Systemic Insecticide Application at Transplanting – An Assessment of Imidacloprid Placement

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Project Background – Systemic Insecticide Application

- Best practice for TSWV suppression
  - Predominantly in the form of imidacloprid
  - Historically applied via tray drench
  - Early season *Myzus persicae* and *Epitrex hiritipennis* control
- Large producers have ceased tray drench applications
  - Prefer to apply via transplant water solution
- Why?
  - Simplicity: tray drench applications are sometimes inconvenient
  - Reduced injury potential when transplanting conditions are unfavorable (cool/damp)
- Concern that too many products are going into transplant water solutions
  - Fungicides, insecticides, fertilizer(s), biologicals, plant health promoters, etc.
- Observations of plant stand issues every season
- <u>Proposed Idea from Farmers:</u>
  - Transition product placement from directly in-furrow to a short distance from seedling rhizosphere
  - Common practice for grain producers

Project Background

In-Furrow Application

Sidedress Application


Checchi & Magli
Checchi & Magli
Checchi & Magli
Checchi & Magli


CARLISLE


OXFORD
North Carolina

Research Objectives

1. Quantify early-season insect herbivory
2. Measure early-season imidacloprid assimilation
3. Document TSWV stand losses
4. Determine injury potential from systemic insecticide placement and/or rate

2022 & 2023 Systemic Insecticide Treatment List

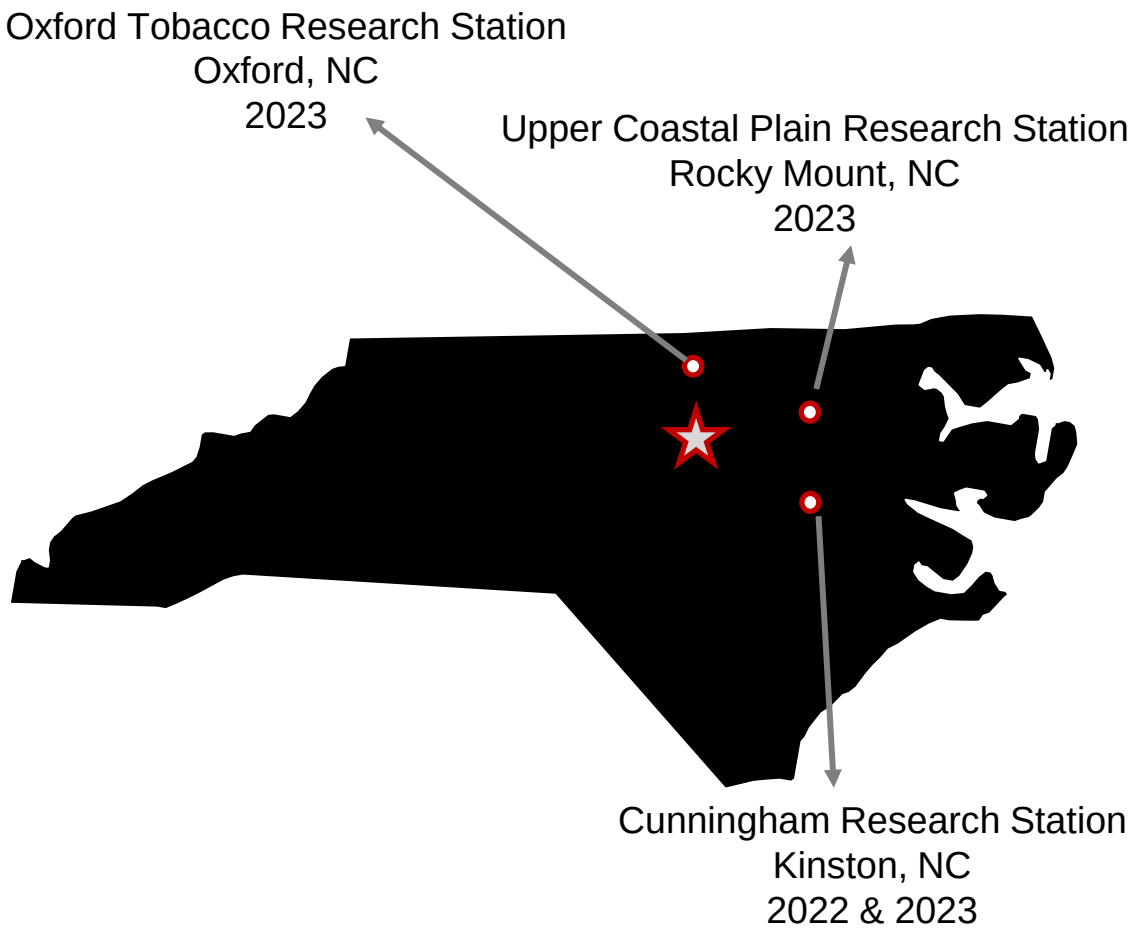
Table 1. List of imidacloprid application rates and placements evaluated for insect suppression efficacy and plant response in 2022 and 2023.

