

Tillage and Cover Crops

2012 LOUISIANA AGRICULTURAL TECHNOLOGY &
MANAGEMENT CONFERENCE

Paragon Casino Resort

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Kip Balkcom

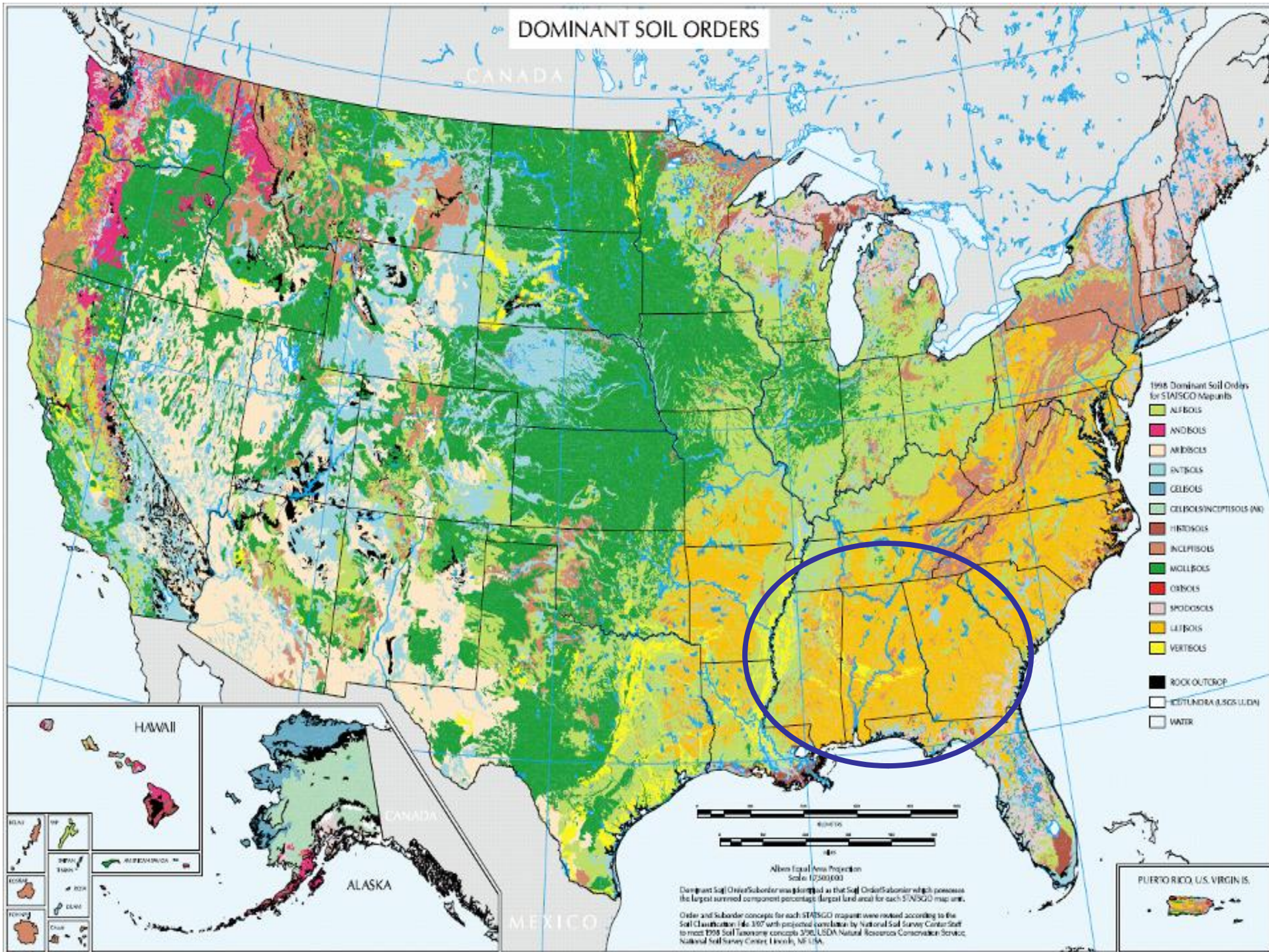
Research Agronomist

