49th Tobacco Workers Conference – Paper 15 – January, 21, 2020 – Louisville KY

University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

Effects of EndoMaxx Concentrated Endomycorrhizal Fungi on Dark Tobacco

V. Witcher, C. Rodgers, A. Keeney, A. Bailey
University of Kentucky, Princeton KY

J. Cranmer, Valent USA, Morrisville NC

EndoMaxx

- Contains 4 beneficial mycorrhizae fungi
  1. Glomus intraradices
  2. Glomus mosseae
  3. Glomus aggregatum
  4. Glomus etunicatum
- Fungi create a symbiotic relationship with the plant by colonizing the plant's root system increasing root mass and thereby enhancing water and nutrient absorption under variable environmental conditions throughout the crop cycle – including drought
- Not a plant food

Research Objective

Evaluate greenhouse tray drench and transplant water treatments of MycoApply EndoMaxx on the roots of dark-fired tobacco and in turn the effects on

- Plant height and width (6 wks after transplanting)
- Chlorophyll index (6 wks after transplanting)
- Mycorrhizal root colonization
- Yield
- Quality

2018 EndoMaxx Trial

- Crider Silt Loam soil with pH 6.4
- Randomized Complete Block Design, 4 reps per treatment
- Pretransplant fertilizer broadcast/A - 275 lb N, 110 P_2O_5, 100 K_2O
- KT D17LC set May 24 at 40”x32” = 4900 plants/A
- Tray drench treatments applied on May 23 - one day prior to transplanting
- Transplant water treatments applied at transplanting on May 24
  - Transplant water volume 125 gal/A

Treatments		
1	EndoMaxx tray drench	3.5 g/A
2	EndoMaxx transplant water	5.0 g/A
3	*VBC-80163 tray drench	2.5 oz/A
4	*VBC-80163 transplant water	2.5 oz/A
5	Untreated	0

*VBC-80163 is an experimental liquid formulation of EndoMaxx by Valent.

2018 Pre-Topping
Plant Height and Width on July 5

Trt	Treatment	Plant Height (cm)	Plant Width (cm)
1	EndoMaxx tray drench (3.5 g/A)	61.4 bc	87.8 abc
2	EndoMaxx transplant water (5 g/A)	65.0 ab*	88.7 ab
3	*VBC-80163 tray drench (2.5 oz/A)	67.7 a*	89.7 a*
4	*VBC-80163 transplant water (2.5 oz/A)	60.1 bc	83.0 c
5	Untreated	59.3 c	84.6 bc

*VBC-80163 is an experimental liquid formulation of EndoMaxx.

2018 Pre-Topping
NDVI Leaf Chlorophyll Index

Trt	Treatment	Chlorophyll Index July 25
1	EndoMaxx tray drench (3.5 g/A)	56.9 ab
2	EndoMaxx transplant water (5 g/A)	56.5 ab
3	*VBC-80163 tray drench (2.5 oz/A)	57.2 a
4	*VBC-80163 transplant water (2.5 oz/A)	54.1 b
5	Untreated	56.3 ab

*VBC-80163 is experimental liquid formulation of EndoMaxx by Valent.

