

Growth and Physiological Characteristics of Oat Cover Crop in Sod-based Cropping Systems



D. Zhao, D. Wright, J. Marois, and C. Mackowiak

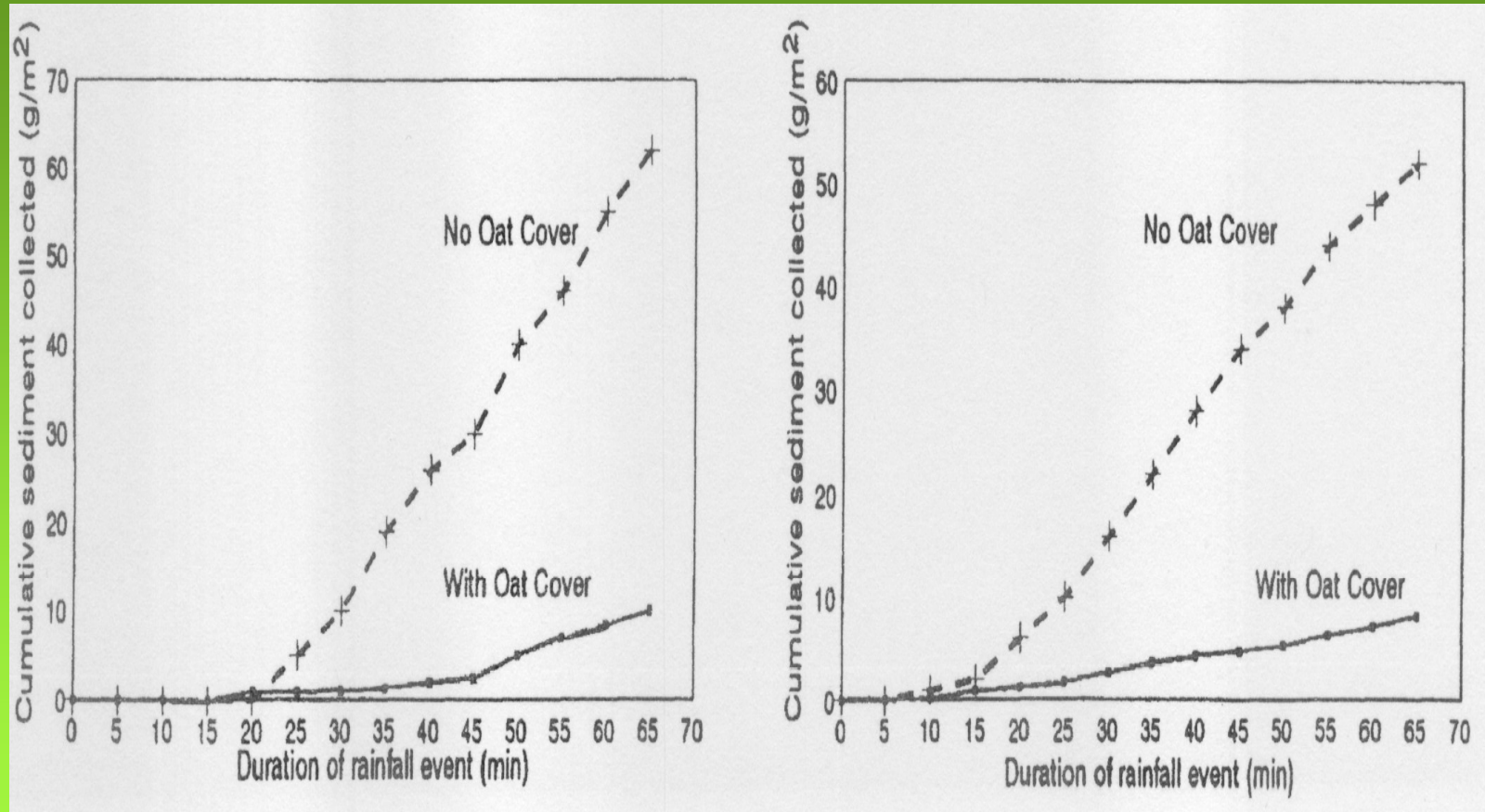
NFREC, Quincy, FL

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- Soil erosion is a major issue in most agricultural regions worldwide
 - Conservation tillage is a promise of reducing soil erosion and improving soil health and agricultural sustainability
 - Cover crop is a key component of conservation tillage

