Peanut Response To Metribuzin

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Introduction

- Herbicide-resistant Palmer amaranth is one of the most troublesome weeds in agronomic crops in GA (Webster, ed. 2012; Webster, ed. 2013)

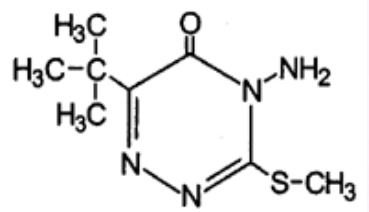
Palmer Amaranth Biology

- Wide germination window (Keeley et al. 1987)
  - *March-October*
  - *Greatest germination from June-August*
- Prolific seed production
  - *Over 446,000 seed per plant in non-crop (Webster and Grey 2015)*
  - *Over 60,000 seed per plant when planted on August 1 (Keeley et al. 1987)*

Field Corn: Post-Harvest Palmer Amaranth Populations **Must** be Managed!

Post-Harvest Control Option

- Metribuzin
  - Good POST and residual control of Palmer amaranth (Crow et al. 2015; Grey et al. 2014)
    - *Takes pressure off of PPOs*
  - Can help reduce Palmer amaranth contributions to weed seed-bank
  - ~30-60 day half-life (Shaner, ed. 2014)
  - Microbial degradation and highly water soluble (Shaner, ed. 2014)



metribuzin

TRICOR®
HERBICIDE

Palmer Amaranth Burndown - 2019

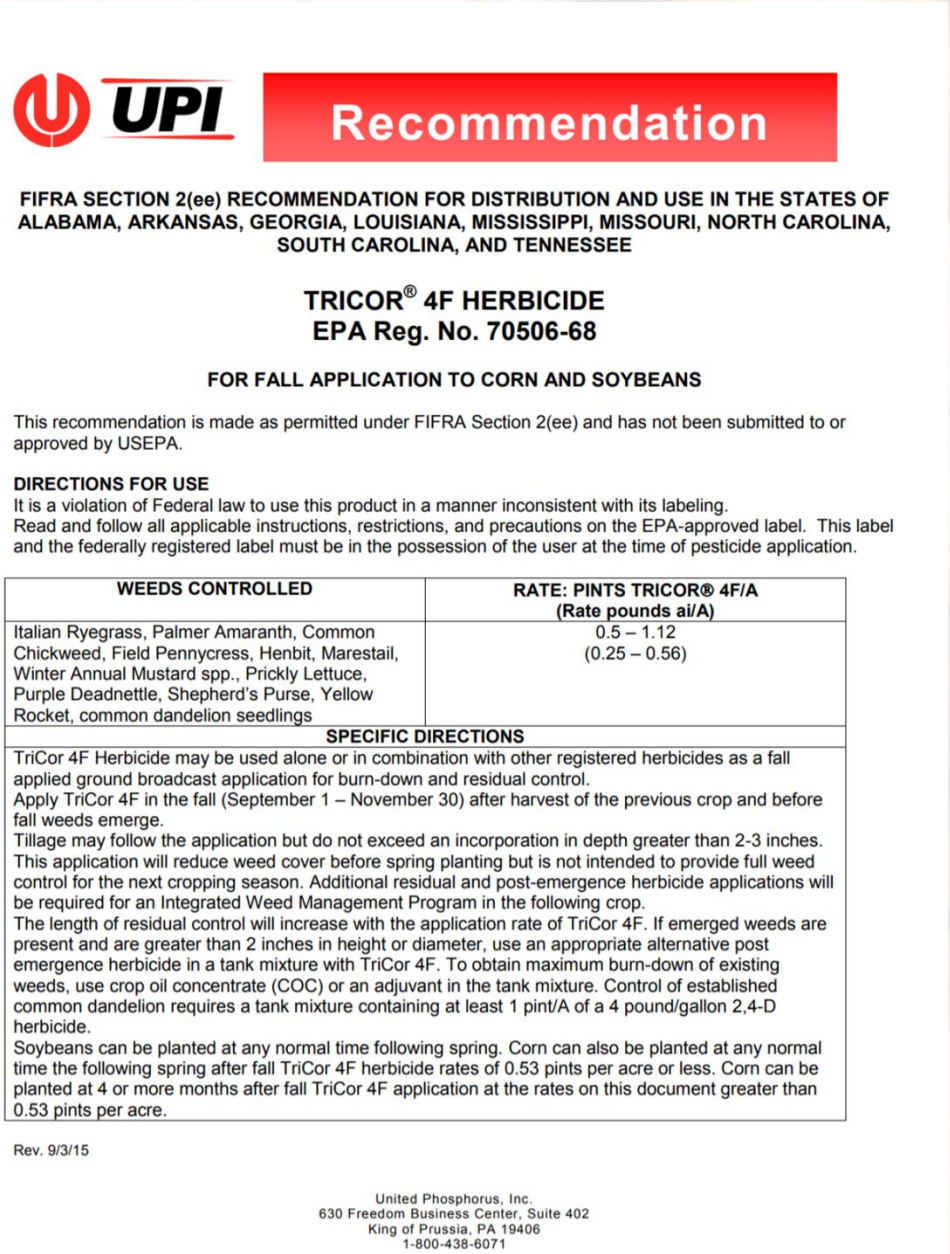
(AMAPA 1-6” tall)

NTC

Gramoxone 3SL @ 840 g ai ha^{-1}
Tricor 4L @ 280 g ai ha^{-1}
Induce @ 0.25% v/v

NC-01-19
May 20
10 DAT

Issues



UPI **Recommendation**

FIFRA SECTION 2(ee) RECOMMENDATION FOR DISTRIBUTION AND USE IN THE STATES OF ALABAMA, ARKANSAS, GEORGIA, LOUISIANA, MISSISSIPPI, MISSOURI, NORTH CAROLINA, SOUTH CAROLINA, AND TENNESSEE

TRICOR® 4F HERBICIDE
EPA Reg. No. 70506-68

FOR FALL APPLICATION TO CORN AND SOYBEANS

This recommendation is made as permitted under FIFRA Section 2(ee) and has not been submitted to or approved by USEPA.