In-furrow (100 gal/a)			Sidedress (20 gal/a)	
Water Only	--	+	--	--
Water + Imidacloprid	0.13 lbs ai/a	+	--	--
Water + Imidacloprid	0.26 lbs ai/a	+	--	--
Water Only	--	+	Water + Imidacloprid	0.13 lbs ai/a
Water Only	--	+	Water + Imidacloprid	0.26 lbs ai/a

[a] Imidacloprid applied as Admire® Pro (Bayer CropScience LP, St. Louis, MO, USA)

Methods & Materials

- Four locations
- Randomized complete block design
  - Four replications per site
- Two row plots
  - Row one = harvest row
  - Row two = destructive sampling row
  - Row width 44 – 48 in
- Planted with modified mechanical transplanter (previously shown)
  - NC1226 & NC960 (Foley Seed & Service)
  - GL365 (GoldLeaf Seed Co.)
  - Seedlings were not treated with a systemic insecticide in the greenhouse
  - Foliar insecticides not applied from 0-6 weeks after transplanting

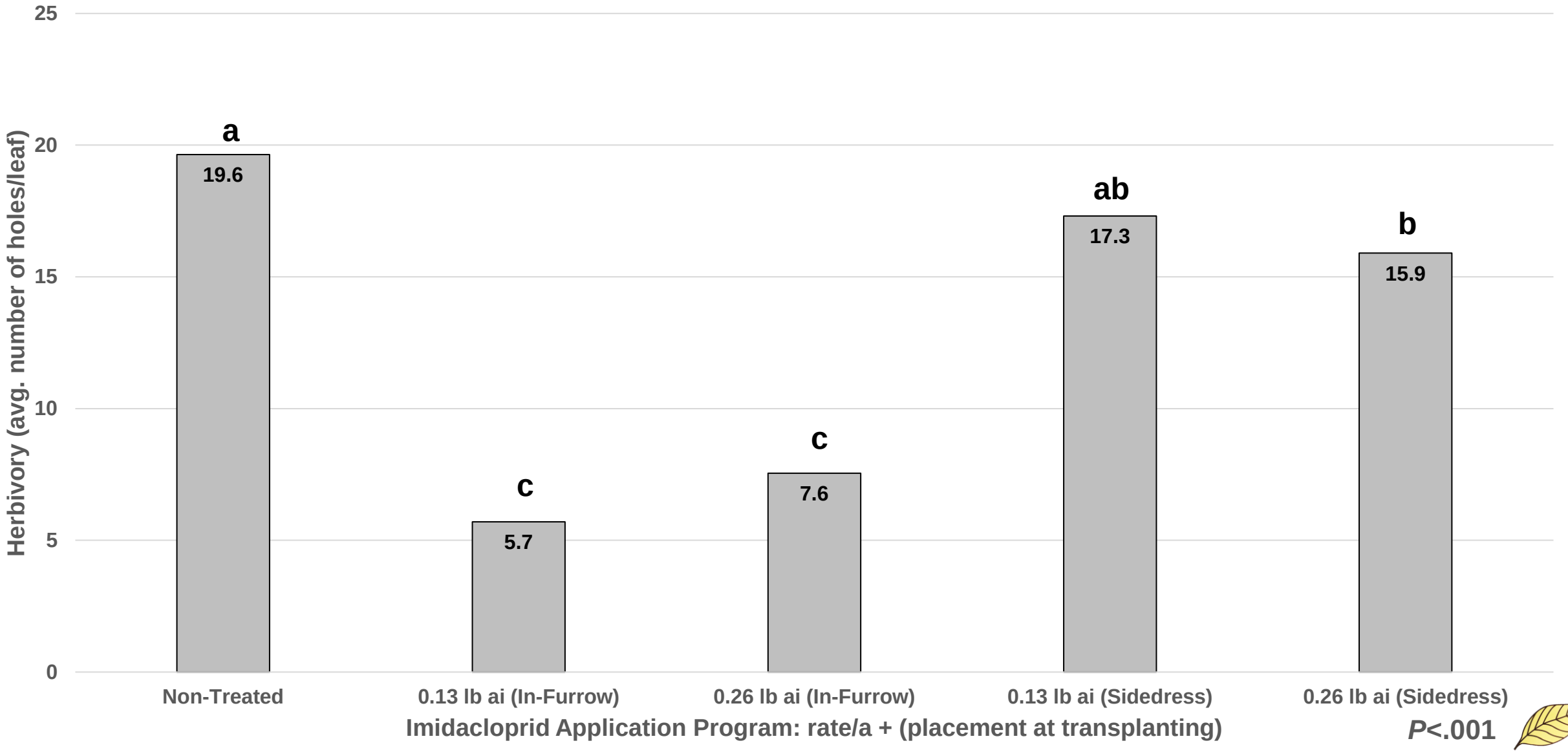


Data Collection & Analysis

- 2, 4, & 6 Weeks After Transplanting
  - *E. hiritipennis* herbivory (10 plants/plot)
  - Fresh/dry plant mass and imidacloprid residue (5 plants/plot)
- 8 Weeks After Transplanting
  - TSWV stand loss assessments
- Post Harvest
  - Yield, visual quality, value, and chemistry
- Data Analysis:
  - Proc MIXED (SAS version 9.4)
  - Random Effects = environment and replication
  - Fixed Effects = treatment

