

The impact of black shank (*Phytophthora nicotianae*) presence and nitrogen fertilization on yield and leaf quality of burley tobacco varieties

Kate Turner | PhD. Graduate Research Assistant
Entomology and Plant Pathology Dept.
University of Tennessee

Dr. Zach Hansen | Research Plant Pathologist
USDA-ARS
Cornell University

Dr. Mitchell Richmond | Assistant Professor
Plant Science
University of Tennessee



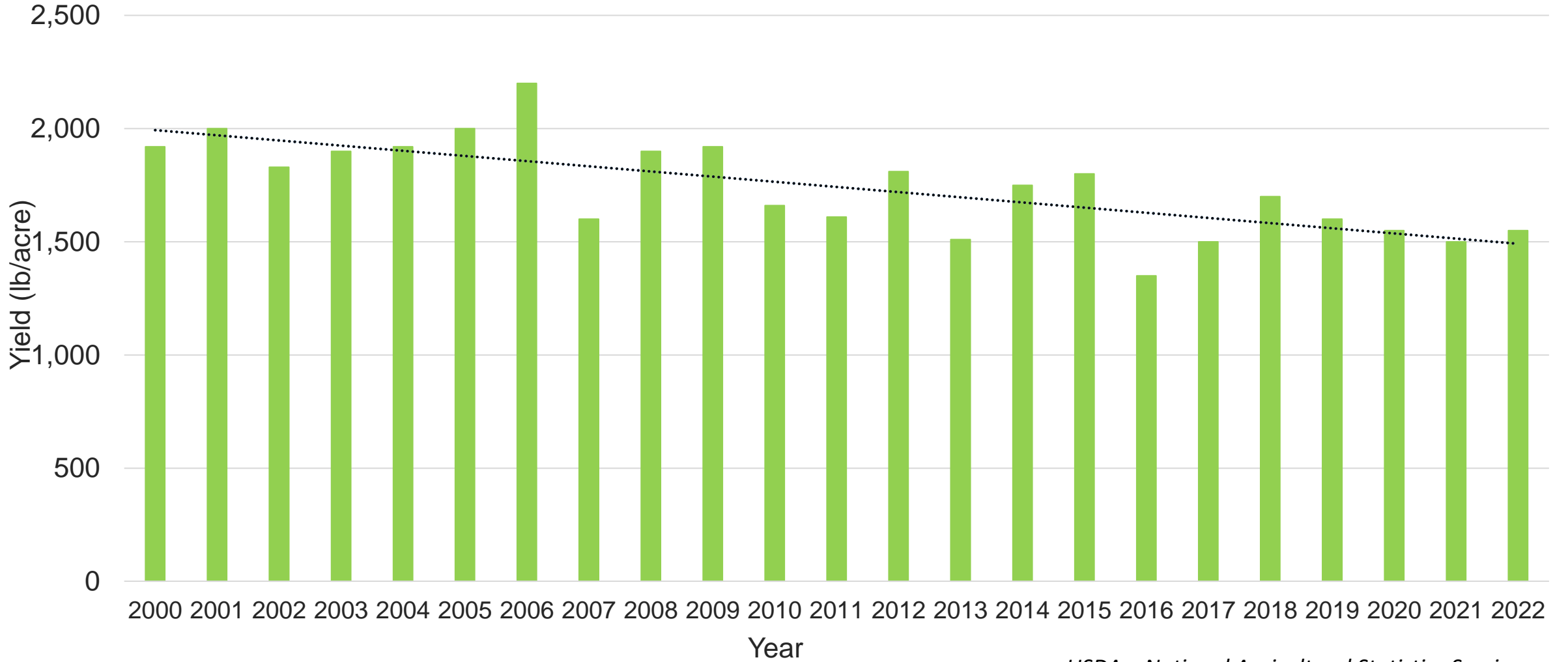
THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

Black Shank Background

- *Phytophthora nicotianae* is the casual agent of black shank
- Most devastating disease of tobacco
- Primarily managed through resistant varieties and fungicides



Burley Tobacco Yield in Tennessee 2000-2022



USDA – National Agricultural Statistics Service

Is black shank a potential factor related to yield decline?

