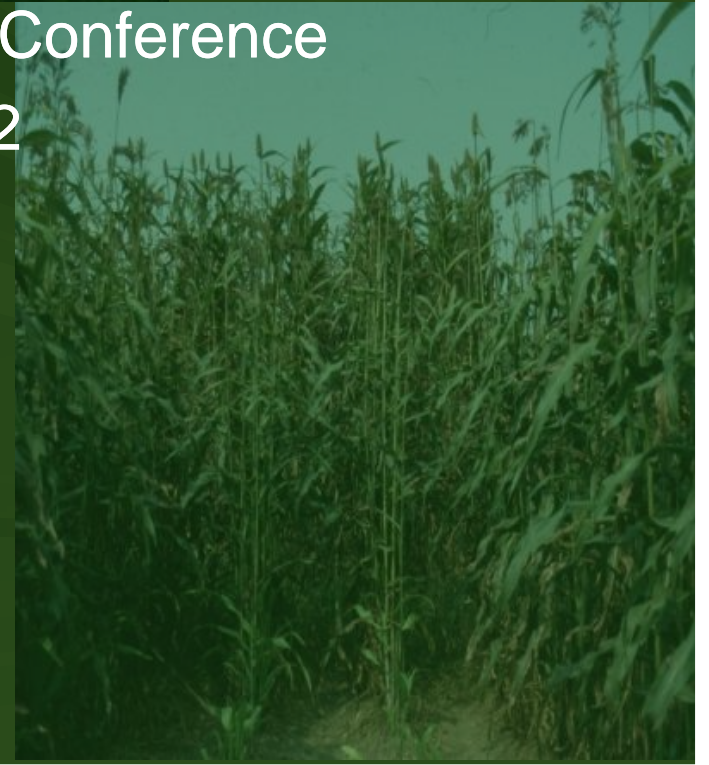


# Bioenergy Crops

Michael Blazier, Richard Vlosky, Dek Terrell, Glenn Hughes,  
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# What is biofuel?

- Biofuel: Any fuel developed from **plant biomass**
- Biofuel types:
  - Biomass for **burning** = replaces/supplements coal for electricity generation
  - Biomass for **transport fuel** = replaces/supplements gasoline or diesel
    - Ethanol
    - Green gasoline
    - Biodiesel



# Why biofuel?

- High dependence on imported oil
  - 70% of U.S. oil imported
  - Political unrest in supplying countries = less energy security for U.S.
- Global energy demands increasing while petroleum supplies decreasing
- U.S. mandating production of more domestic fuel sources
  - Example: DOE mandate to replace 30% of petroleum transport fuels with biofuels by 2025

# Today's biofuel market

- Government mandates
- Economic trends

# Today's biofuel market



# Today's biofuel market

## ■ Main biofuels:

- Wood burned for electricity

- Corn for ethanol

  - 2010: 13.3 billion gallons

  - Example: Bunge-Ergon, Vicksburg, MS

- Soybean for biodiesel

  - 2010: 315 million gallons

  - Example: Vanguard Synfuels, Pollock, LA

What can be grown for biofuels  
in Louisiana?

# Ag Waste for Biofuels

- Corn stover
  - 1.3 billion tons generated per year
- Sugarcane bagasse
- Forest harvest biomass
  - 3 to 8 tons/acre after harvest



