Economic Aspects of Asian Soybean Rust

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For National Soybean Rust Symposium,

St. Louis, Mo.

Nov.-29-Dec. 01, 2006

Economics of Asian Soybean Rust in U.S.

- **U.S. Losses ’05 & 06 kept at a minimum by highly successful work of researchers, Extension, govt., industry & Weather**

Large regional differences in potential impacts

Economics of Asian Soybean Rust in U.S.

- **How to evaluate the economic value of your work?**

- **Opportunities for interdisciplinary work with ag economists**
  - **-- Optimum timing & application rates of fungicides with varying SB prices**
  - **-- Competitive position of SB vs. alternative crops with varying SB prices & probability of ASR severity levels**
  - **-- Economic value of spore-movement forecasting model**

Economic Dimensions of Asian Soybean Rust in U.S.

- **Micro or Farm Level**
  --Yield losses
  -- Chemical costs
  -- Application costs
  -- Insurance coverage
  -- Government payment impacts (LDPs, CCPs)

- **Macro or "Big-Picture" Effects**
  -- National Production Impact
  -- National Control Costs
  -- Price Impacts
  -- Total Dollar Impact

International Dimensions (Because of global SB market)

USDA Asian Soybean Rust Report 2004

- **Concentrated on Macro or "Big-Picture" Effects**

  --Built up from farm-level impacts

- **Asian Rust hadn't entered U.S.**

  -- First year impact (After entry)

  -- Third-year impact

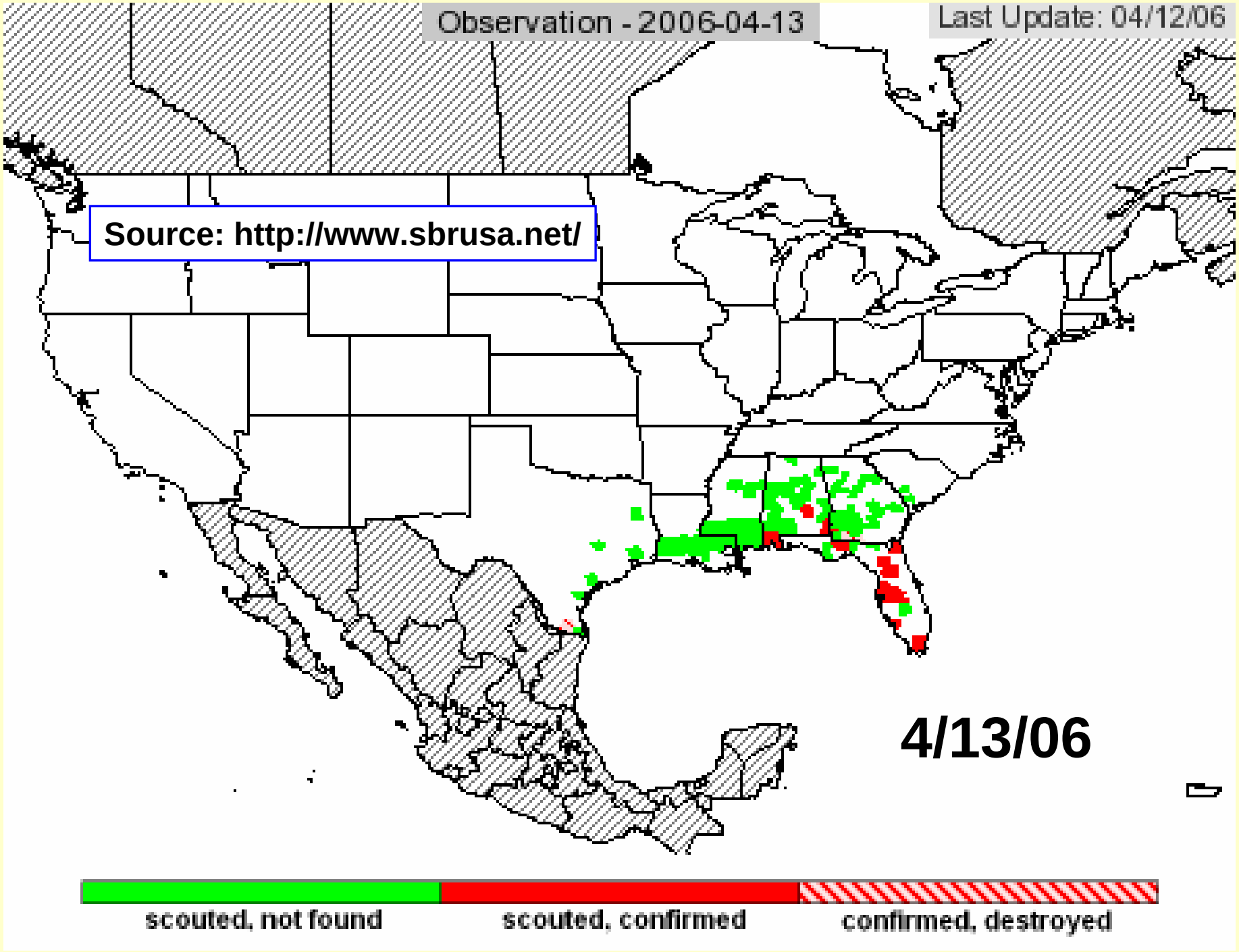
  -- Included price, yield, cost impacts