USDA-ARS

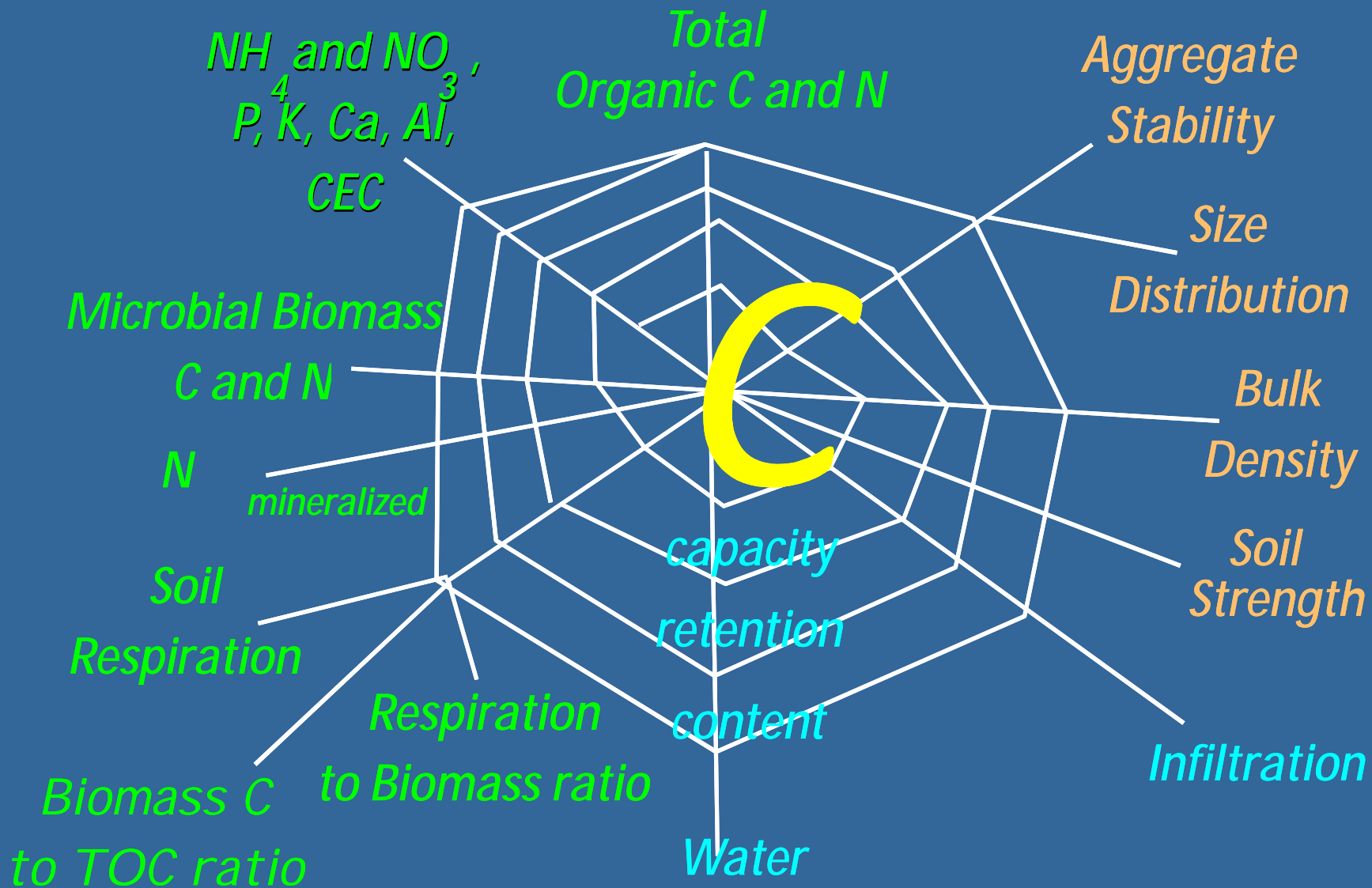
National Soil Dynamics Laboratory

Auburn, AL

DOMINANT SOIL ORDERS



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



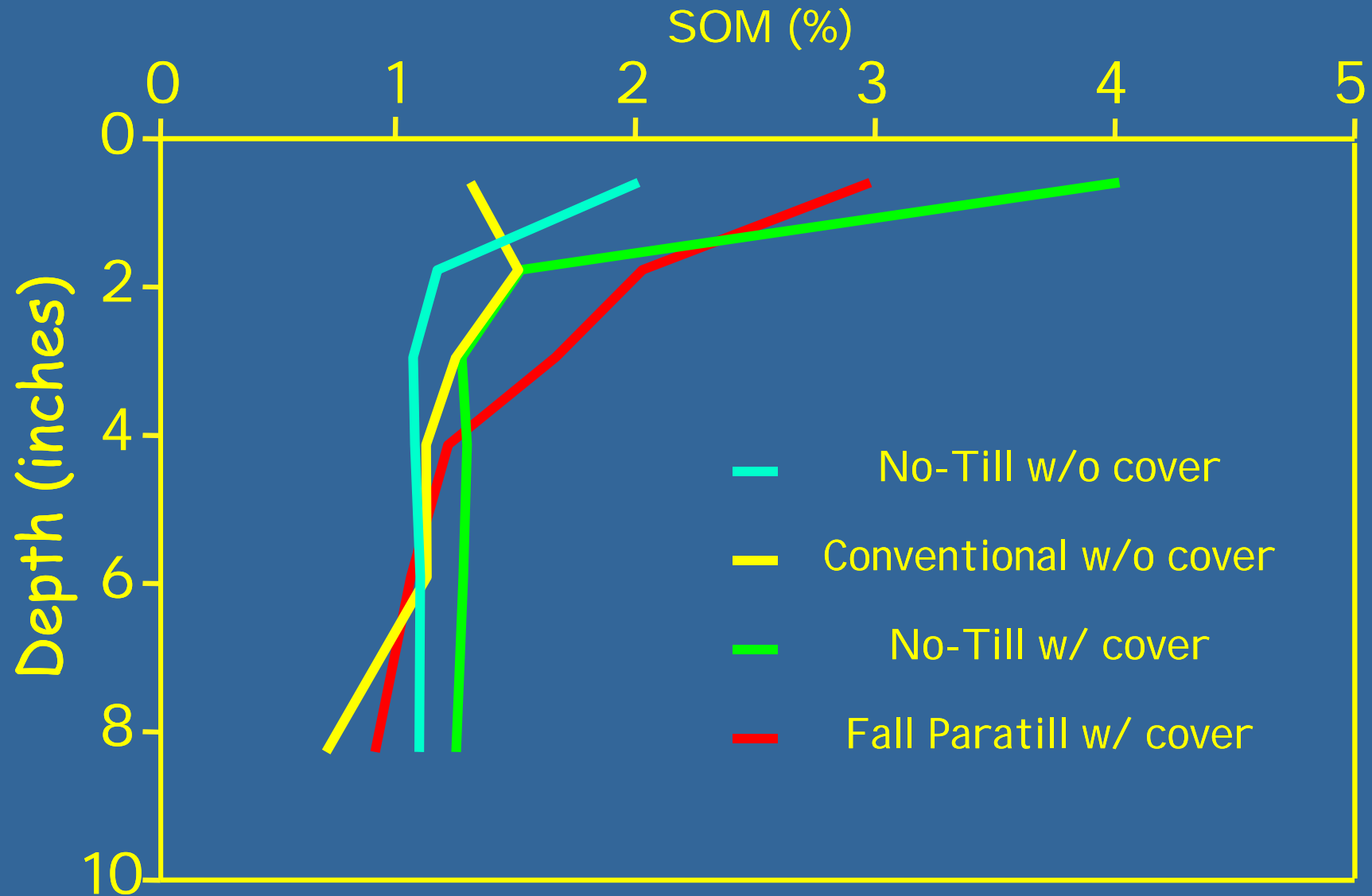
Manage compaction . . .



