Conservation Systems in the Southeast

Southern Conservation Agricultural Systems Conference

Norman, OK

February 20, 2013

Kip Balkcom

Research Agronomist

USDA-ARS, NSDL

Conservation Systems Research

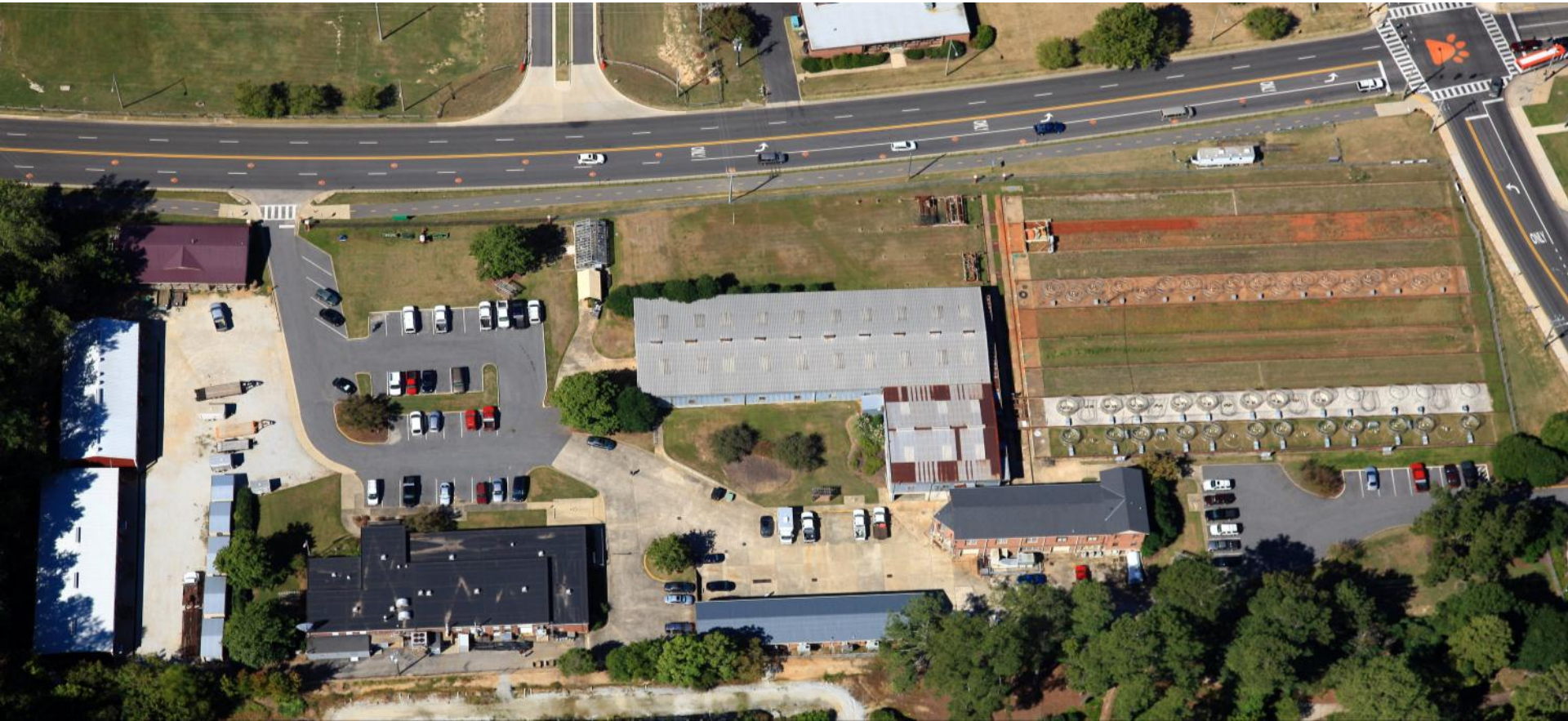
Auburn, AL

National Soil Dynamics Laboratory

Auburn, Alabama

USDA-ARS National Soil Dynamics Laboratory
Auburn, Alabama

- Global Change Research
- Conservation Systems Research
- Waste Management Research



Conservation Systems Research Team

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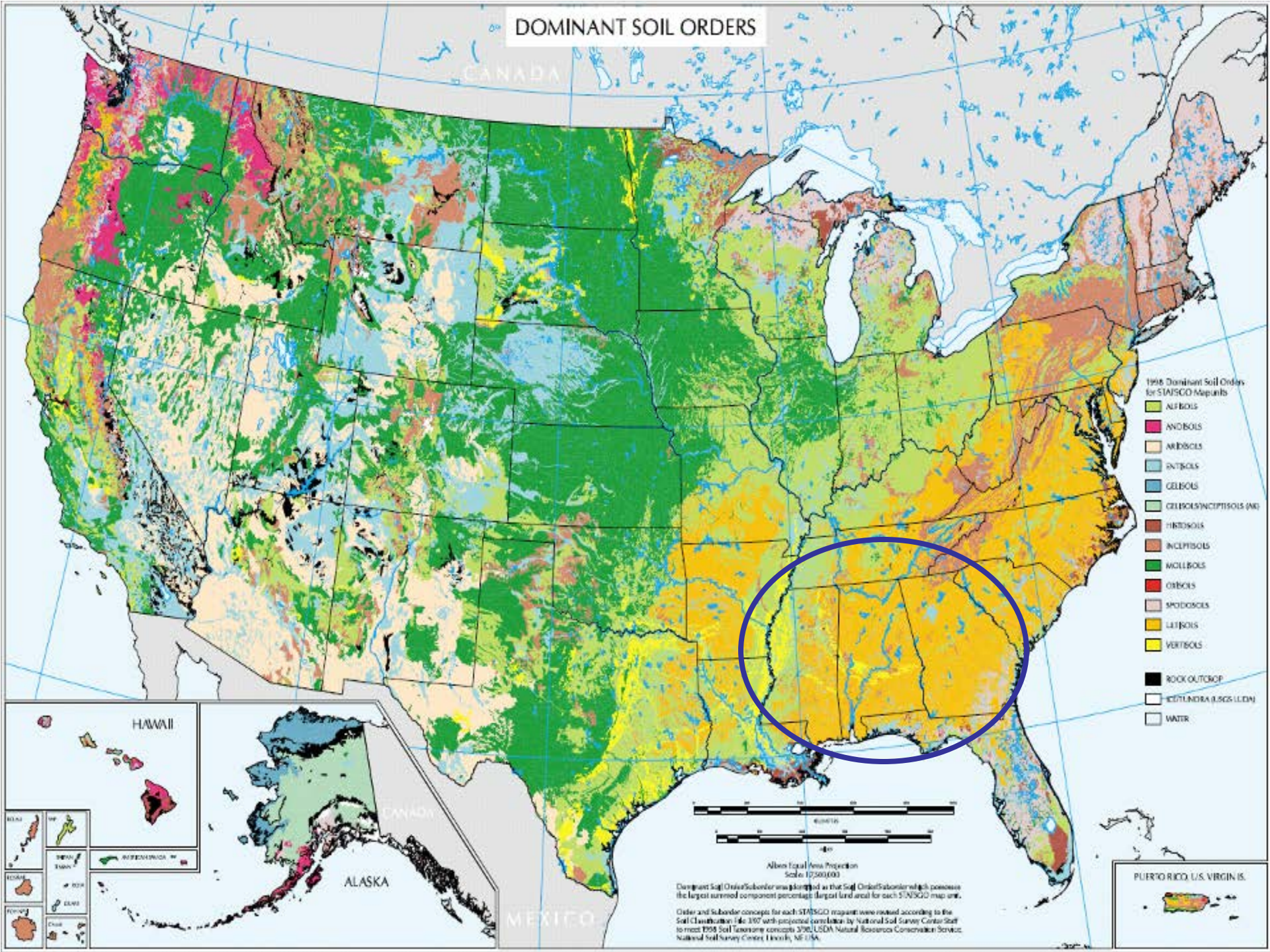
  - (Agronomic Science Technician)