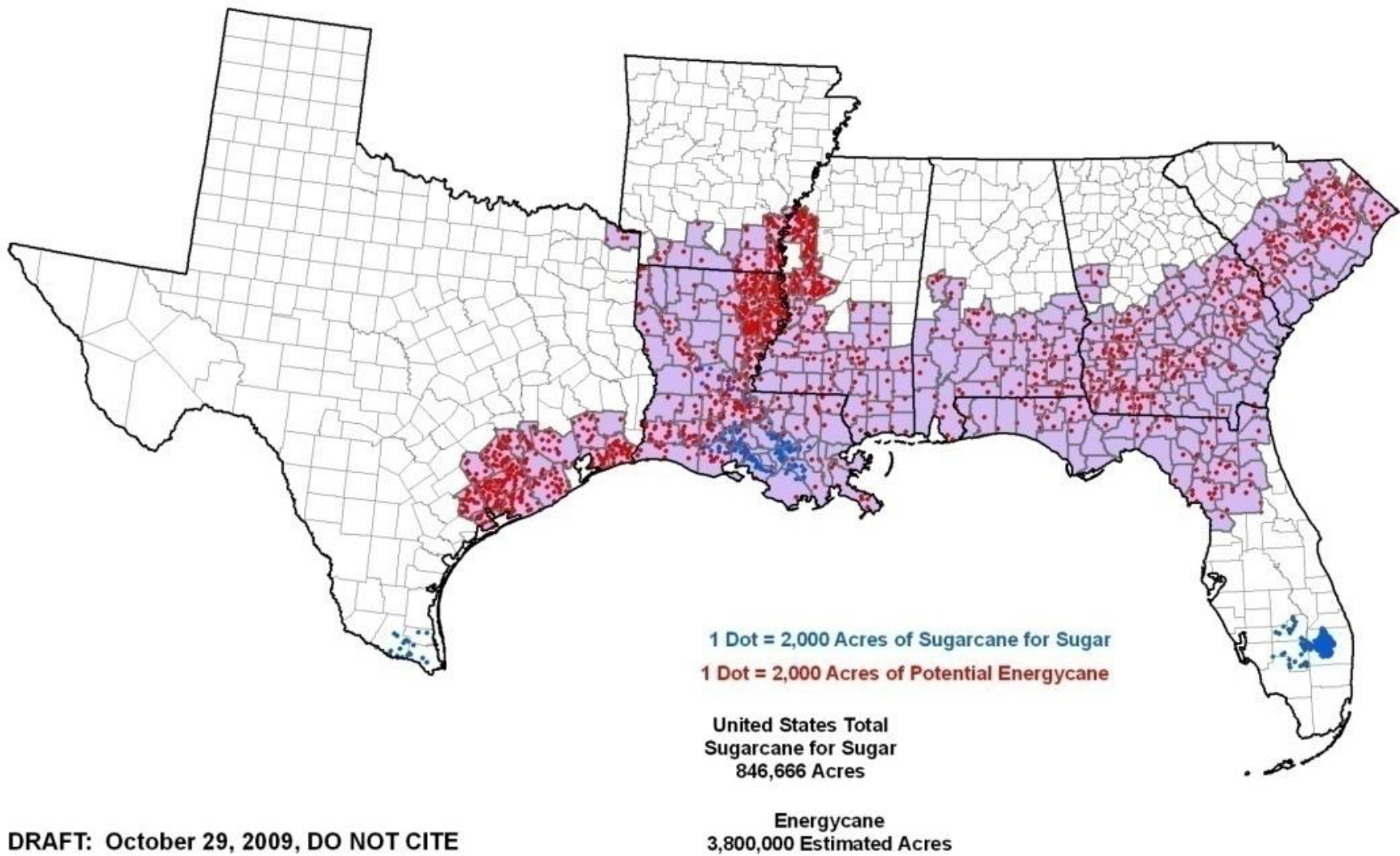
# Emerging biofuel crops

## ■ Energy cane

- 15 tons biomass/acre/yr
  - 4 tons/acre/yr usable for sugar
- Make ethanol, butanol from fiber
- Power production facility from burning bagasse
- Bred to tolerate lower temperatures than sugarcane



# Energycane and 2007 Ag Census Sugarcane for Sugar



DRAFT: October 29, 2009, DO NOT CITE

# Emerging biofuel crops

- Sweet sorghum
  - Ethanol production
    - Squeeze plant, collect juice, add yeast, make ethanol
  - Yields similar to energy cane
  - Can be grown throughout SE US



# Emerging biofuel crops

Sweet Sorghum



July - September

Energy Cane



October - January

Bagasse, syrup,  
woodchips,  
molasses, etc.



February - June

# Emerging biofuel crops

- New project led by LSU AgCenter:
  - “Regional Program for Production of Multiple Agricultural Feedstocks and Processing to Biofuels and Biobased Chemicals”
  - Consortium of universities, industry, USDA partners from 8 states
  - Key objectives: Develop and refine production processes for making gasoline, jet fuel, diesel, butanol, isoprene from energy cane and sweet sorghum

# Emerging biofuel crops

- New project led by LSU AgCenter (cont.):
  - Refinery testing
    - Pilot plant being built on LSU AgCenter research station
    - Industry partners using their facilities
  - Variety and cropping system testing
    - State-wide network of research sites
  - Economic performance testing
  - Environmental impact testing