DIRECTIONS FOR USE
It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read and follow all applicable instructions, restrictions, and precautions on the EPA-approved label. This label and the federally registered label must be in the possession of the user at the time of pesticide application.

WEEDS CONTROLLED	RATE: PINTS TRICOR® 4F/A (Rate pounds ai/A)
Italian Ryegrass, Palmer Amaranth, Common Chickweed, Field Pennycress, Henbit, Marestail, Winter Annual Mustard spp., Prickly Lettuce, Purple Deadnettle, Shepherd's Purse, Yellow Rocket, common dandelion seedlings	0.5 – 1.12 (0.25 – 0.56)

SPECIFIC DIRECTIONS

TriCor 4F Herbicide may be used alone or in combination with other registered herbicides as a fall applied ground broadcast application for burn-down and residual control.
Apply TriCor 4F in the fall (September 1 – November 30) after harvest of the previous crop and before fall weeds emerge.
Tillage may follow the application but do not exceed an incorporation in depth greater than 2-3 inches. This application will reduce weed cover before spring planting but is not intended to provide full weed control for the next cropping season. Additional residual and post-emergence herbicide applications will be required for an Integrated Weed Management Program in the following crop.
The length of residual control will increase with the application rate of TriCor 4F. If emerged weeds are present and are greater than 2 inches in height or diameter, use an appropriate alternative post emergence herbicide in a tank mixture with TriCor 4F. To obtain maximum burn-down of existing weeds, use crop oil concentrate (COC) or an adjuvant in the tank mixture. Control of established common dandelion requires a tank mixture containing at least 1 pint/A of a 4 pound/gallon 2,4-D herbicide.
Soybeans can be planted at any normal time following spring. Corn can also be planted at any normal time the following spring after fall TriCor 4F herbicide rates of 0.53 pints per acre or less. Corn can be planted at 4 or more months after fall TriCor 4F application at the rates on this document greater than 0.53 pints per acre.

Rev. 9/3/15

United Phosphorus, Inc.
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King of Prussia, PA 19406
1-800-438-6071

- UPL (formerly UPI) released a Section 2(ee) recommendation for fall applications of metribuzin.
- Plantback intervals are listed for corn and soybean only.

Issues

Rotational Restrictions listed on TriCor 4F Label

4 months	8 months	12 months	18 months
Alfalfa	Barley	Potatoes	Sugar Beets
Asparagus	Lentils	Rice	Onions
Barley	Peas		Other root crops not listed
Corn	Wheat		**ALL OTHER CROPS NOT LISTED ON THIS LABEL**
Forage Grasses			
Potatoes			
Sainfoin			
Soybeans			
Sugarcane			
Tomatoes			
Wheat			

Objective

- Evaluate the response of peanut to various rates of metribuzin applied preemergence.

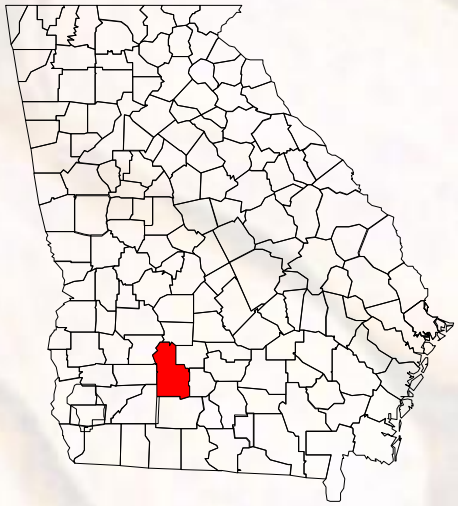
- Data will assist in reducing the plant-back interval on the Tricor® 4F label.

Hypothesis

- Based on a targeted application rate of 280 g ai ha^{-1} and an estimated half-life of ~30-60 days, we hypothesize that rates of 70 g ai ha^{-1} or less (~two half-lives) should not negatively affect peanut growth and development.

Materials and Methods

- Trials conducted in 2017 and 2018 in Ty Ty, GA



Year	% OM	% sand	% silt	% clay	pH	CEC
2017	0.53	94	4	2	6.0	3.5
2018	0.76	94	4	2	6.0	3.3

- ‘GA-06G’ peanut were planted in late April both years (twin-row).

Materials and Methods

- Metribuzin was applied preemergence (two days after planting):
  - 0, 35*, 70, 140, 280, 420, and 560 g ai ha^{-1}

    *35 g ai ha^{-1} rate not included in 2018 due to planting errors
- Treatments applied using a CO_2-pressurized backpack sprayer
  - 140 L ha^{-1}
  - AIXR 11002 nozzles
- Plots were kept weed-free using labeled herbicides and hand-weeding
- Randomized Complete Block Design
- Four replications

Data Collected

- Visual Estimates of Crop Injury
  - 0 to 100%
- Peanut Plant Stand Reductions
- Peanut Yield Loss (%)

Data Analysis

- Data were subjected to nonlinear regression using log-logistic analysis to describe a dose-response relationship
  - Seefeldt et al. 1995

$$y = C + \frac{D - C}{1 + \left(\frac{X}{I_{50}}\right)^{b}}$$

- C = Lower limit
- D = Upper limit
- b = slope
- I_{50}= dose giving 50% response

- Parameter estimates were obtained using PROC GLM in SAS 9.4 and graphed in SigmaPlot 14.0

Data Presented

- Early and late season injury
  - *2017*
  - *2018*
- Stand reduction
  - *2017*
  - *2018*
- Yield
  - *2017 and 2018 combined*