DOMINANT SOIL ORDERS

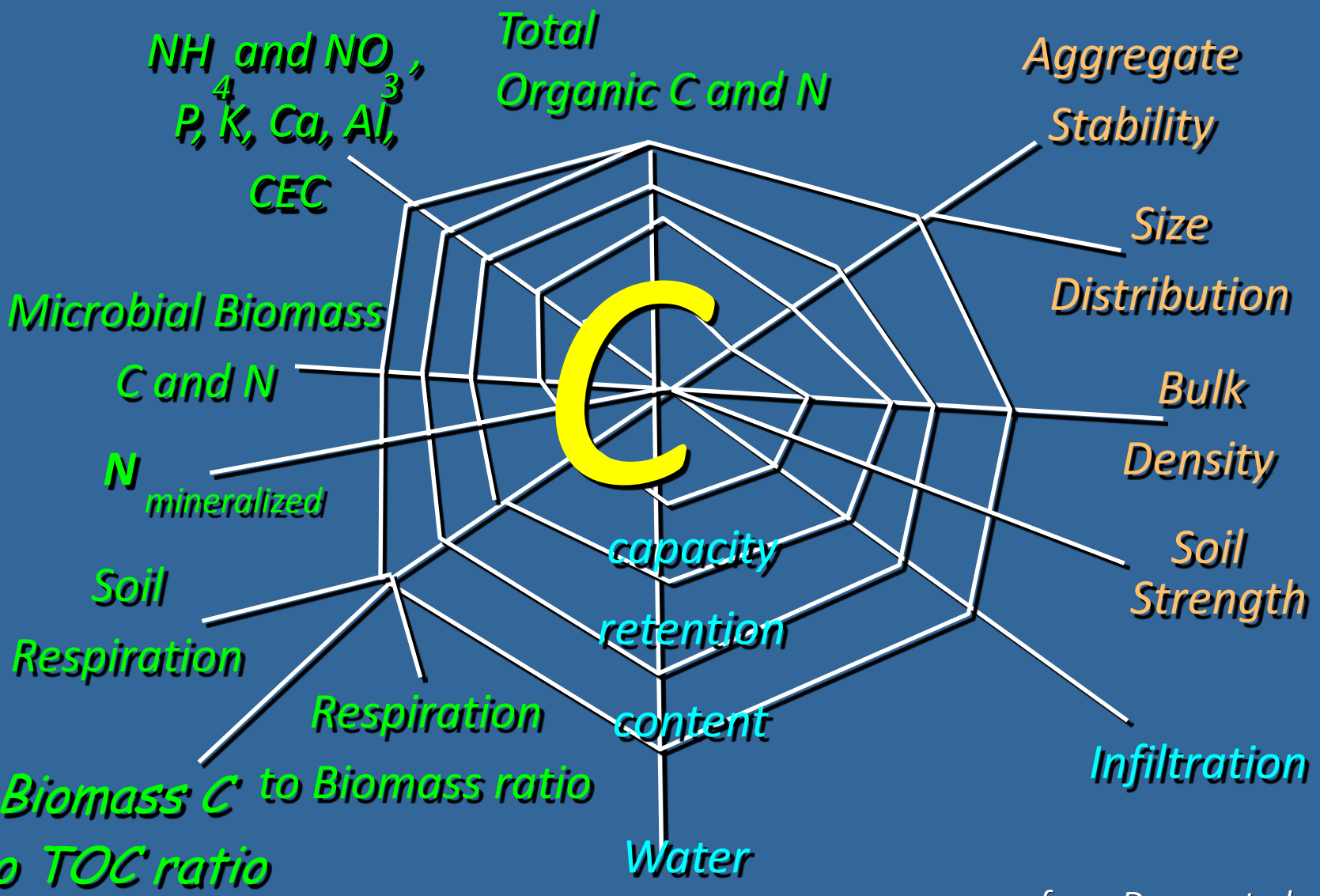


Albers Equal Area Projection
Scale: 1:7,500,000

Dominant Soil Order/Suborder was plotted as that Soil Order/Suborder which possesses the largest summed component percentage (largest land area) for each STATSGO map unit.

Order and Suborder concepts for each STATSGO mapunit were revised according to the Soil Classification File 3/97 with projected correlation by National Soil Survey Center Staff to meet 1998 Soil Taxonomy concepts 3/98. USDA Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE USA.

Soil C is the basis of Soil Quality/Productivity



from Doran et al., 1993

How to increase soil C and improve soil quality?