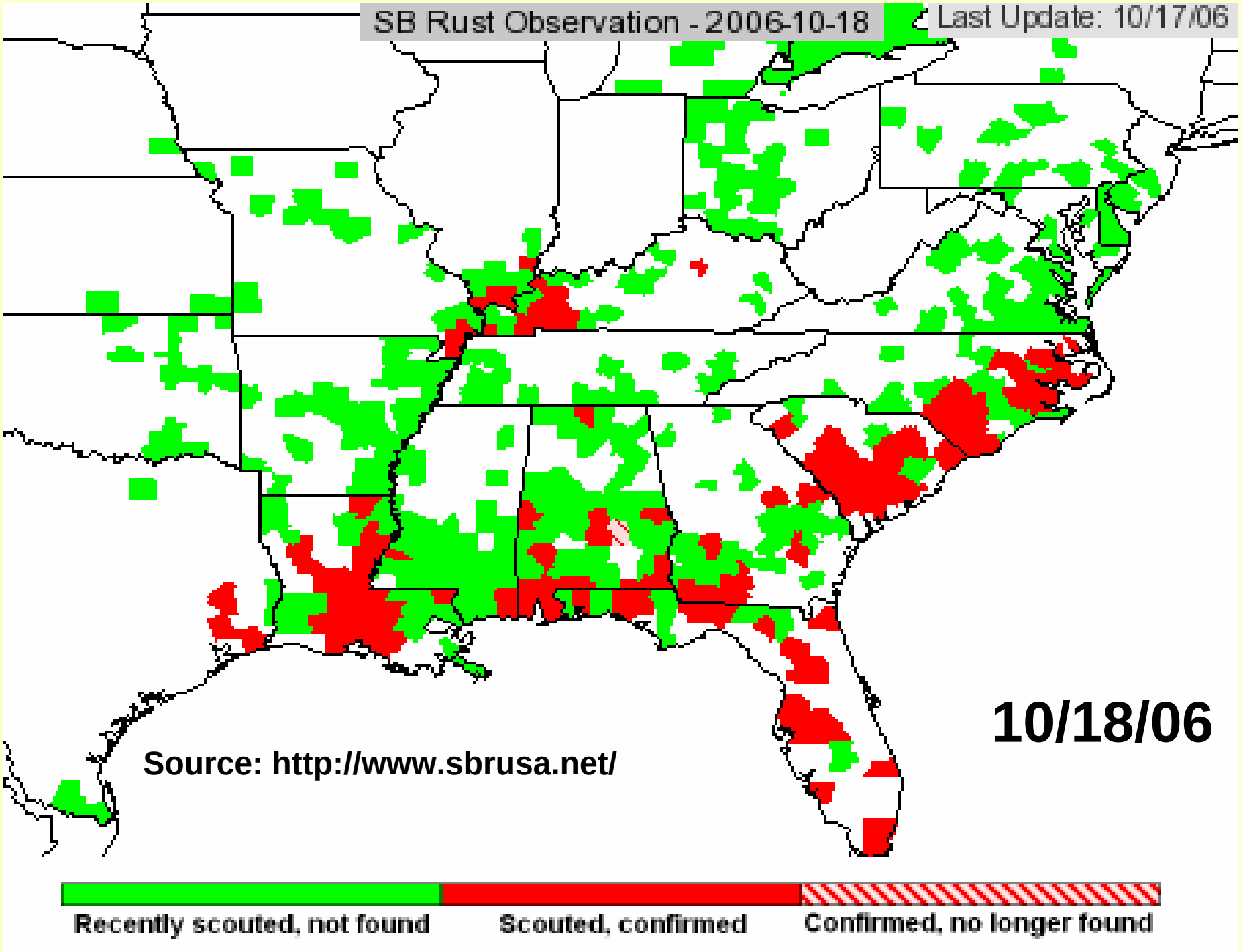
  -- National Production Impact

- **International Dimensions**
  - Supply shortage in U.S. would be tempered by prices signaling to expand in South America

Economics of Asian Soybean Rust in U.S.

- **2006 U.S. Soy Crop:**
  - **--3.204 bil. Bu.**
  - **–Price: $6.20**
  - **–Value: $19.86 bil.**
  - **–(2nd Most Valuable Crop)**
  - **–Corn: About $34.3 bil.**


Observation - 2006-04-13
Last Update: 04/12/06
Source: http://www.sbrusa.net/
4/13/06
scouted, not found
scouted, confirmed
confirmed, destroyed


SB Rust Observation - 2006-10-18
Last Update: 10/17/06
10/18/06
Source: http://www.sbrusa.net/
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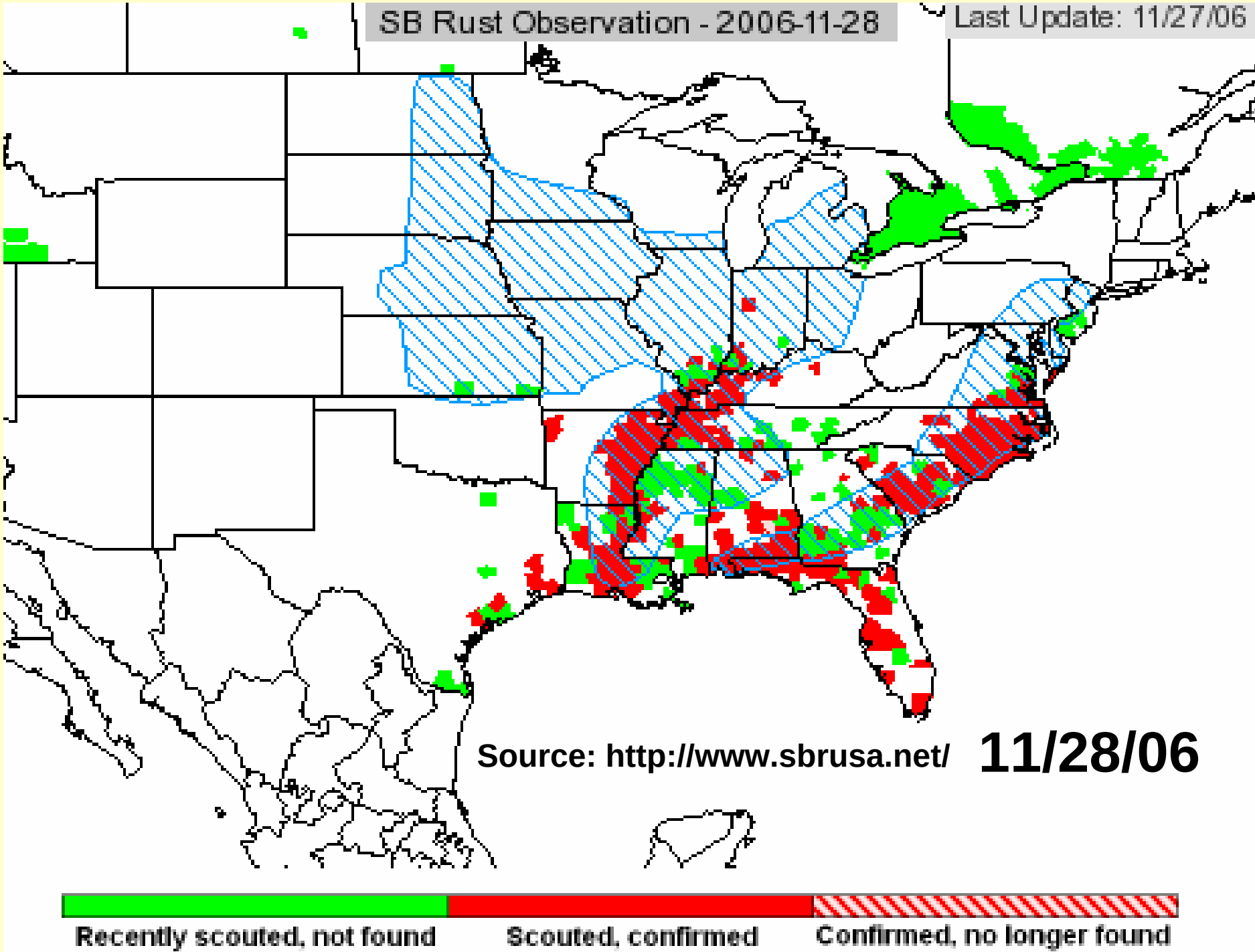
SB Rust Observation - 2006-11-28
Last Update: 11/27/06
Source: http://www.sbrusa.net/
11/28/06
Recently scouted, not found
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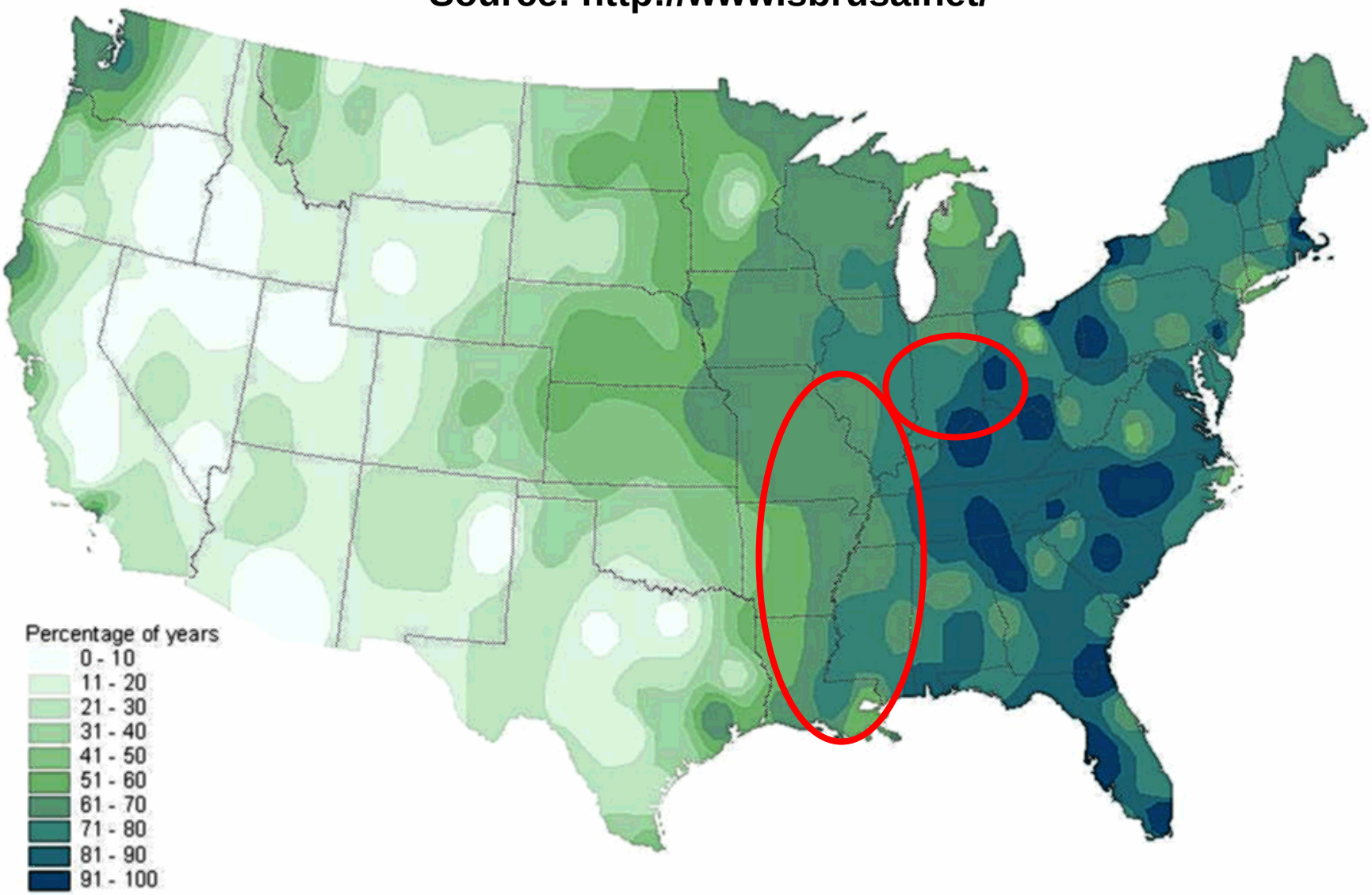
Confirmed, no longer found