Benefits of Cover Crops

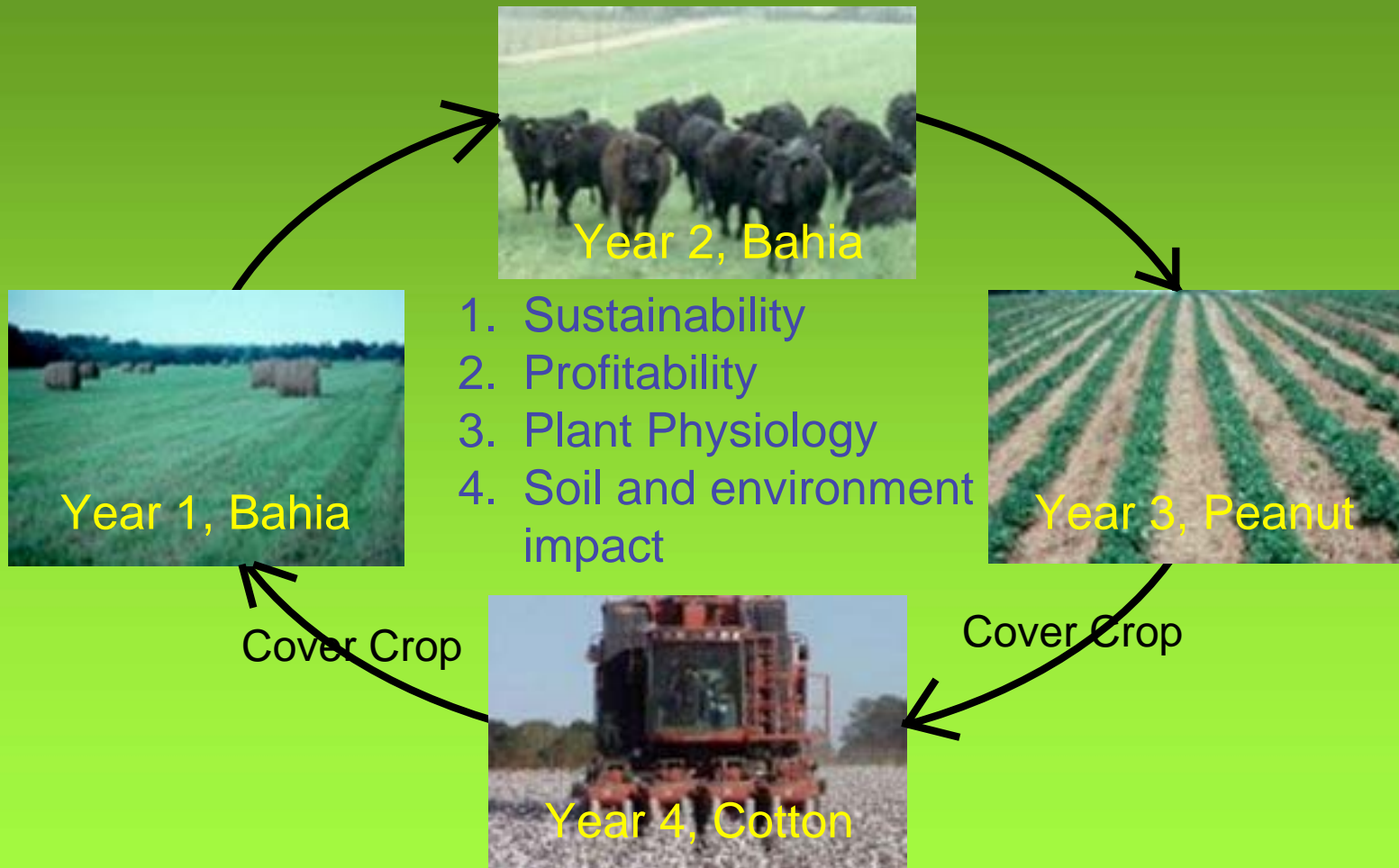
- Control soil erosion
- Reduce water and nutrient runoff
- Improve soil structure, water infiltration, and nutrient cycling
- Modify soil moisture
- Contribute to soil OM and soil biological diversity
- Control weeds through competition and microclimatic alteration
- Reduce insect and disease pressures
- Serve as a nutrient trap to reduce nutrient leaching

Oat Cover Crop and Soil Erosion



From Horton et al., 1994

Sod Based Rotation Projects

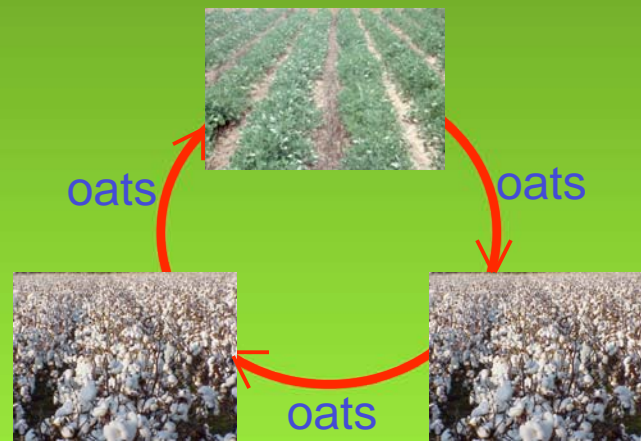
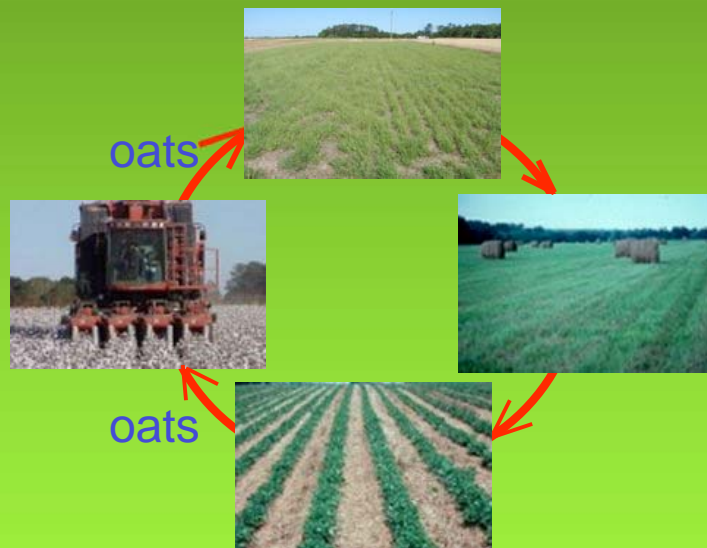


Field Study in 2000-2007 at Quincy, FL

Two Rotation Systems

Sod System: (B1-B2-P-C)

Conventional System: (P-C1-C2)



Oat Winter Cover Crop
Following Peanut and Cotton in Both Systems

Sod-Based Rotation in the Southeastern USA

- Improve soil quality
 - Organic matter
 - Earthworms
 - Infiltration
- Increase crop yield
 - Root growth
 - Pest and diseases
 - Nutrient and water supply
- Increase sustainability and net return

Winter Cover Crop in Sod-Based Rotation

- Sandy soils in the SE increase the risk of soil erosion and N leaching.
- To improve the benefits of conservation tillage, a winter cover crop has been included in the sod-based rotation system.