- Many factors that can influence yield
 - labor
 - weather
 - production practice changes
 - new variety releases
- Black shank pathogen antagonizing the resistant varieties
 - visually plants look fine, but yield is impacted



KT 215LC



No black shank

KT 215LC



Race 0

KT 215LC



Race 1

Burley Variety by Nitrogen Field Trial

- Objective 1: To evaluate selected burley varieties under black shank and non-black shank conditions.
- Objective 2: Assess the relationship between nitrogen and the black shank pathogen on the selected varieties.
 - Nitrogen rates were 0%, 50%, 100% and 150% of the recommended rate of 225 N/acre.
 - The trial was rated throughout the growing season for disease severity.

Material and Methods

- Two field sites at the Northeast Tennessee Research and Education Center in Greeneville, TN (Birdwell Nursery and Oakridge Field)
 - Birdwell Nursery (Established black shank nursery)
 - Oakridge Field (Non-black shank nursery; been out of tobacco production for 15 years)
- Varieties:
 - KT215LC (Race 10/10- 10, Race 1- 9/10)
 - KT222LC (Race 0- 10/10, Race 1- 9/10)
 - Hybrid404LC (Race 0- 0/10, Race 1- 0/10)
- Nitrogen: Urea (0, 112.5, 225, 337.5 lbs N/acre)
- Randomized complete block design with four replications
- Four row plots, 20 ft x 14 ft
- Center two rows were utilized for measurements at layby and before harvest
 - Plant height, stem diameter, stand counts, number of leaves, yield

Summer 23' Research Trials



Non-Black Shank Nursery (Oakridge)



July 17th



July 31st



August 15th

Non-Black Shank Nursery



KT 222
0 lb N/ac



KT 222
112.5 lb N/ac



KT 222
225 lb N/ac



KT 222
337.5 lb N/ac

Non-Black Shank Nursery



Hybrid 404
0 lb N/ac



Hybrid 404
112.5 lb N/ac



Hybrid 404
225 lb N/ac



Hybrid 404
337.5 lb N/ac

Non-Black Shank Nursery



KT 215
0 lb N/ac



KT 215
112.5 lb N/ac



KT 215
225 lb N/ac



KT 215
337.5 lb N/ac

Black Shank Nursery (Birdwell)



