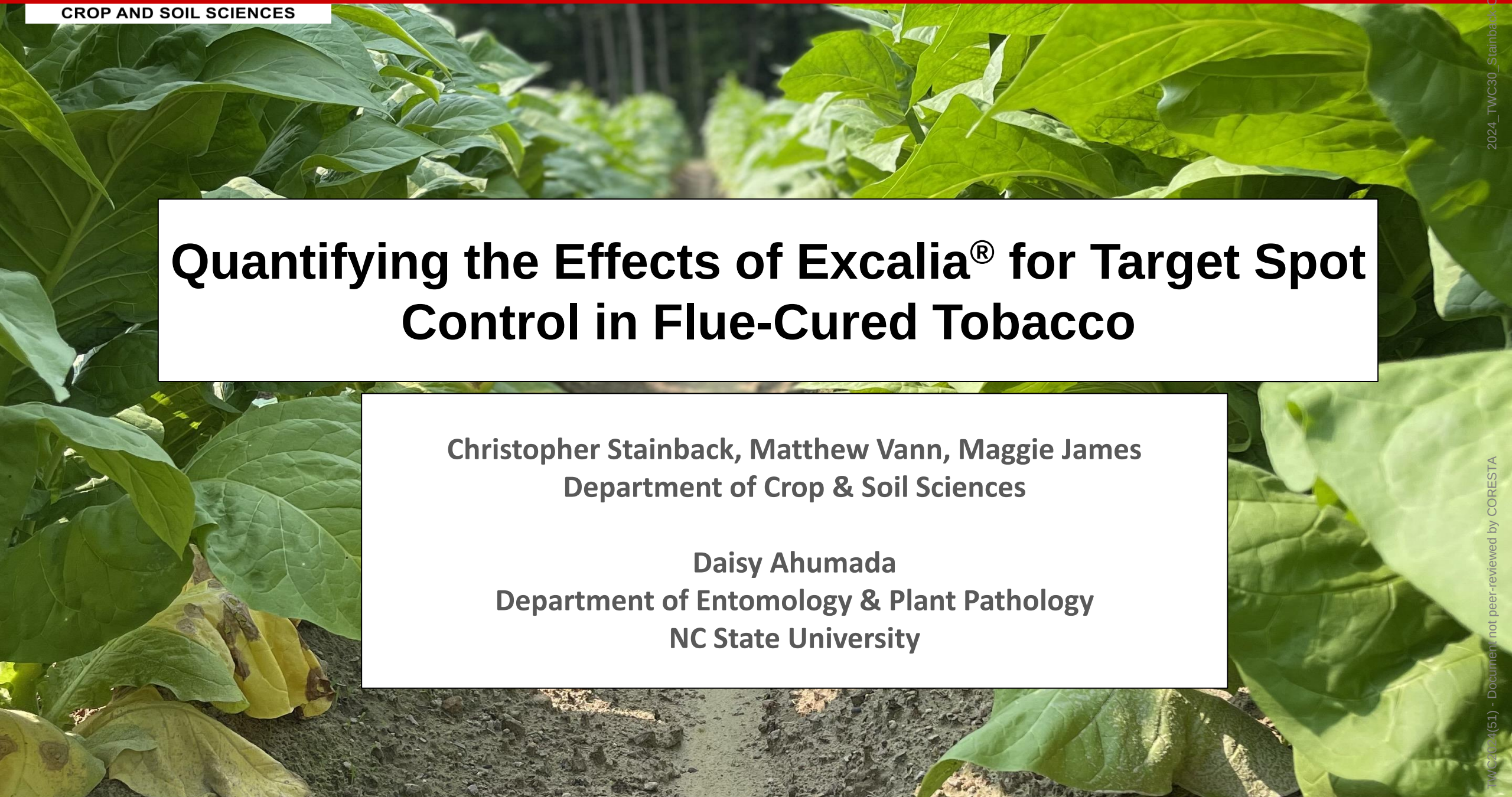

Quantifying the Effects of Excalia® for Target Spot Control in Flue-Cured Tobacco