Results

Rainfall/Irrigation

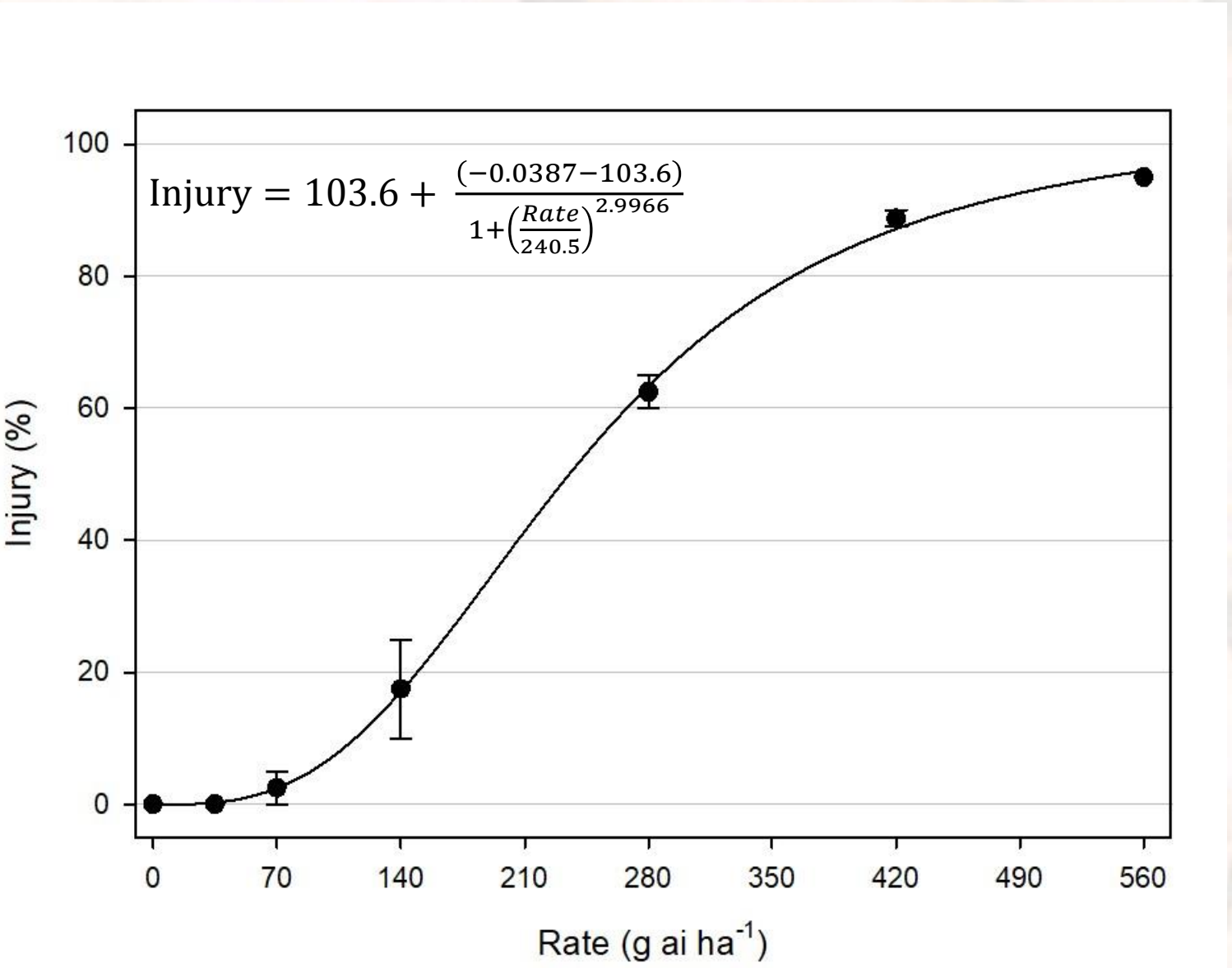
2017

Time (DAP)	Rain (cm)	Irrigation (cm)	Total (cm)
0-7	0.3	1.3	1.6
8-14	3.7	1.3	5.0
15-21	0.3	1.3	1.6
22-30	2.3	2.6	4.9
Total	**6.6**	**6.5**	**13.1**

2018

Time (DAP)	Rain (cm)	Irrigation (cm)	Total (cm)
0-7	0	1.3	1.3
8-14	0	1.3	1.3
15-21	3.7	0	3.7
22-30	9.6	0	9.6
Total	**13.3**	**2.6**	**15.9**

