Impact of Weed Management on Peanut Yield and Weed Populations the Following Year

A.T. Hare, D.L. Jordan, R. Leon
Introduction

• Timing of weed control generally influences yield
• Few studies have been conducted to compare the impacts of weed management in subsequent years
• Research was conducted during 2016-2018 to determine weed control and yield of peanut and the effect of weed control the following season in cotton
• This information will be used to compare the cost of weed control and economic return on herbicide investment
Introduction

• Resistance management strategies
• Diversification of management tactics such as mixing and rotating MOAs is critical in preventing and managing herbicide resistance (Norsworthy et al. 2012)
• A major challenge in managing weeds is minimizing the return of weed seed to the soil seedbank (Swanton and Booth 2004)
• One Palmer amaranth plant m\(^{-1}\) reduced peanut yield by 28% (Burke et al. 2007)
Hypotheses

• Weed control and peanut yield will be greater with more intensive herbicide programs
• Weed populations in cotton the year following peanut will be lower with more intensive herbicide programs
• Cotton yield will be greater following peanut with more intensive herbicide programs due to fewer weeds and less weed interference with cotton early in the season
Objectives

• To determine the number and timing of herbicide applications needed for optimum weed control and peanut yield

• To compare previous years herbicide program on effects of seedbank contribution and yield of the following crop
Materials and Methods

• Initial season (Peanut)
  - Bailey peanut variety planted early May at Lewiston-Woodville and Rocky Mount in 2016 and 2017

• Herbicide Application Sequences/Timings
  - 2 or 6 weeks after planting (WAP) only
  - 2 and 4 WAP
  - 4 and 6 WAP
  - 2, 4, and 6 WAP
  - A no-herbicide control was included
  - 0.125 lbs ai/A clethodim + 1 % (v/v) COC 7 WAP
Materials and Methods

- Randomized Complete Block Design with plot size of 4 rows (91-cm spacing) by 9 m
- Conventionally-prepared raised seed beds
- Norfolk sandy loam (Lewiston-Woodville) and Goldsboro loamy sand (Rocky Mount)
- Management other than weed control based on NC Cooperative Extension recommendations

<table>
<thead>
<tr>
<th>Herbicides Used</th>
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<tbody>
<tr>
<td><strong>2 WAP</strong></td>
</tr>
<tr>
<td>0.13 lbs. ai/A paraquat + 0.25 lbs. ai/A bentazon + 0.25% (v/v) NIS</td>
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<tr>
<td><strong>4 WAP</strong></td>
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<tr>
<td>0.5 lbs. ai/A bentazon + 0.2 lbs. ai/A lactofen + 0.125% (v/v) COC</td>
</tr>
<tr>
<td><strong>6 WAP</strong></td>
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<tr>
<td>0.063 lbs. ai/A imazapic + 0.2 lbs. ai/A lactofen + 0.125% (v/v) COC</td>
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Materials and Methods

• Application Equipment:
  - CO₂-pressurized backpack sprayer calibrated to deliver 140 L ha⁻¹ at 125 kPa
  - Nozzle – AIXR 11002

• Data Collection:
  - Visual ratings of percent broadleaf and annual grass control at 7, 10, and 20 WAP
  - Yield

• Weed control and yield were subjected to ANOVA using PROC Mixed and separated using Fisher’s Protected LSD at p≤0.05
Materials and Methods

• Subsequent Season (Cotton)
  ➢ Cotton planted into previous year’s plots
  ➢ Herbicide program included POST applications of glyphosate and/or glyphosate plus dicamba

• Data collection:
  ➢ Weed densities recorded 3, 7, and 20 WAP
  ➢ Cotton lint yield

• Data for weed densities and lint yield were subjected to ANOVA using PROC Mixed and separated using Fisher’s Protected LSD at p≤0.05
Lewiston-Woodville 2016-2017

Common Ragweed: 97 plants / m²
Texas millet: 75 plants / m²
Common Ragweed Control (7 WAP)

Control (%)