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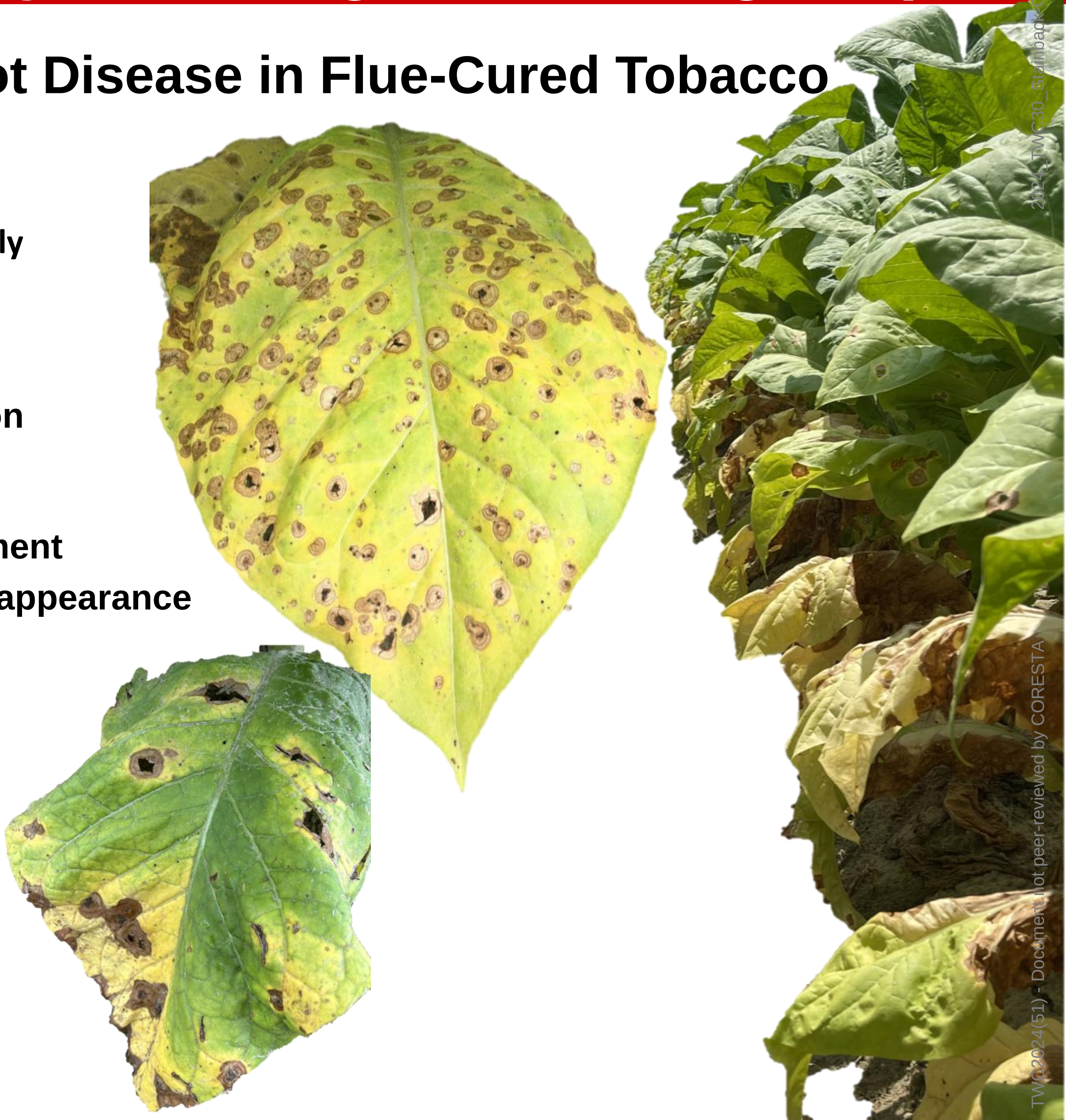
Project Background- Target Spot