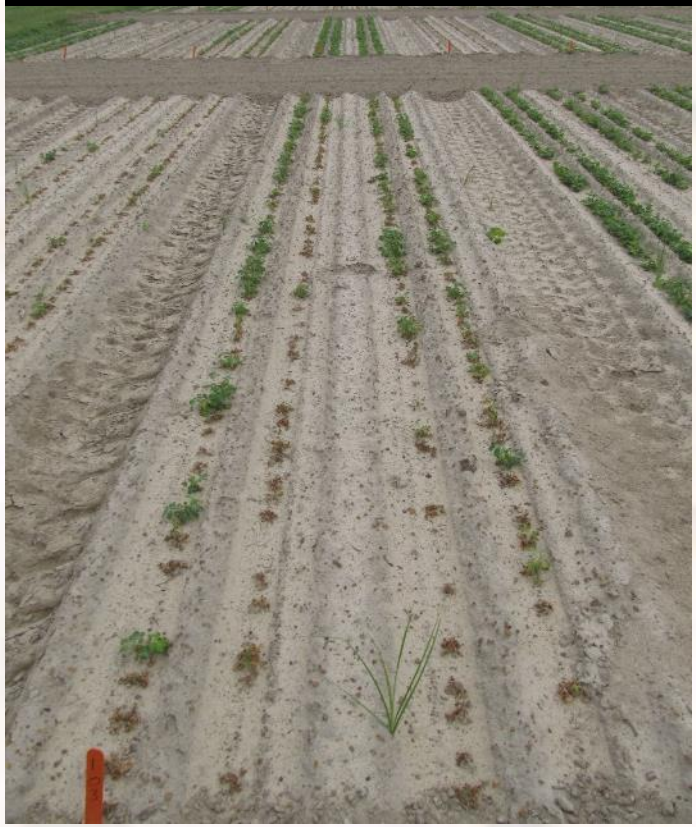
Early Season Injury – 2017



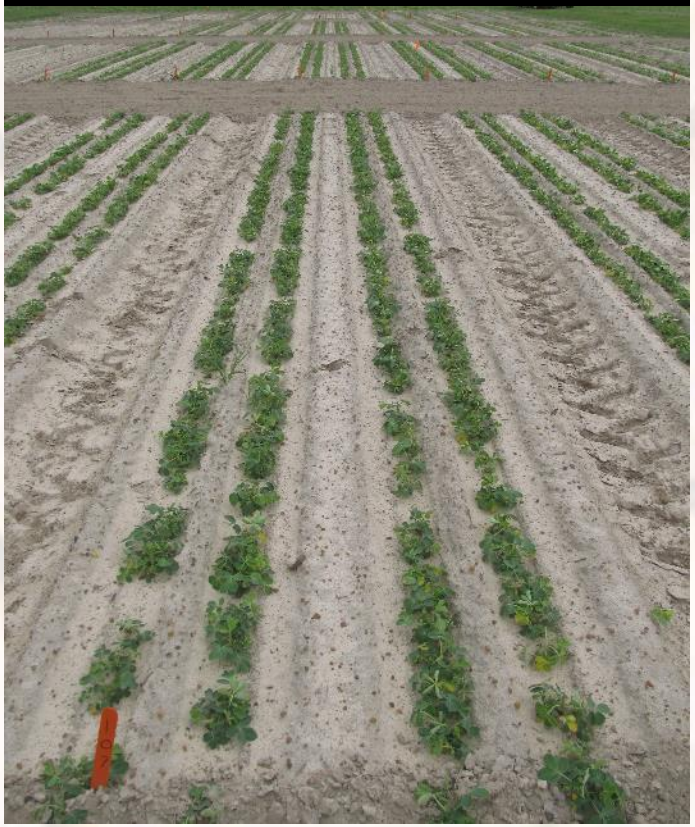
$R^2 = 0.98$
$I_{50} = 240.5$
29 DAP

Early Season Injury - 2017

280 g ai ha^{-1}



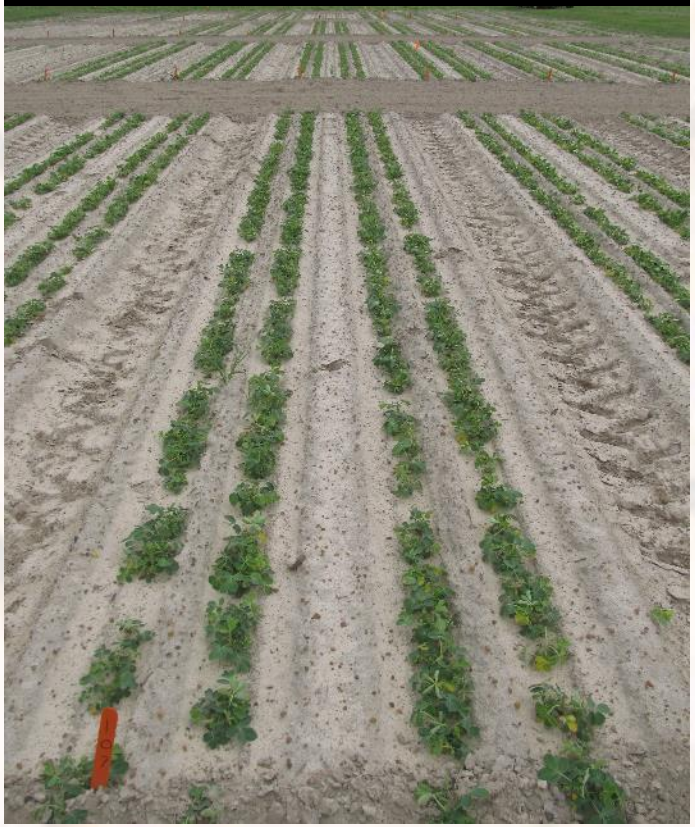
0 g ai ha^{-1}



Early Season Injury - 2017

140 g ai ha^{-1}

0 g ai ha^{-1}

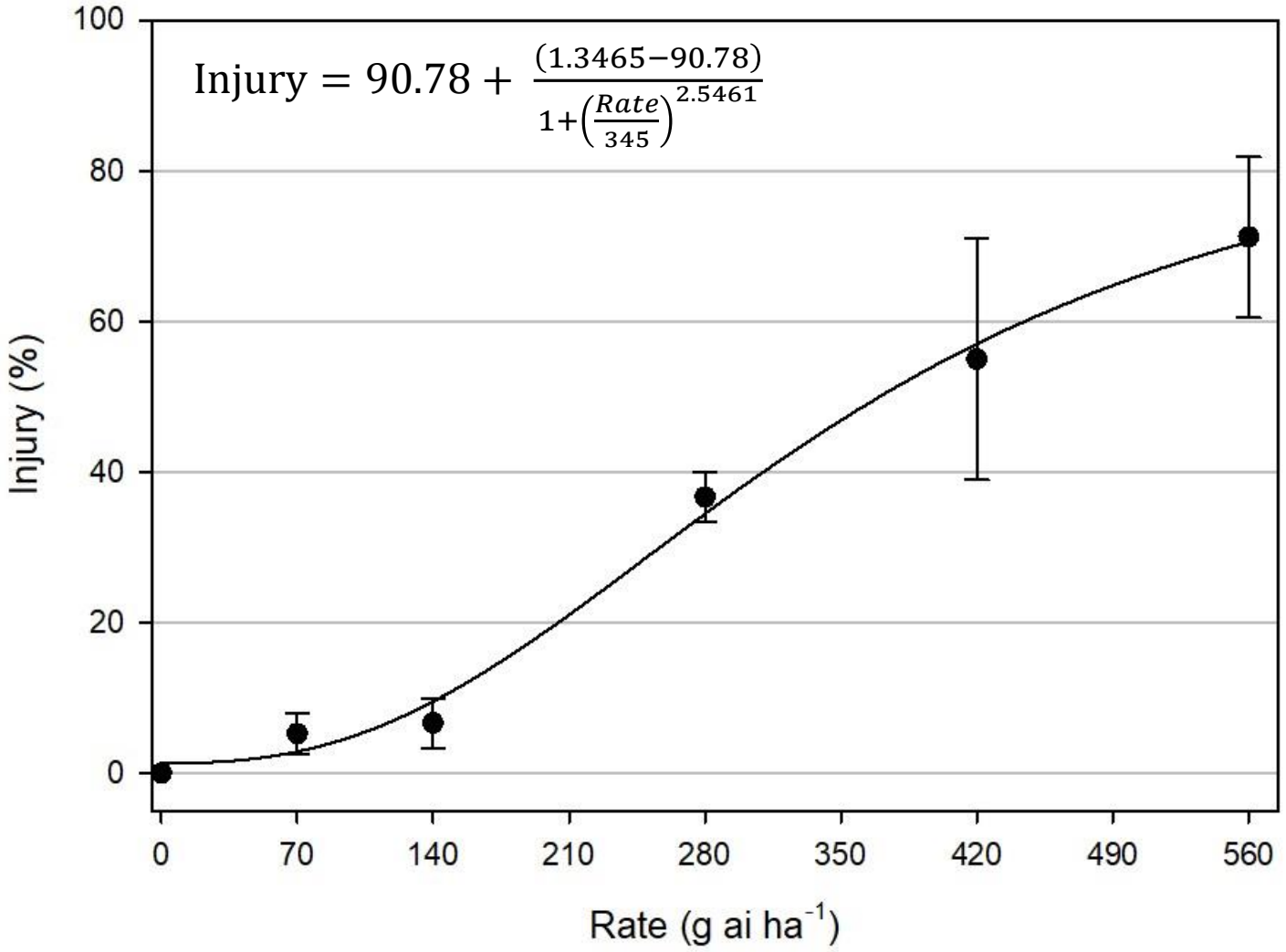


Early Season Injury - 2017

70 g ai ha^{-1}

0 g ai ha^{-1}

Early Season Injury - 2018