# Emerging biofuel crops

## ■ Switchgrass

- Native across US
- Yields 2 to 12 dry tons/acre
  - 4 tons = minimum yield to feed facilities
- Minimal inputs:
  - Herbicide in years 1-2
  - Annual fertilization N, P, K

## ■ Energy benefits:

- 7,500 BTU = low-grade coal
- Cellulosic ethanol



# Emerging biofuel crops: Short-rotation woody crops

- Fast-growing trees
- Yield 2 to 20 dry tons/acre/year
  - DOE: 8-10 tons/acre/year needed to sustain biofuel facilities
- Harvest size in 3 – 10 years
- Possible trees:
  - Cottonwood
  - Sycamore
  - Black willow
  - Eucalyptus

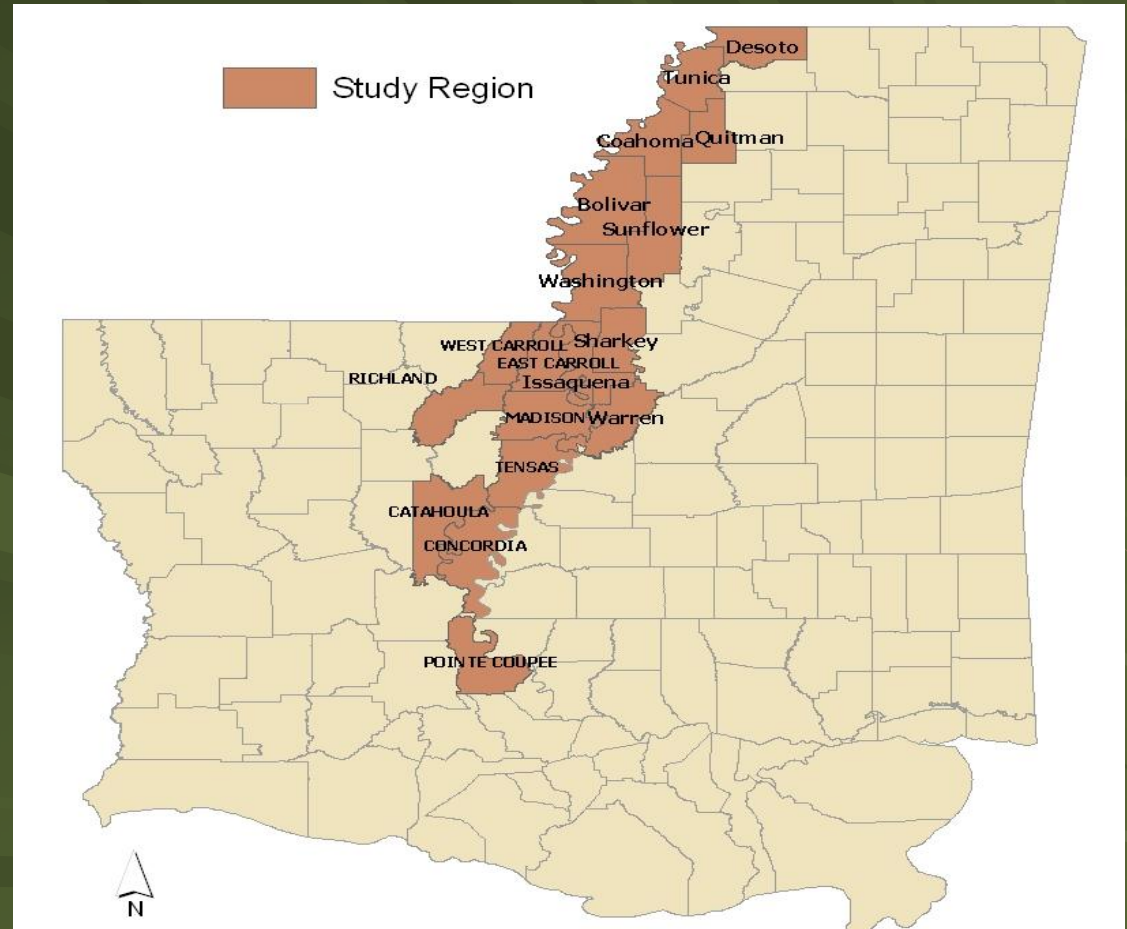




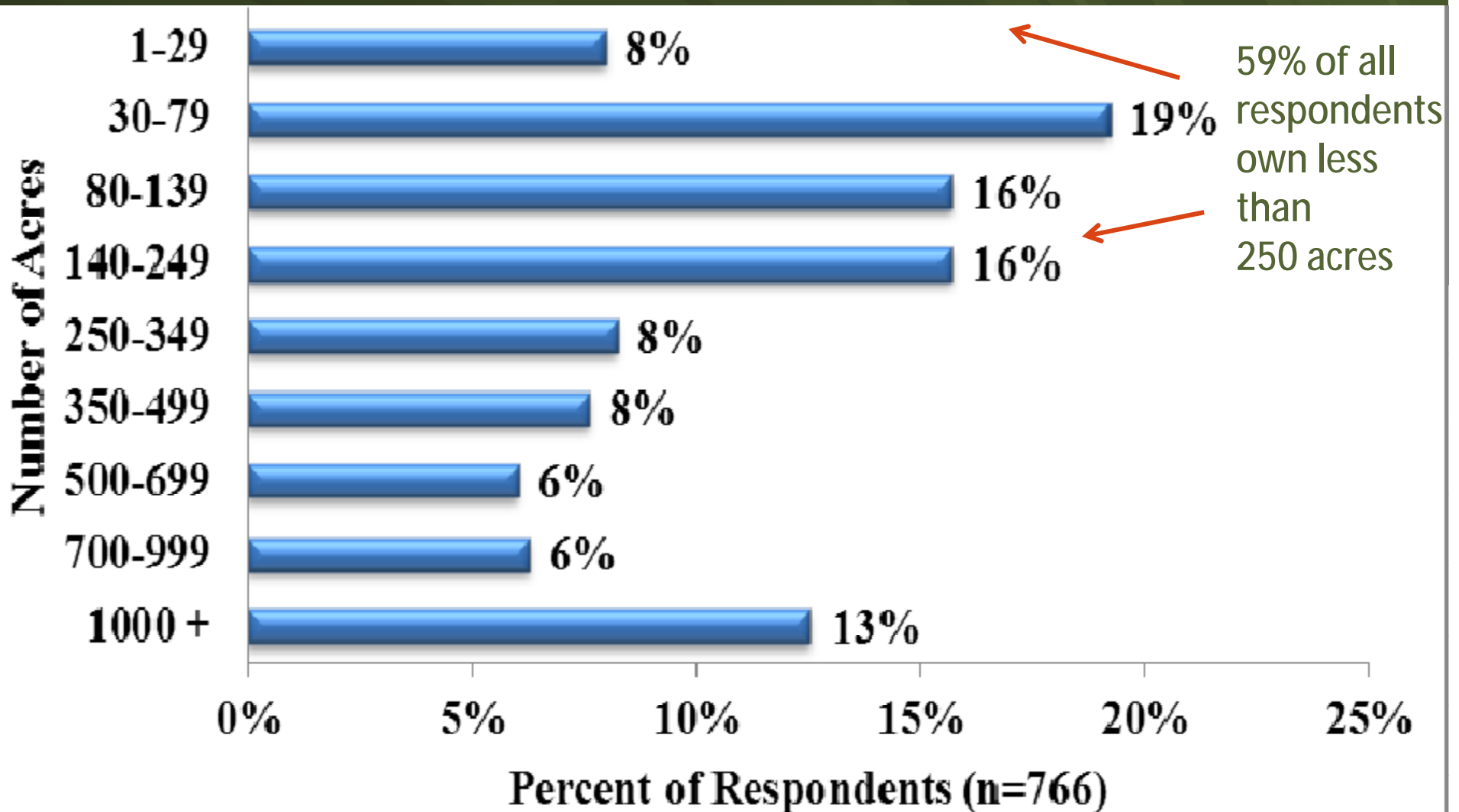
What are farmers thinking about  
biofuels?