2018 and 2019 Root Sampling and Lab Procedures

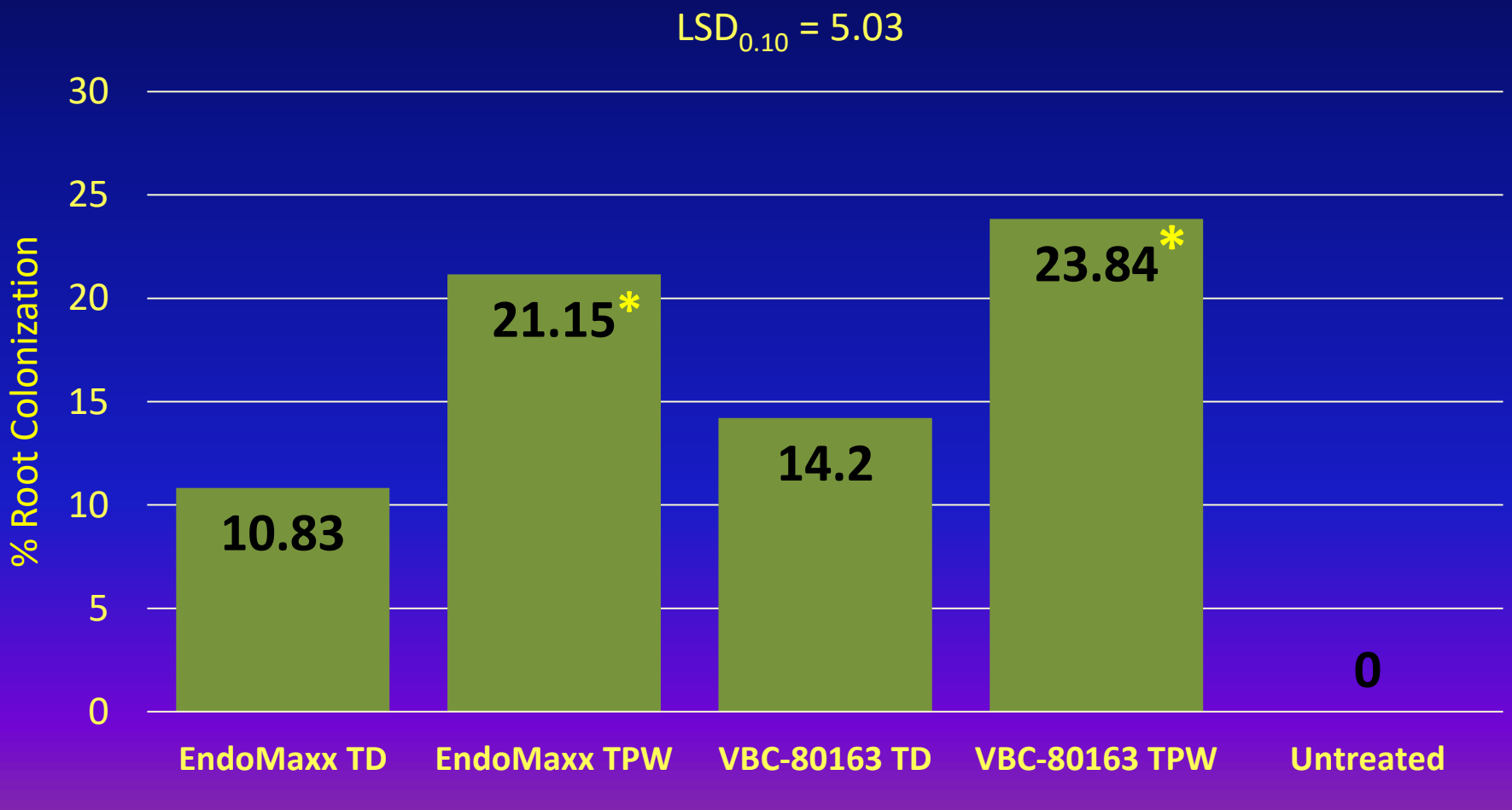
Root Sampling Protocol

- 2 – 3 weeks before harvest
- 2 root balls from each plot – approximately 61 cm diameter hole around stalks
- Roots washed with low pressure to remove as much soil as possible without damaging root ball
- Roots allowed to dry in ambient air, placed in paper bags and then placed in plastic bags and sealed for transport
- Samples shipped to arrive 2-3 days post collection to Florida Ag Research in Thonotosassa, FL for analysis