✓ **Conservation Tillage with Cover Crops**

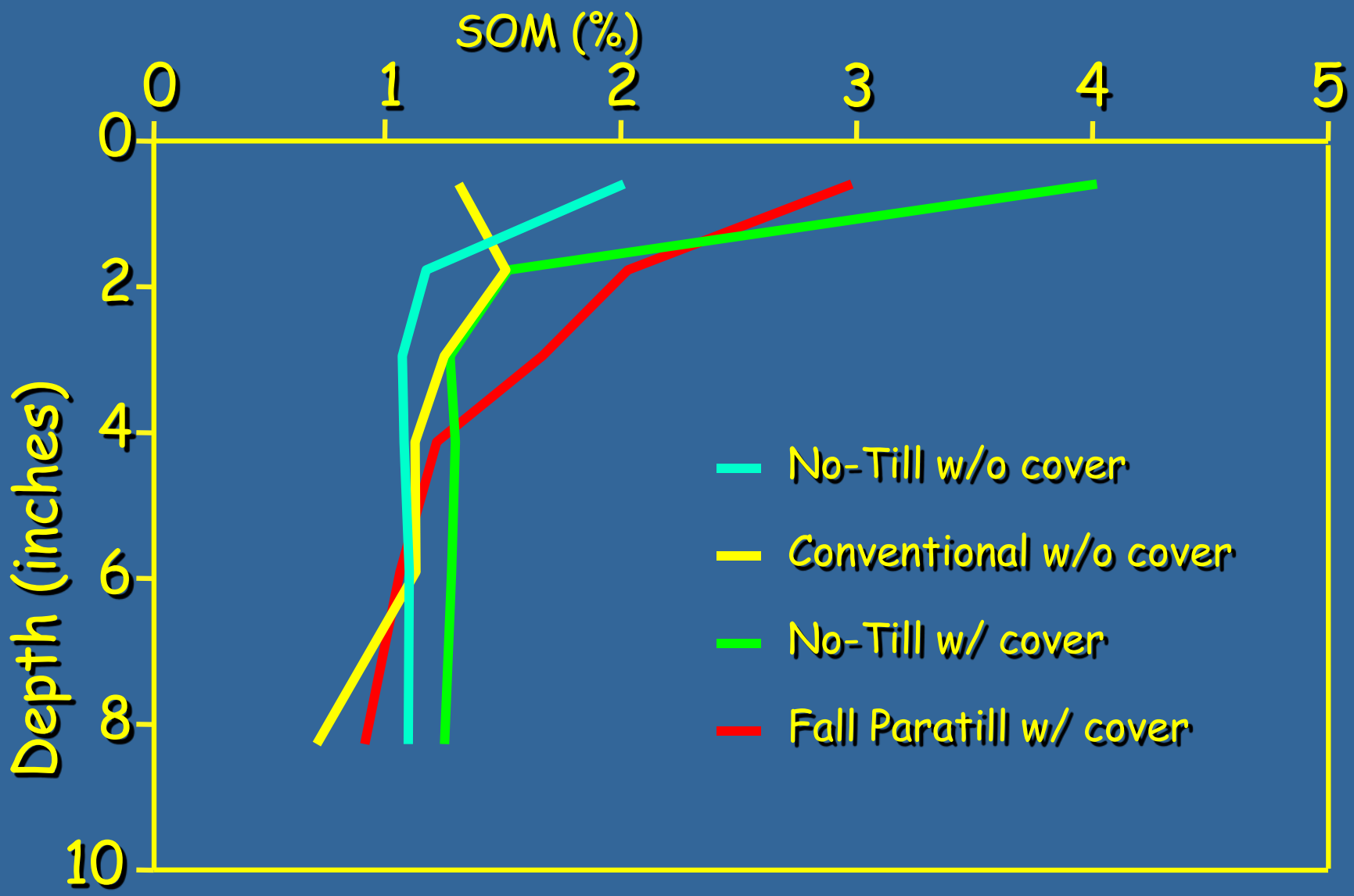
Conservation System

Conventional Tillage Promotes Soil Erosion

Manage compaction . . .

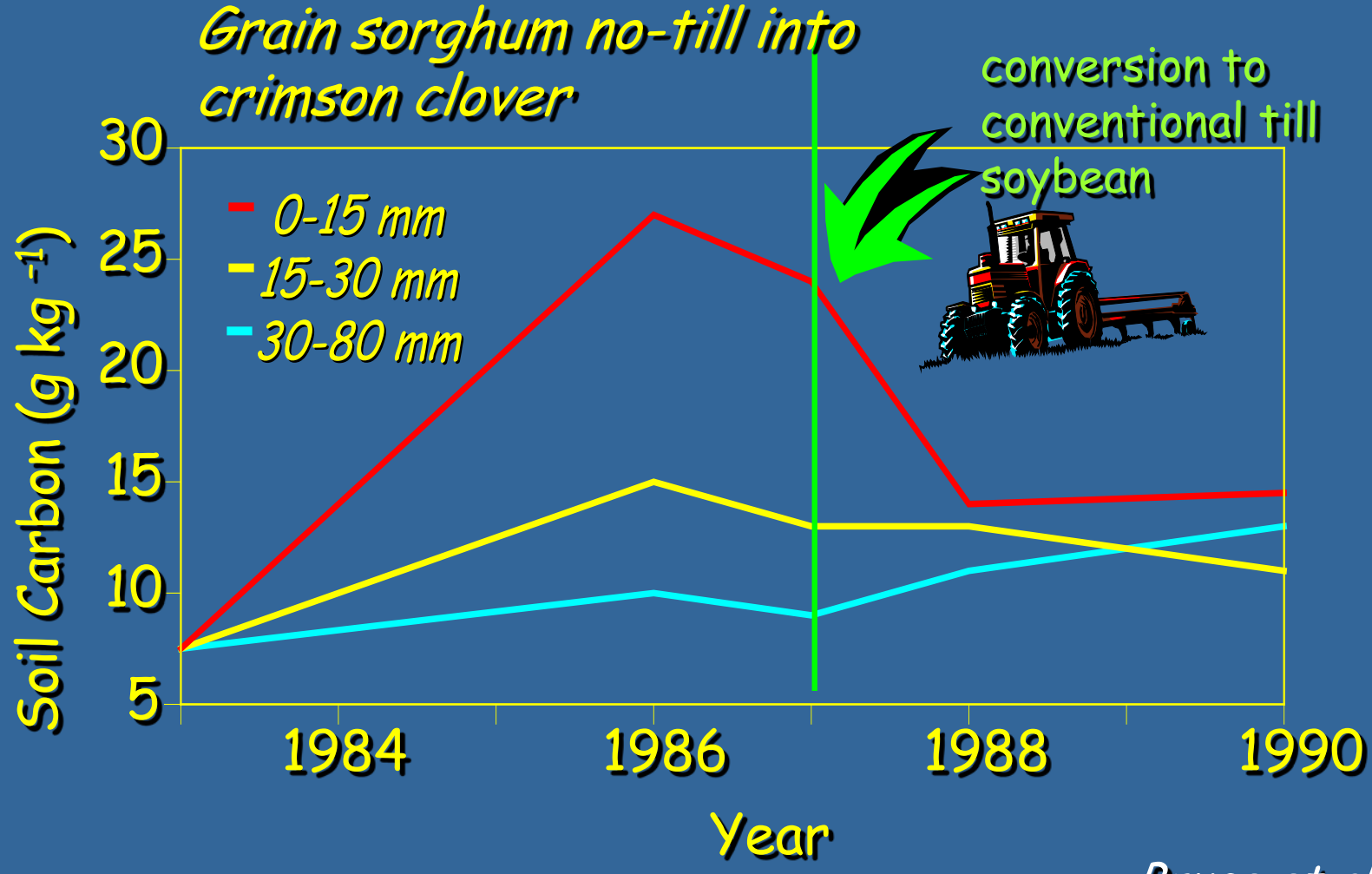
Non-inversion Tillage

Tillage and rye cover crop effects on SOM after 5 y



Decatur silt loam

Effect of cropping/tillage system on soil C from an eroded Ultisol in Georgia.



Bruce et al., 1995

What is a Cover Crop?