# Study Region

- Surveys sent to farmers along Lower Mississippi Alluvial Valley

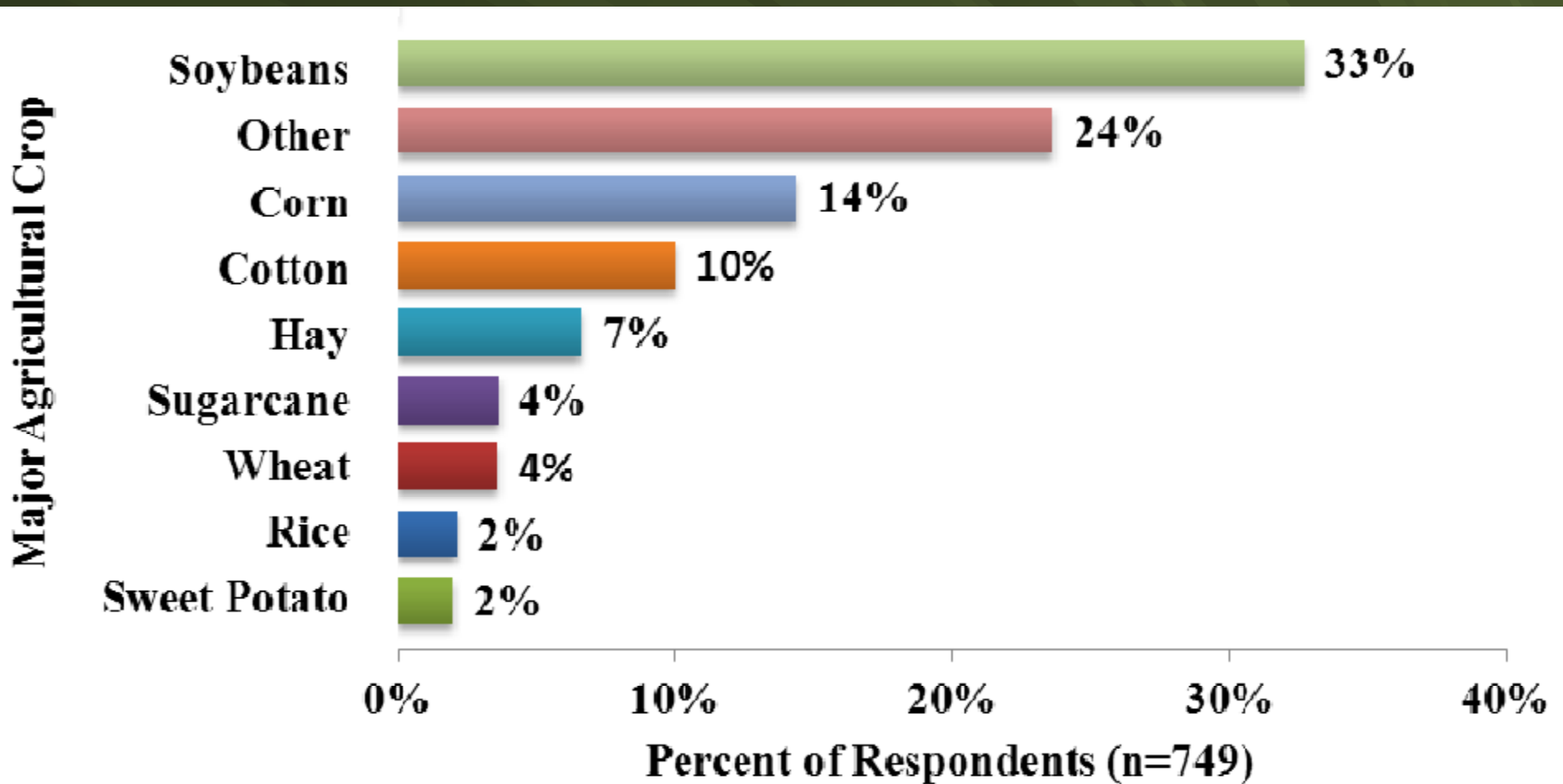


# Agricultural Producers Socio-Demographic Ownership Size



# Agricultural Producers

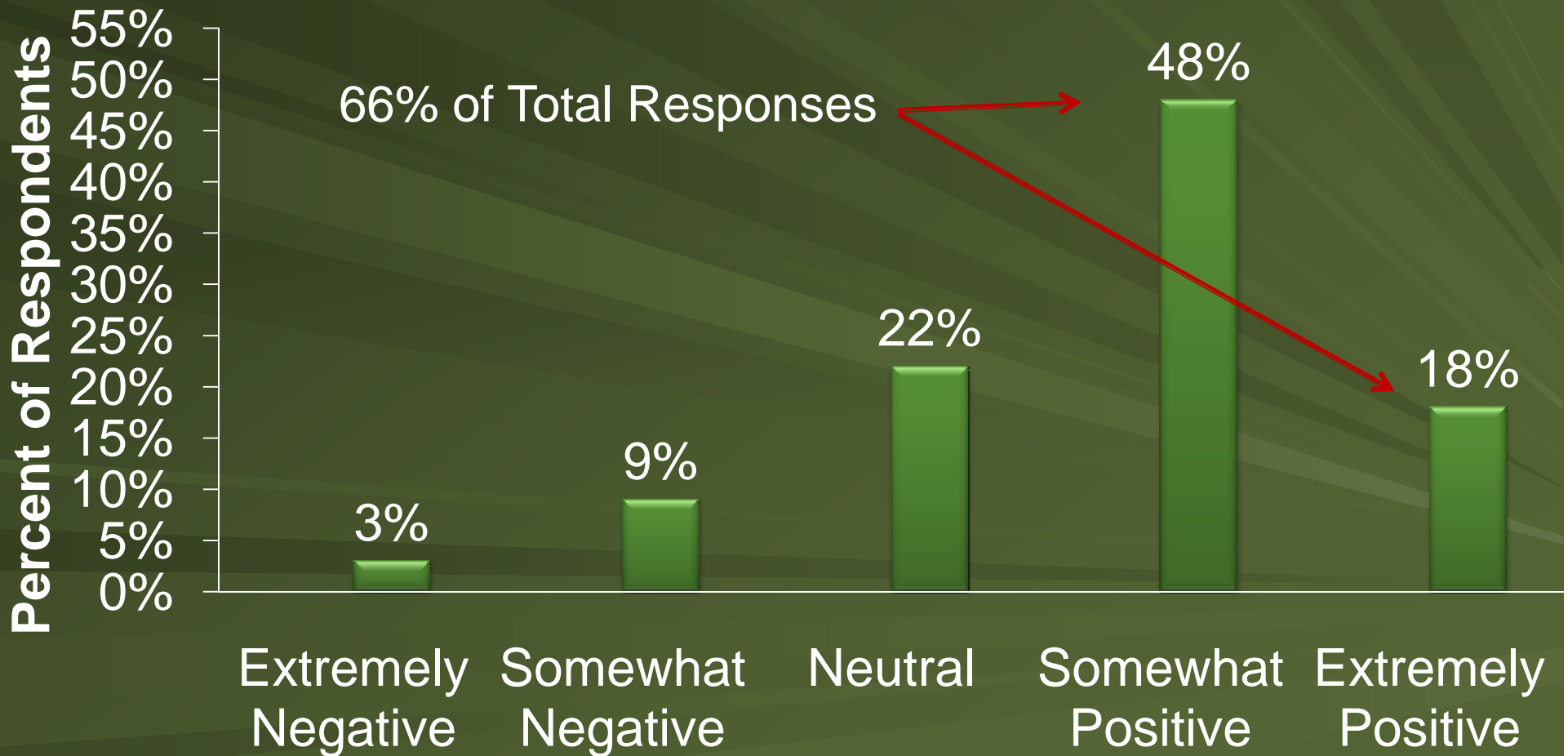
## Agricultural Management



Other responses include: trees, grain sorghum, and fruits

# Agricultural Producers

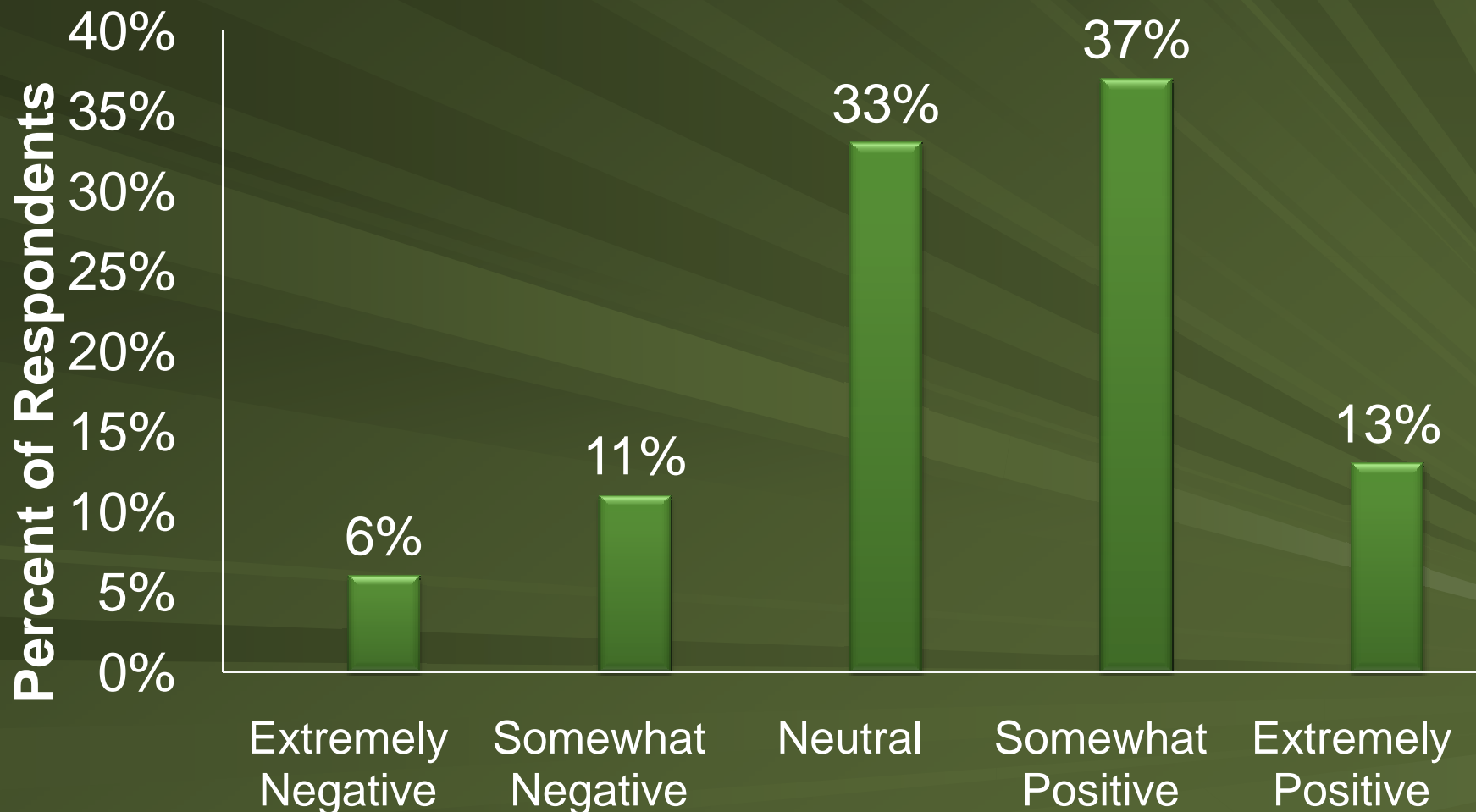
“What is your overall opinion of using biomass for bioenergy?”  
n = 733



## Agricultural Producers

“A bioenergy market will be competitive compared to conventional energy markets.”

n = 727



## Agricultural Producers Biomass Perceptions Percent of Respondents

Survey Questions	Strongly/ Somewhat Disagree	Somewhat/ Strongly Agree
Economically viable technologies exist for converting biomass to bioenergy (n=732).	14%	56%
Agricultural biomass harvesting and collection will not require extra personnel and equipment (n=729).	43%	25%
Agricultural biomass transportation can be done with traditional agricultural equipment (n=725)	21%	49%

# Agricultural Producers Biomass Perceptions Percent of Respondents

<b>Survey Questions</b>	<b>Strongly/ Somewhat Disagree</b>	<b>Somewha t/ Strongly Agree</b>
Converting agricultural biomass to bioenergy is a simple process that can be done at most agricultural processing facilities (n=728)	35%	24%
Agricultural biomass requires utilizing entire crop as well as residual feedstock (n=610).	33%	36%