Non-inversion Tillage

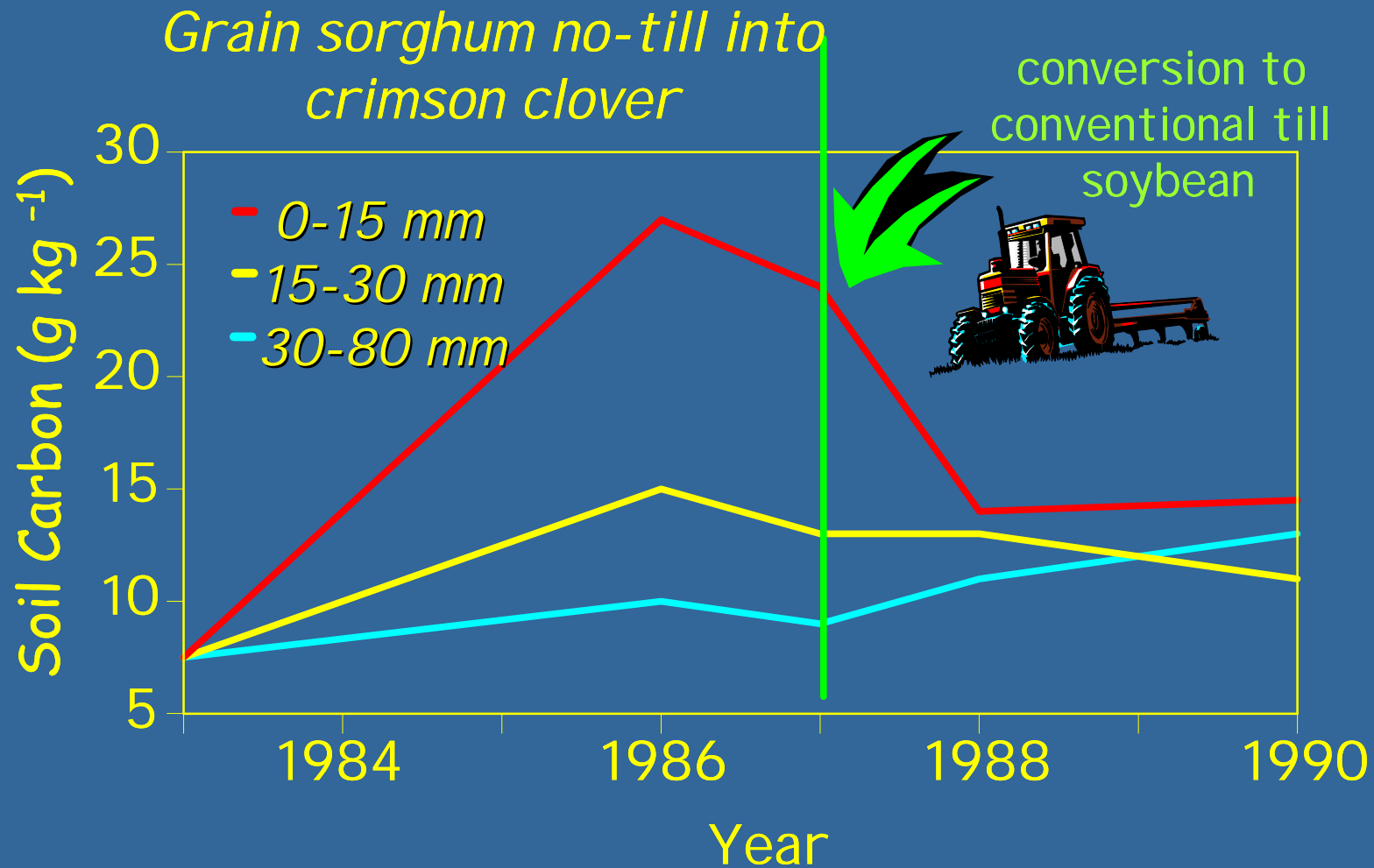


Tillage and rye cover crop effects on SOM after 5 y



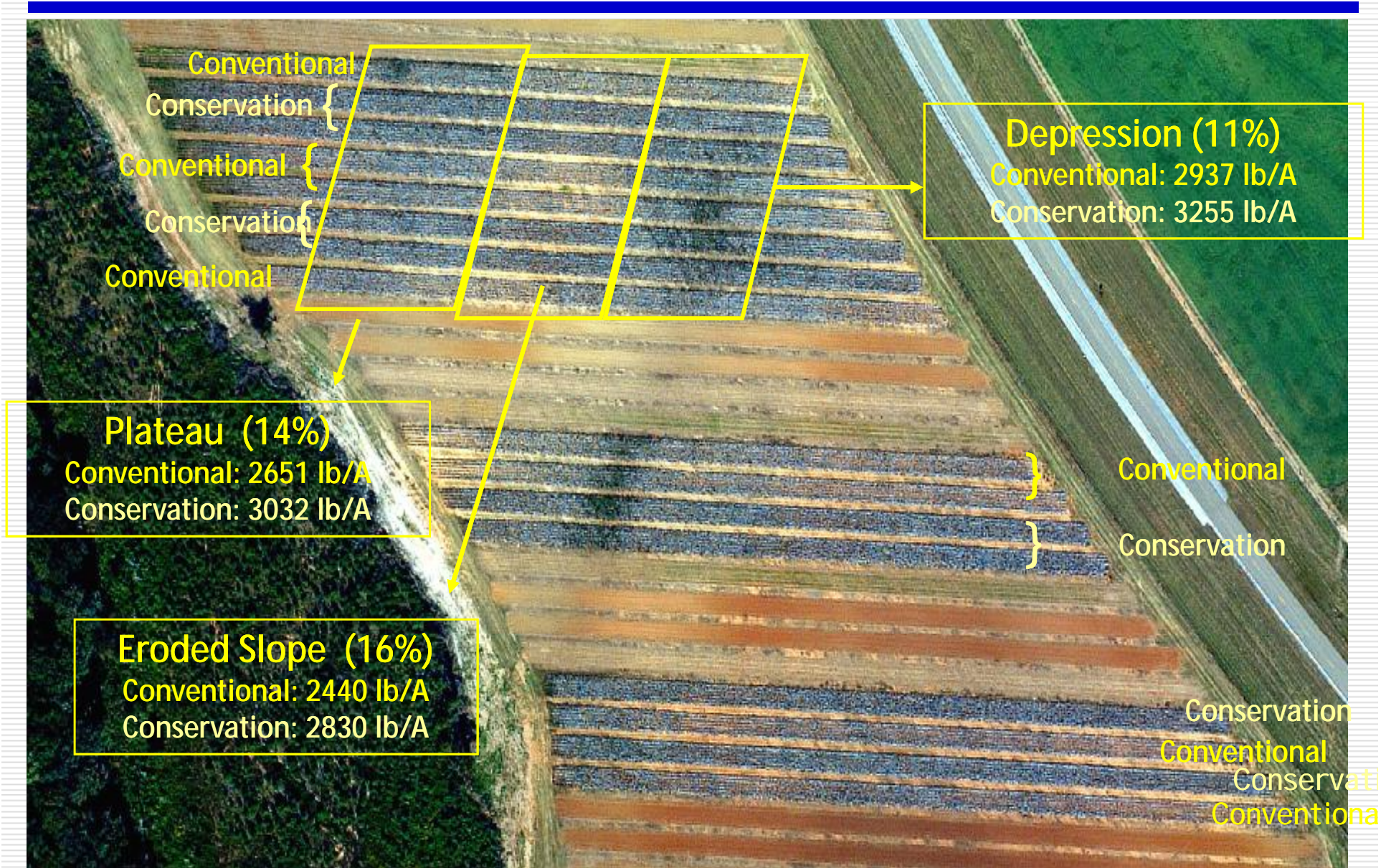
Decatur silt loam

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



Bruce et al., 1995