- **A crop whose main purpose is to benefit the soil and/or a subsequent crop in one or more ways, but is not intended to be harvested for feed or sale.**

Courtesy: Harry Schomberg, USDA-ARS

High Residue Cover Crop

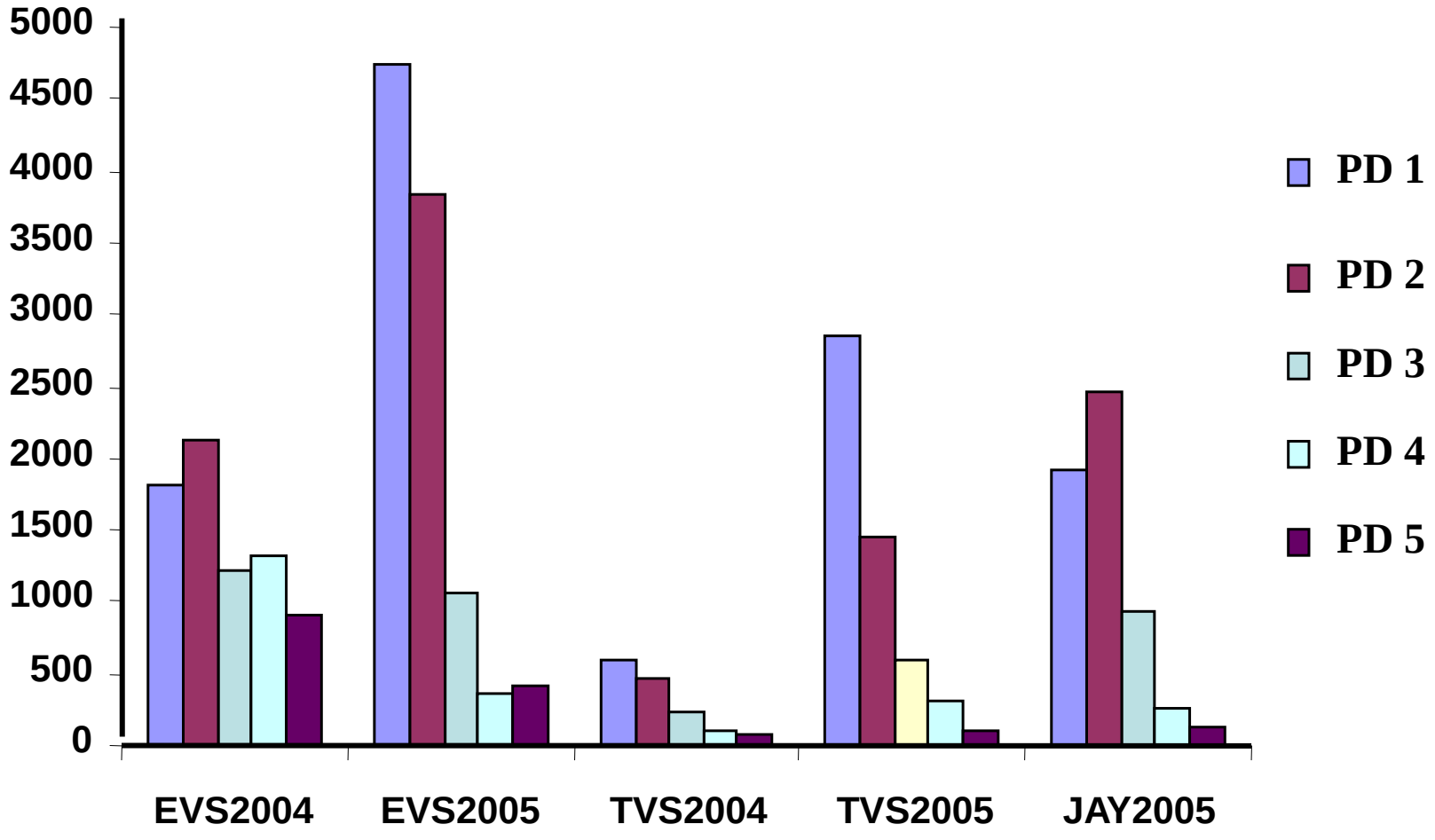
Why use Cover Crops?

- Erosion control
- Soil and water quality improvement
- Increased water infiltration
- Minimize nutrient loss