July 17th



July 31st



August 15th

Black Shank Nursery



KT 222
0 lb N/ac



KT 222
112.5 lb N/ac



KT 222
225 lb N/ac



KT 222
337.5 lb N/ac

Black Shank Nursery



KT 215
0 lb N/ac



KT 215
112.5 lb N/ac



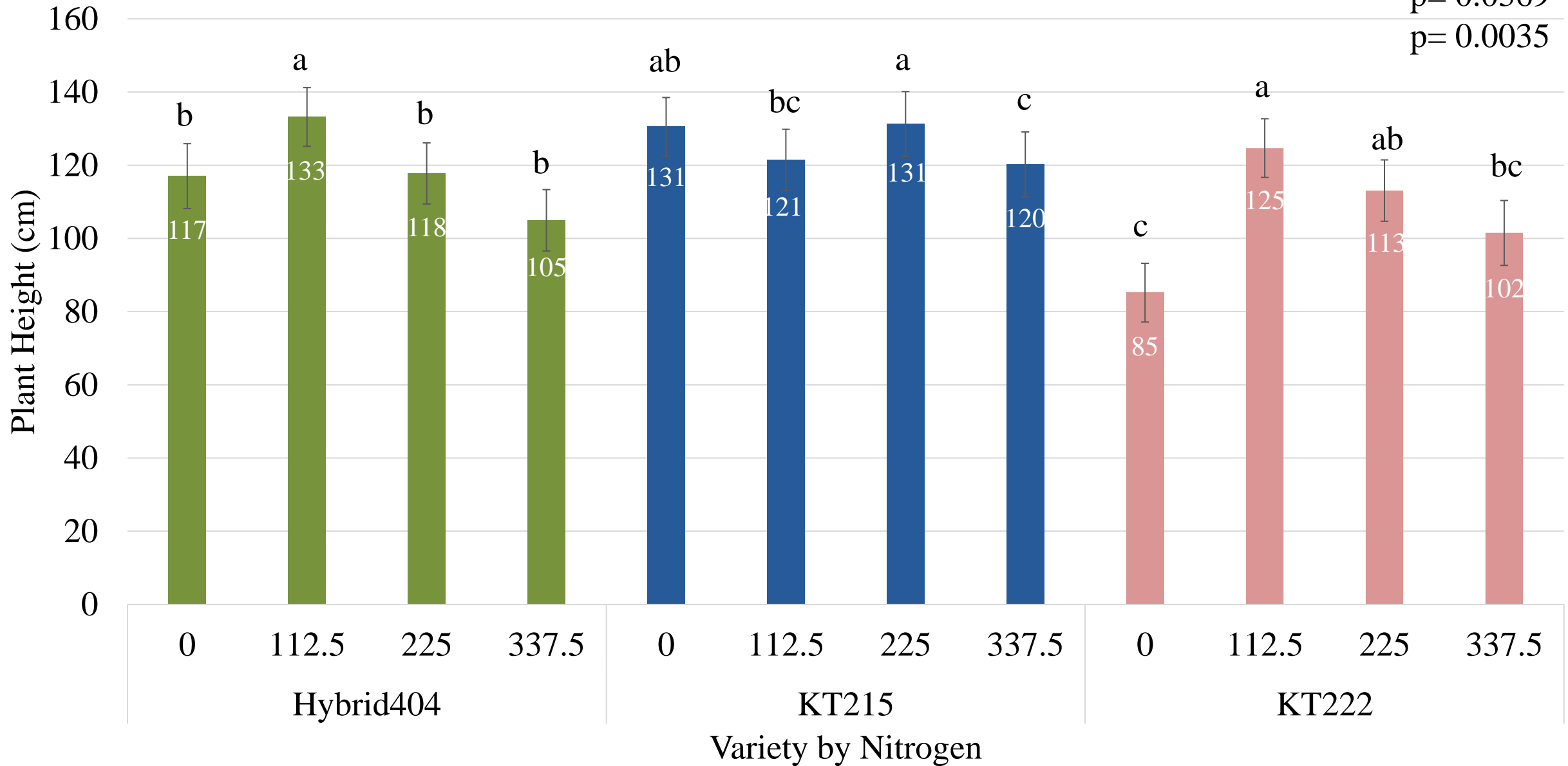
KT 215
225 lb N/ac



KT 215
337.5 lb N/ac

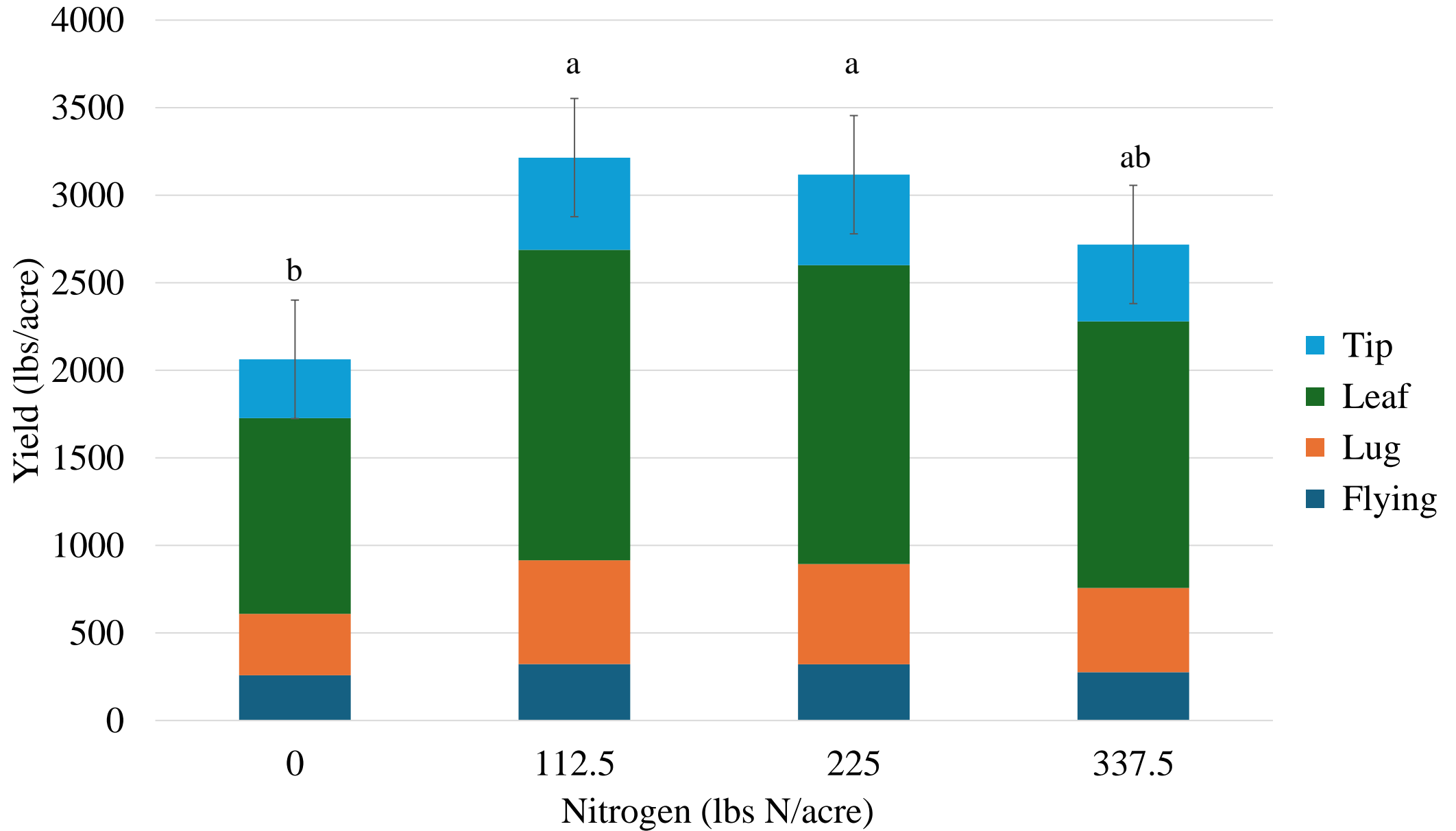
Non-Black Shank Nursery Plant Height Prior to Harvest