Field Scale Research





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

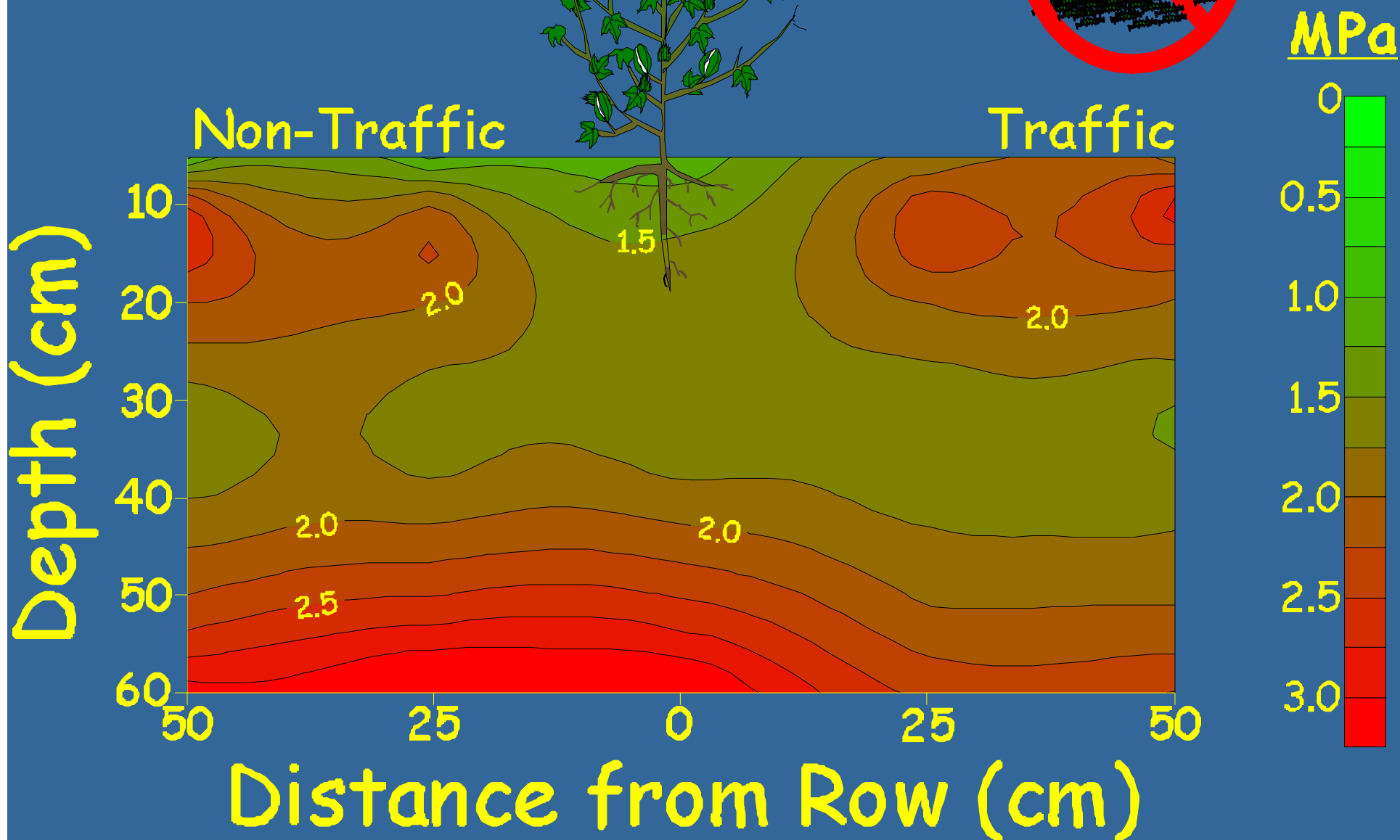


Soil organic
carbon



Tennessee Valley-Clay Soils

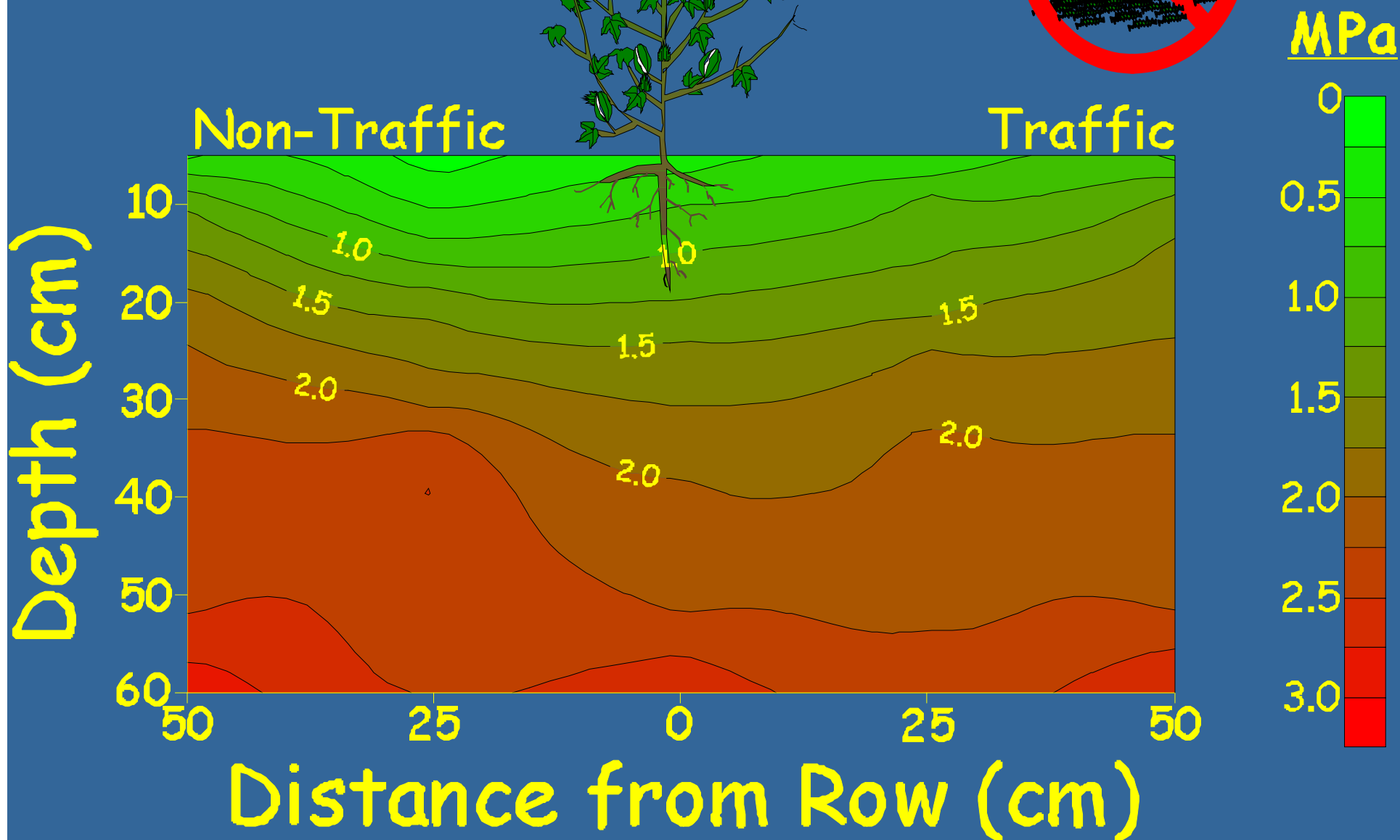
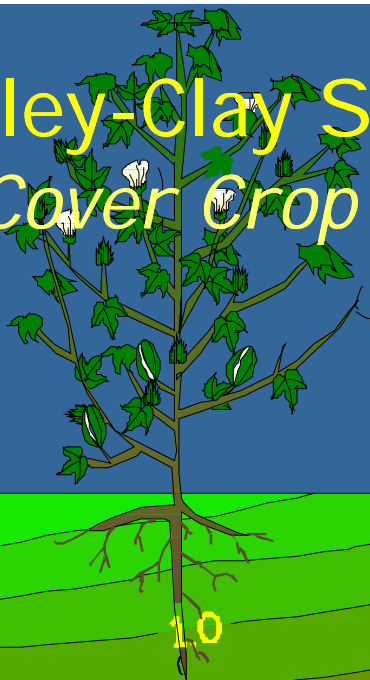
No-Till w/o Cover Crop