Percentage of years out of 30 that climatic conditions are expected to support establishment of soybean rust

Source: http://www.sbrusa.net/



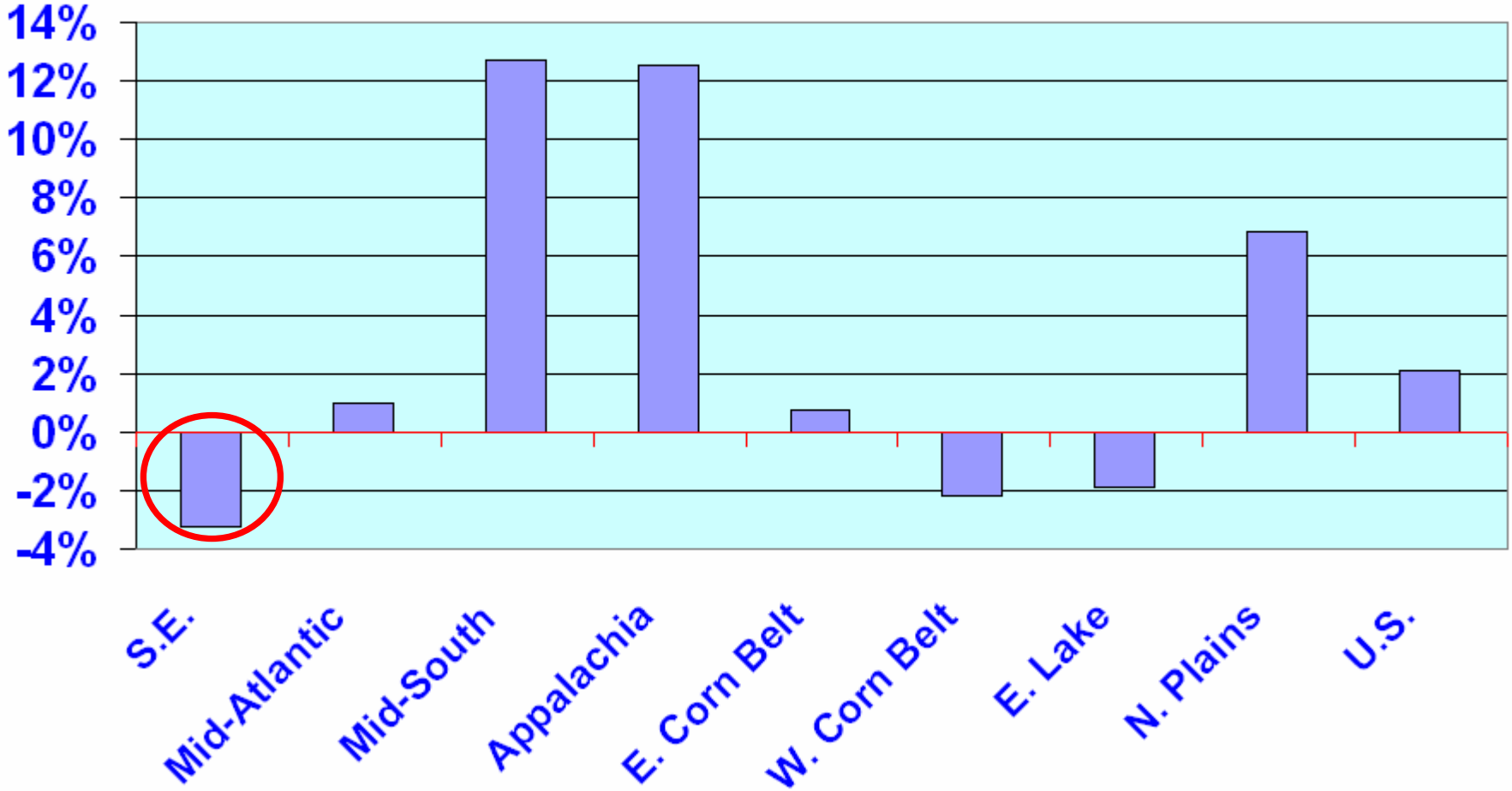
Source: Magarey, R. Center for Plant Health, Science, and Technology, Animal and Plant Health Inspection Service, U.S. Department of Agriculture and North Carolina State University, Raleigh, NC, 2003.

Note: Map based on 30 years of data to estimate infection potential.

Regional Designations for Soybean Production

- Southeast: AL, Fl, SC, GA
- Mid-South: AR, LA, MS
- Appalachia: Ky, TN
- E. Lakes: MI, WI
- E. Corn Belt: IL, IN, OH
- W. Corn Belt: MO, IA, MN
- N. Plains: KS, NE, SD, ND
- Mid-Atlantic: DE, MD, VA, NC

Percent Changes in U.S. Soybean Planted Acres by Major Crop Regions, 2003-06



U.S. Soybean Production, 2006

Region	Mil. Bu.	% of U.S. Crop	Value, Mil. $
Southeast	17	1%	106
Mid-Atlantic	80	3%	498
Mid-South	179	6%	1,112
E. Corn Belt	1,005	31%	6,229
E. Lakes	156	5%	970
W. Corn Bel	1,020	32%	6,326
N. Plains	602	19%	3,734
NJ, NY, PA	29	1%	182
Tenn., KY	104	3%	646
Other	10	0.3%	62
Total	3,204	100%	19,864

Example Farm-Level Impacts

One Spraying

- **Approx. cost/treatment* $16/A.**
- **Assumed yield loss** (8%)**
- **Normal soybean yield in S.E.*** 30.5 bu./A.**
- **Avg. Soybean Price, $/Bu. $6.00/bu.**
- **Approx. loss/A. $30.64**
- **Total soybean value/A. (Normal) $183.00**
- **Percent of gross value lost 16.7%**

*Based on Gary Munkvold, Associate Professor and Seed Science Endowed Chair Iowa State University Dept. of Plant Pathology estimates, ISU

**Assumes careful scouting & timely treatment for rust

***4-state southeastern U.S. average yield, 2003-05.

Example Regional Impacts

Asian Soy Rust throughout Southeast

- One spray-745,000 A. x $30.64/A. = $22.8 mil.
- Two sprays: = $34.9 mil.