Currently the most problematic Leaf Spot Disease in Flue-Cured Tobacco

Target Spot

- ***Rhizoctonia solani*** **- soilborne fungal pathogen that can significantly reduce yield potential**
- **Initial infection occurs on foliage closest to the soil**
- **Wet/Humid conditions initiate further sporulation/infection**
  - **Capable of affecting each stalk position**
- **Pathogen development leads to necrotic lesion development**
  - **Pathogen/Host competition → Concentric ring appearance**
- **Major concern since 2019-2020**



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Project Background- Target Spot

Economic Impact

- **Reported statewide in 2021 to cause ~ 7% yield reductions**
  - **(>$34 million)**
- **In the coastal plain producing region alone 10-15% yield reductions**
- **Premature senescence and loss of leaf area promote yield loss**

Control Methods

- **Historically successfully controlled with azoxystrobin**
- **Mancozeb not a logical option**
  - **Residue concerns and mediocre control**
- **Overapplication, lack of options and ineffective application techniques may have promoted *R. Solani* tolerance to azoxystrobin**
- **No additional fungicide registered for use in nearly 20 years**

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Product Information

Excalia Fungicide

- **Active Ingredient: Inpyrfluxam**
- **Manufacturer: Valent U.S.A**
- **FRAC Group 7 fungicide**
  - **SDHI Inhibitor**
- **Registered for control of fungal leaf spot diseases in**
  - **Apple**
  - **Peanut**
  - **Soybean**
  - **Sugar Beet**
- **Registered max rate per application (2 – 4 fl oz / acre)**

EXCALIA® FUNGICIDE

Average cost/acre

- $8/ fl oz
- $16 per acre (2 fl oz/acre rate)

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Research Objectives

- Evaluate Inpyrfluxam for efficacy against Target Spot (*Rhizoctonia solani)*
- Determine dose response significance
  - 2 fl oz / acre (0.04 lb ai/acre)
  - 4 fl oz /acre (0.08 lb ai/acre)
  - 10 fl oz /acre (0.22 lb ai/acre)
- Compare inpyrfluxam efficacy to current control products (azoxystrobin, mancozeb)
- Identify cured leaf residues
- Quantify yield improvements, if necessary

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List of Treatments

Table 1. 2022 and 2023 foliar fungicide treatments for efficacy against target spot in North Carolina . [a,b]

Trt Num.	Product	Active Ingredient	Rate	FRAC Code
1.	Non-Treated	-	-	-
2.	Excalia	Inpyrfluxam	2 fl oz/a	7
3.	Excalia	Inpyrfluxam	4 fl oz/a	7
4.	Excalia	Inpyrfluxam	10 fl oz/a	7
5.	Quadris F	Azoxystrobin	8, 9, 9 fl oz/a	11
6.	Manzate Pro-Stick	Mancozeb	2 lbs/a	M03

a Each fungicide was applied three times per growing season: 4, 6, and 8 weeks after transplanting
b Application volume increases from 1-3 application
“,” indicates that the application rate was changed following first application

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Methods & Materials

- 2022: Three research sites
  - *A. alternata*
  - Limited *R. solani*
  - Varieties: NC 1226, GL 365, NC 196
- 2023: Three research sites
  - *R. solani*
  - Limited *A. alternata*
  - Varieties: NC 1226, GL 365, NC 960
- RCBD w/four replications per site
  - Four row plots (50 ft length)
  - Two treatment rows
  - Two guard rows
- Application Protocol:
  - 4WAT: 25 GPA solution volume
  - 6WAT: 35 GPA solution volume
  - 8WAT: 50 GPA solution volume

- Injury ratings one week after each treatment (scale of 0-100)
- Visual leaf spot severity and number of infected leaves assessed immediately prior to first and third harvest
- Severity Protocol:
  - N=5 plants/plot
  - Plants divided into lower, middle, and upper groups
  - N=7 leaves/group,
    - Each leaf given a % severity rating (scale of 0-100%)
    - Each leaf with at least one lesion quantified
- Stalk positions were harvested for yield and quality
- Data analyzed using Proc Mixed (SAS 9.4)