## Agricultural Producers

# Respondent Perceptions of Environmental and Market Issues

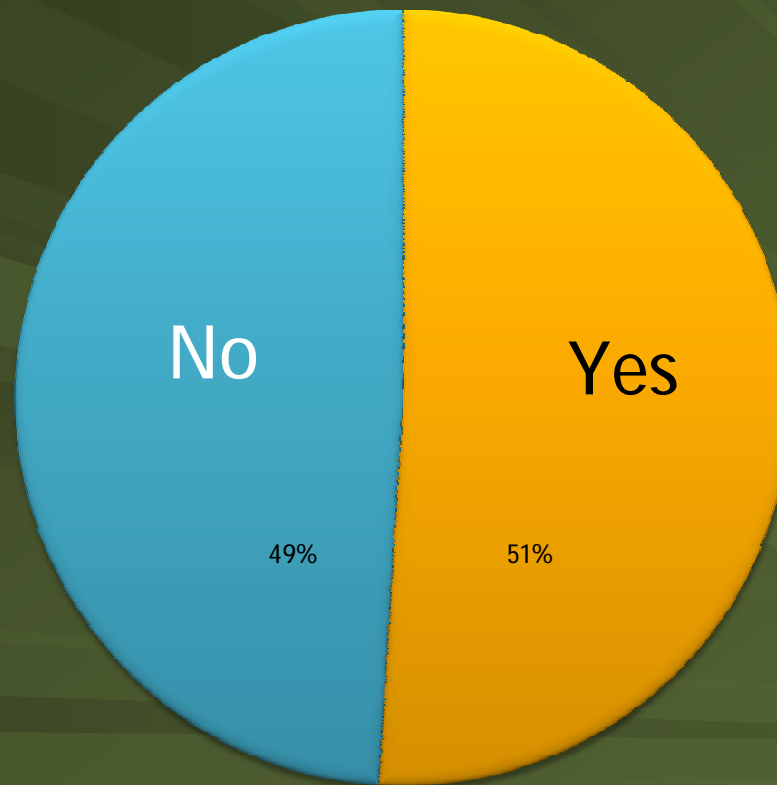
	Percent of Respondents that Somewhat / Strongly Agree
Biomass Issues	
I believe harvesting agricultural biomass negatively impacts wildlife habitat (n=709)	27%
I believe harvesting agricultural biomass negatively impacts air and water quality (n=710)	20%
I believe harvesting agricultural biomass negatively impacts soil quality (n=704)	28%

## Agricultural Producers Respondent Perceptions of Environmental and Market Issues

	Percent of Respondents that Somewhat / Strongly Agree
Biomass Issues	
Tax credits should be given to landowners, harvesters, and companies that utilize biomass for bioenergy (n=703)	68%
Subsidies should be provided as an incentive to companies for selling biomass residues from agricultural operations (n=704)	56%
Incentive programs should be provided to defray the costs of establishing biomass crop species (n=704)	61%
Grants should be awarded for research and development capable of advancing biomass production technologies. (n= 704)	73%
Secured loans should be provided to develop and construct commercial scale bio-refineries (704)	62%

## Agricultural Producers

“Would you be willing to participate in management activities specifically geared toward biomass production from your agricultural land?”



## Agricultural Producers

# Conclusions

- 3 51% of respondents were willing to participate in bioenergy feedstock production.
- 3 The high percent of neutral responses suggests respondent would benefit from additional information.
- 3 A gap exists between the desire to utilize agricultural biomass and the viability of bio-based markets.

What would be the economic impact of an ag-based biofuel facility?

# Hypothetical Biomass Facilities in Mississippi and Louisiana

Cellulosic ethanol plant located in the Delta  
region of either Mississippi or Louisiana

## Assumptions

- Annual output = 77 million gallons
- Construction cost: \$220 million
- 25% construction expenditures from within the region in Louisiana; 20% from within Mississippi region
- Feedstock cost: \$29/green ton
- Feedstock annual consumption: 1.5 million green tons; of which 500,000 green tons from within region

**Earnings and Output Figures are in \$ Million**

**The Economic Impact of Construction of a  
Cellulosic Ethanol Plant using Agricultural Waste as a  
Feedstock in the Louisiana Delta Area**

	Jobs	Earnings	Output
Direct Effect	442	\$14.2	\$55.0
Indirect Effect	74	\$3.4	\$11.6
Induced Effect	62	\$1.7	\$6.3
Total Effect	578	\$19.4	\$72.9

**Earnings and Output Figures are in \$ Million**

**The Economic Impact of Operations of a  
Cellulosic Ethanol Plant using Agricultural Waste as a  
Feedstock in the Louisiana Delta Area**

	Jobs	Earnings	Output
Direct Effect	92	\$7.2	\$34.7
Indirect Effect	43	\$2.3	\$9.5
Induced Effect	34	\$0.9	\$3.4
Total Effect	169	\$10.5	\$47.7



# Key points

- Policy and economic trends increasing interest in biofuels
- Several crop options for Louisiana
- Farmers favorable to biofuels, but need more information