Asian Soy Rust on 20% of mid-South

- One spray-1.09 mil. A. x $33.4/A. = $36.4mil.
- Two sprays: = $53.8 mil.

Potential Price Impact: Bu. Loss = .17% of U.S. crop x 2.5% = Price Rise: $0.026/Bu.

Southeast crop value gain: $0.58 mil.

Mid-South crop value gain: 5.02 mil.

Combined Net Loss to Soy Industry, S.E. & Mid-South: One spray $53.6 mil.

Two sprays $83.1 mil.

Regional Impacts, Continued

Potential Price Impact (Included in prev. slide):

- **Bu. Loss = .17% of U.S. crop x 2.5% Price Rise for each % crop loss = +$0.026/Bu.**

Southeast crop value gain: $0.58 mil.

Mid-South crop value gain: 5.02 mil.

Regional Impacts much larger if Asian Rust moves into Corn Belt

Asian Soy Rust on 15% of East Corn Belt
Net Loss to Soy Industry

- One spray-2.9 mil. A. x $37.5/A. = $154.4 mil.
- Two sprays: = $200.8 mil.

Potential Price Impact: Bu. Loss = 2.4% of U.S. crop x 2.5 x $6: Price Rise: $0.36/Bu.

Increased value of crop is included in losses

Combined with southern losses:

One Spray	$208 mil.
Two Sprays	$237.5 mil.

(8% Losses too small for insurance benefit)

USDA 2004 Economics of Asian Soybean Rust Report

- **Largest impact was on soy growers**
- **Other Impacts**

  -- Livestock feed costs

  -- Consumers through higher food costs
- **3-Yrs. Out Estimated Total Impact**

Large loss	**$ 2.00 bil.**
Medium loss	**$ 1.17**
Small loss	**$ 0.24**

USDA 2004 Economics of Asian Soybean Rust Report

- **3-Yrs. Out Estimated Impact**

	Medium* (Spread)	Low**
Soybean producers	-$828 mil.	-$164
Livestock producers	-57	-9
Other crop producers	+5	+18
Consumers	-287	-240

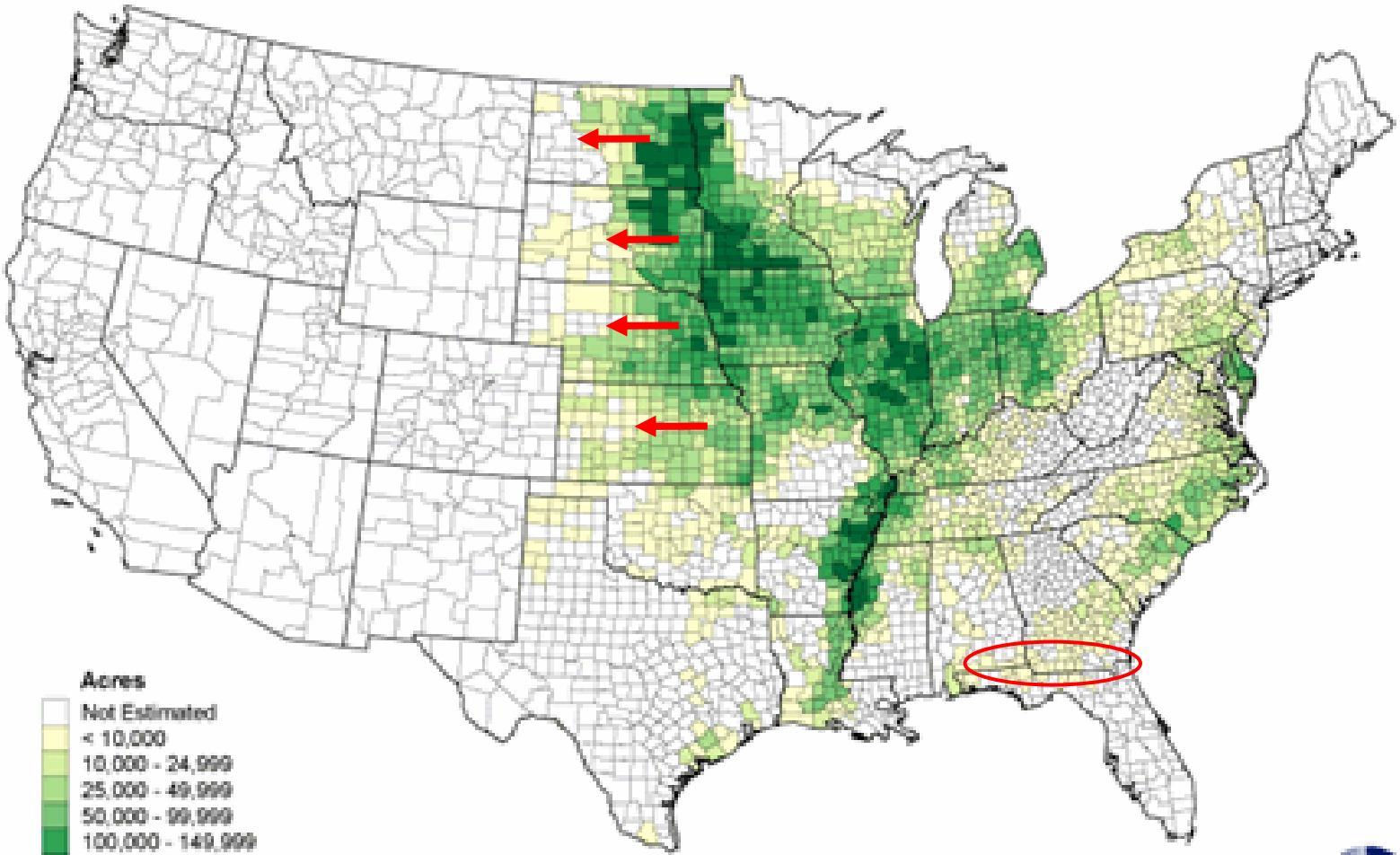
*Over Corn Belt, Appalachia, Delta, S.E., N.E., with 4.3% yld. Loss, $25/A. Cost