Winter Cover Crops

- Used for pasture or hay
- Killed and returned to soil prior to planting summer row crops
- Determination of cover crop growth and physiology as affected by cropping system can help improve crop production management practices.

Objectives

- To determine effects of the two rotation systems and summer row crops (peanuts and cotton) on an oat cover crop
- To provide information of biomass productivity and N recovery of oats in the SE

Experimental Design

Oat cover crop:

- Carlivar: Fla 501
- Planting date: 8 Dec. 2006

Treatment:

- Two systems
 - Sod system (B1-B2-P-C)
 - Conventional system (P-C1-C2)
- Two nitrogen rate for cotton crops (0 N and 60 N)

Experimental design:

- Split-plot design [system (main plot) and N (subplot)]
- Three replications

Measurements

1. Starting 49 DAP (01-19-07) the following measurements were taken biweekly:

- Plant height
- Leaf chlorophyll
- Leaf $\text{NO}_3\text{-N}$ concentration
- Aboveground biomass



 Additional measurements include:

- Number of tillers (73 & 101 DAP)
- Soil penetration (50 & 72 DAP)
- Oat N uptake (101 DAP)



An Overview of the Experimental Field of Oat Cover Crop (02-05-2007)



Oat Cover Crop as Affected by Summer Crops (02/05/2007)