Soil organic carbon

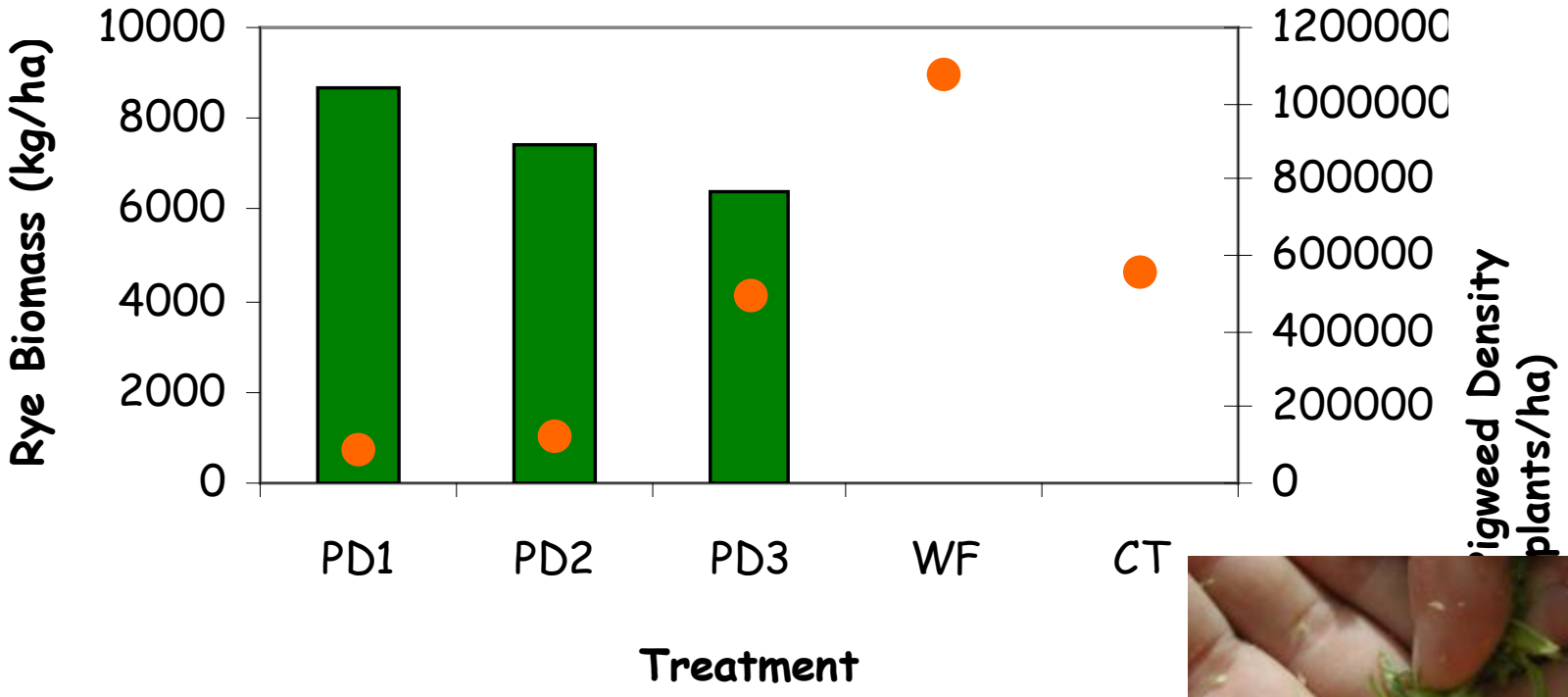
High Residue Cover Crops Suppress Weeds

Planting Date - Clover Biomass



Courtesy: Andrew Price

Cover crop planting date affects rye biomass and pigweed density



Cover Crop Fertilization

N Contribution of Peanut Residue

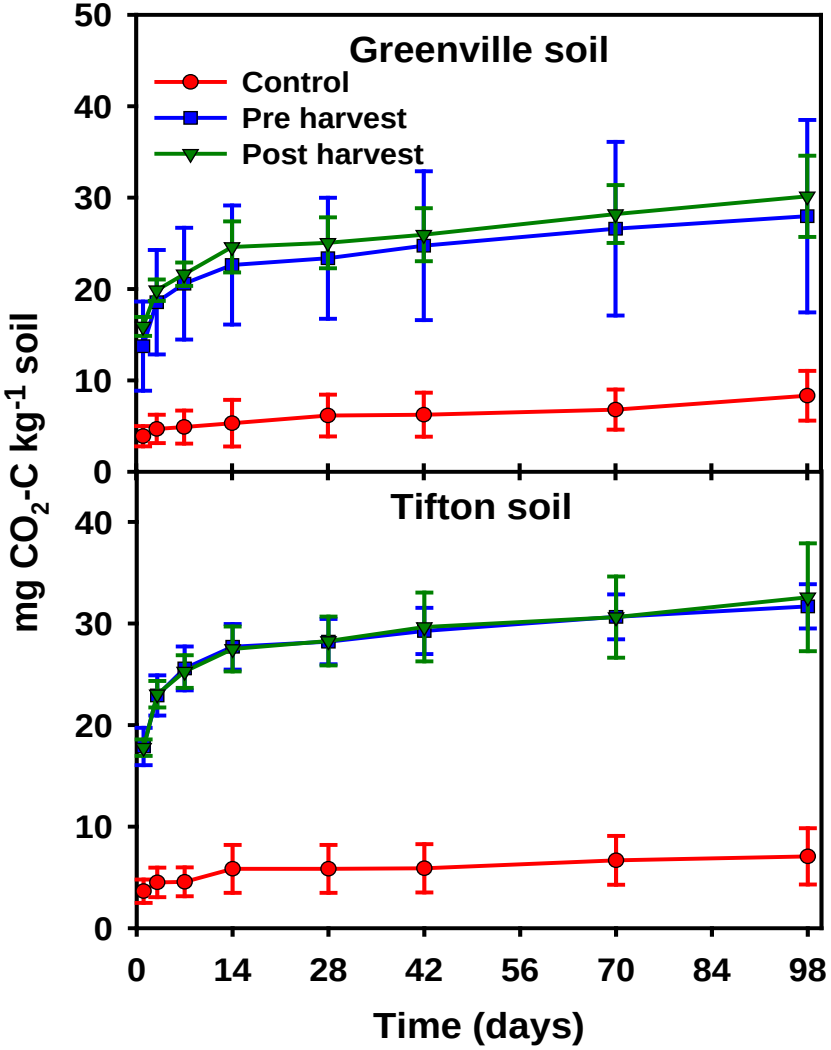
- **Estimate N contributed by peanut residues to a succeeding rye cover crop in a conservation tillage system.**

- **Utilized laboratory and field studies.**

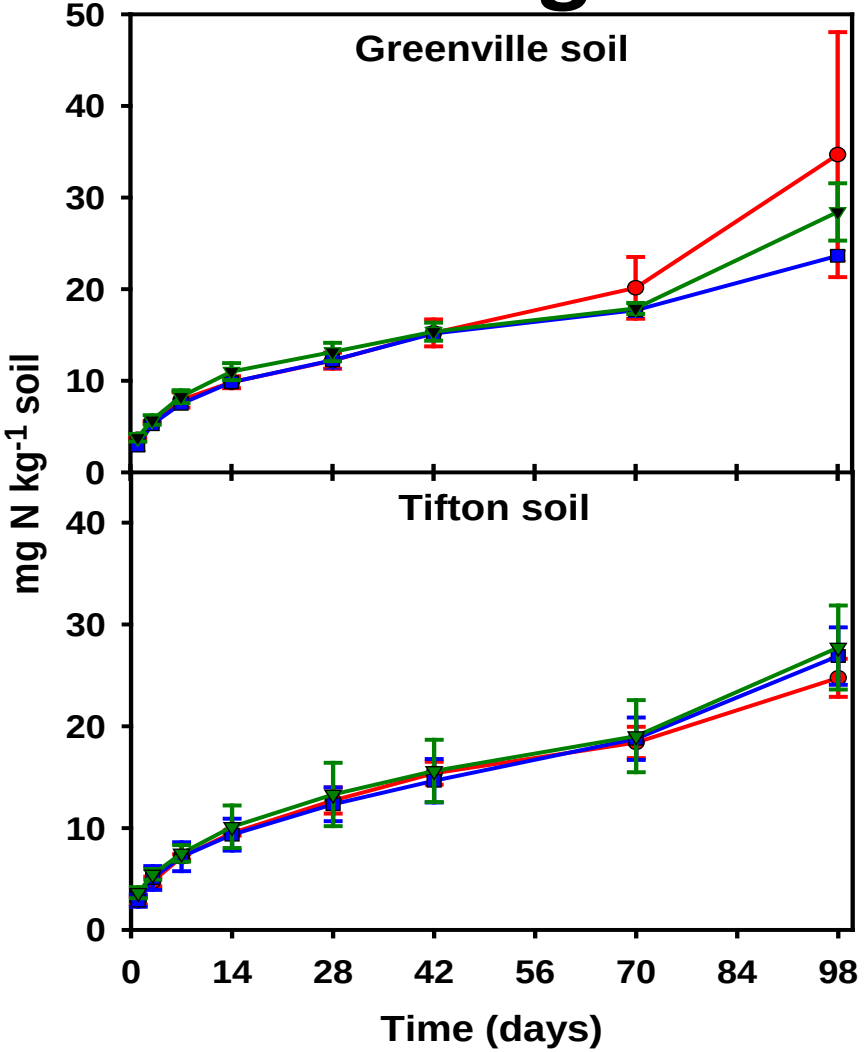
Peanut residue did not contribute significant amounts of N based on 3-year biomass yields.