**Over Appalachia, Delta, S.E., with 0.9% yld. Increase on treated acres

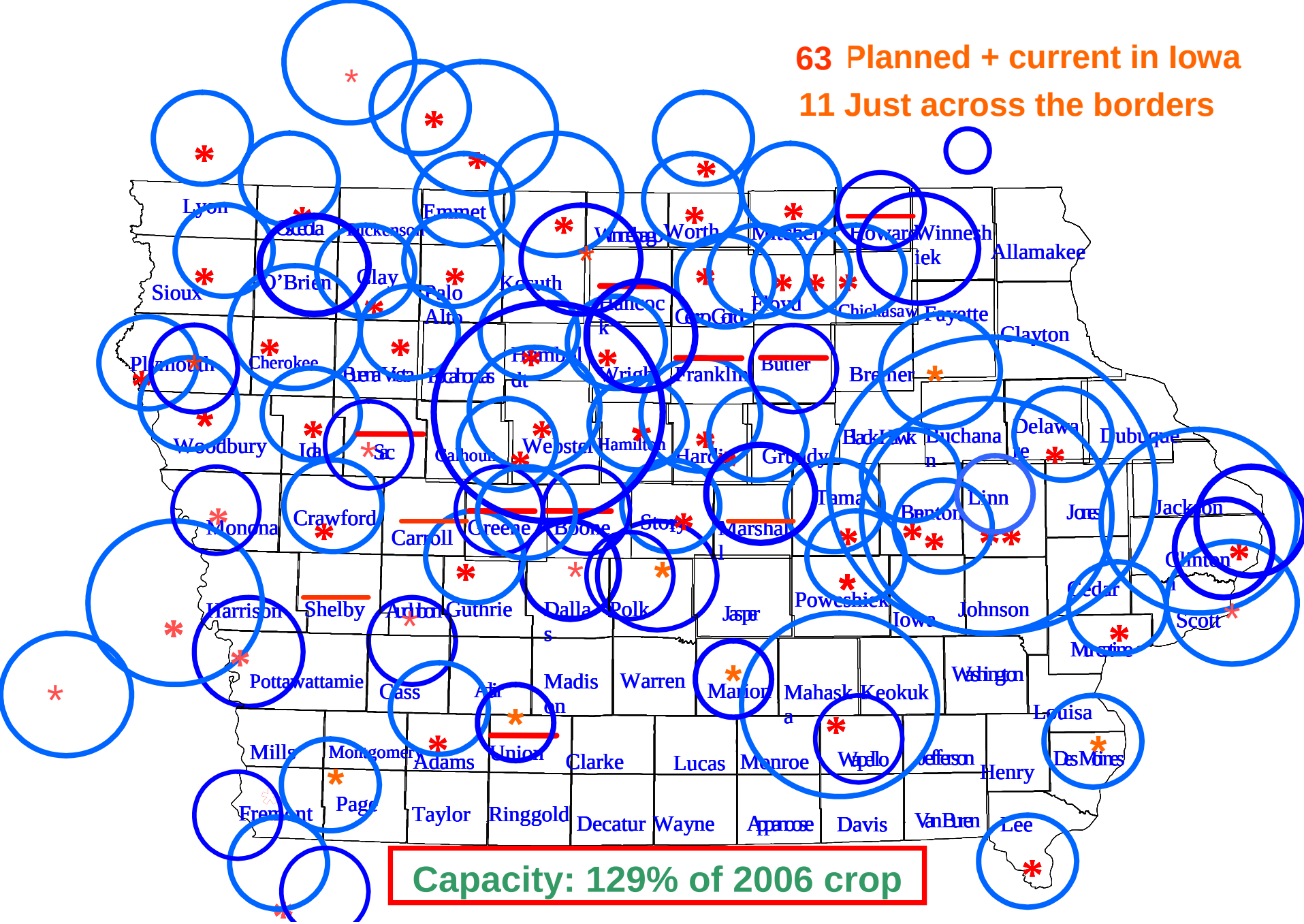
Soy Industry Dynamics

- Rapid Expansion in Corn-ethanol to pull big acreage from Soybeans in Corn Belt
- Soy Belt Northwest movement to continue (to area of lower ASR risk)
- Biofuels to bring soy expansion in S. America via higher bean prices, offsetting reduced U.S. exports
- Southern U.S. soybeans, most vulnerable to Asian Soy Rust (shift to other crops?)

Soybeans 2004
Planted Acres by County



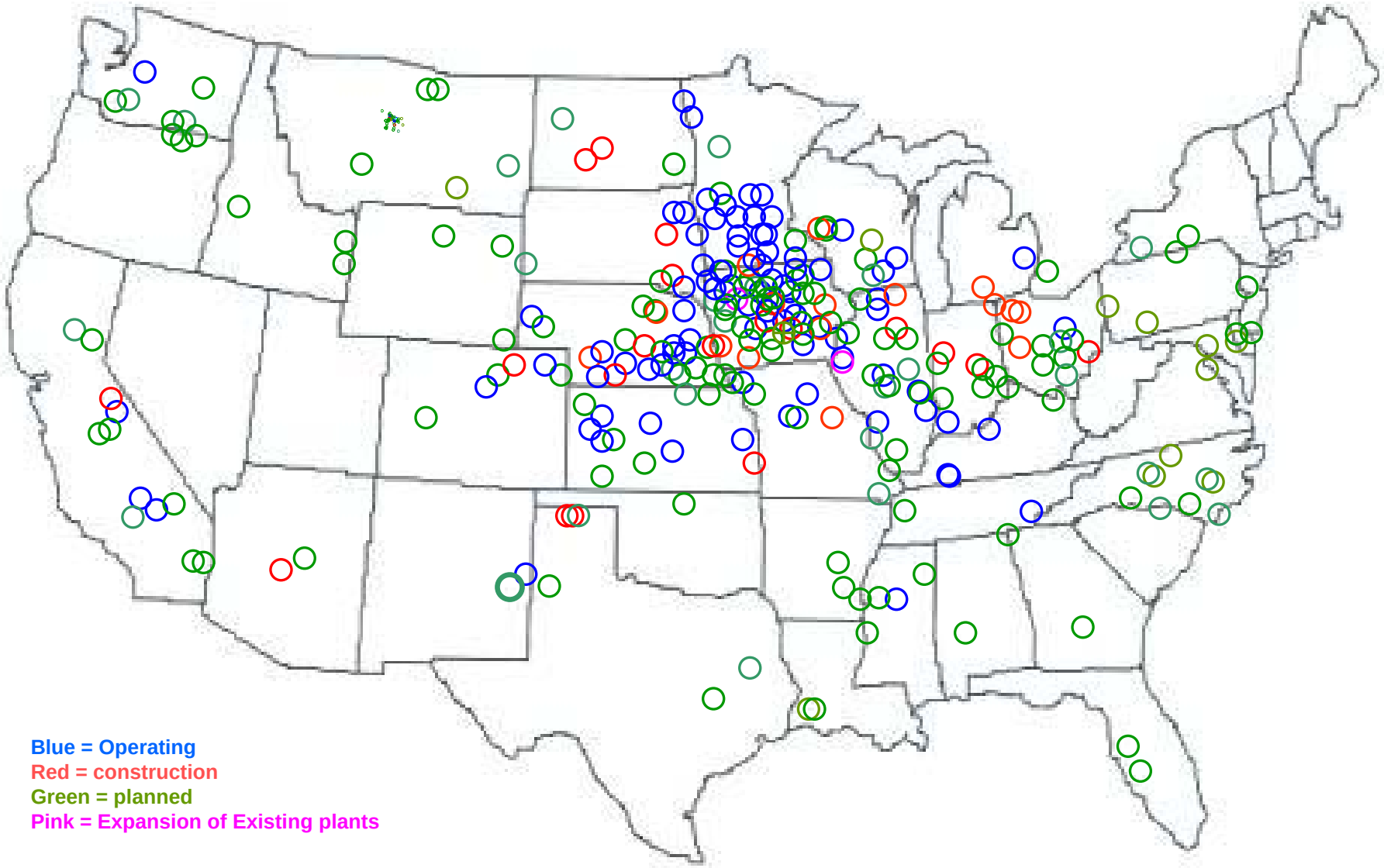
U.S. Department of Agriculture, National Agricultural Statistics Service