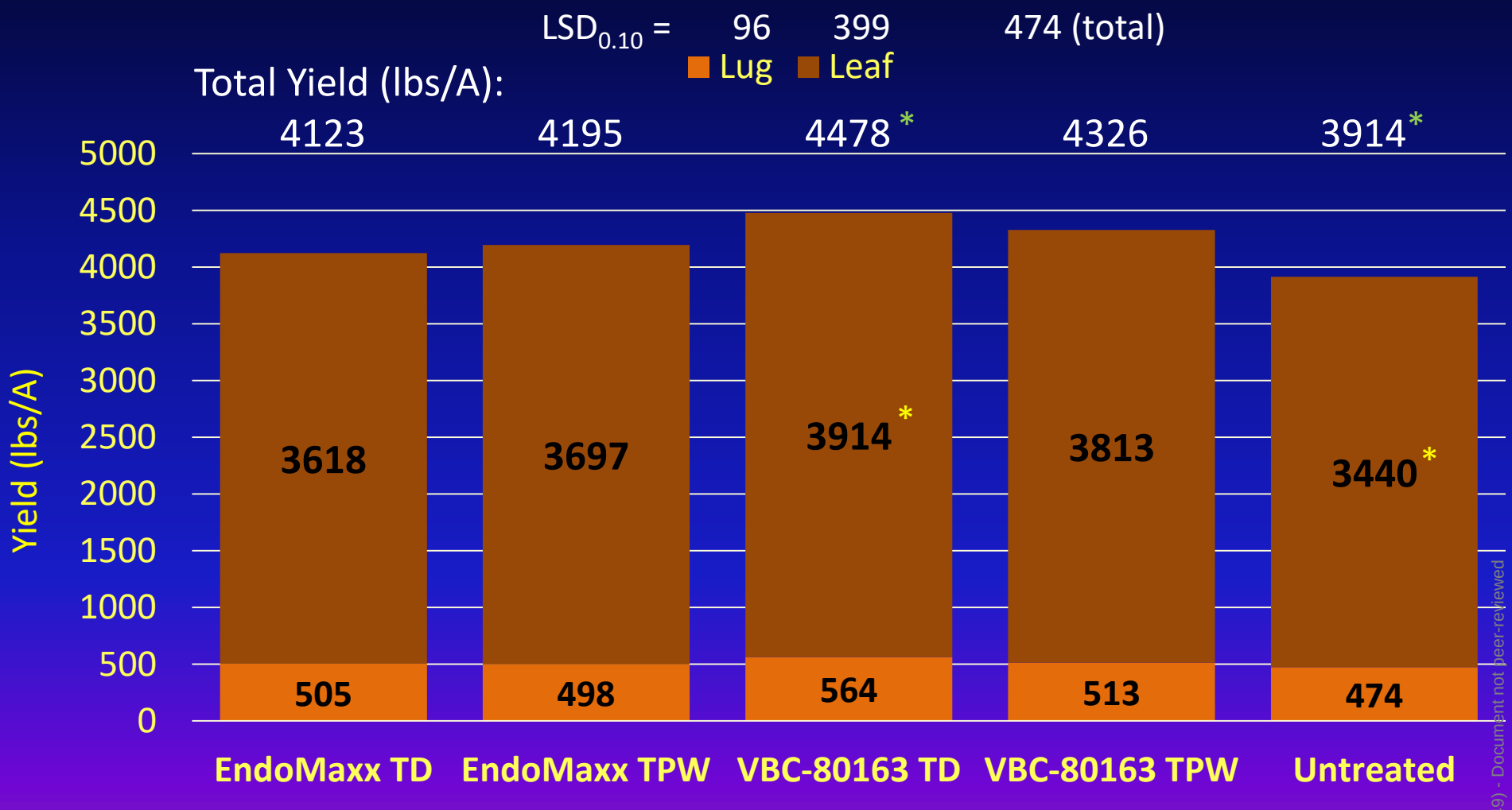
Mycorrhizal Root Colonization Test

- Roots cut into 1-2 cm pieces and washed with running tap water
- Added 10% Sodium hydroxide to cover roots and autoclave for 10 minutes
- Bleached high pigmented roots with chlorine and washed 3 times with tap water
- Acidify roots with HCL for 5 minutes and drain
- Stain roots and autoclave 10-15 minutes; drain off dye
- Immerse roots in water to de-stain
- Examine roots under dissecting or compound microscope