Peanuts



Cotton 1

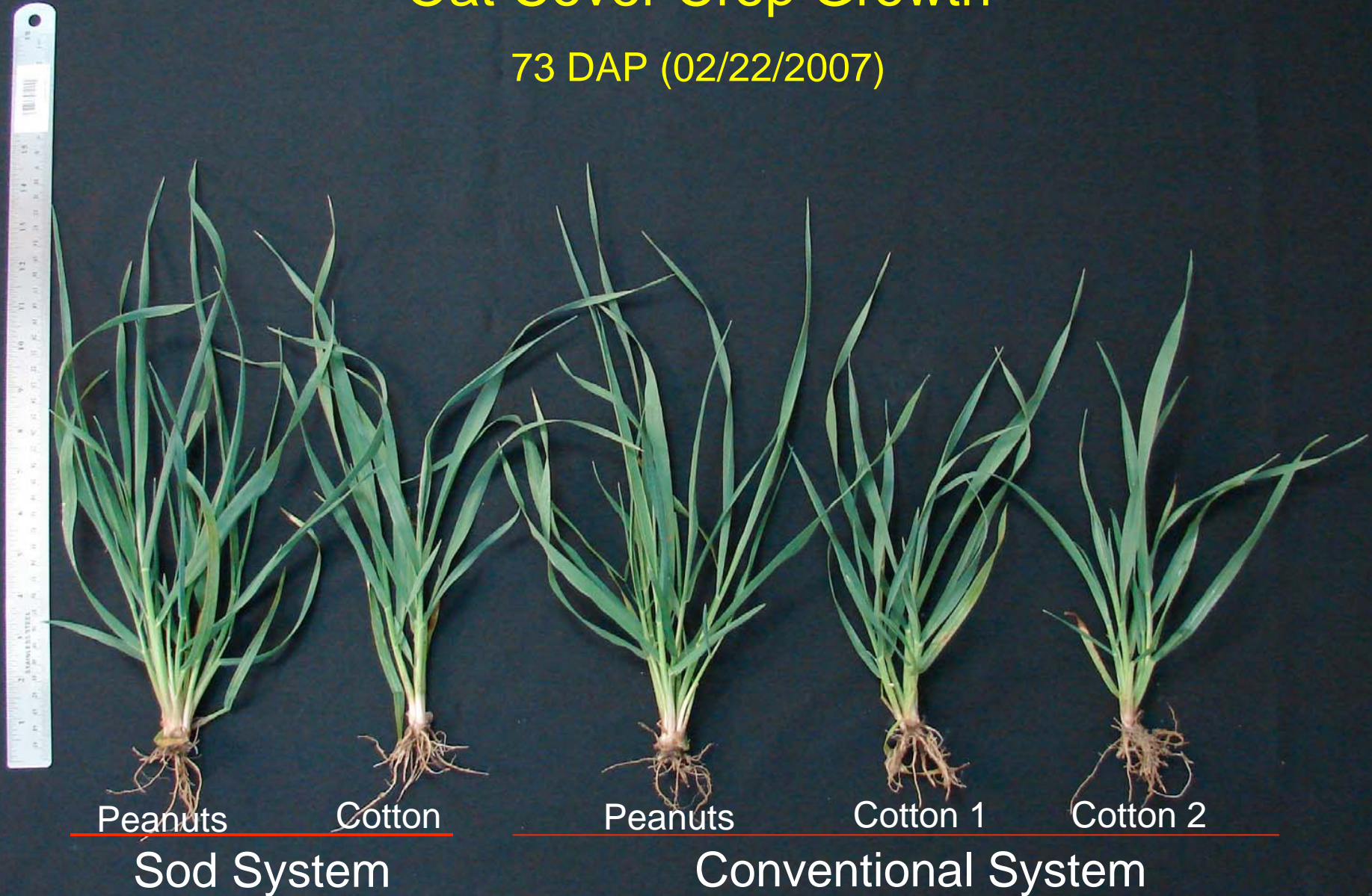


Cotton 2

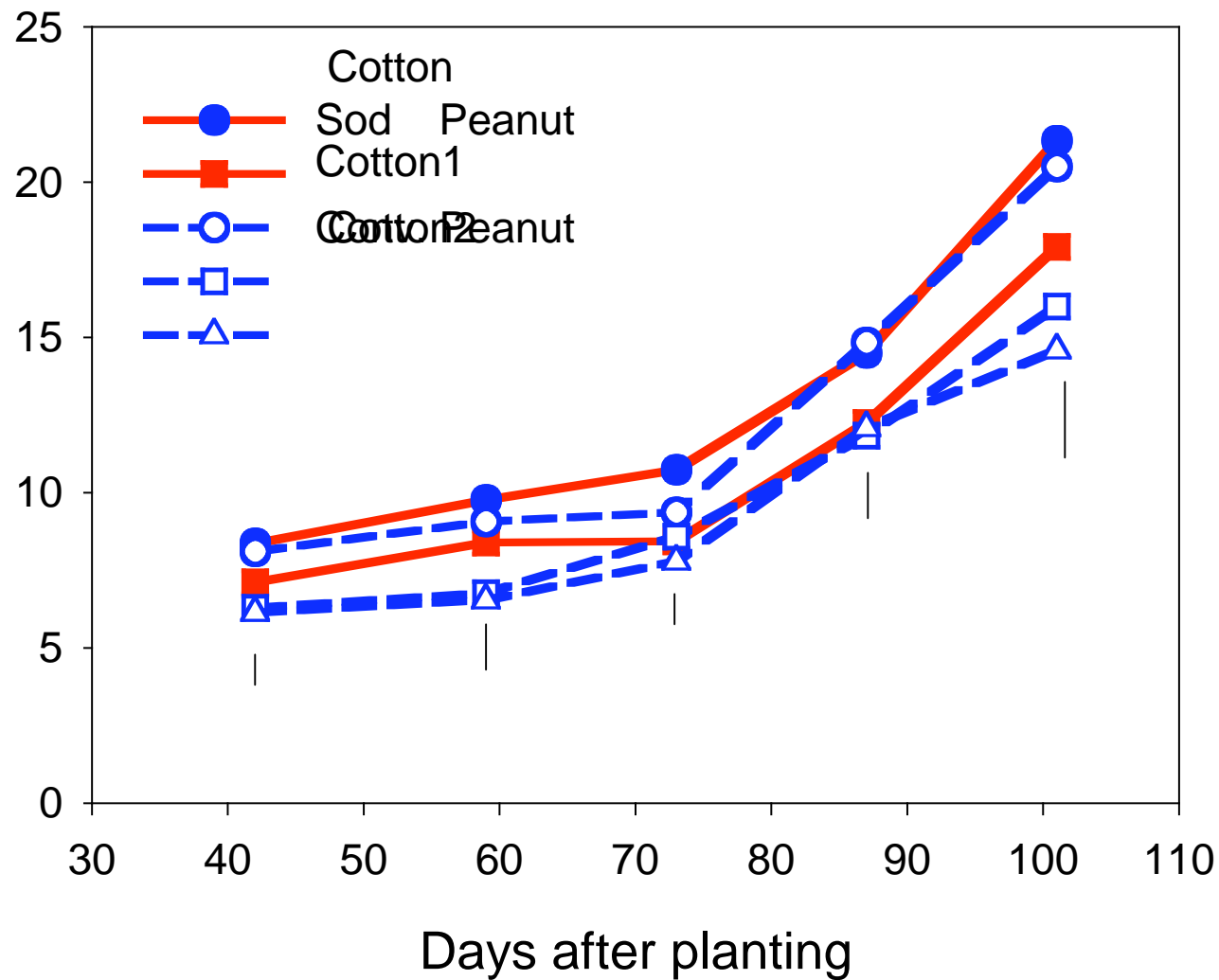