Iowa corn processing & ethanol plants, current & planned, 11/20/06

Existing & Planned U.S. Corn Processing Plants

Potential capacity 80% of current corn crop



8/30/06

5.5 Bil. Bu. For Ethanol

Figure 4. Extra U.S. Corn Acres Needed to Maintain Exports & Projected Ethanol

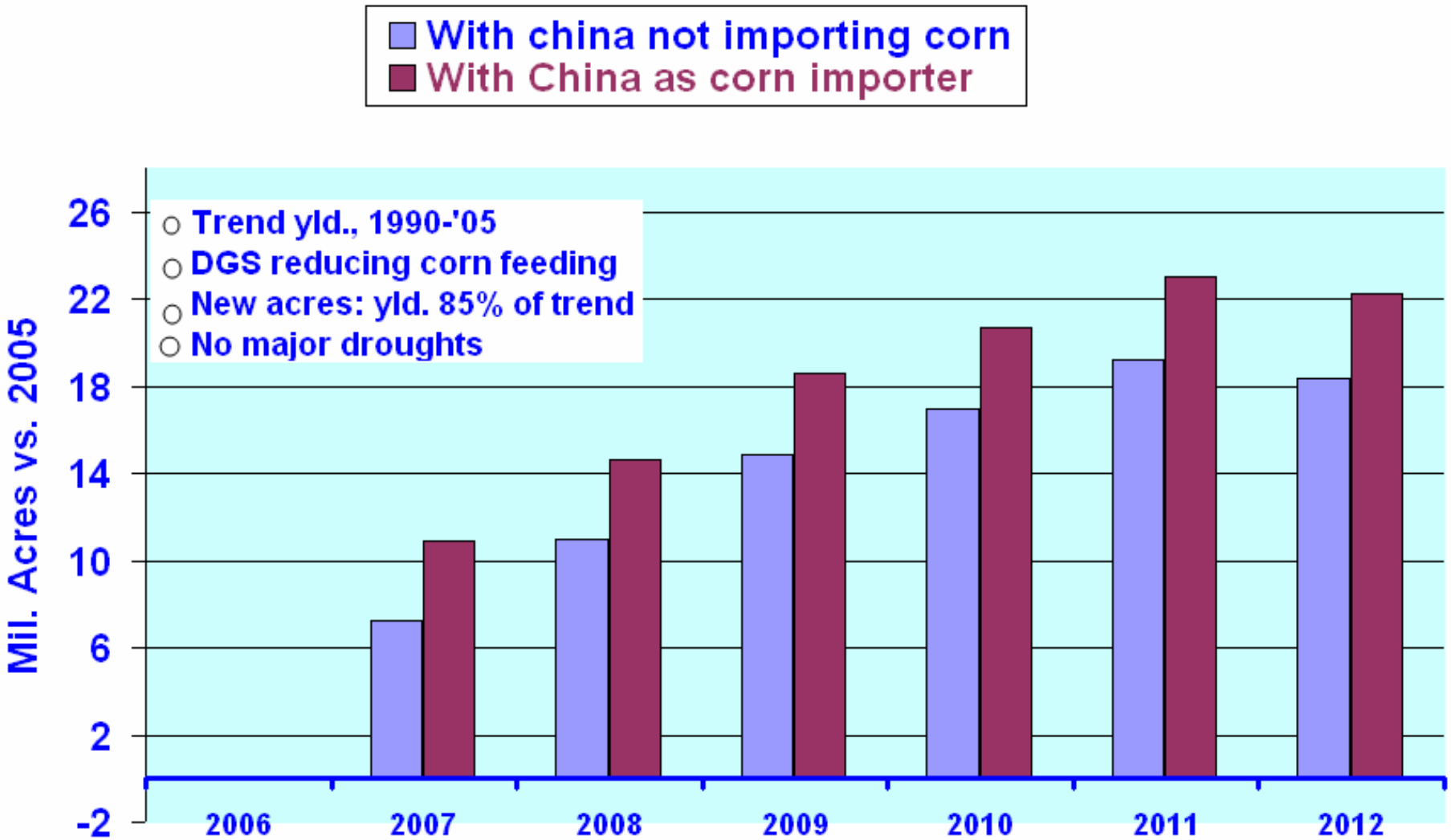
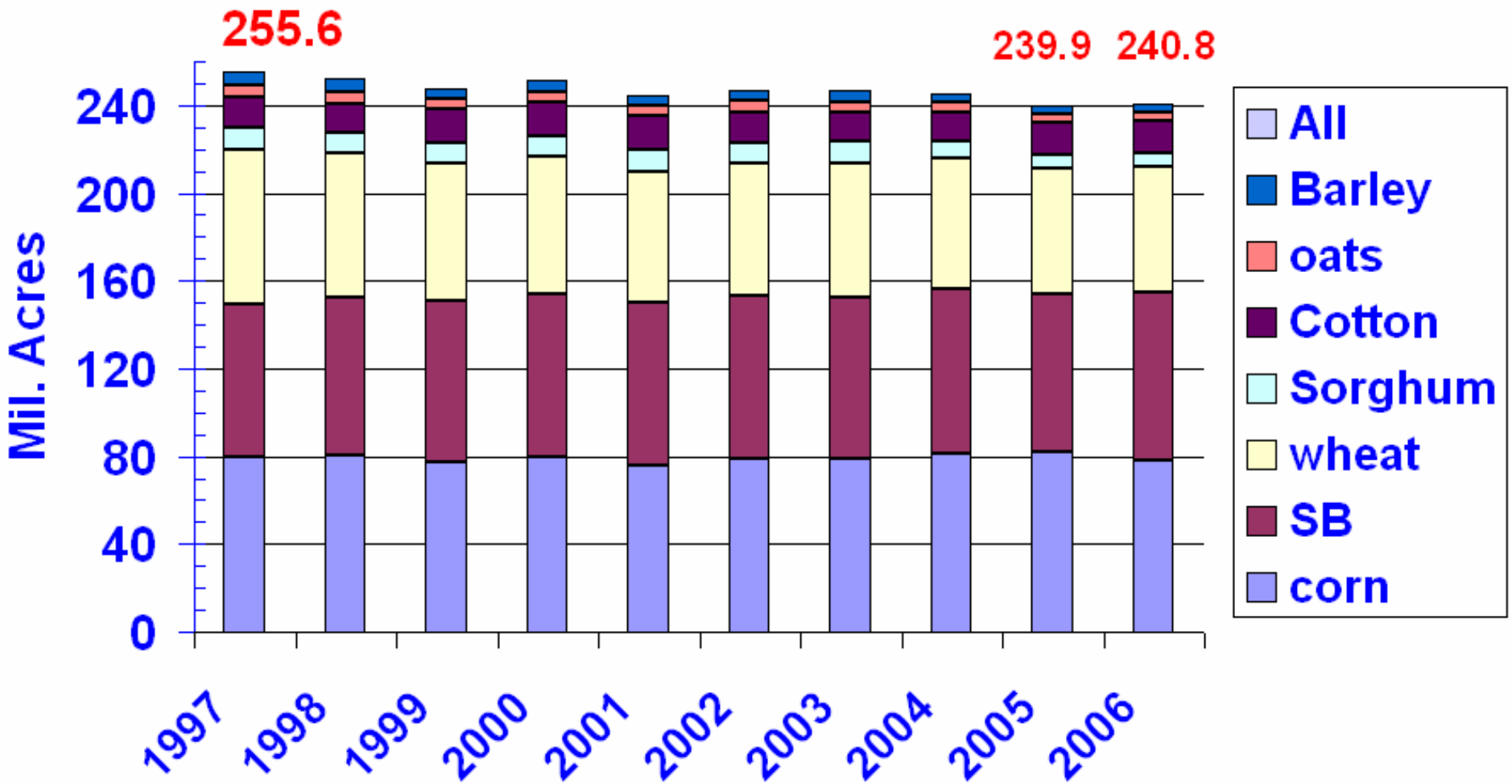