2018 Percent Root Colonization By Mycorrizae

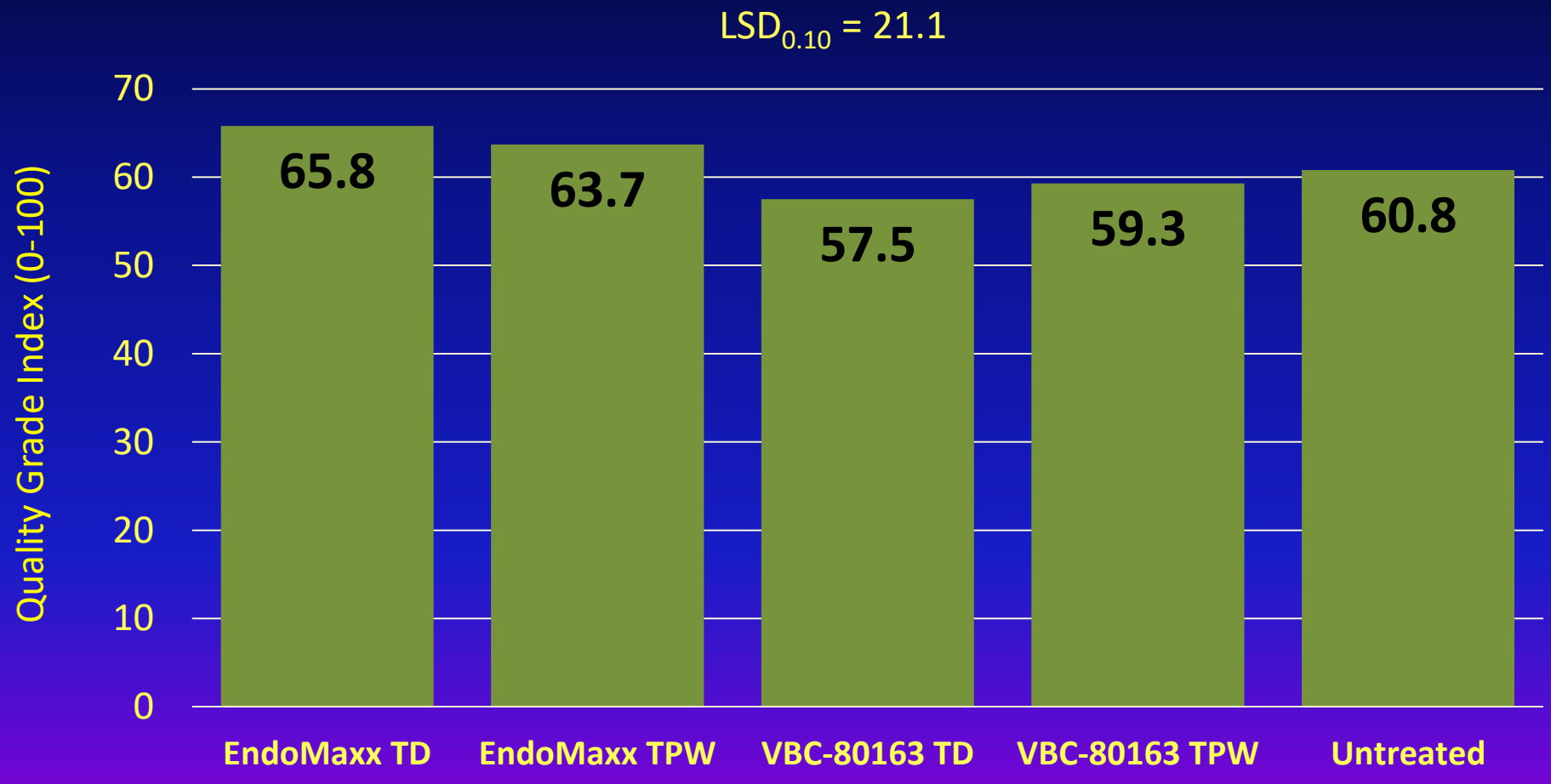


2018 Dark-Fired Tobacco Yield



Average total yield for treatments = 4281 lb/A

2018 Quality Grade Index



*No statistical differences in leaf quality between treatments.

2019 EndoMaxx Trial

- Crider Silt Loam soil with pH 6.3
- Randomized Complete Block Design, 4 reps per treatment
- Pretransplant Fertilizer Broadcast/A - 275 lb N, 70 P_2O_5, 100 K_2O
- KT D17LC set May 29 at 40”x32” = 4900 plants/A
- Tray drench treatments applied on May 28 – one day prior to transplanting
- Transplant water treatments applied at transplanting on May 29
  - Transplant water volume 125 gal/A

Treatments		
1	*VBC-80163 tray drench	2.5 oz/A
2	*VBC-80163 transplant water	2.5 oz/A
3	Untreated	0

*VBC-80163 is an experimental liquid formulation of EndoMaxx by Valent.

2019 Pre-Topping
Plant Height & Width on July 12

Trt	Treatment	Plant Height (cm)	Plant Width (cm)
1	*VBC-80163 tray drench (2.5 oz/A)	55.4 a	78.6 a
2	*VBC-80163 transplant water (2.5 oz/A)	62.9 a	80.7 a
3	Untreated	61.8 a	77.6 a