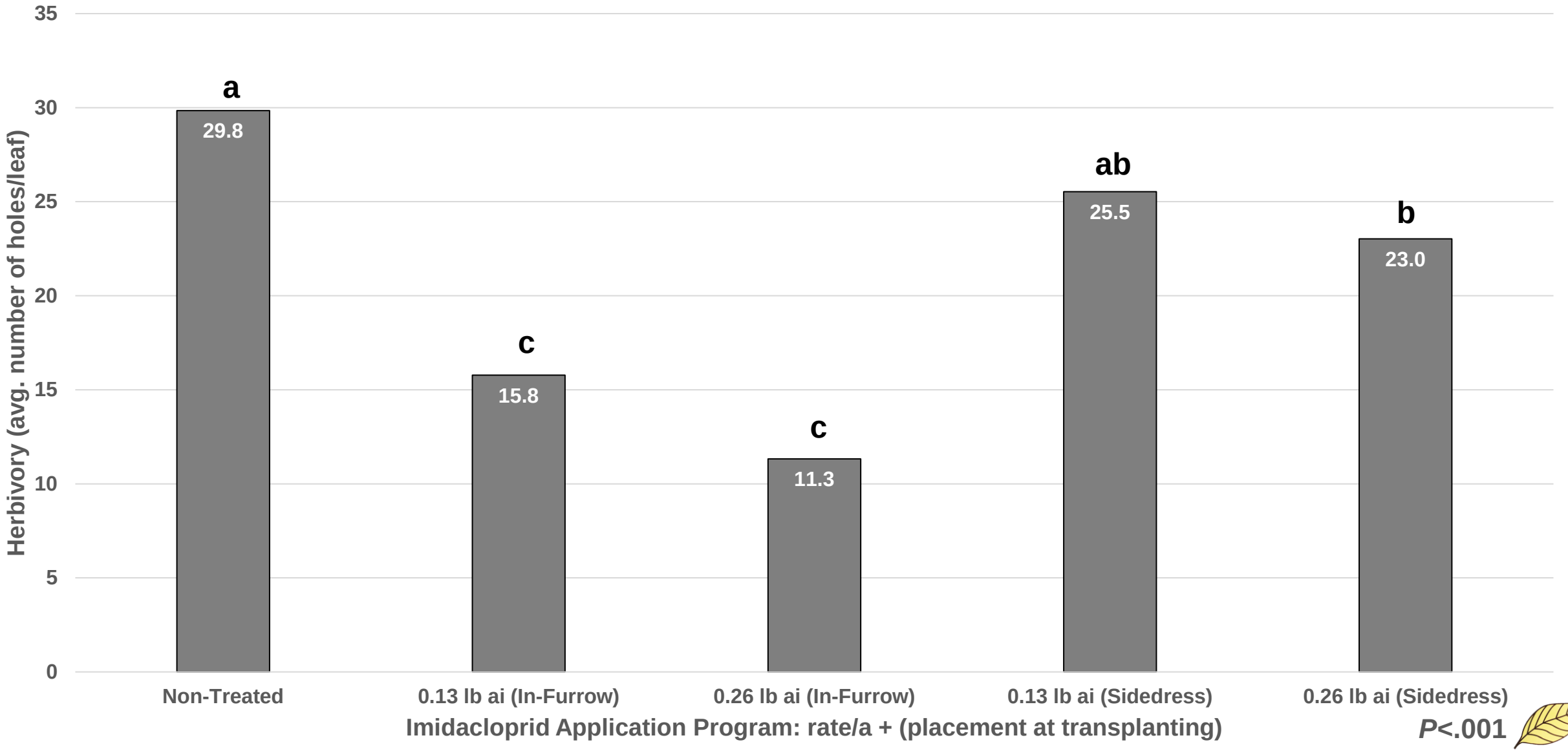
E. hiritipennis Herbivory – 2 WAT

Flea Beetle Herbivory as Influenced by Imidacloprid Application Rate and Placement – Data are Pooled Across Four Environments