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1st Application

Single TG6 Nozzle
25 GPA Output

4 Weeks After Transplanting

16 May, Lenoir County

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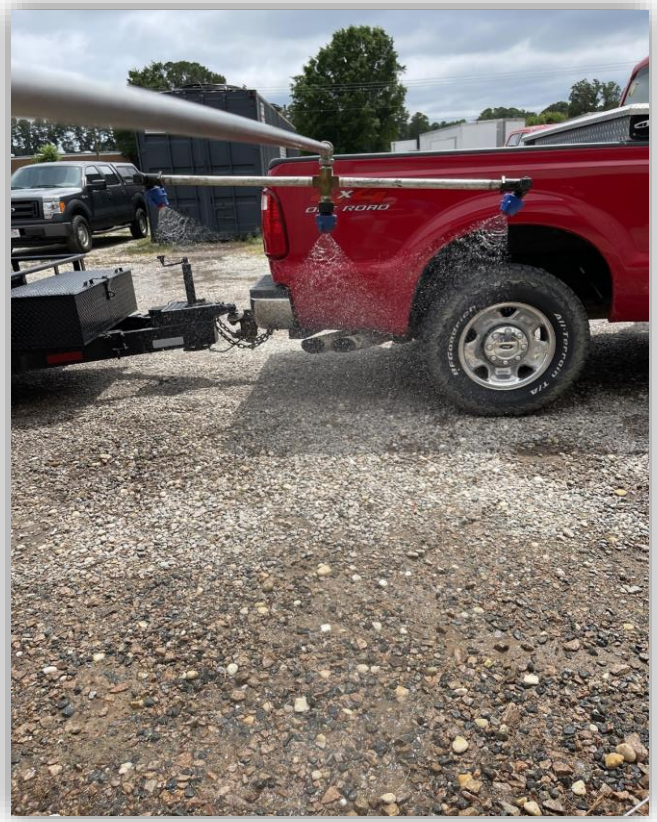
2nd Application



XR8004 Flat Fan Nozzles (3)
20 in. Boom Width
35 GPA Output

6 Weeks After Transplanting

22 June, Granville County

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3rd Application

Drop Nozzle Application
XR8003 - XR11003
50 GPA Output

8 Weeks After Transplanting

26 July, Granville County

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Excalia Injury Evaluation

Table 1. 2023 Excalia Fungicide Injury Evaluation. Oxford Tobacco Research Station. Trial initiated Aug 03, 2023. [a,b,c,d]

Trt Num.	Product	Rate	Volume
1.	Non-Treated	-	-
2.	Excalia	3 fl oz/a	50 GPA
3.	Excalia	6 fl oz/a	50 GPA
4.	Excalia	15 fl oz/a	50 GPA
5.	Excalia	4 fl oz/a	50 GPA
6.	Excalia	8 fl oz/a	50 GPA
7.	Excalia	20 fl oz/a	50 GPA

[a] Each rate was applied three times, once every seven days.
[b] Visual injury ratings followed every four and seven days after each application
[c] Variety used: GL 365
[d] Visual post-treatment ratings upwards of 28 days after first treatment did not reveal any phytotoxic effects of the various rates