Peanut Residue Mineralization

Carbon



Nitrogen

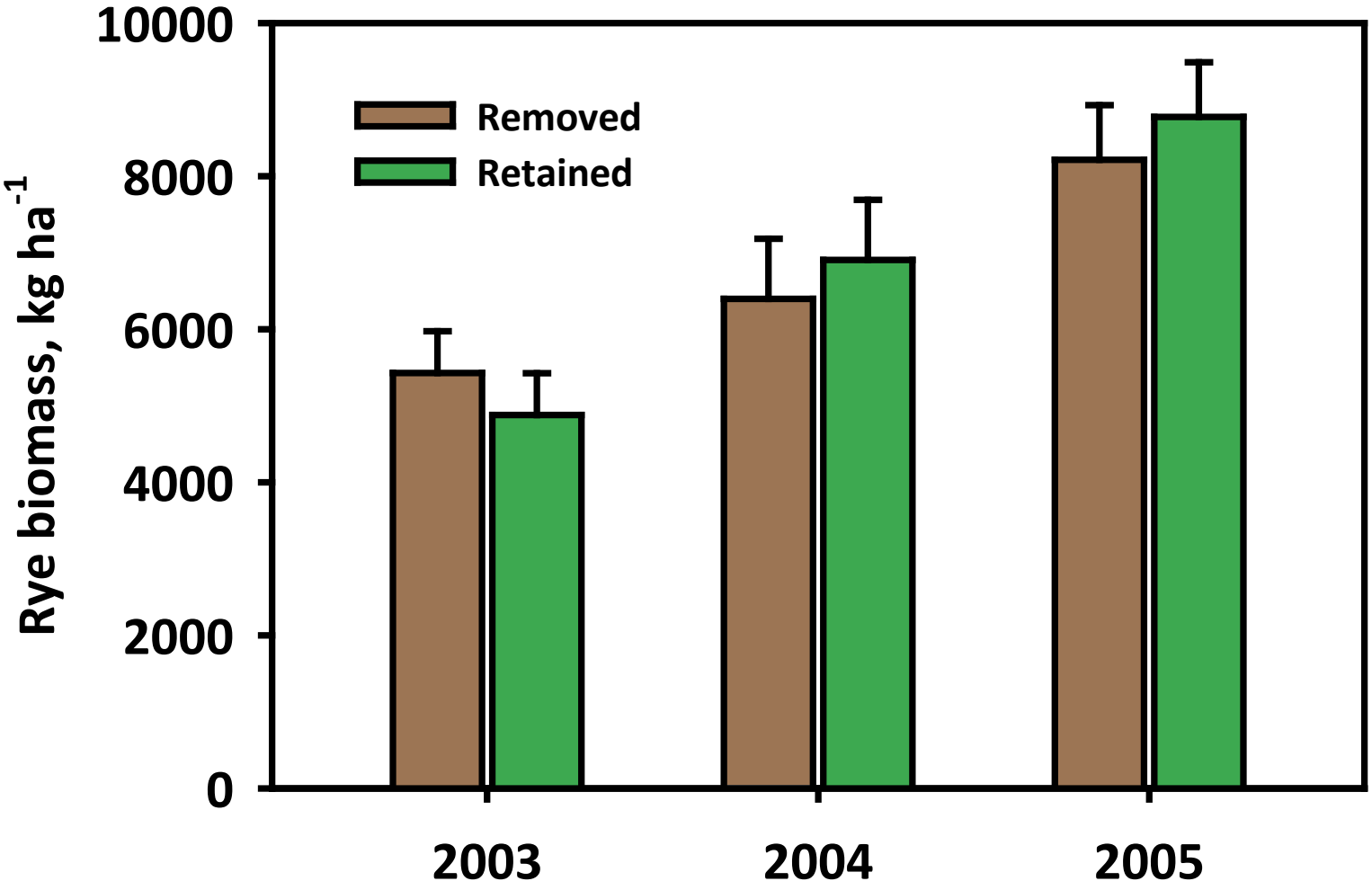


Balkcom et al., 2004

Peanut Residue

Peanut crop year	Peanut biomass	C	N	C/N ratio	P	K	Ca
	lb ac^{-1}	-----%	-----		---------%	---------	
2002	2820	42.2	1.7	25.3	0.10	1.2	0.83
2003	2880	44.0	1.1	39.6	0.16	1.3	1.2
2004	3000	36.2	1.4	26.6	0.18	0.35	0.97