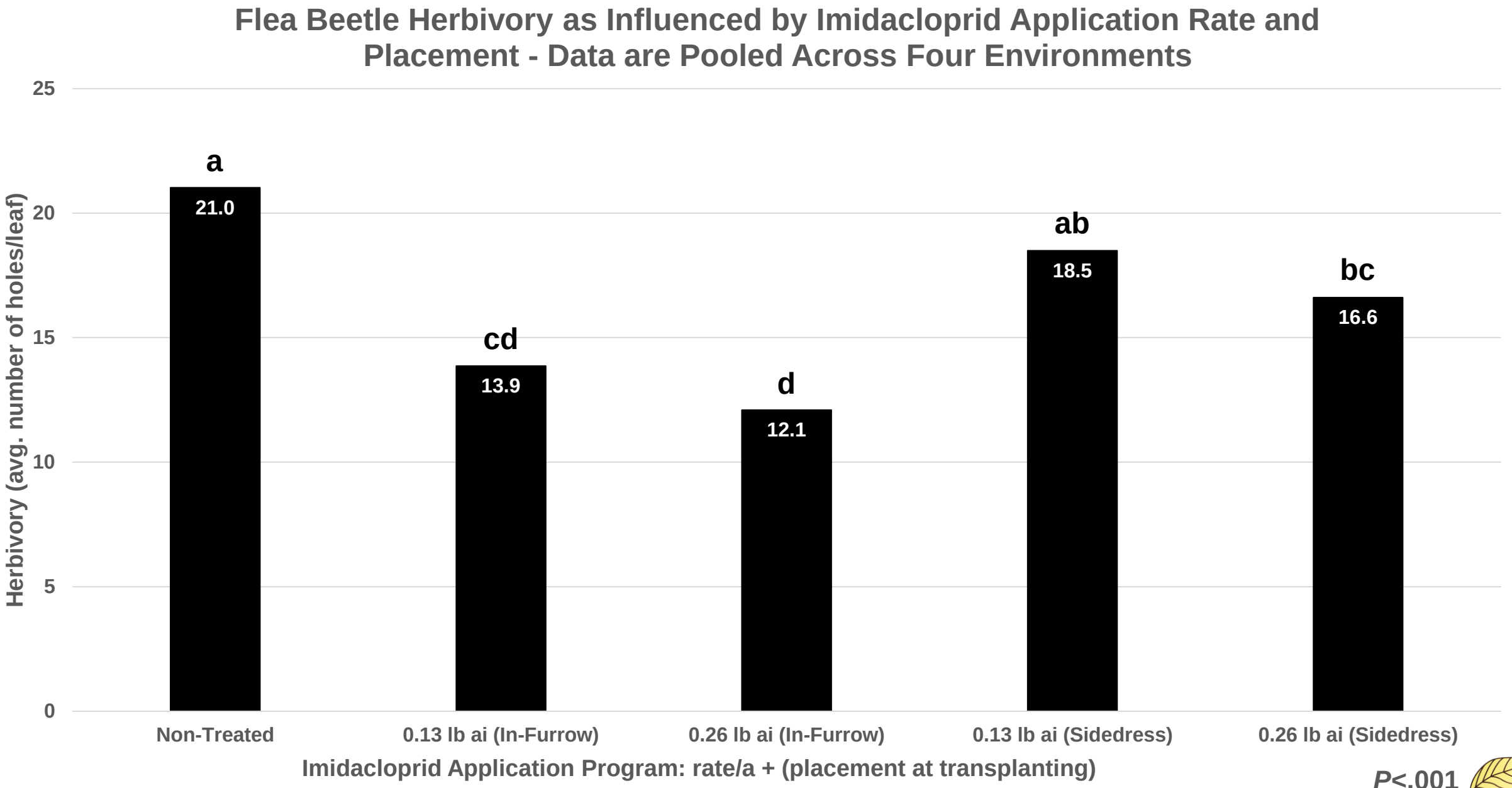


E. hiritipennis Herbivory – 4 WAT

Flea Beetle Herbivory as Influenced by Imidacloprid Application Rate and Placement - Data are Pooled Across Four Environments