p= 0.0061
p= 0.0369
p= 0.0035



Non-Black Shank Nursery Yield

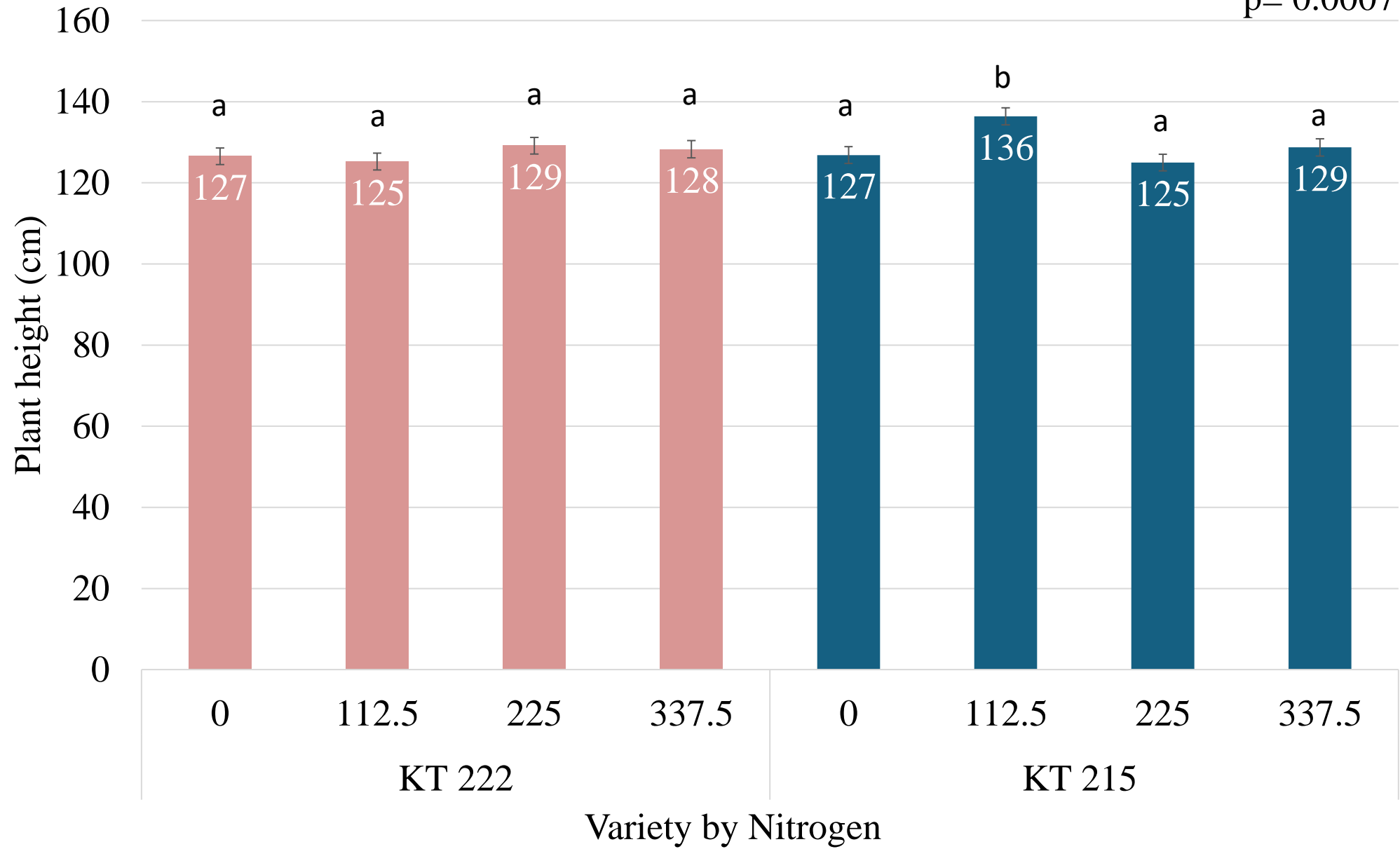
p < 0.0001



Black Shank Nursery Plant Height

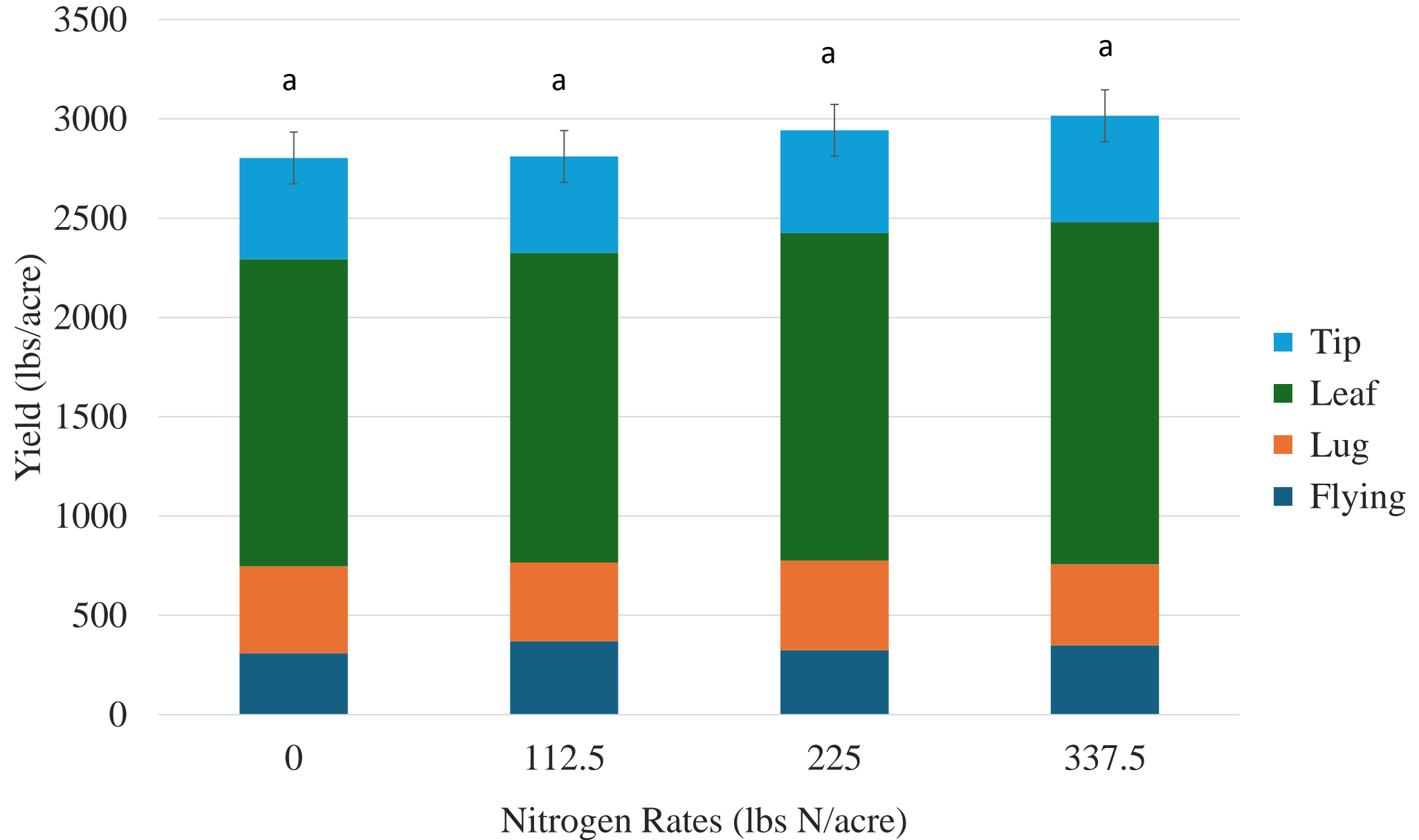
p= 0.3858

p= 0.0007



Black Shank Nursery Yield Data

p < 0.0001



Future Work

- Repeat trials
 - Additional Locations
 - Northeast Research and Education Center
 - Locate a black shank free field
 - Highland Rim Research and Education Center
 - Recently established black shank nursery

Acknowledgements

- Dr. Mitchell Richmond
- Richmond Lab
- Dr. Zach Hansen
- NETREC



UT **AGRESEARCH**
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

UT **EXTENSION**
INSTITUTE OF AGRICULTURE
THE UNIVERSITY OF TENNESSEE

Thank you!

Questions? Comments?