Herbicide Application Sequence

NTC  2   6   24  46  246

A    AB   B   B   C   C
Common Ragweed Control (10 WAP)

![Graph showing control of ragweed over time with herbicide application sequence (NTC, 2, 6, 24, 46, 246). The bars represent control percentages, with 'A' indicating high control and 'C' indicating low control.](image-url)
Common Ragweed Control (20 WAP)
Peanut Yield

Lbs./Acre

Herbicide Application Sequence

- NTC
- 2
- 6
- 24
- 46
- 246
Subsequent Season Cotton
Common Ragweed Density (3 WAP)

The graph shows the density of Common Ragweed per square meter across different herbicide application sequences. The data indicates that the density is highest in the NTC (No Treatment Control) and decreases with increasing application sequence, with 246 being the second highest after 2 WAP.
Texas Millet Density (3 WAP)

[Bar chart showing the number of plants per square meter for different herbicide application sequences. The sequences are labeled as NTC, 2, 6, 24, 46, and 246. The chart indicates that the NTC sequence has the highest number of plants, followed by the sequences at 24, 46, and 246, with the 6 and 2 sequences having the lowest number of plants.]
Lewiston-Woodville Cotton Lint Yield

![Bar chart showing cotton lint yield in pounds per acre for different herbicide application sequences. The application sequences are labeled as NTC, 2, 6, 24, 46, and 246. The yield values are indicated as A, with the highest yield at 1750 lbs./Acre for the NTC sequence.](image-url)
Rocky Mount

Palmer amaranth: 54 plants / m²
Large crabgrass: 51 plants / m²
Palmer Amaranth Control (7 WAP)
Palmer Amaranth Control (10 WAP)

Control (%)

Herbicide Application Sequence

NTC  2   6   24  46  246

- C
- AB
- BC
- AB
- AB
- A
Palmer Amaranth Control (20 WAP)

![Bar chart showing control percentage over different herbicide application sequences.](chart.png)
Peanut Yield

![Bar Chart]

- **Herbicide Application Sequence**
  - NTC
  - 2
  - 6
  - 24
  - 46
  - 246

- **Lbs. / Acre**
  - A
  - BC
  - AB
  - CD
  - BCD
  - D

The chart shows the yield in pounds per acre for different herbicide application sequences. The highest yield is achieved with the 246 sequence, followed by 24, BC, AB, CD, BCD, and the lowest yield is seen with the NTC sequence.
Subsequent Season Cotton
Palmer Amaranth Density (3 WAP)

![Bar chart showing plants per square meter for different herbicide application sequences. The sequences are labeled NTC, 2, 6, 24, 46, and 246. The chart indicates the density of plants for each sequence with different letters (A, AB, B) for comparison.]
Large Crabgrass Density (3 WAP)

![Bar chart showing the effect of different herbicide application sequences on crabgrass density. The x-axis represents the herbicide application sequence (NTC, 2, 6, 24, 46, 246), and the y-axis represents plants per square meter. The chart includes columns labeled AB, A, AB, B, and AB.](image-url)
Rocky Mount Cotton Lint Yield

![Bar graph showing the effect of herbicide application sequence on cotton lint yield. The graph shows a comparison of lint yield across different application rates (NTC, 2, 6, 24, 46, 246 Lbs./Acre) with treatment codes (A) indicating no significant difference at the 5% level of significance.](image-url)
2 and 4 WAP
2, 4, and 6 WAP
Summary

• Weed control and peanut yield will be greater with more intensive herbicide programs
  Yes, greater control and yields were associated with more intensive herbicide programs at both locations

• Weed populations in cotton the year following peanut will be lower with more intensive herbicide programs
  Location dependent

• Cotton yield will be greater following peanut with more intensive herbicide programs due to fewer weeds and less weed interference with cotton early in the season
  No, a short duration of interference before an effective in-season herbicide program protected yields
Future Research

• Economic analysis of herbicide inputs
• Research with soil applied herbicides and post herbicides
• Longer term study
• Monitor herbicide resistance
Citations