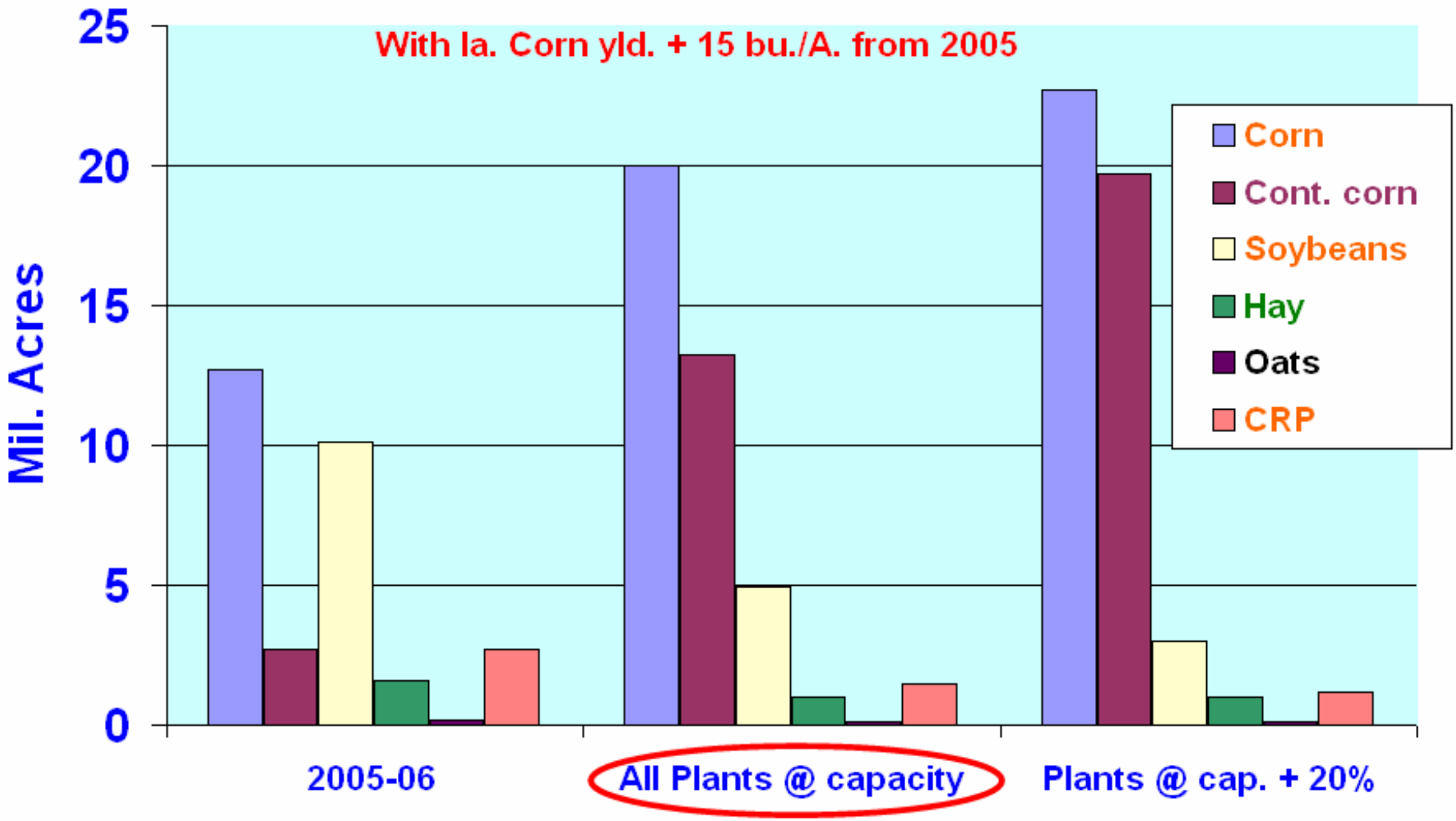
Figure 3. U.S. Planted Acreage of Major Grains, Oilseeds, and Cotton



Source of data: USDA, NASS

10/30/06

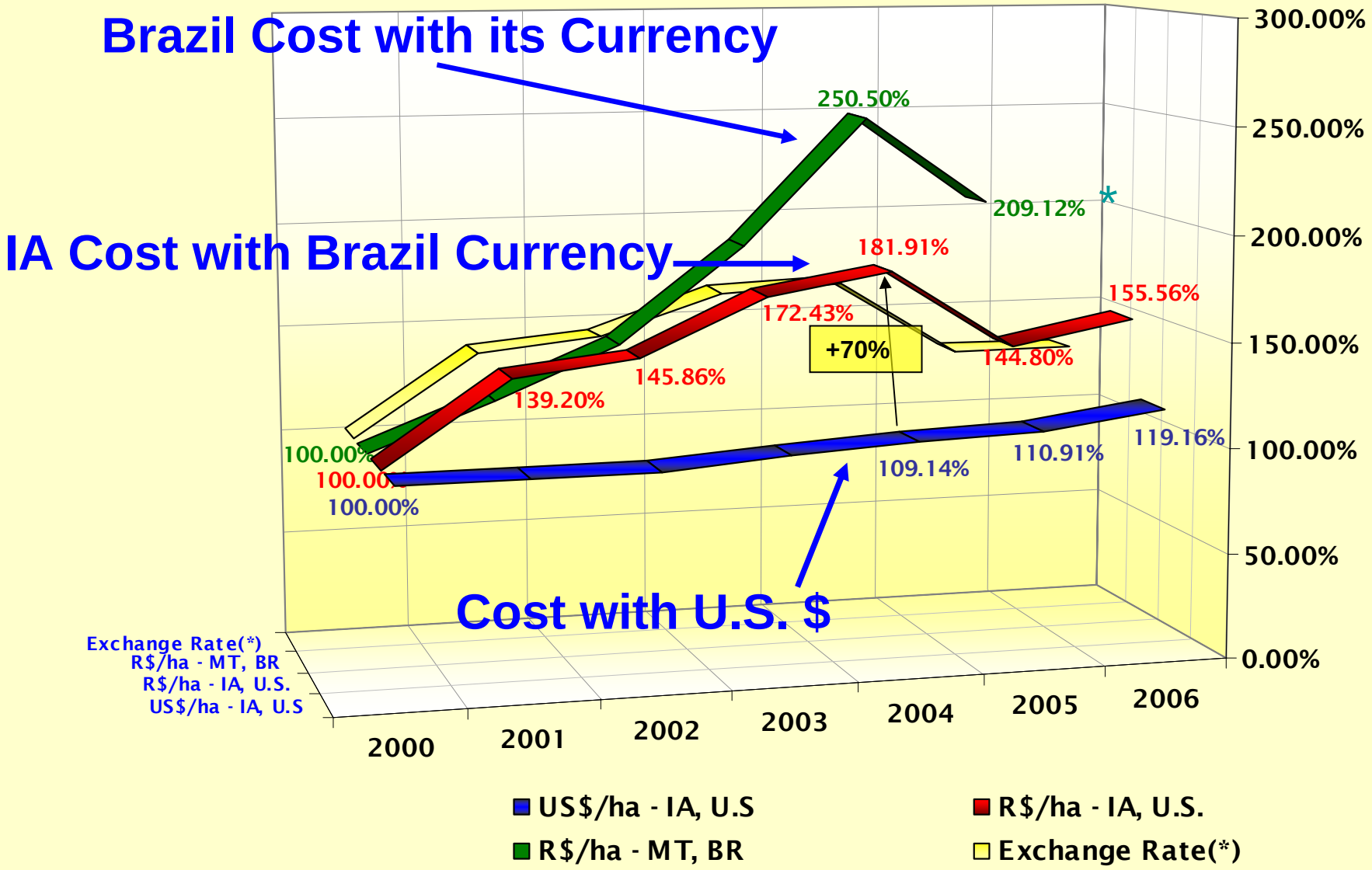
Iowa Current & Potential 2012 Crop Acreages