Drop Nozzle app.
- 7 Flat fan nozzles

0% Injury at any research site (2022 & 2023) growing seasons

***Target rate is likely to be 2 fl oz/a (0.04 lb ai/acre)**

FRAC Group 11

Excalia

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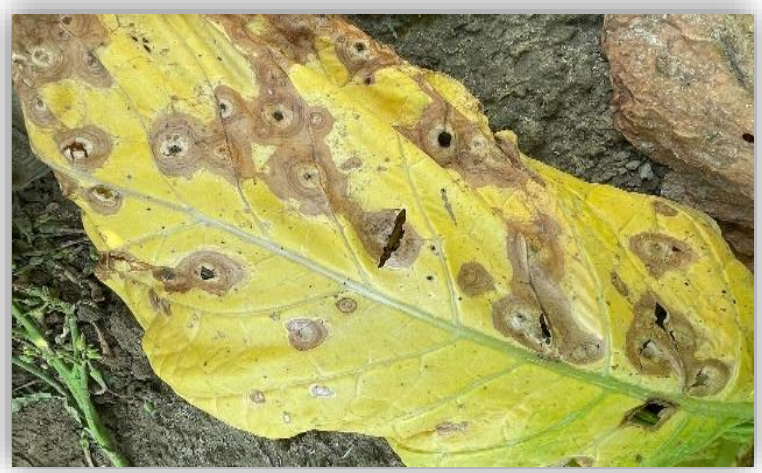
5%

30%



40%

15%

60%

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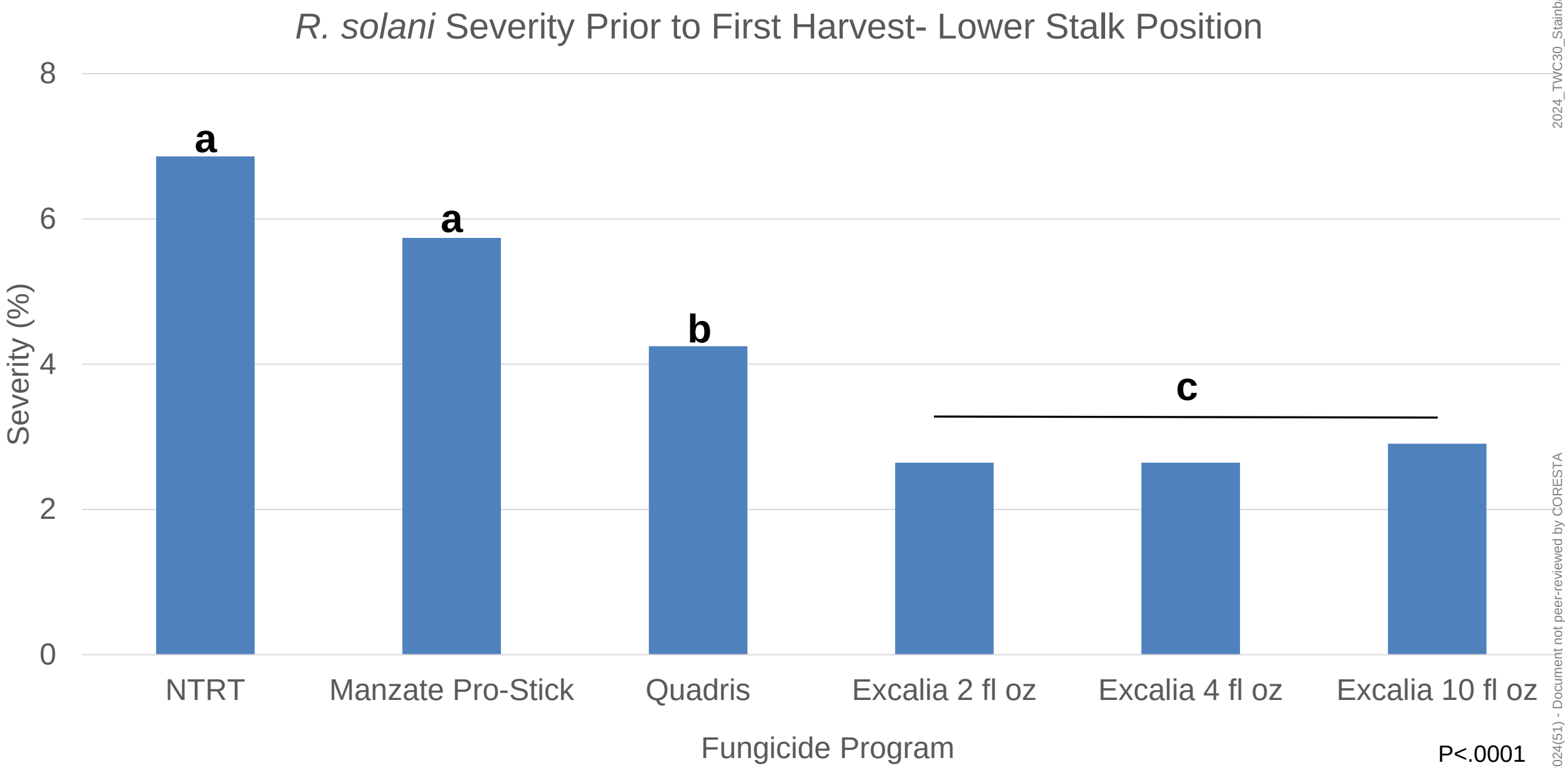
2023 Results – Lower Stalk Position