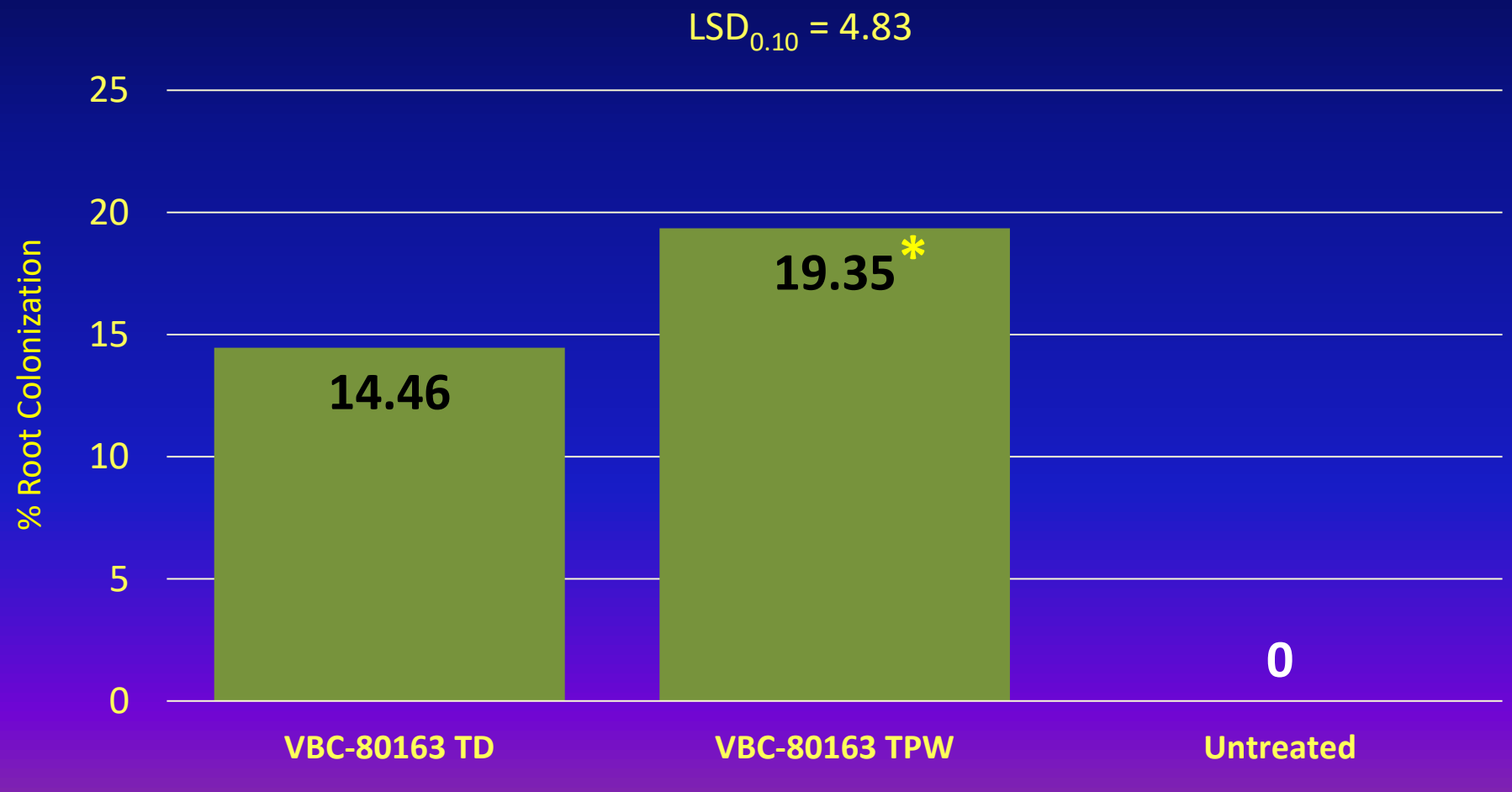
*VBC-80163 is experimental liquid formulation of EndoMaxx by Valent.

2019 Pre-Topping
NDVI Leaf Chlorophyll Index

Trt	Treatment	Chlorophyll Index July 12	Chlorophyll Index September 4
1	*VBC-80163 tray drench (2.5 oz/A)	35.3 a	58.2 a
2	*VBC-80163 transplant water (2.5 oz/A)	34.5 a	54.1 a
3	Untreated	35.7 a	56.7 a