Effects of Rotation System and Summer Crops on Oat Cover Crop Growth

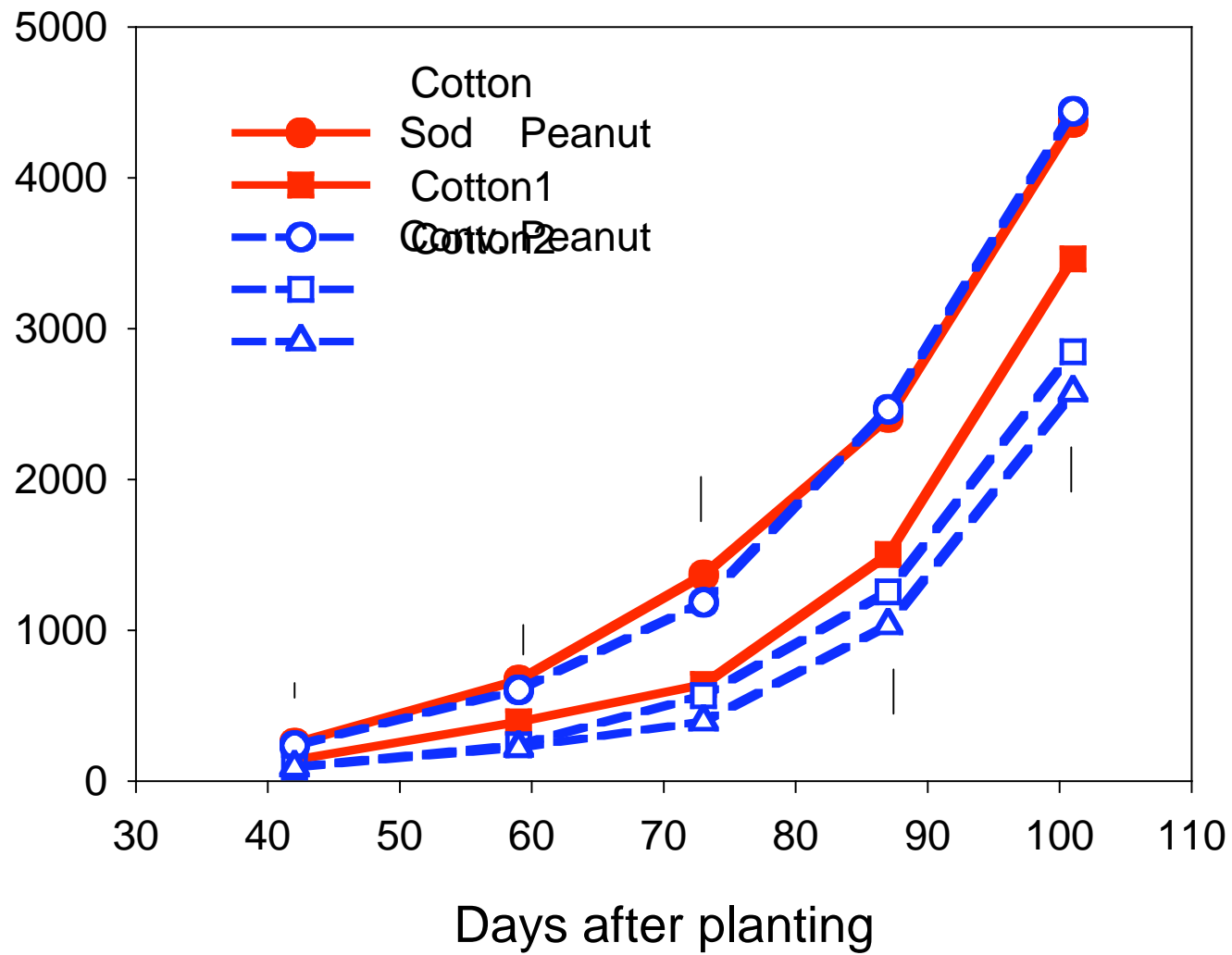
73 DAP (02/22/2007)



