Development of Trifludimoxazin for Use in Peanut

C. C. Abbott* and E. P. Prostko, University of Georgia, Tifton, Georgia 31793

Introduction

- Trifludimoxazin is a new protoporphyrinogen oxidase-inhibiting (PPO) herbicide under possible development for preemergence (PRE) use in peanut (*Arachis hypogaea* L.).
- Palmer amaranth (*Amaranthus palmeri* S. Wats) is the most troublesome weed in peanut production (Fig. 1).
- Palmer amaranth has confirmed herbicide resistance in Georgia to glyphosate, acetolactate synthase (ALS), and PPO herbicides.
- Trifludimoxazin may have the potential to combat PPO-resistant weeds, because of its differential binding to the PPO enzyme binding pocket.

Fig. 1. Peanut field infested with Palmer amaranth.

Objectives

- **Cultivar Trials**
  - Determine the effects of PRE applied trifludimoxazin on the growth and development of three commercially available peanut cultivars.
- **Efficacy Trials**
  - Determine the efficacy of trifludimoxazin in controlling problematic weeds within a standard UGA recommended weed control program (Fig. 2).

Fig. 2. Trifludimoxazin treatment with NTC on either side of plot.

Materials and Methods

Overview

- Location: UGA Ponder Farm, Ty Ty, Georgia
- Plot size: 1.83 X 7.62 m
- All PRE treatments were applied 1 day after planting (DAP)
- Treatments applied using CO_2-powered, backpack sprayer calibrated to deliver 140 L ha^{-1} at 275 kPa with 11002AIXR nozzles
- All plots were irrigated

Fig. 3. Setting up to spray herbicide treatments.

Cultivar Trials

- Trials conducted in 2019, 2020, 2021
- Maintained weed-free
- Treatments arranged in 3 (cultivar) X 4 (PRE rates) factorial
- Cultivars: GA-06G, GA-16HO, GA-18RU
- Rates: 0 (NTC), 25 (2/3X), 38 (1X), and 75 (2X) g ai/ha
- RCBD with four replications
- Data collected included: Plant density, plant stunting, leaf necrosis, and yield

Fig. 4. Trifludimoxazin treatment with NTC on either side of plot under irrigation.

Efficacy Trials

- Trial conducted in 2020, 2021
- Cultivar: GA-16HO
- Rates: 0 , 25 (2/3X), 38 (1x), 75 (2X), 150 (4X) g ai/ha
- PRE's used with trifludimoxazin: Pendimethalin, Diclosulam, *S*-metolachlor, and Dimethenamid-P
- POST: Imazapic, *S*-metolachlor, Dimethenamid-P, 2,4-DB
- RCBD w/ 3 – 4 replications
- Data collected included: Weed control (%), plant stunting, leaf necrosis, and yield

Data Analysis

- All data were subjected to ANOVA
- Means separated using Tukey-Kramer HSD Method
- P=0.05

Fig. 5. Harvesting research plots with a 2-row peanut combine.

Results and Conclusions

Cultivar Trials

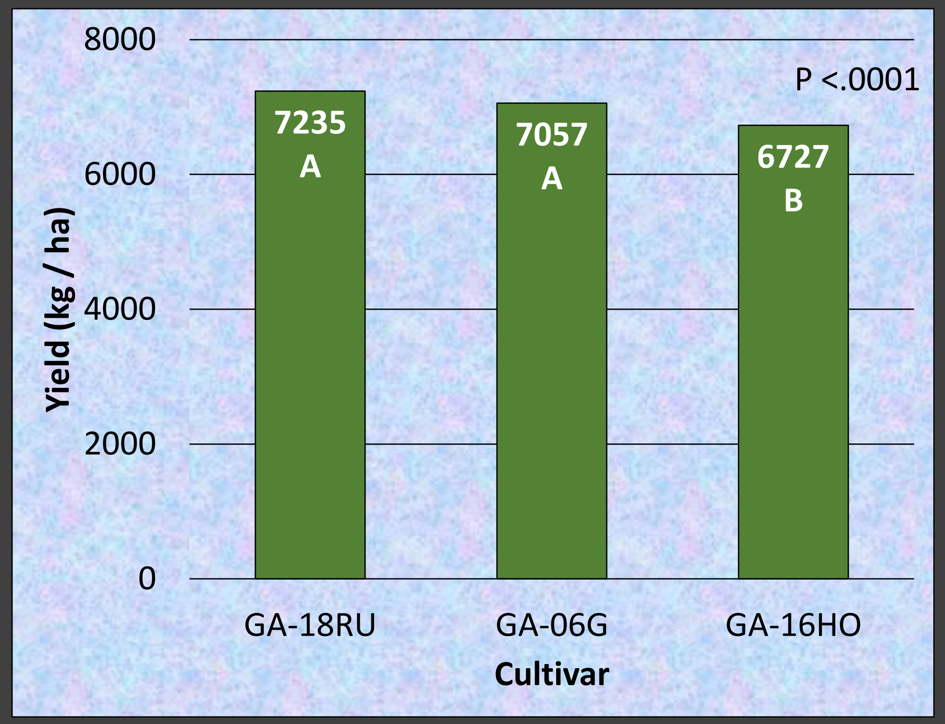

Fig. 6. Cultivar yield response when averaged across all rates of trifludimoxazin. GA-16HO yielded 5% - 7% less than GA-06G and GA-18RU. Trifludimoxazin rates were NS.

Fig. 7. Trifludimoxazin necrosis on peanut 14 days after treatment. Applied PRE @ 75 g ai/ha on cultivar GA-16HO. This injury led to 5% in plant stunting, but injury was transient.

Efficacy Trials (58 DAP)

Fig. 8. Non-treated control. Plots were unable to be harvested due to severity of weed pressure.

Fig. 9. PRE (1 DAP): Pendimethalin @1065 g ai/ha; Flumioxazin @ 87 g ai/ha g; Diclosulam @ 13.5 g ai/ha
POST (25 DAP): Imazapic @ 70 g ai/ha; *S*-metolachlor @ 1071 g ai/ha; 2,4-DB @ 280 g ai/ha

Fig. 10. PRE (1 DAP): Pendimethalin @1065 g ai/ha; Trifludimoxazin @ 38 g ai/ha; Diclosulam @ 13.5 g ai/ha
POST (25 DAP): Imazapic @ 70 g ai/ha; *S*-metolachlor @ 1071 g ai/ha; 2,4-DB @ 280 g ai/ha

Conclusions

- **Cultivar**
  - The peanut cultivars evaluated in this study were not sensitive to any rates of trifludimoxazin. There is adequate crop safety within a 2X application window.
- **Efficacy**
  - PRE trifludimoxazin herbicide treatments provided weed control and yield similar to current standards.

References

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