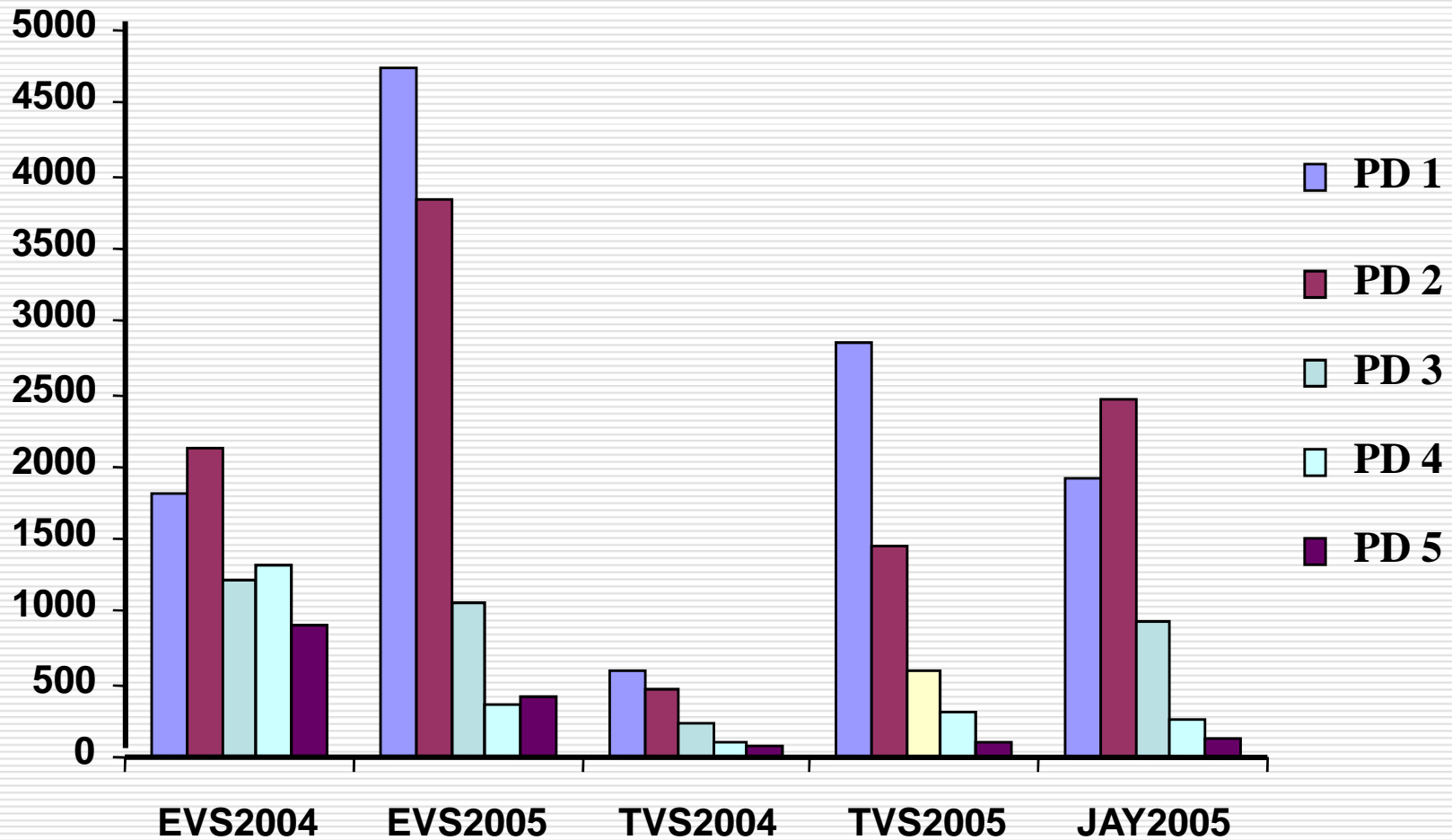


Tennessee Valley-Clay Soils

No-Till with Cover Crop

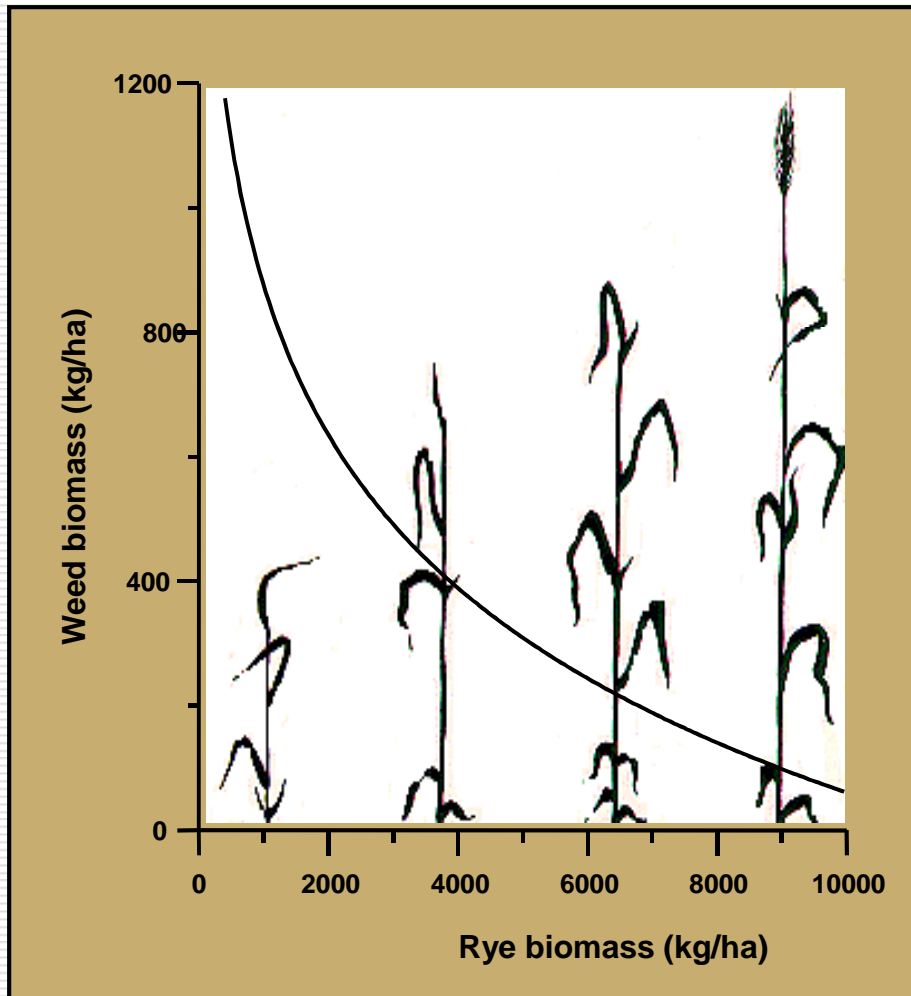


Planting Date - Clover Biomass

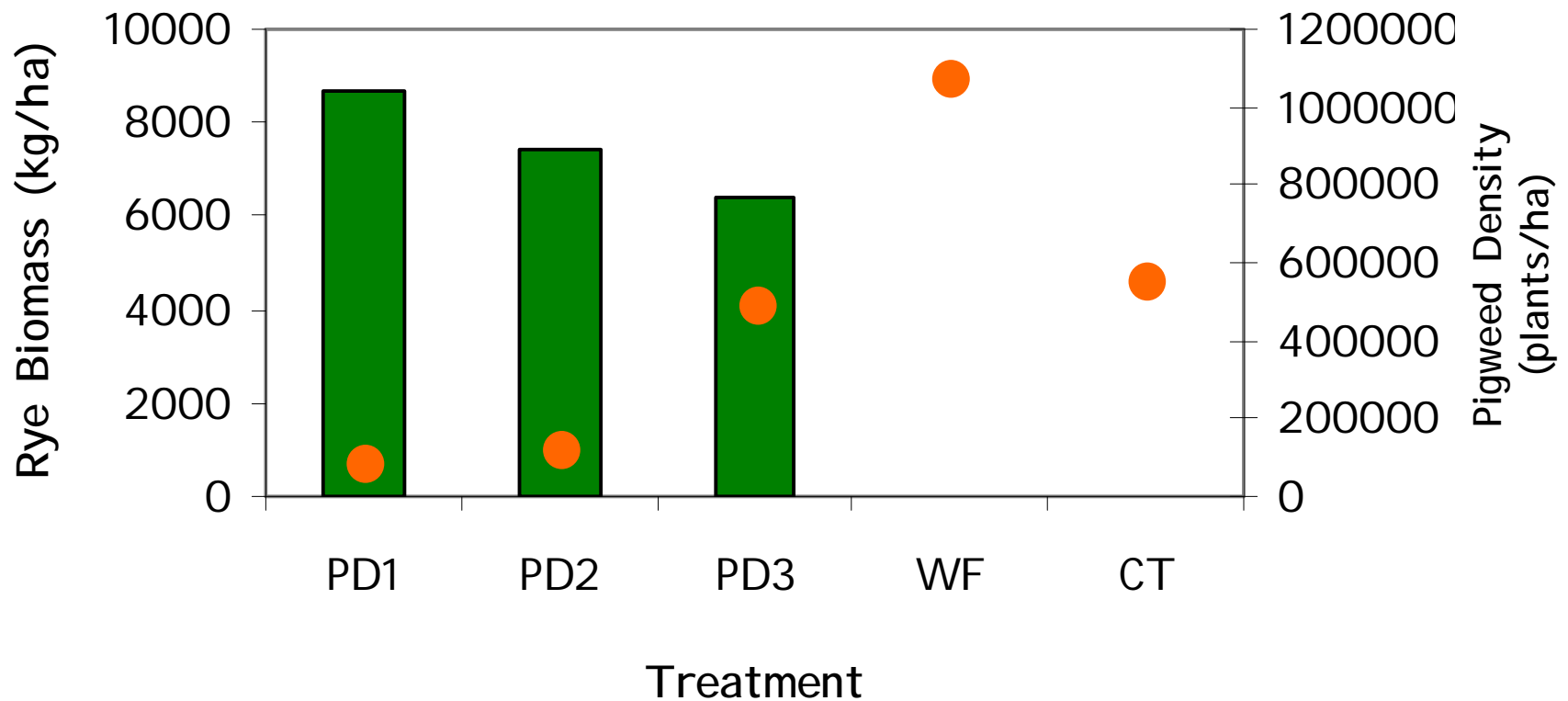


Courtesy: Andrew Price

Winter Cover Crop Biomass and Weed Suppression



Cover crop planting date affects rye biomass and pigweed density



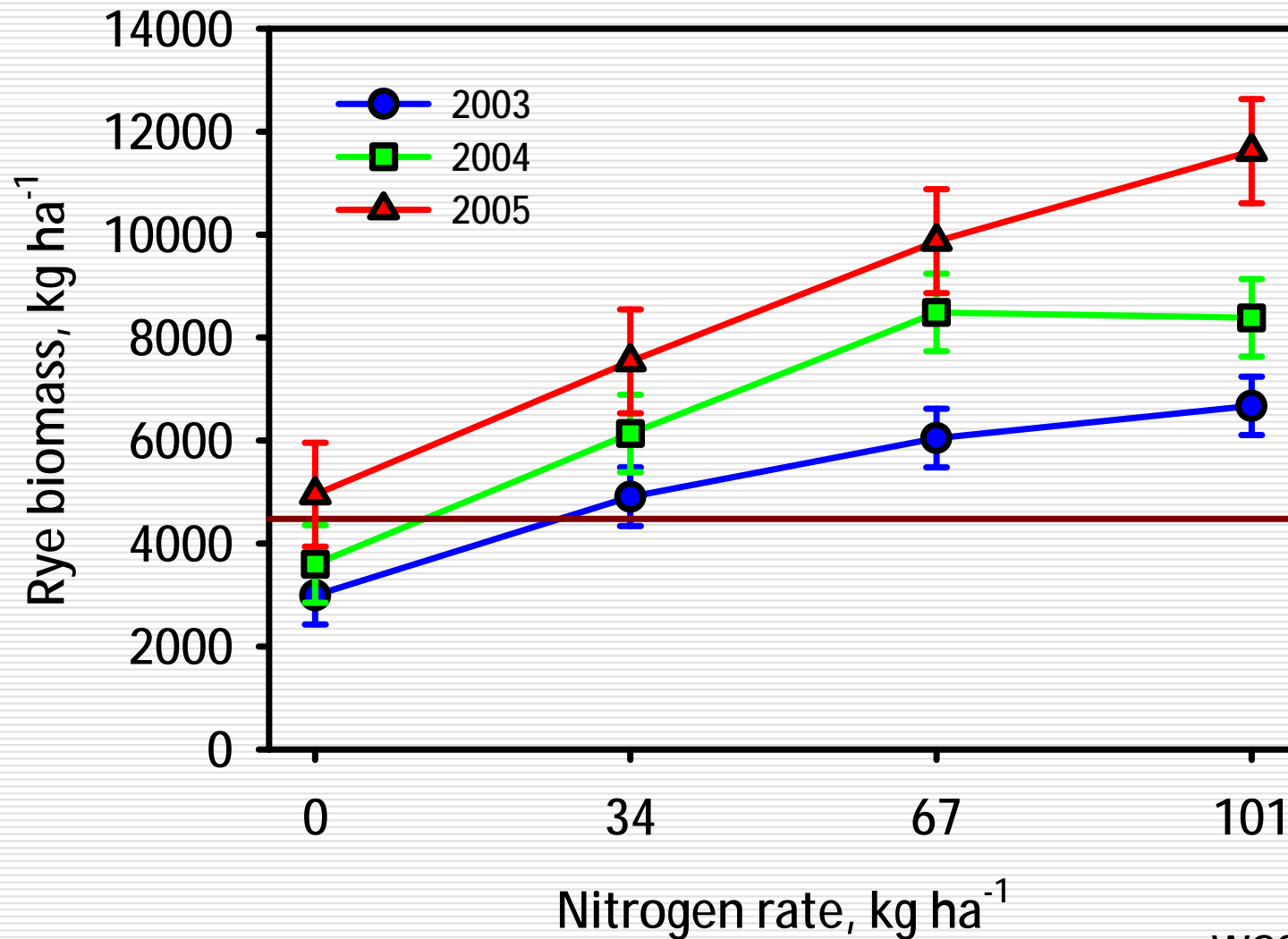
Cover Crop Fertilization

90 lb N ac⁻¹

0 lb N ac⁻¹



N Fertilizer Effects on Rye Cover Crop Biomass Production