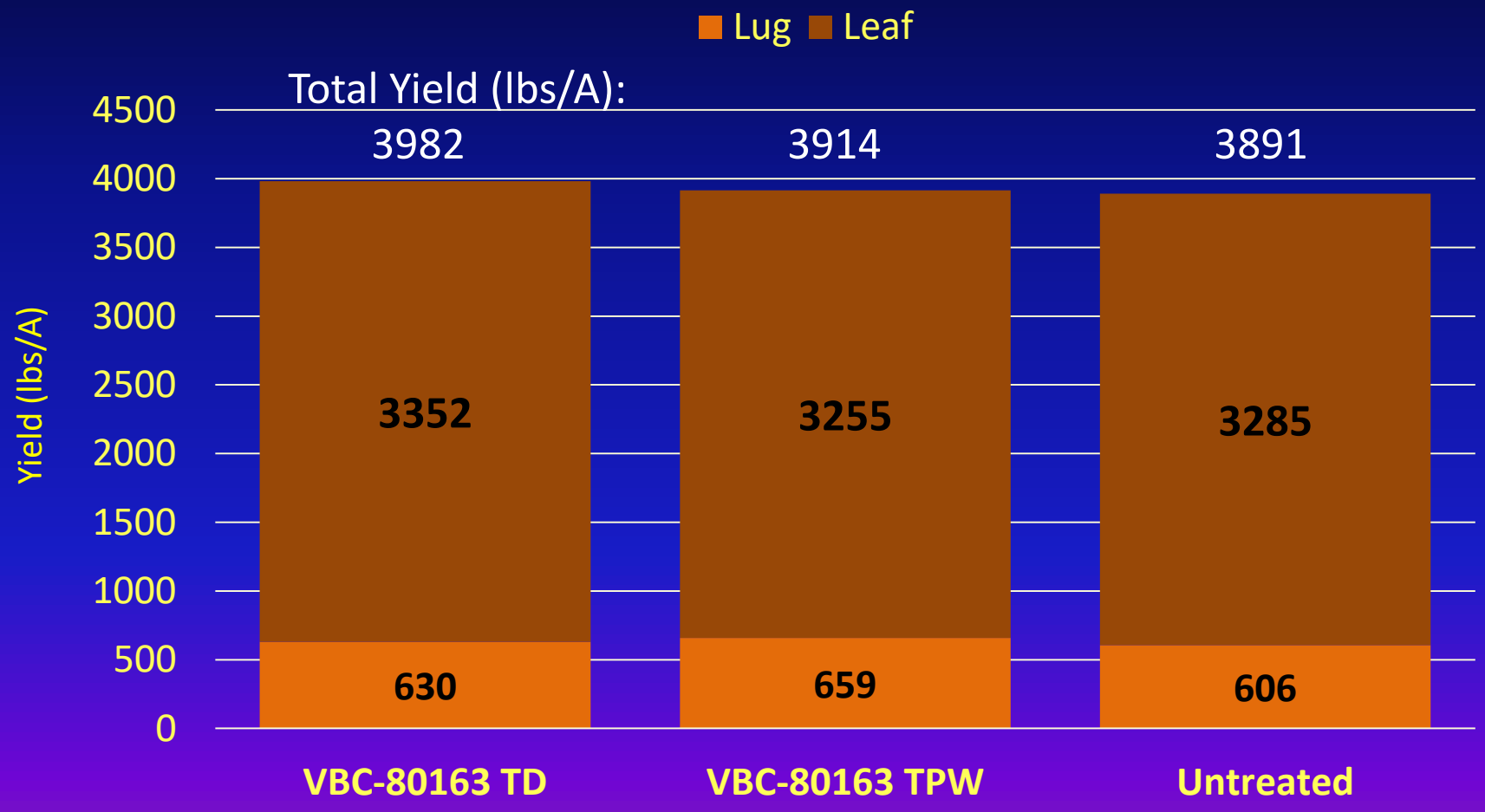
*VBC-80163 is an experimental liquid formulation of EndoMaxx by Valent.

2019 Percent Root Colonization by Mycorrizae



2019 Dark-Fired Tobacco Yield

$LSD_{0.10}$ = 93 356 354 (total)



Average total yield for treatments = 3948 lb/A

EndoMaxx Trial Summary

- **Plant Height and Width**
  Small but significant difference in 2018, none in 2019

- **Chlorophyll**
  No statistical differences in 2018 or 2019

- **Root Colonization**
  Good root colonization from both EndoMaxx and VBC-80163 with statistically higher colonization from transplant water applications in both 2018 and 2019 trials

- **Yield**
  Trend toward higher yields with EndoMaxx and VBC-80163 compared to untreated check in 2018; Yields not significantly different in 2019

- **Quality**
  No statistical differences in Grade Index in 2018
  Data for 2019 unavailable at this time

Appreciation is extended to
Valent USA Corporation
for support of this research through funding and provision of treatment products.

Appreciation is also extended to
John Cranmer, Field Market Development Specialist, Valent USA Corporation.

Questions?