‘Example’ of Exchange Rate Impact

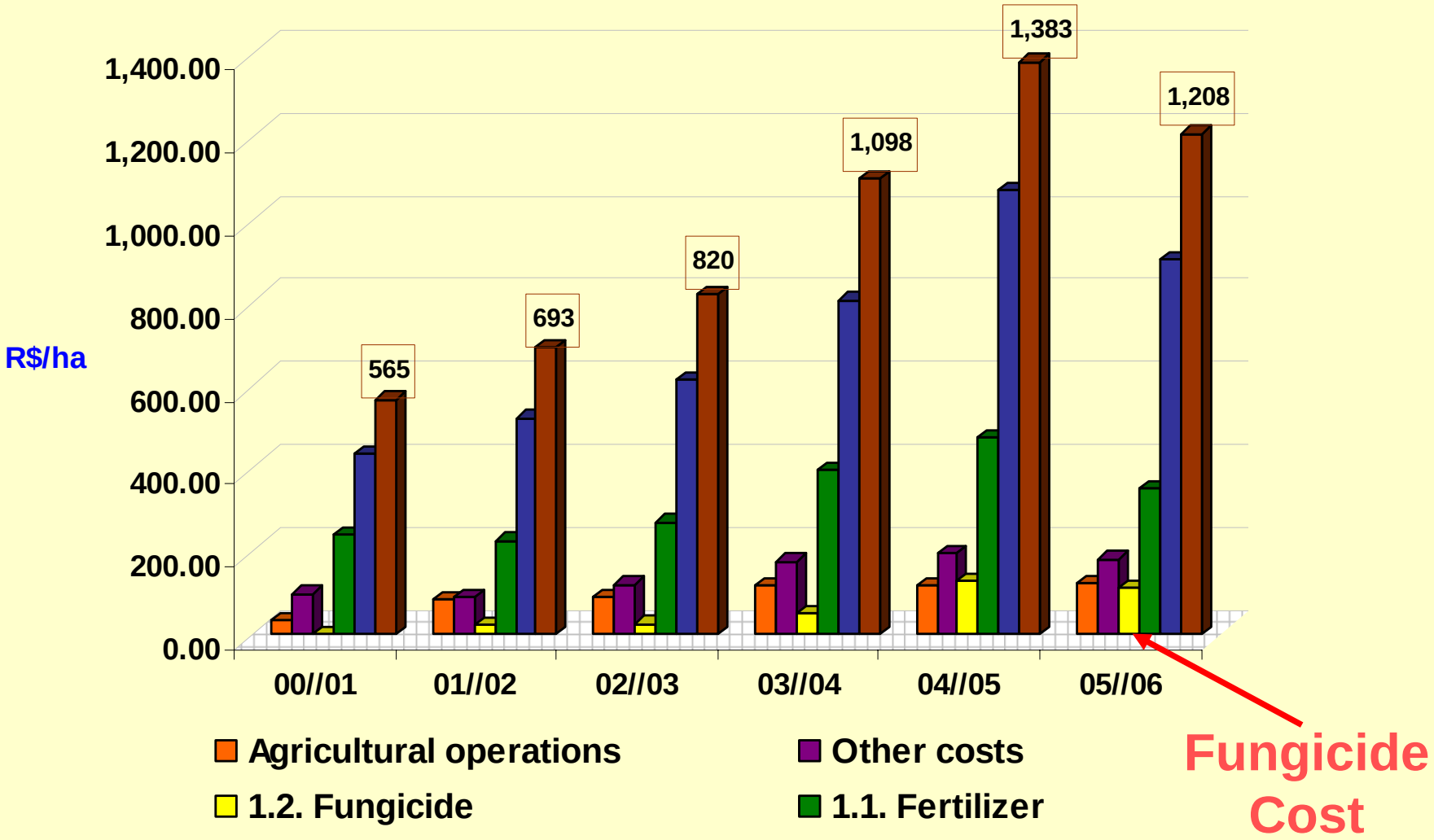
Iowa’s Soybean Costs

Sources: Embrapa Agropecuária Oeste, Brazil & Enos Ma, University of Sao Paulo



Variable Costs

Sorriso, MT - Brazil



Sources: Embrapa Agropecuária Oeste, Brazil & Enos Ma, University of Sao Paulo

Implications

- **Huge ethanol demand to change crop rotations, next 3-4 years in Midwest**
- **Corn Belt:Typical rotation may be 2-3 years of corn, followed by soybeans**
- **Lower total economic risk exposure to Asian Soybean Rust, but still large**
- **Important to protecting remaining crop**
- **Rising bean price may re-start Brazil soybean expansion**

http://www.econ.iastate.edu/faculty/wisner/

MINIMUM SOYOIL PRICE FOR BIODIESEL BREAKEVEN
at GIVEN WORLD CRUDE OIL PRICE

PRX_C_US_BA, GTB-06-03, Mar-14-06

		Crude Oil Price, $/bbl								
		$30.00	$35.00	$40.00	$45.00	$50.00	$55.00	$60.00	$65.00	$70.00
		Profitability of Biodiesel at given crude oil and soyoil prices, %$/lb								
Soybean	$0.19	($0.10)	$0.02	$0.14	$0.25	$0.37	$0.49	$0.61	$0.73	$0.85
Oil Price	$0.20	($0.18)	($0.06)	$0.06	$0.18	$0.30	$0.42	$0.54	$0.66	$0.78
$/lb	$0.21	($0.25)	($0.13)	($0.01)	$0.11	$0.23	$0.35	$0.47	$0.58	$0.70
	$0.22	($0.32)	($0.20)	($0.08)	$0.04	$0.15	$0.27	$0.39	$0.51	$0.63
	$0.23	($0.39)	($0.28)	($0.16)	($0.04)	$0.08	$0.20	$0.32	$0.44	$0.56
	$0.24	($0.47)	($0.35)	($0.23)	($0.11)	$0.01	$0.13	$0.25	$0.37	$0.48
	$0.25	($0.54)	($0.42)	($0.30)	($0.18)	($0.06)	$0.05	$0.17	$0.29	$0.41
	$0.26	($0.61)	($0.49)	($0.38)	($0.26)	($0.14)	($0.02)	$0.10	$0.22	$0.34
	$0.27	($0.69)	($0.57)	($0.45)	($0.33)	($0.21)	($0.09)	$0.03	$0.15	$0.27
	$0.28	($0.76)	($0.64)	($0.52)	($0.40)	($0.28)	($0.16)	($0.05)	$0.07	$0.19
	$0.29	($0.83)	($0.71)	($0.59)	($0.48)	($0.36)	($0.24)	($0.12)	$0.00	$0.12
	$0.30	($0.91)	($0.79)	($0.67)	($0.55)	($0.43)	($0.31)	($0.19)	($0.07)	$0.05
	$0.31	($0.98)	($0.86)	($0.74)	($0.62)	($0.50)	($0.38)	($0.26)	($0.15)	($0.03)

For Blue Sky Scenario, PRX adopts a crude oil price of $50/bbl and thus a minimum 24 cent/lb soyoil price, to evaluate impact of subsidized biodiesel marke

References

- M. Livingston, R Johansson, S Daberkow, M. Roberts, M. Ash, & V. Breneman, *Economic & Policy Implications of Wind-Borne Entry of Asian Soybean Rust into the United States,* OSC-04D-02, April 2004, ERS, USDA
- USDA, NASS, Crop Production, Annual Summary, January 2006
- USDA, NASS, Crop Production, November 9, 2006
- USDA, WAOB, World Agriculture Supply-Demand Report, 11/09/06
- Renewable Fuels Association, ethanol.org
- grainnet.com and various press releases and industry reports on planned ethanol plants
- Enos Ma, Agricultural Economics, University of Sao Paulo, personal communication
- USDA, National Soybean Rust Commentary
- Gary Munkvold, Associate Professor and Seed Science Endowed Chair, Iowa State University Dept. of Plant Pathology, communication on spraying costs