E. hiritipennis Herbivory – 6 WAT



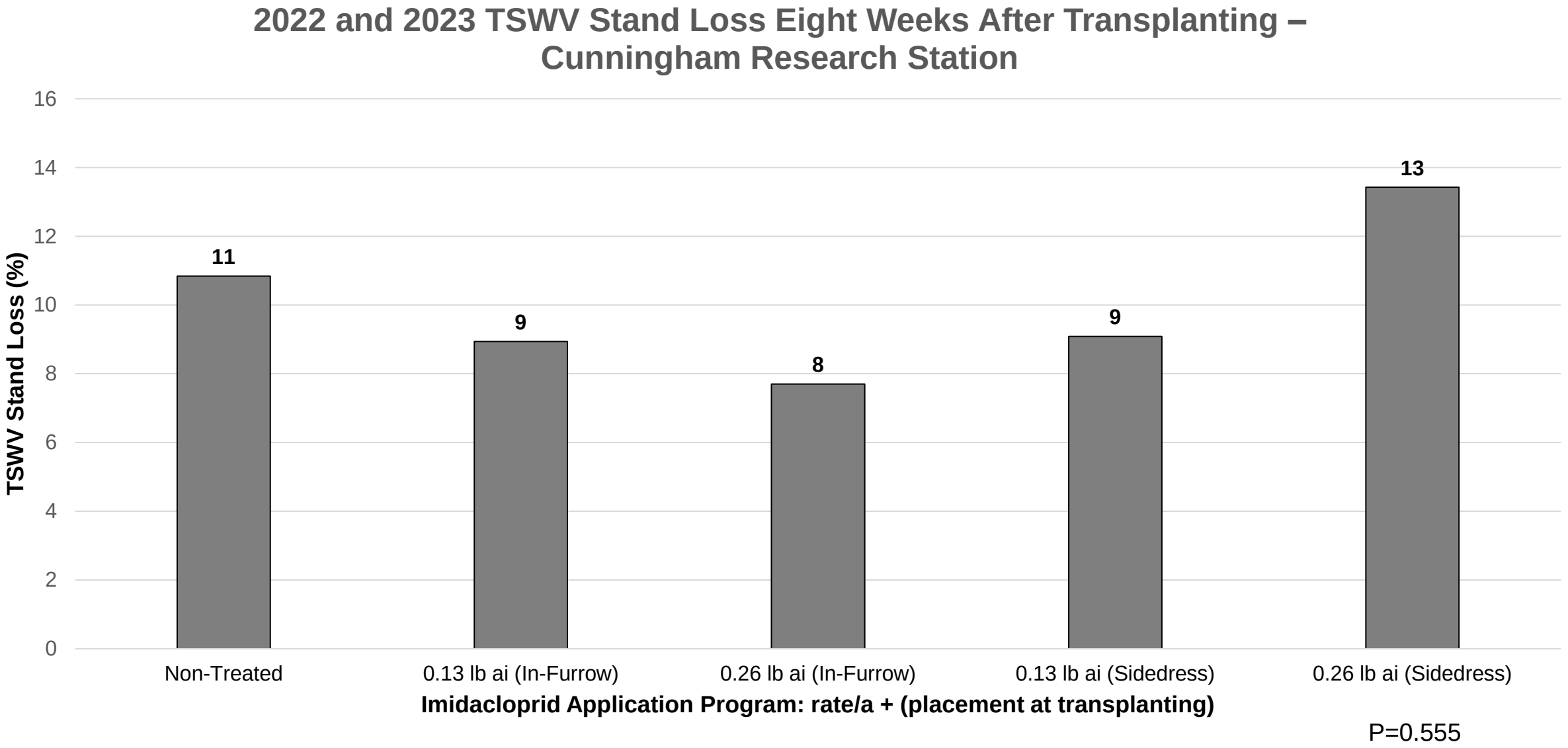
Imidacloprid uptake and seedling mass

Table 2. Foliar imidacloprid residue and tobacco plant dry mass as influenced by imidacloprid application rate and placement.[a]