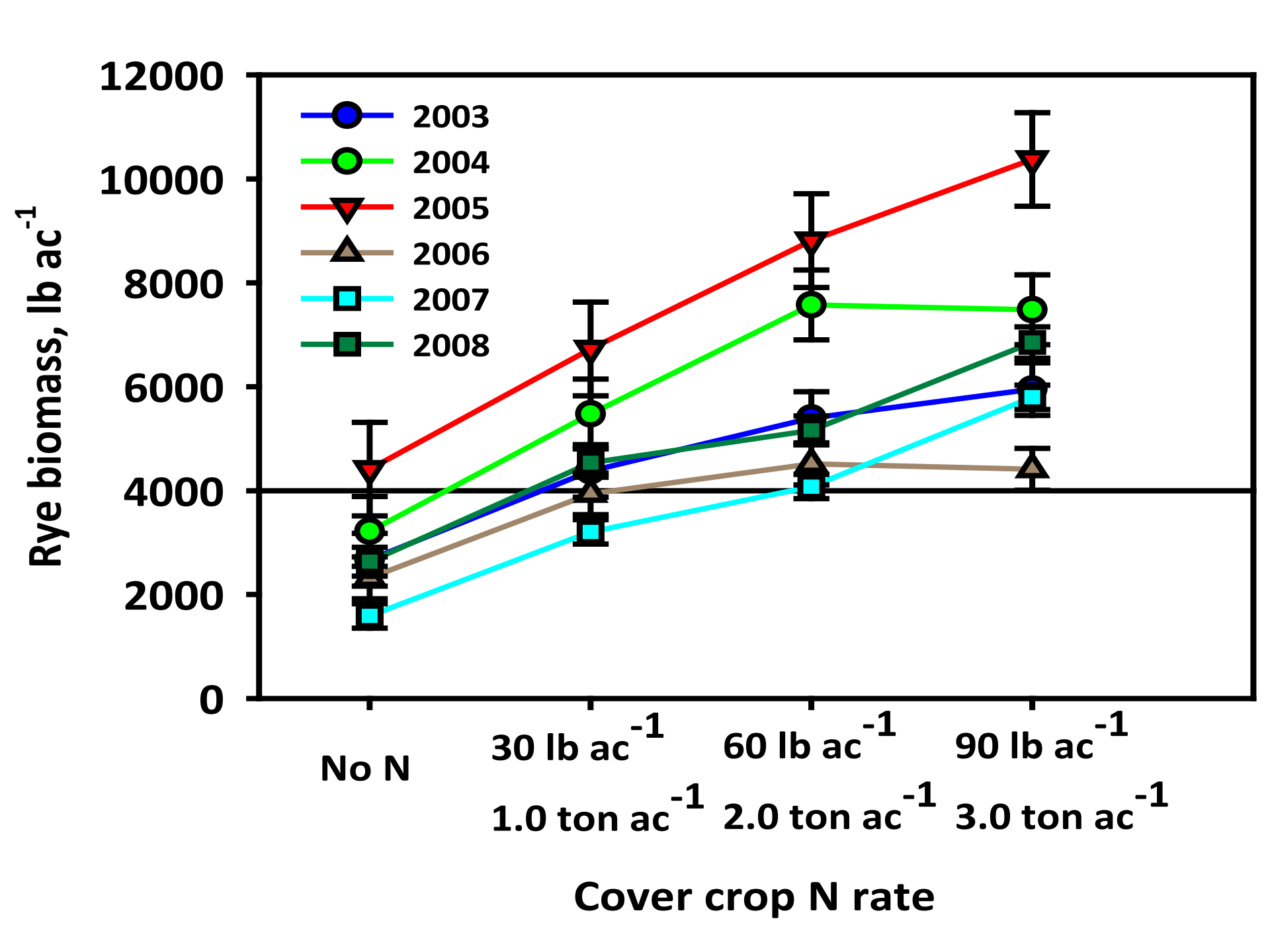
Peanut Residue



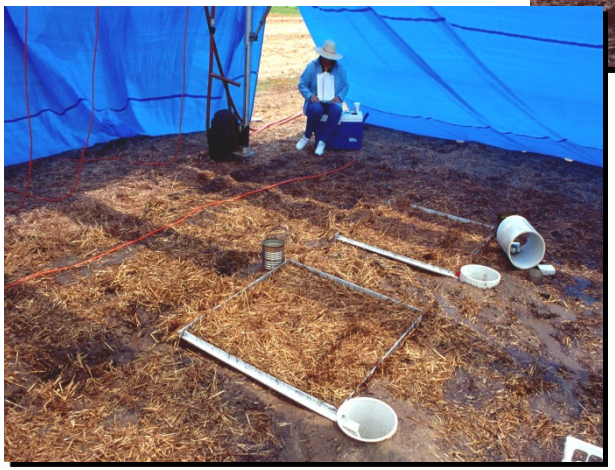
WGS Headland, AL

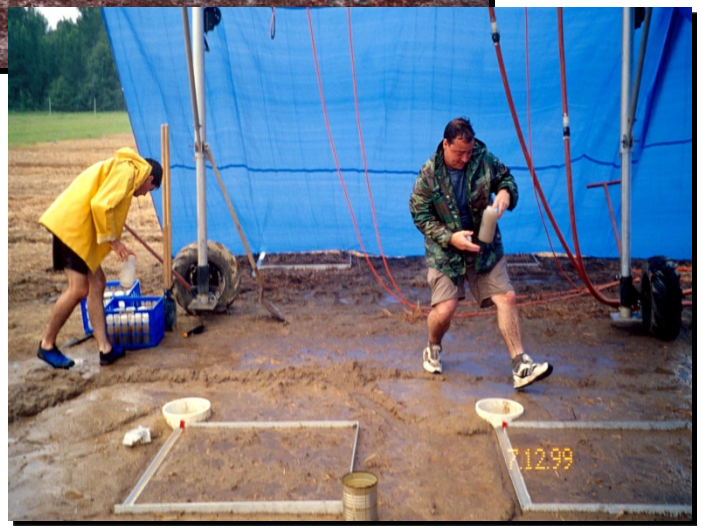
Alternative N Sources

- **Compare N sources, rates, and time of application for a rye cover crop to maximize biomass production.**

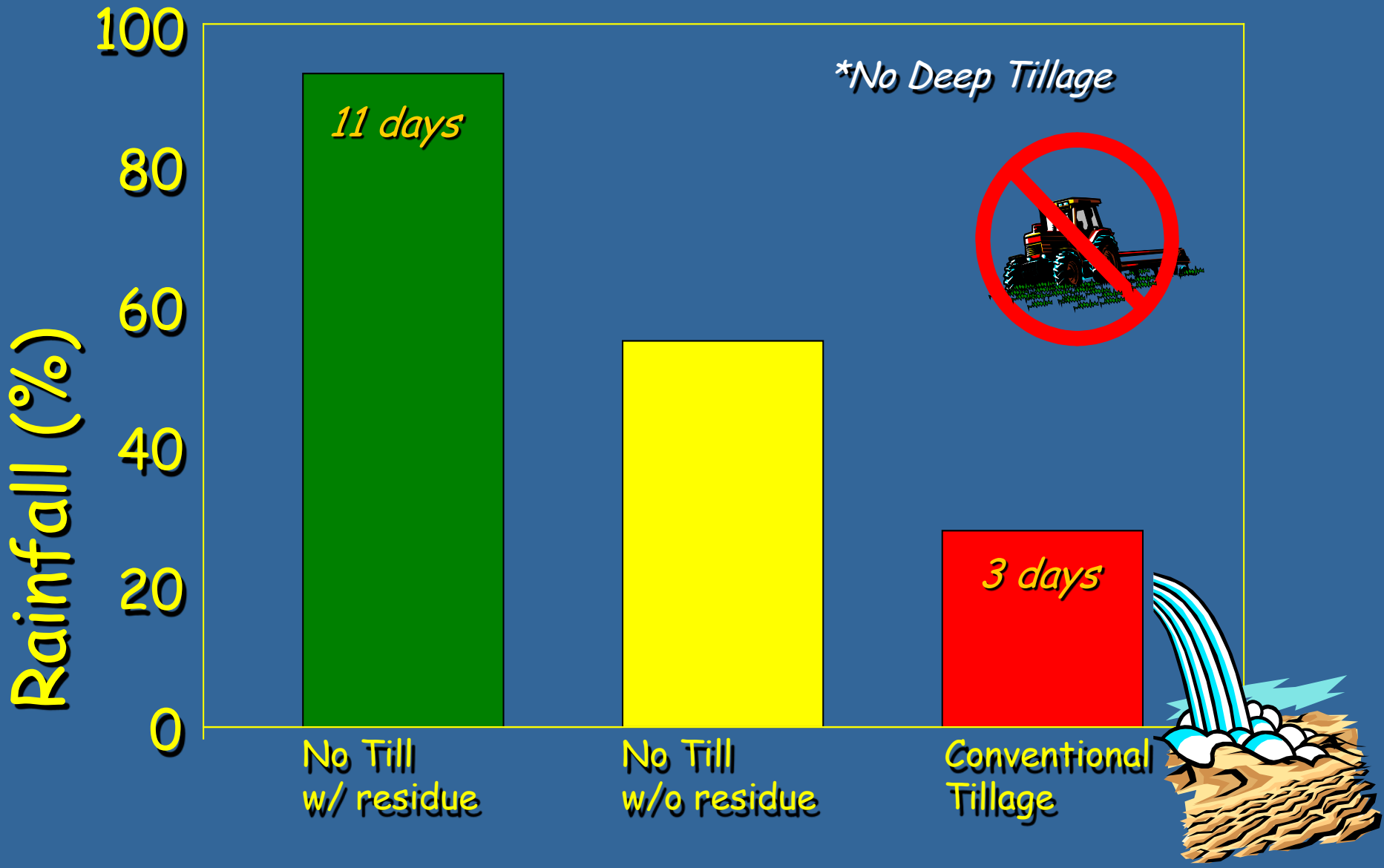

12000
10000
8000
6000
4000
2000
0
Rye biomass, lb ac-1
2003
2004
2005
2006
2007
2008
No N
30 lb ac-1
1.0 ton ac-1
60 lb ac-1
2.0 ton ac-1
90 lb ac-1
3.0 ton ac-1
Cover crop N rate

Rainfall Simulation Study . . .