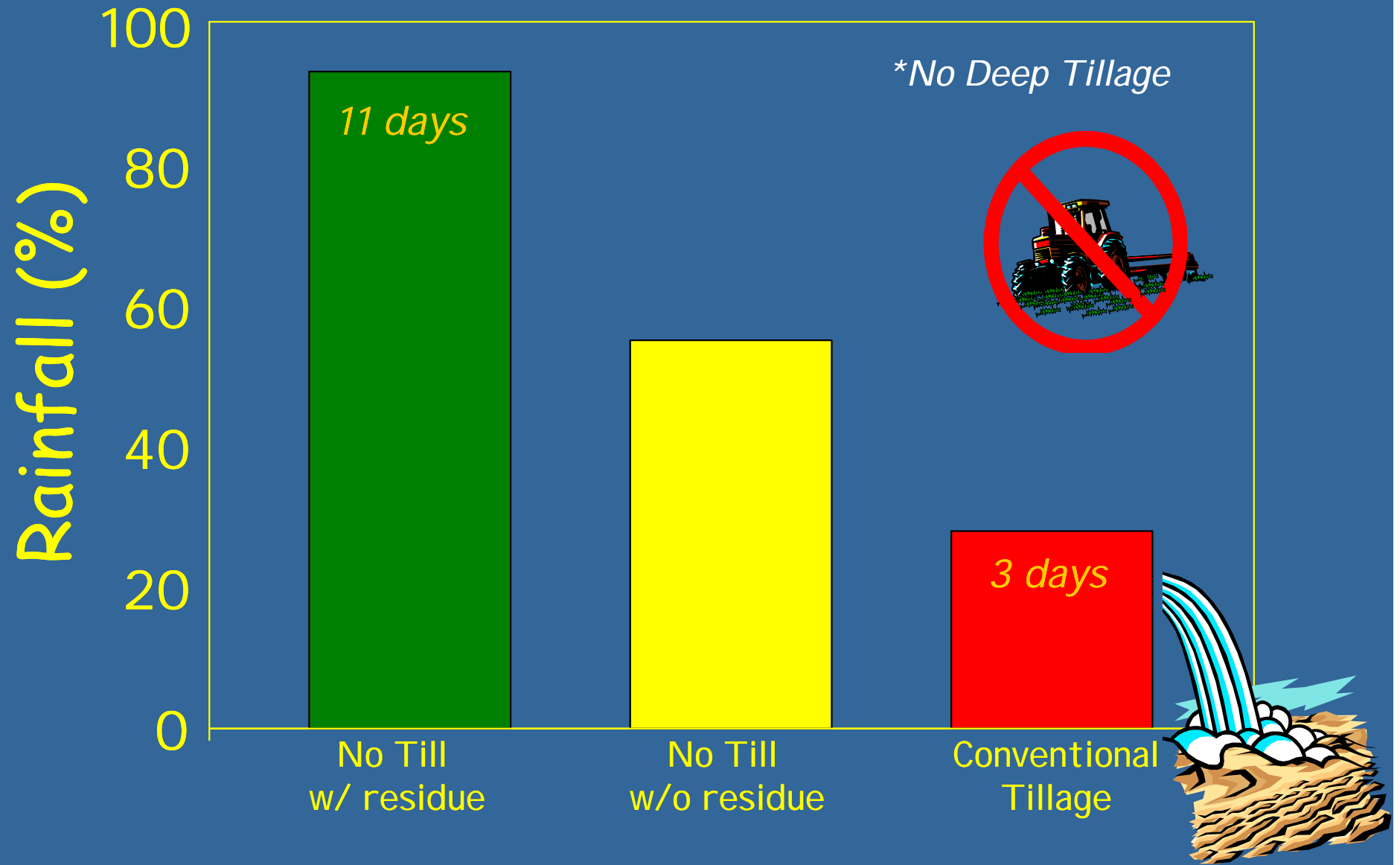


WGS Headland, AL

Rainfall Simulation Study . . .



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



Soil Water Conservation



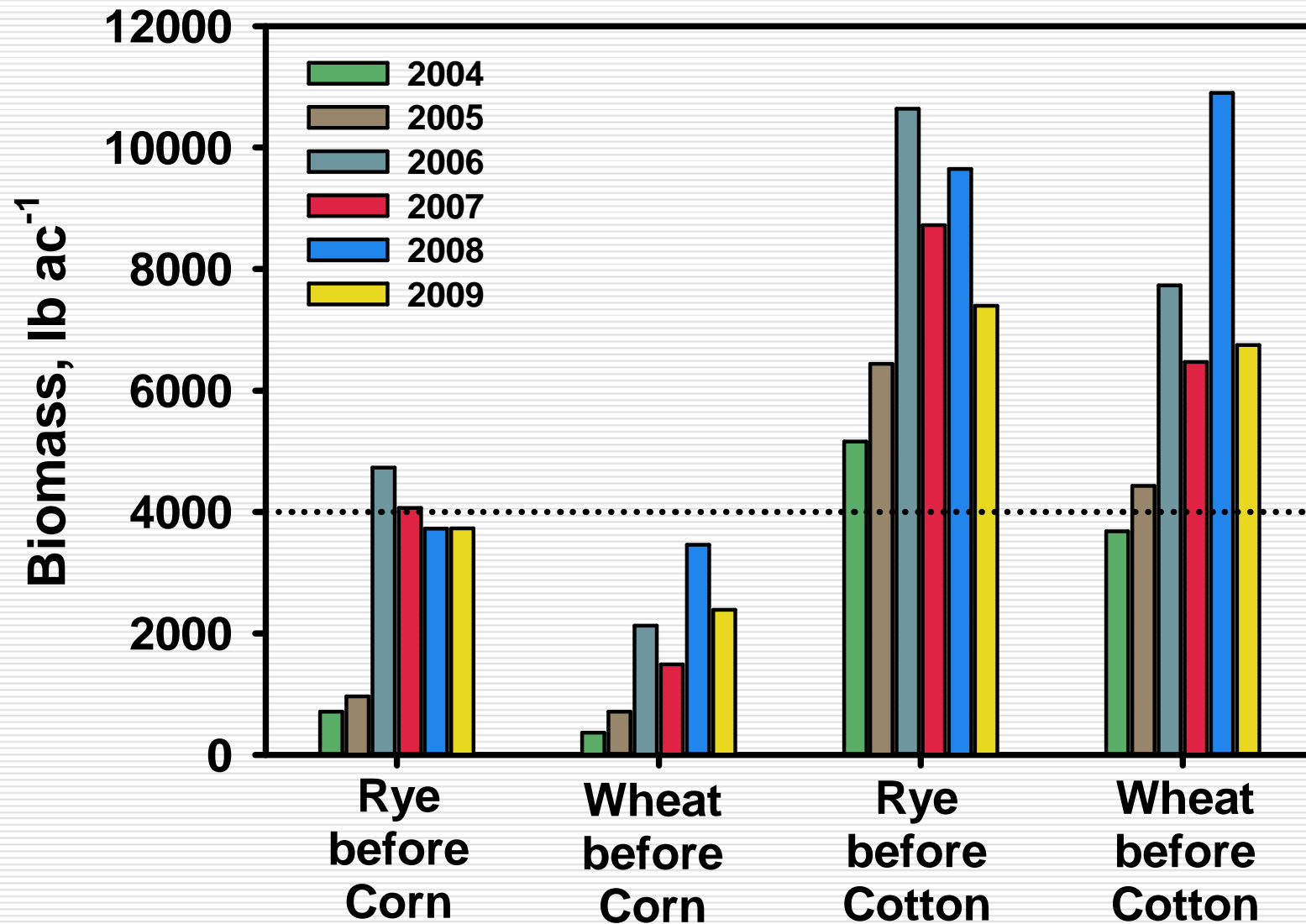
Timing Termination



2-4 weeks



Biomass Production Time of Termination



Methods of Termination

Physical methods

- Incorporation
- Mowing
- Mechanical Rolling



Roller Variations



Roller Variations



Roller Variations



Roller Variations



Rollers/crimpers developed at the NSDL

Smooth roller with crimping bar
U.S. Patent pending
(Kornecki, et al.)



Less vibration transferred to tractor, adjustable crimping force, a unique crimping bar design to accommodate for uneven soil surface

Two-Stage roller/crimper
U.S. Patent pending
(Kornecki)



Compact design, with adjustable crimping force. Drum with crimping bars isolated to minimize vibration. Intended for small vegetable farm operation:

Roller for elevated beds:
U.S. Patent allowed
(Kornecki)



One row – two furrows



Two rows – three furrows

Designed both for field and vegetable crops

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.

Tillage and Cover Crop Resources

- Managing Cover Crops Profitably, 3rd ed. Sustainable Agriculture Network.
www.sare.org/publications/covercrops/covercrops.pdf
- UC SAREP Cover Crop Resource Page
www.sarep.ucdavis.edu/ccrop/
- National Sustainable Agriculture Information Service (ATTRA)
www.attra.org
- Schomberg, H.H., and K.S. Balkcom. Cover crops [Online]. Available at: www.soilquality.org/practices/cover_crops.html
www.ars.usda.gov/msa/auburn/nsdl