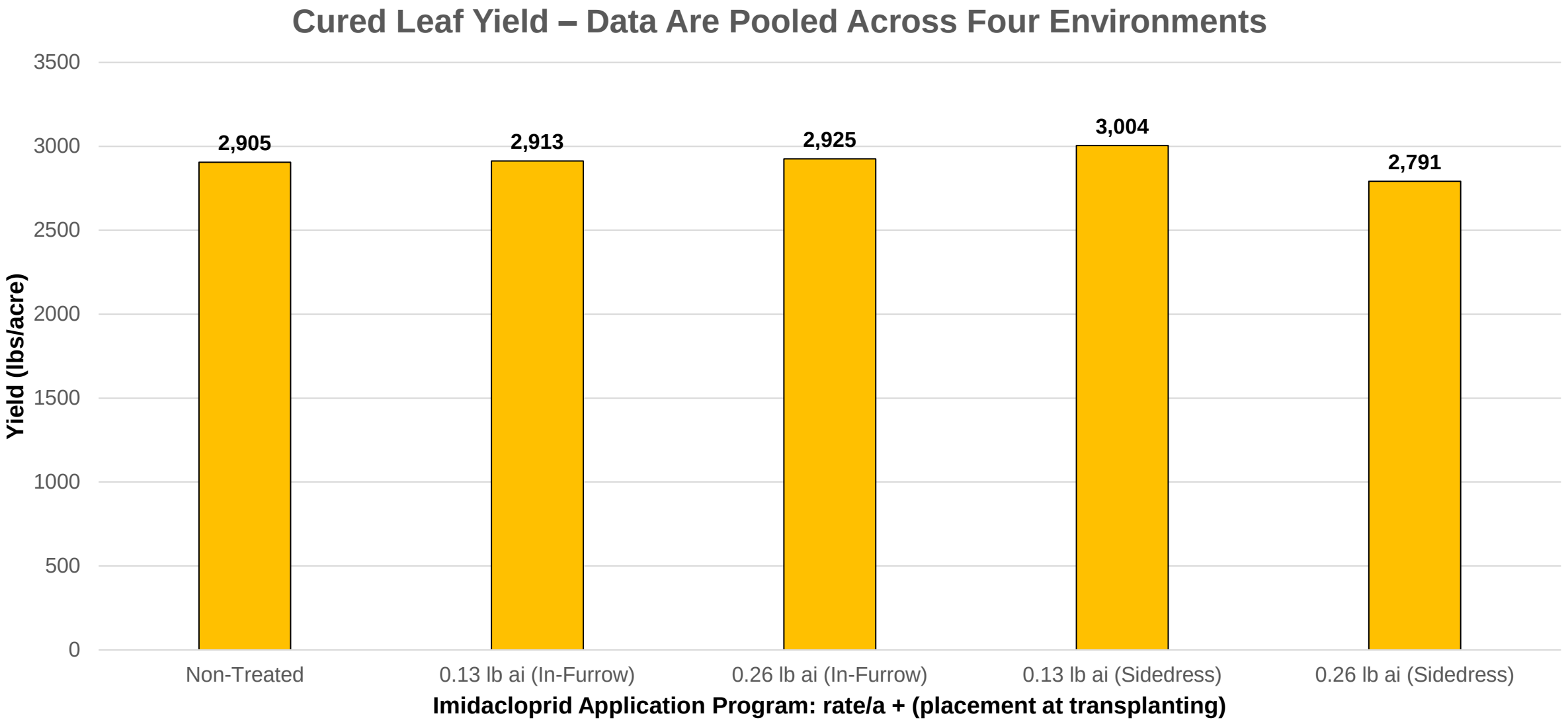
Placement	Imidacloprid Rate	Residue (ppm)			Dry Mass (g/plant)		
	lbs. ai/a	2WAT[b]	4WAT	6WAT	2WAT	4WAT	6WAT
Non-treated	0.00	--[c]	--	--	0.76 ab	5.56 bc	40.20 c
In-furrow	0.13	53 b	12 b	2 b	0.81 a	5.83 ab	45.16 ab
In-furrow	0.26	148 a	30 a	3 a	0.78 ab	6.19 ab	44.50 a-c
Sidedress	0.13	11 c	9 bc	2 b	0.71 bc	6.59 a	45.70 a
Sidedress	0.26	9 c	3 c	1 c	0.67 c	4.84 c	40.80 bc

[a] Treatment means followed by the same letter within the same column are not significantly different at the α=0.05 level.
[b] WAT; weeks after transplanting.
[c] Residues not reported.

2022 and 2023 TSWV Stand Losses



Cured Leaf Yield



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Project Objectives Revisted

1. Quantify early-season insect herbivory

2. Measure early-season imidacloprid assimilation

3. Document TSWV stand losses

4. Determine injury potential from systemic insecticide placement and/or rate

1. Definitive reduction with sidedress placement vs. in-furrow

2. Definitive reduction with sidedress placement vs. in-furrow

3. Inconclusive, but reasoning is that sidedress applications may be less effective

4. No impact to injury potential

Preliminary Conclusions

- Insecticide sidedress applications are not useful for commercial farmers
- Historical TSWV losses should dictate decisions about tray drench vs. transplant water applications
  - High TSWV areas should utilize tray drench
  - Low TSWV areas can use transplant water
  - All growers should reference the NC State thrips flight monitoring tool
- Producers need to think more in-depth about what they do/don't put in transplant water
- Future Research Opportunity:
  - Base fertilizer applications with liquid products

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  - Oxford Tobacco Research Station
  - Upper Coastal Plain Research Station
  - Lower Coastal Plain Research Station

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Thank You!

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