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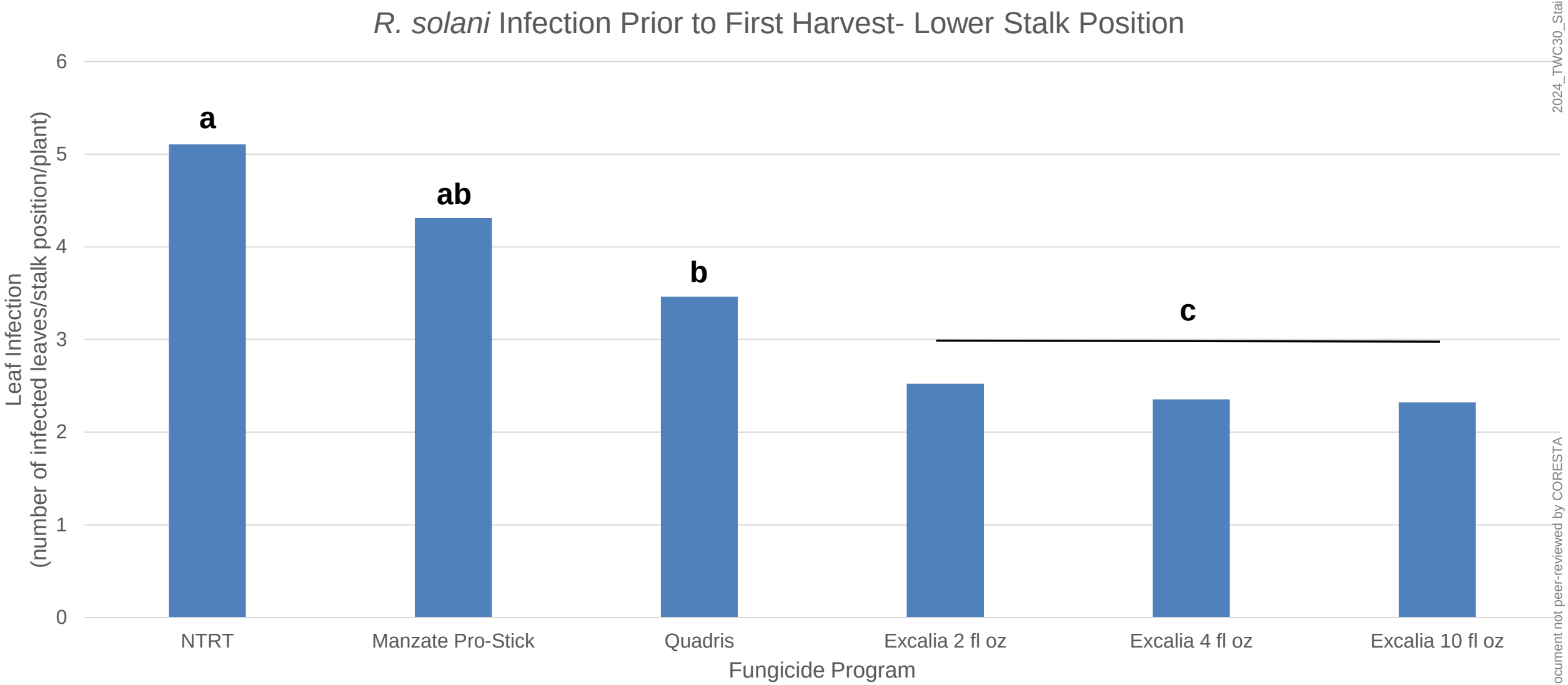
2023 Results – Lower Stalk Position