R^2 = 0.83
I_{50} = 345.0
52 DAP

Early Season Injury - 2018

280 g ai ha^{-1}

0 g ai ha^{-1}

Early Season Injury - 2018

140 g ai ha^{-1}

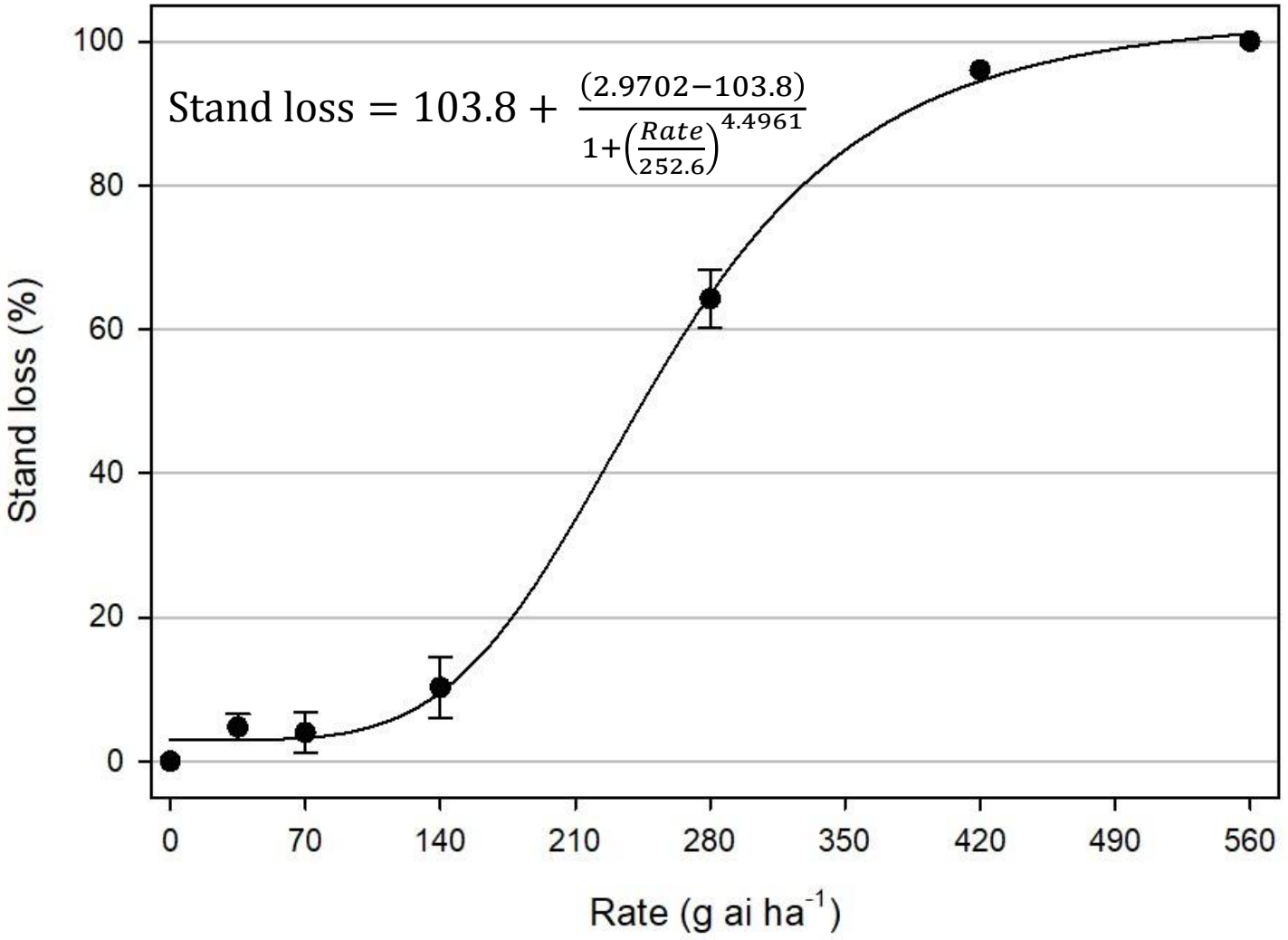
0 g ai ha^{-1}

Early Season Injury - 2018

70 g ai ha^{-1}

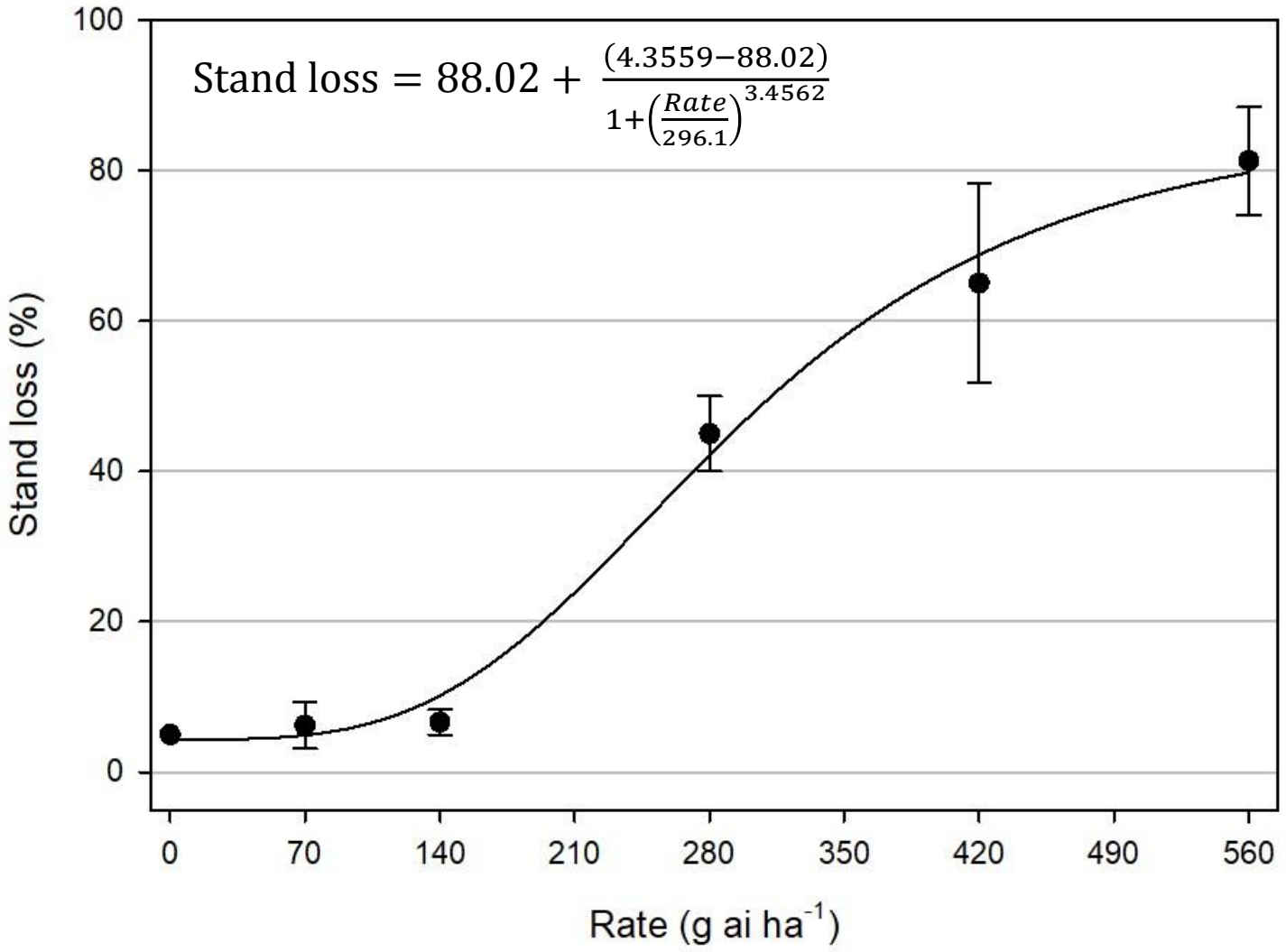
0 g ai ha^{-1}

Peanut Stand Loss - 2017



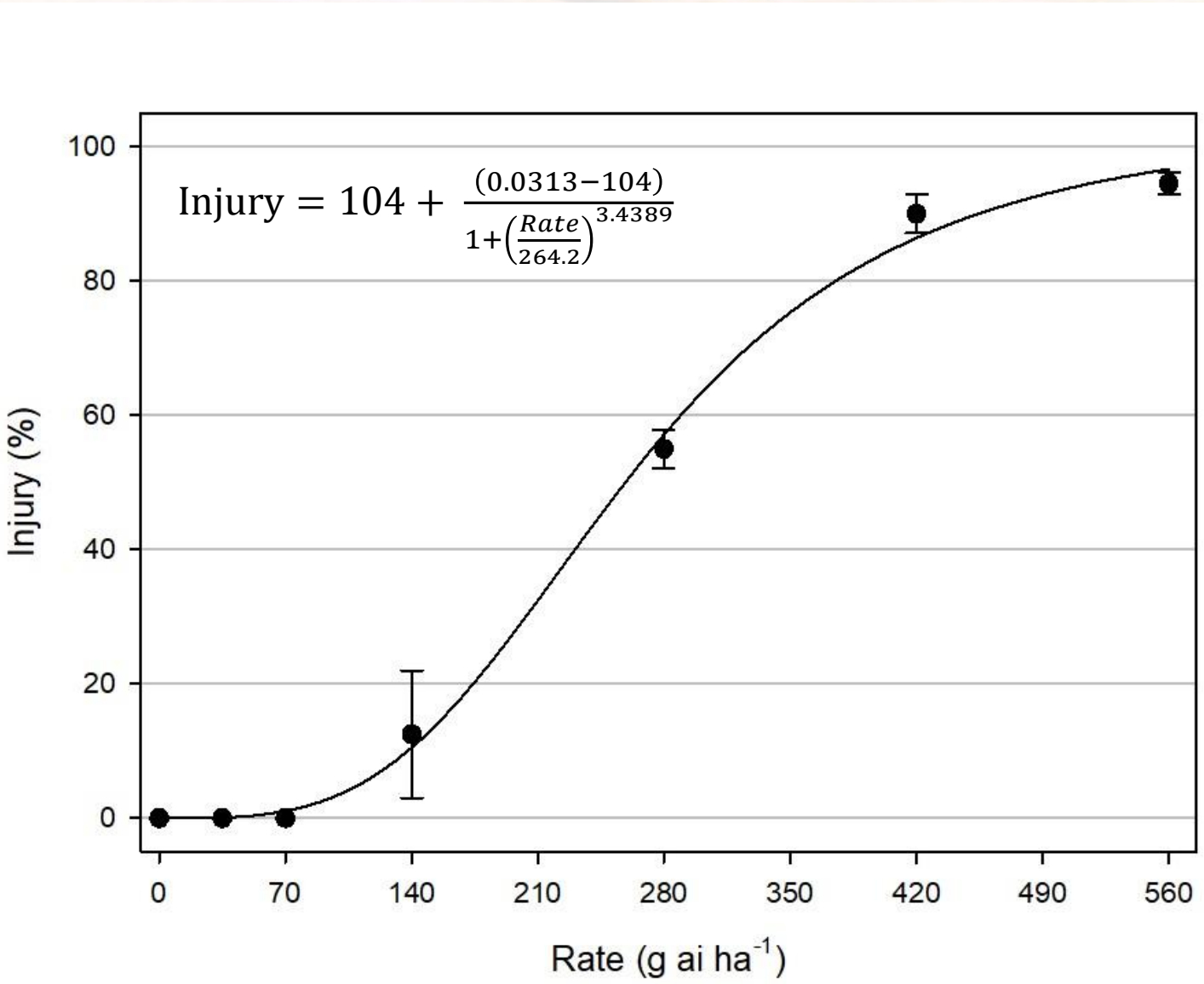
R^2 = 0.99
I_{50} = 252.6
31 DAP

Peanut Stand Loss - 2018



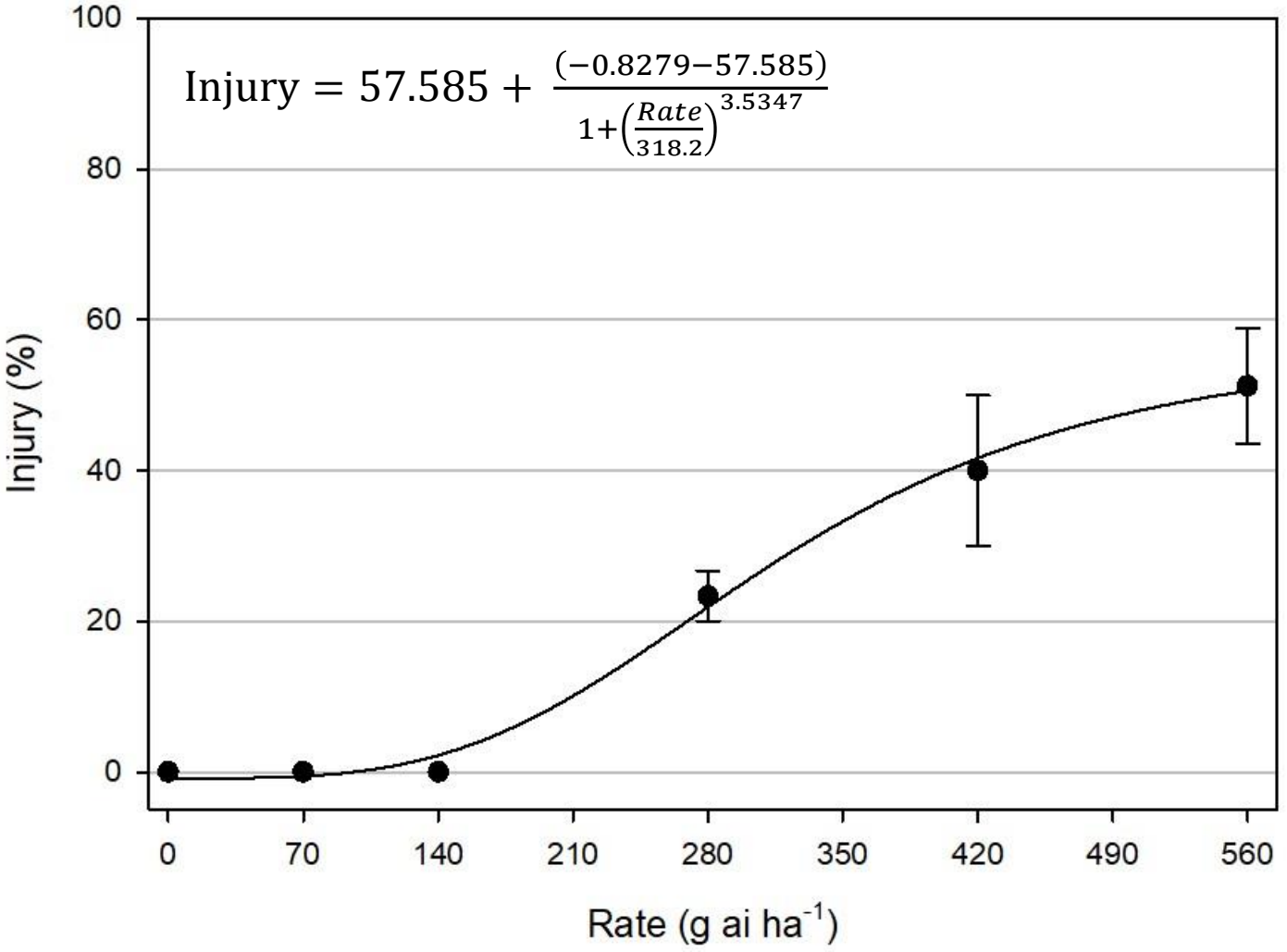