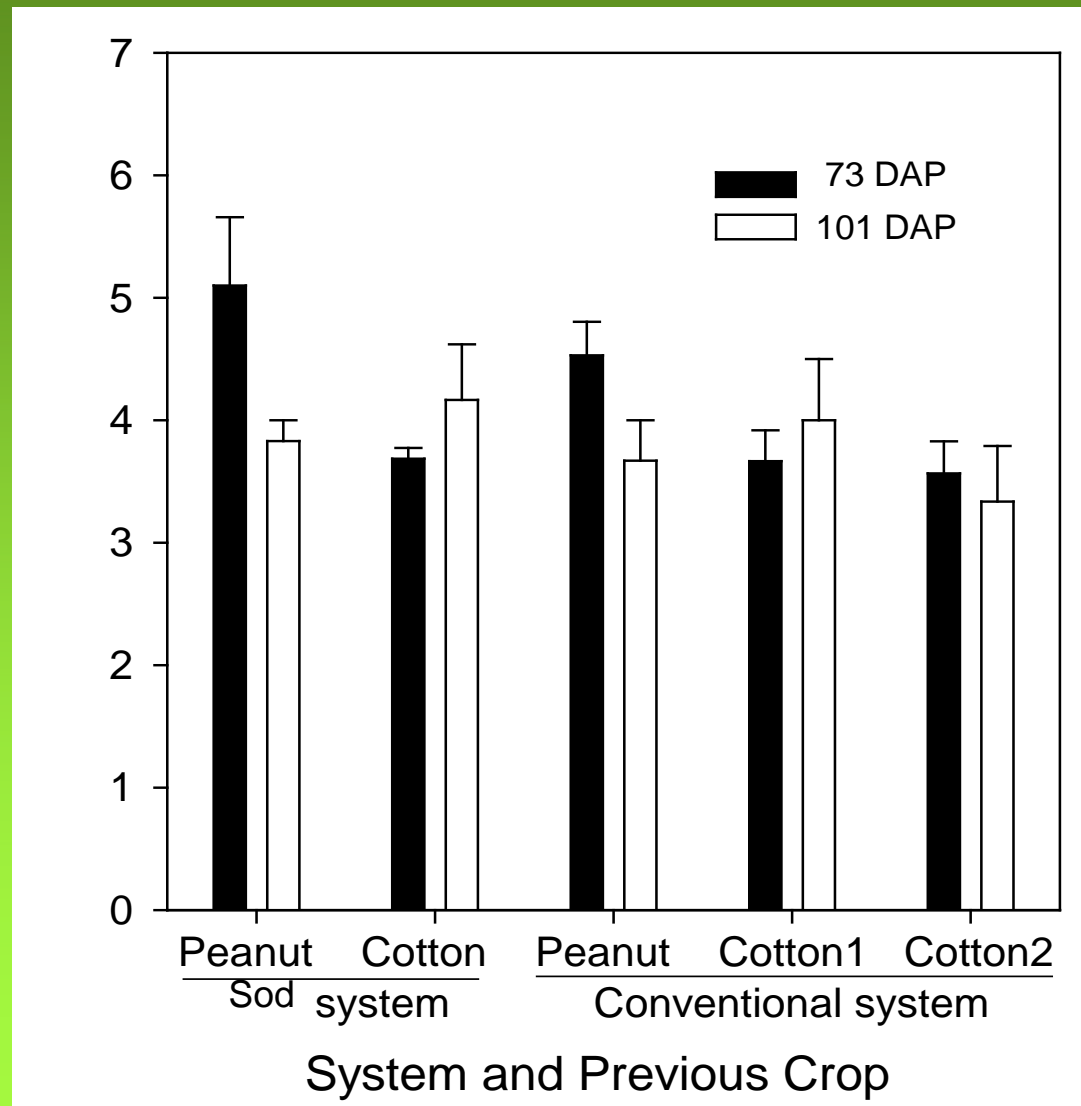
Plant Height of Oat Cover Crop



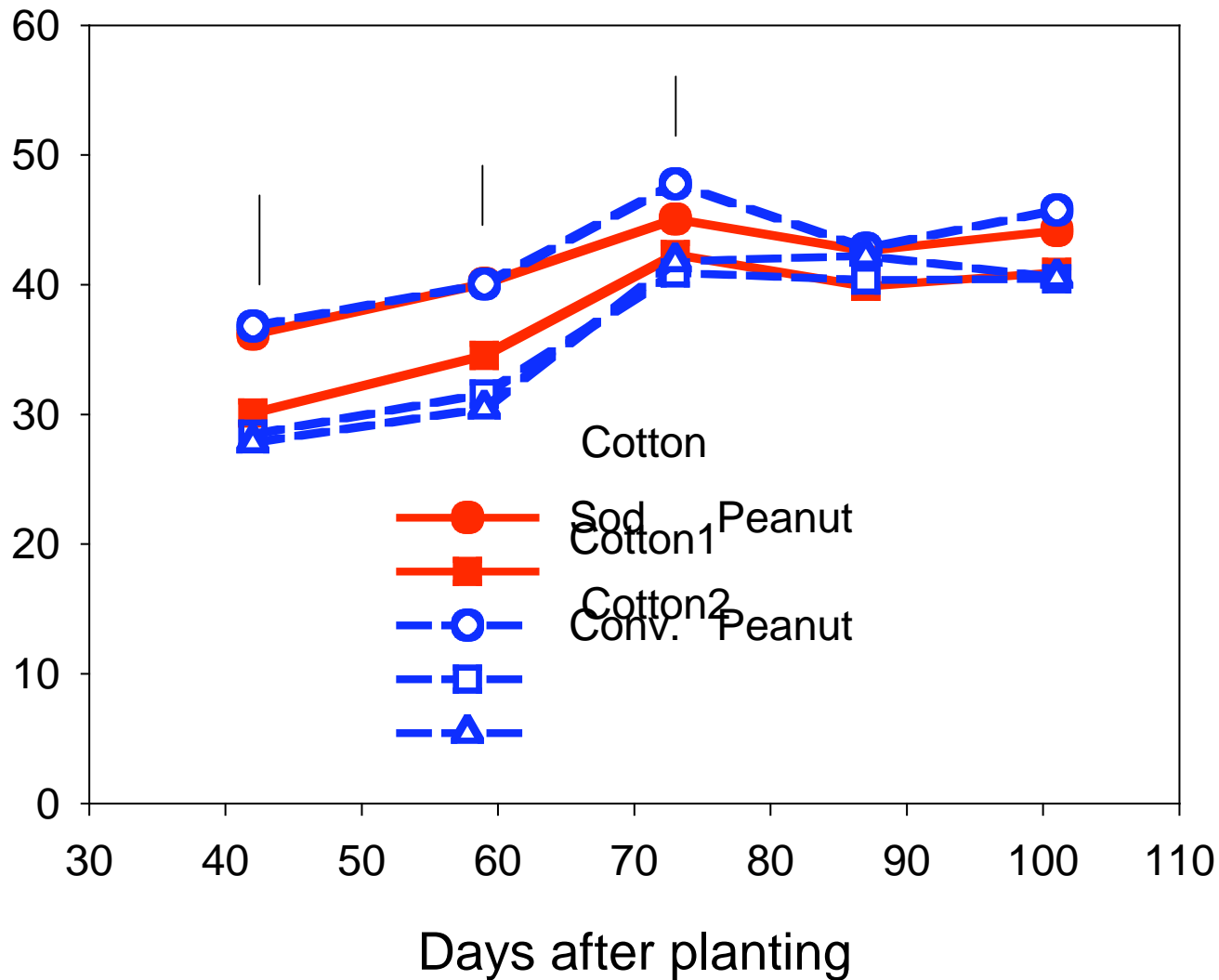
Shoot Biomass of Oat Cover Crop



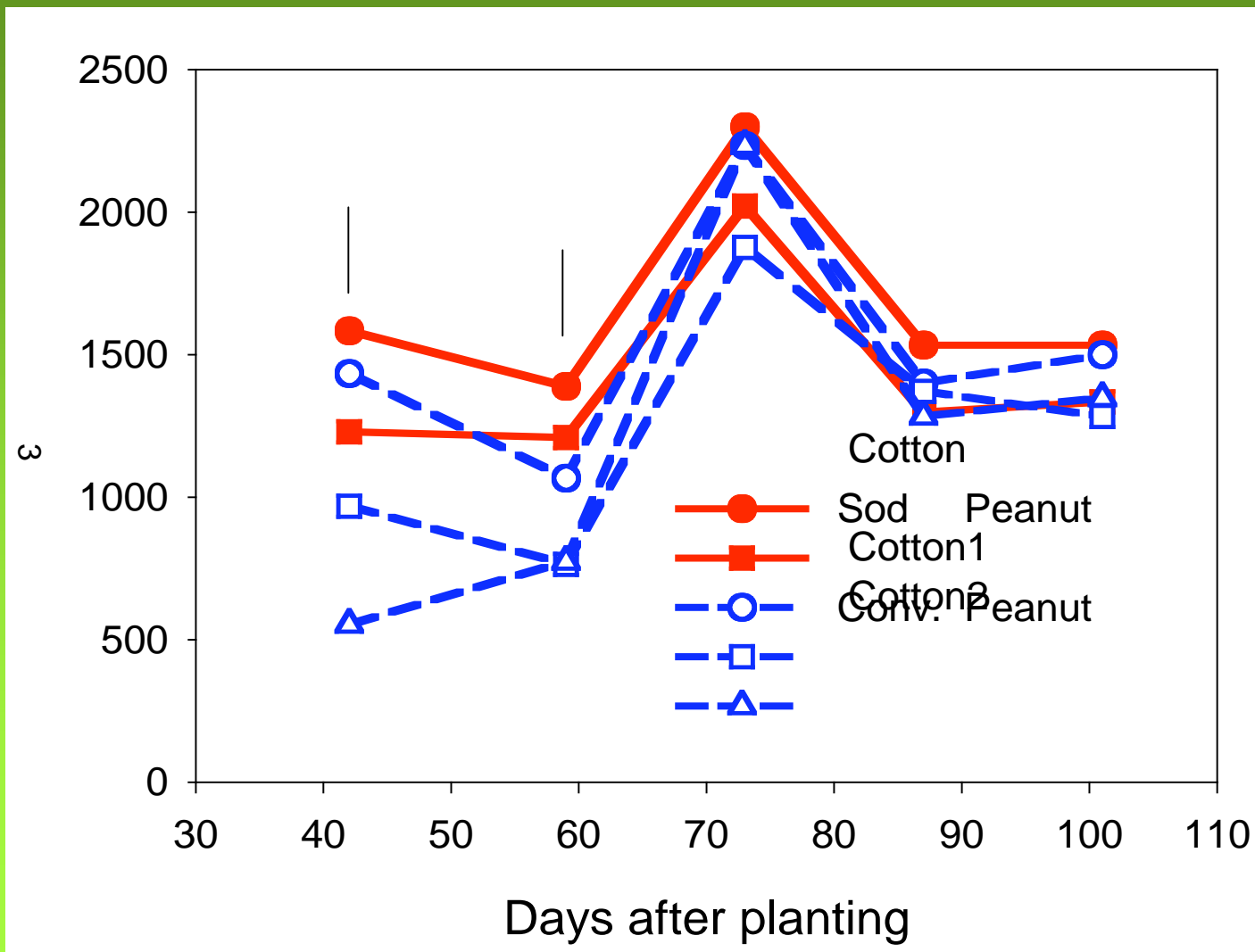
Tillers of Oat Plants



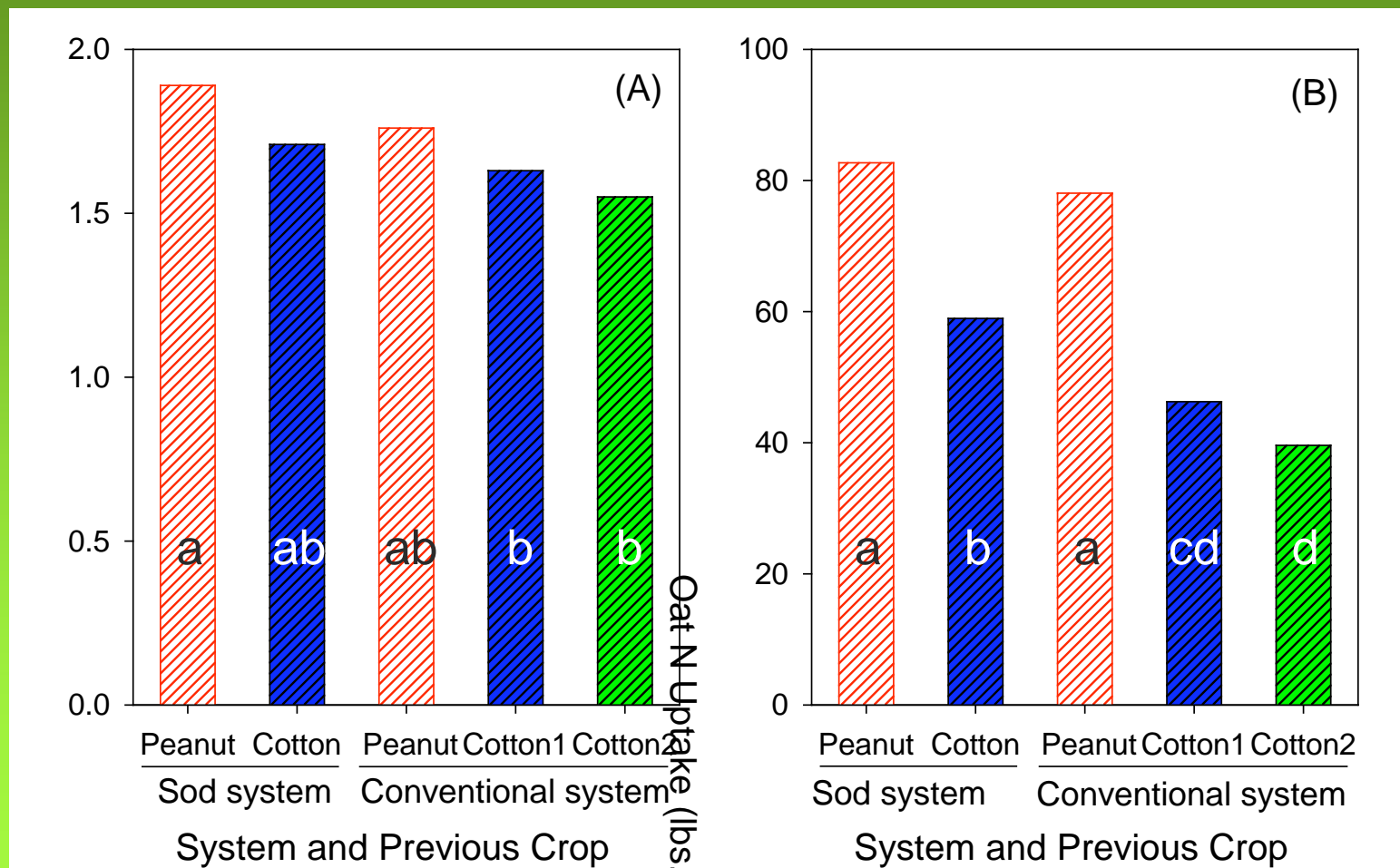
Leaf Chlorophyll of Oat Cover Crop



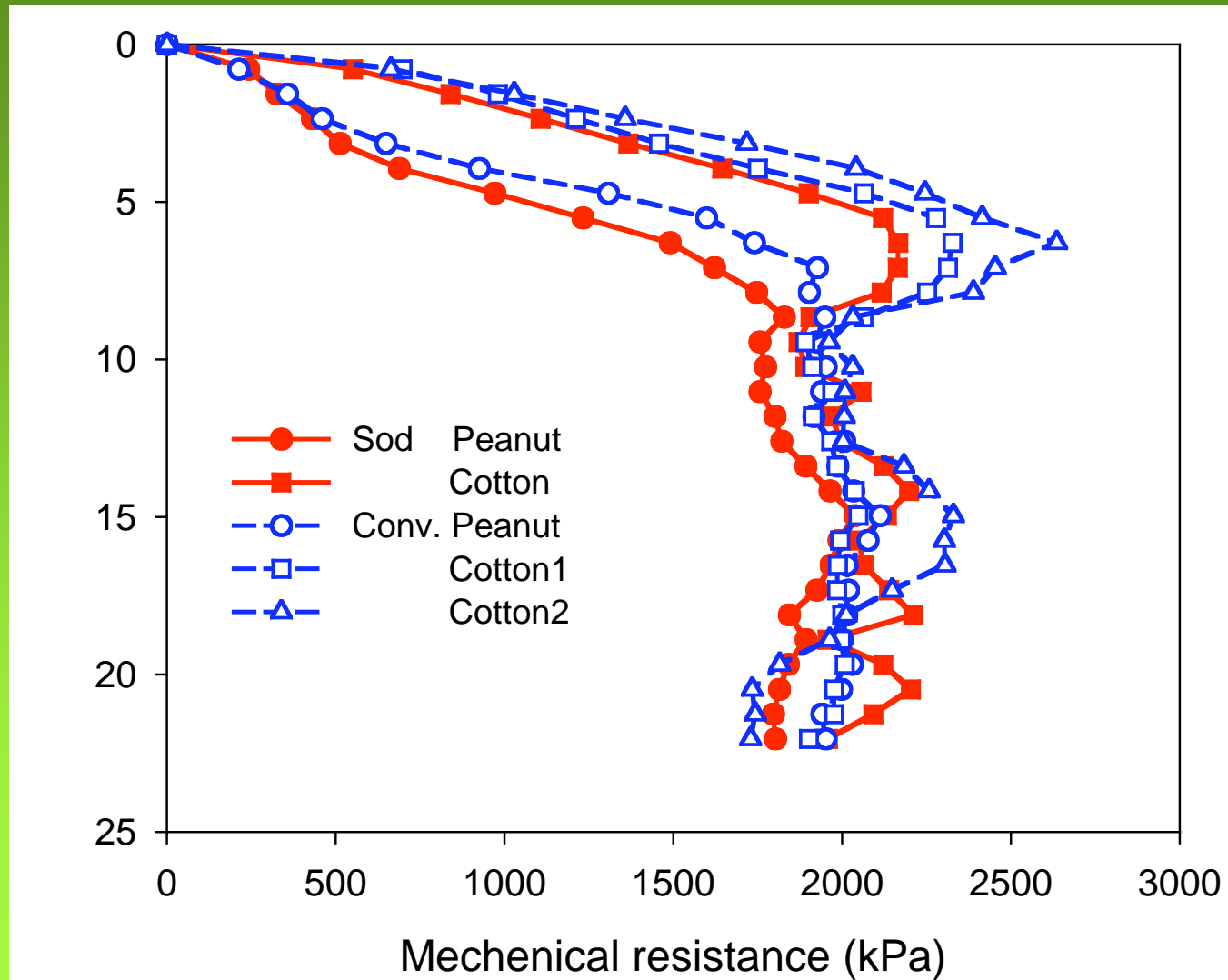
Leaf Sap $\text{NO}_3\text{-N}$ of Oat Cover Crop



Oat Shoot N Concentration and N Uptake at Pre-heading



Soil Mechanical Resistance



Each data point is the mean of 36 measurements from 3 replications on 02/06 and 02/16/2007.

Summary

- Cropping system and summer crop influenced oat shoot biomass, N status, and N recovery.
- Oats in the Sod system had greater biomass, leaf chlorophyll and leaf sap $\text{NO}_3\text{-N}$ conc. as compared to oat in the Conventional system.
- Oat in peanut plots had much greater shoot biomass and N conc. than oats in cotton plots.
- Increased oat growth and N status in the Sod system can be associated with improved soil quality by the bahiagrass.
- Data from this study can help growers with their N management of cotton and peanuts in either sod or conventional systems in SE.
- Our data are also useful for producers who manage cover crops for livestock as pasture or hay.

Acknowledgements

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Thank You