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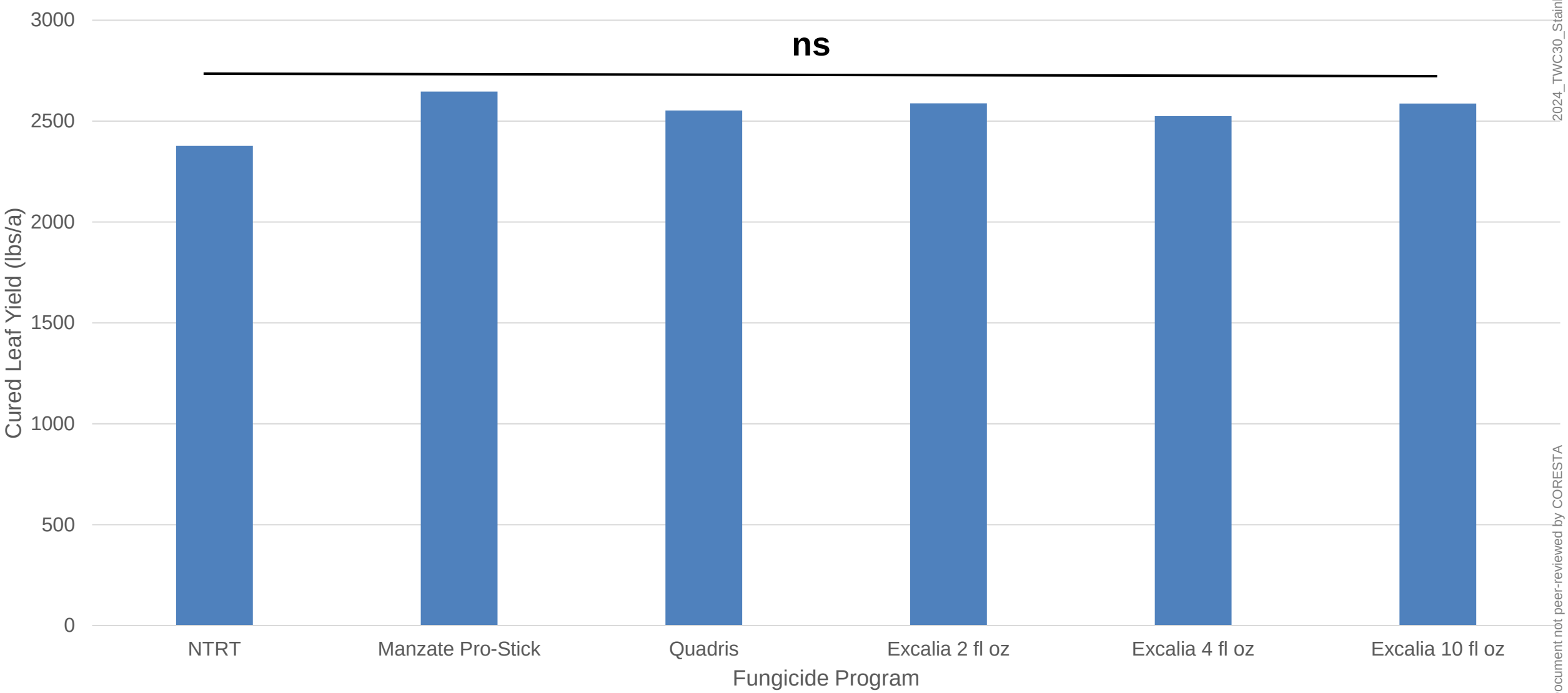
2023 Results – Cured Leaf Yield



