbert
KU Geography

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Land-use/land-cover data



Finney County



Dominant Land Use/Land Cover Classes

Corn	Winter Wheat	Fallow/die Cropland	Barren
Sorghum	Other Small Grains	Grass/Pasture/Non-ag	Urban/Developed
Soybeans	Double-Cropped	Woodland	Water
Sunflowers	Alfalfa	Shrubland	Wetlands



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Land-use/land-cover data II

Depicting temporal variation of land use/land cover across KS

Field-level change detection:

- crop rotations
- biofuel intensification
 - e.g., increased frequency of corn cropping
- biofuel extensification
 - e.g., conversion of non-corn cropland to corn



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Farm-level Land Use Decisions I

Administering three waves of surveys to KS farmers

- Wave 1 (N=2500): Feb 2011
- Wave 2 (N=450): Feb 2012
- Wave 3 (N=450): Feb 2013
- Document current, recent past
 - land uses
 - water usage (irrigation)
- Explore role of weather conditions
 - recent past
 - expected future



Jeffrey Peterson
K-State Ag Economics



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Farm-level Land Use Decisions II

Conducting multiple waves of interviews of KS Farmers

- Exploratory Interviews
late spring 2010
- Main Waves
 - Wave 1 (N=216): spring 2011
 - Wave 2 (N=216): spring 2013
- Ethnographic Analysis
 - selected communities in 2012
 - extended residence



Jane Gibson
KU Anthropology



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Water Use (Irrigation) Decisions Impact of Land Uses on Water Quality

- Assess Costs of Biofuel Production
 - reduced water availability
 - i.e., viability of aquifers
 - diminished ambient water quality
- Balanced cultivation
 - benefits (e.g., climate change mitigation)
 - costs