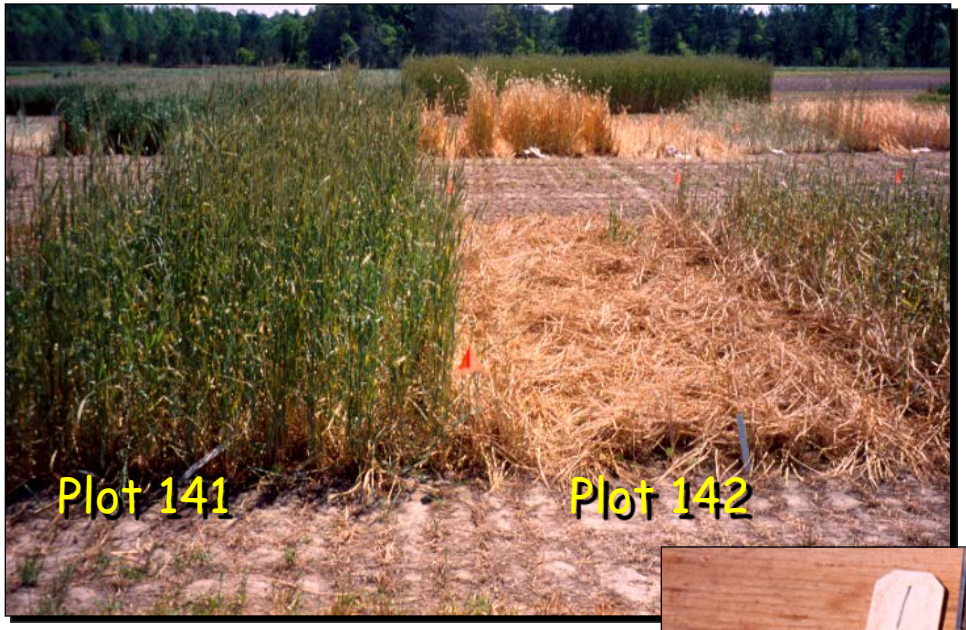




Tillage and residue effects on infiltration of a Coastal Plain Soil (2-inch rain event)



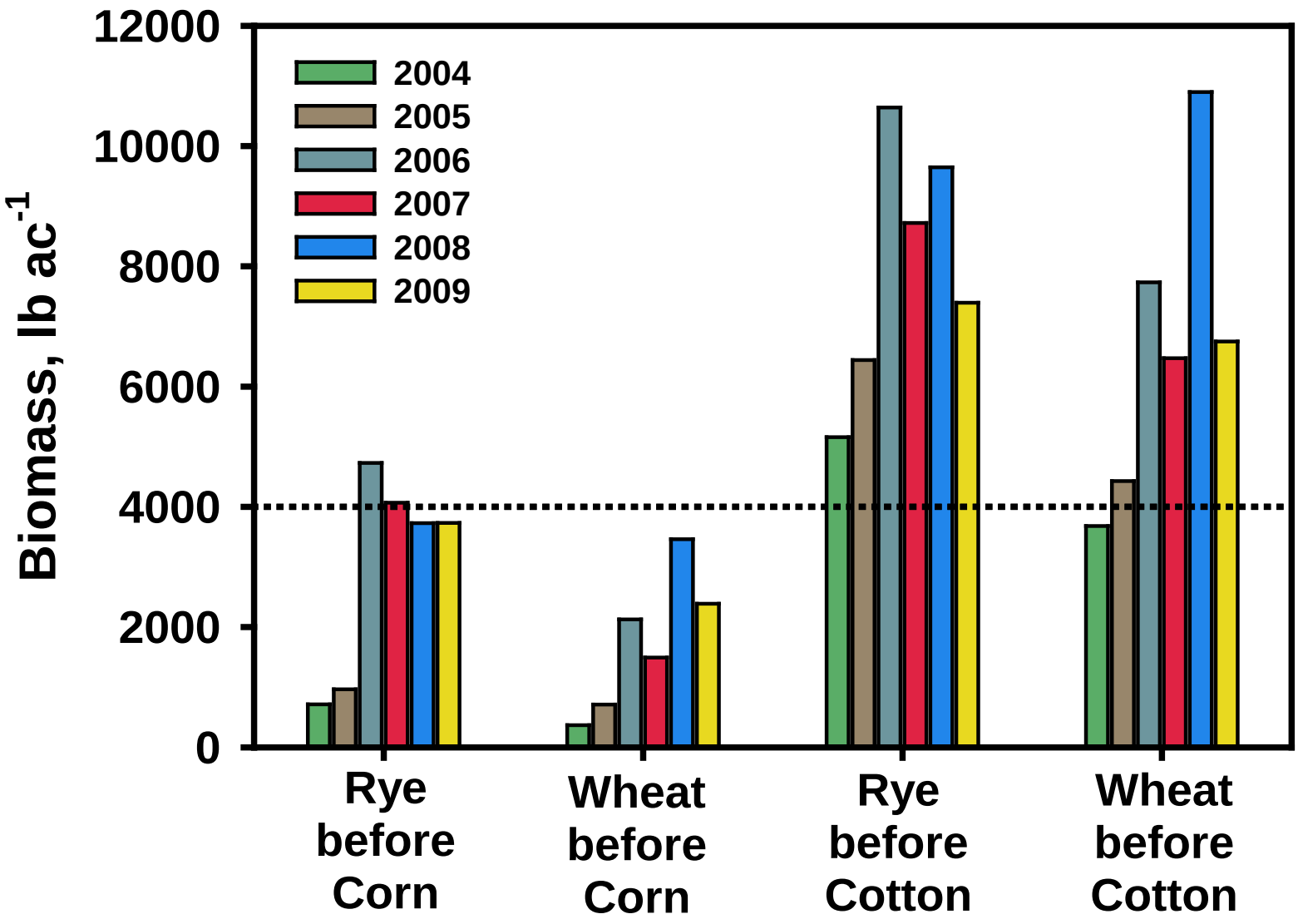
Soil Water Conservation



Timing Termination

2-4 weeks

Biomass Production
Time of Termination



Methods of Termination

Physical methods

- Mowing
- Mechanical Rolling

Roller Variations

Roller Variations

Roller Variations

Roller Variations

www.farmingwithhorses.com

Roller Variations

Combine operations

Rolling the cover crop and performing strip tillage simultaneously.

Ripper Modification

Planter Attachments

Summary

- Plant covers in a timely fashion.
- Consider additional N fertilizer for small grain cover crops, especially if residual N is low.
- Terminate covers ~ 3 weeks ahead of anticipated planting date to allow soil moisture recharge and reduce problems with equipment operation.
- Take advantage of equipment modifications to facilitate tillage and/or planter operations in heavy residue.

Conservation Systems Research

Managing Cover Crops Profitably, 3rd ed. Sustainable Agriculture Network.
www.sare.org/publications/covercrops/covercrops.pdf

Schomberg, H.H., and K.S. Balkcom. Cover crops [Online]. Available at: www.soilquality.org/practices/cover crops.html

- **More information available at:**

www.ars.usda.gov/msa/auburn/nsdl

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