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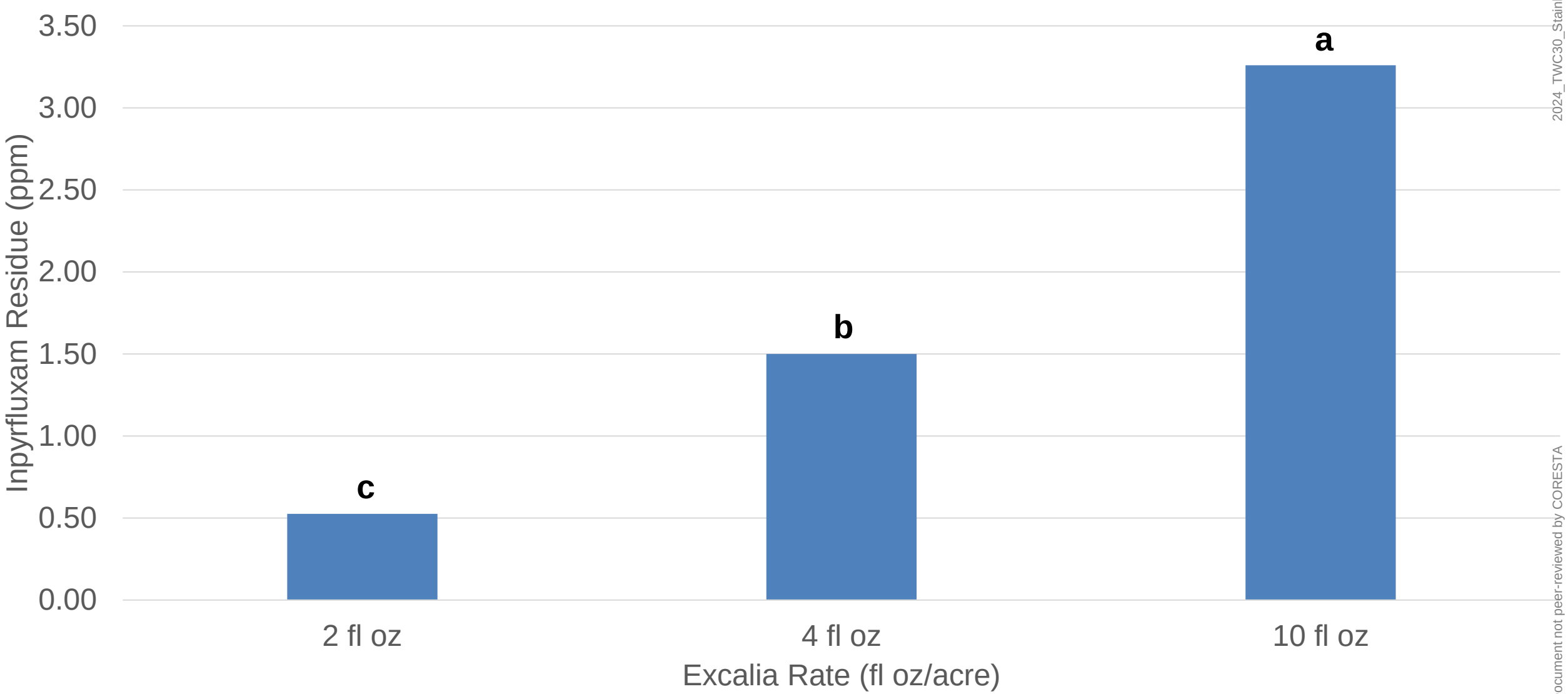
2022 Cured Leaf Residue Measurements



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Preliminary Conclusions

- Inpyfluxam showing great potential for *R. solani* control
  - No observed difference in dose response
- Injury (0%) vs. efficacy (80-86% control)
- Group 7 fungicide
  - Unprecedented in Flue-Cured tobacco
  - Important for resistance management
- Quadris stills shows activity against *R. solani*
  - Cognitive application delivery methods needed
  - Tank mix potential
- Probably not impactful for *A. alternata* or *C. nicotianae*

Border vs. Excalia

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- NCSU Tobacco Agronomy Team

- NCSU Dept. of Plant Pathology
  - Dr. Daisy Ahumada

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Questions?

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