$R^2 = 0.91$
$I_{50} = 296.1$
52 DAP

Late Season Injury - 2017



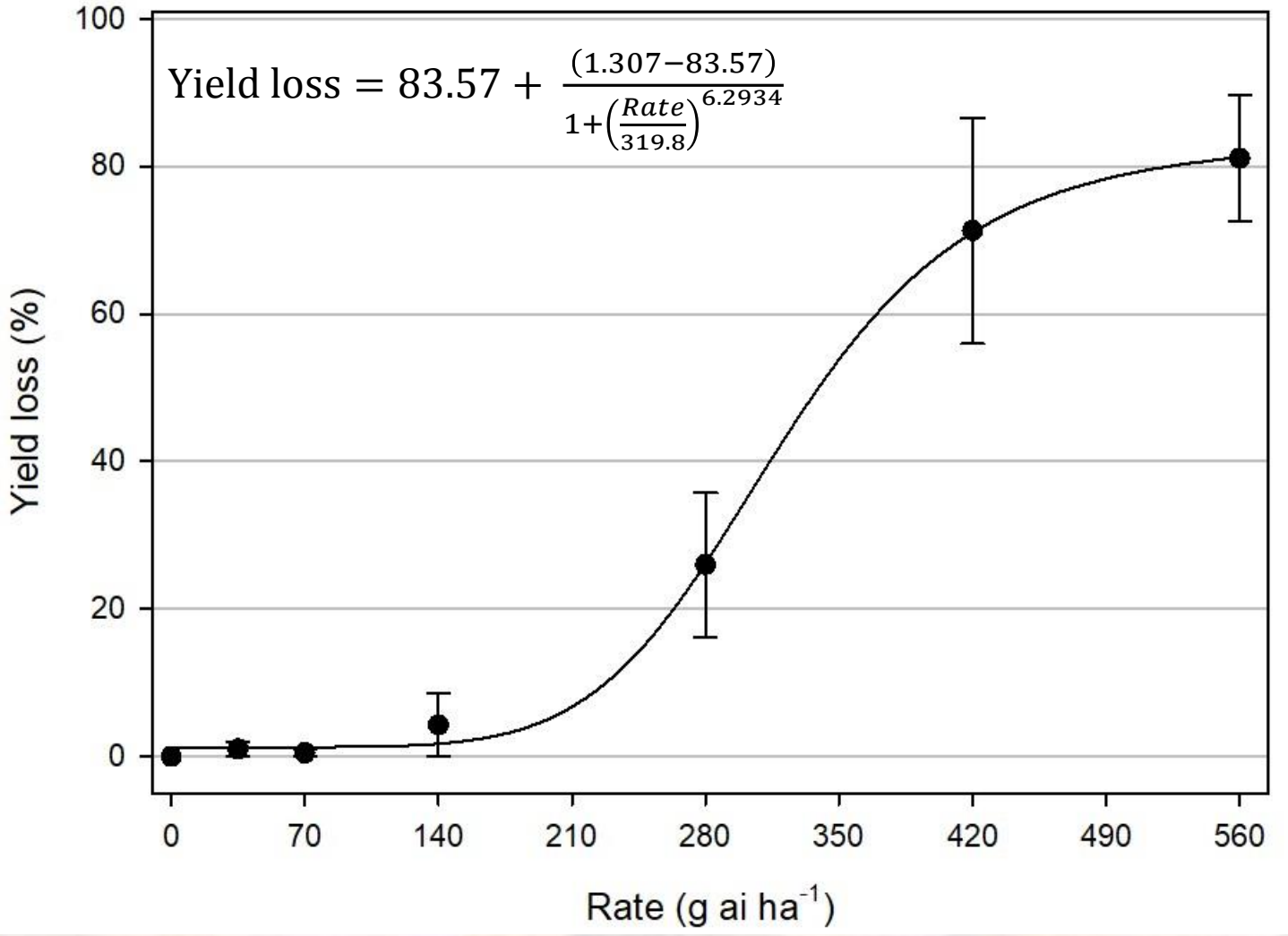
$R^2 = 0.97$
$I_{50} = 264.2$
98 DAP

Late Season Injury - 2018



$R^2 = 0.87$
$I_{50} = 318.2$
85 DAP

Peanut Yield Loss – 2017 & 2018



$R^2 = 0.74$

$I_{50} = 319.8$

5,368 kg ha^{-1}

Summary/Conclusions

- Rates from 280-560 g ai ha^{-1} caused unacceptable injury and stand loss, resulting in 25-80% yield loss.
- The 140 g ai ha^{-1} rate resulted in a maximum of 17% visual injury and 10% stand loss, resulting in minimal yield loss (2%).
  - Comparable injury levels, stand loss, and yield loss were observed at the 0, 35, and 70 g ai ha^{-1} rates.
- We conclude that metribuzin can be used as a post-harvest burndown treatment in corn with minimal injury, stand loss, and yield loss to a subsequent peanut crop.

Hypothesis

Based on a targeted application rate of 280 g ai ha^{-1} and an estimated half-life of ~30-60 days, we hypothesize that rates of 70 g ai ha^{-1} or less (~two half-lives) should not negatively affect peanut growth and development.

FAIL TO REJECT

Future Research

- Study repeated
- PPI applications
  - *A more accurate representation of carryover issues??*
- On-farm evaluations
  - *Burndown after corn harvest at multiple rates, plant peanut the next season and evaluate crop tolerance*

Questions/Comments?