W. Carroll Johnson, III
Research Agronomist – Weed Science
USDA-ARS; Tifton, GA

EFFECT OF WEED CONTROL DEVELOPMENTS ON PEANUT YIELD TRENDS
WEED CONTROL ADVANCES

- This is basically a discussion on the recent (30 year) history of weed control in peanut.
- Many advances in weed control knowledge and technology.
- For decades, significant research and outreach effort has been invested in developing and improving weed management systems in peanut.
Every facet of weed control in peanut has changed in the 30+ year time-frame.

On balance, these changes have significantly improved weed control in peanut.
**CULTURAL WEED CONTROL: CROP ROTATIONS**

- Trend towards more cotton-peanut rotation
  - 1984: 59% peanut acreage rotated with corn.
  - 2003: 70% peanut acreage rotated with cotton.

- How does this affect weed control in peanut?
  - Corn senesces mid-summer, allowing weed emergence and seed production late-season.
  - Cotton matures later and leaf canopy remains intact until defoliation.
  - Weeds quickly infest in the long-fallow period following corn harvest.
    - Specific example shown here is benghal dayflower
CULTURAL WEED CONTROL: ROW PATTERNS AND SEEDING RATES

- 1984: 92% peanut acreage in ‘wide’ rows, 8% acreage as ‘narrow’ or ‘twin’ rows.
- 2003: 41% of peanut acreage in narrow/twin rows.
- Do narrow row patterns improve weed control?
  - Literature (numerous studies) says no improvement in weed control due to quicker canopy closure in narrow/twin row patterns, but yields tend to be higher.
How do narrow/twin row patterns improve weed control in peanut?

- Corresponding increase in use of vacuum planter technology
- Vacuum planters significantly improve accuracy of metering seed; i.e. fewer skips.
- Fewer skips means fewer weed escapes.
1993: 73% of peanut acreage cultivated for weed control.

2003: 19% of the peanut acreage cultivated for weed control.

Why less cultivation?

- More peanut acreage planted to reduced- or no-tillage systems.
- Corresponds with availability of more effective herbicides; i.e. less of a need to cultivate for control of weed escapes.
Less cultivation addresses an inherent weaknesses of peanut:

- Susceptibility of peanut to infection by soil-inhabiting fungi from displaced soil thrown on peanut plant.
- Not needing to cultivate for weed control lessens the risk of yield-reducing disease epidemics.
Herbicides are among the technological marvels that have expanded peanut production since World War II.

Many improvements in herbicide availability in recent years.

- **In 1980:** 12 active ingredients registered for use on peanut.
- **In 2013:** 22 active ingredients registered for use on peanut.
  - Lost a few, but gained many new active ingredients.
  - **Net gain of 17 new active ingredients**
# Herbicide Active Ingredient Registrations in Peanut

<table>
<thead>
<tr>
<th>1980</th>
<th>2013</th>
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<tbody>
<tr>
<td>2,4-DB</td>
<td>2,4-DB</td>
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<tr>
<td>Alachlor</td>
<td>Acifluorozen</td>
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<tr>
<td>Benfin</td>
<td>Alachlor</td>
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<td>Bentazon</td>
<td>Bentazon</td>
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<tr>
<td>Chloramben</td>
<td>Carfentrazzone</td>
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<tr>
<td>Dinitramine</td>
<td>Chlorimuron</td>
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<tr>
<td>Dinoseb</td>
<td>Clethodim</td>
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<tr>
<td>Diphenamid</td>
<td>Diclosulam</td>
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<tr>
<td>Metolachlor</td>
<td>Dimethenamid</td>
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<tr>
<td>Naptalam</td>
<td>Ethalfurinal</td>
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<tr>
<td>Pendimethalin</td>
<td>Fluazifop</td>
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<tr>
<td>Vernolate</td>
<td>Flumioxazin</td>
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<tr>
<td></td>
<td>Imazapic</td>
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<tr>
<td></td>
<td>Imazethapyr</td>
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<tr>
<td></td>
<td>Lactofen</td>
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<tr>
<td></td>
<td>Metolachlor</td>
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<td></td>
<td>Norflurazon</td>
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<tr>
<td></td>
<td>Paraquat</td>
</tr>
<tr>
<td></td>
<td>Pendimethalin</td>
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<tr>
<td></td>
<td>Pyraflufen</td>
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<tr>
<td></td>
<td>Sethoxydim</td>
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<td></td>
<td>Sulfentrazzone</td>
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CHEMICAL WEED CONTROL: MORE HERBICIDES

- **Herbicide losses (9) on peanut since 1980**
  - Dinoseb (regulatory action)
  - Vernolate, chloramben, dinitramine, diphenamid, pyridate (no longer manufactured – business decision)
  - Benefin, fenoxaprop, naptalam (label revision)

- **Herbicide gains (17) on peanut since 1980**
  - Acifluorfen, carfentrazone, chlorimuron, clethodim, diclosulam, dimethenamid, ethalfluralin, fluazifop, flumioxazin, imazethapyr, imazapic, lactofen, norflurazone, paraquat, pyraflufen, sethoxydim, sulfentrazone.
The 17 new herbicide active ingredients are more versatile, consistent, and broader-spectrum than earlier peanut herbicides.

- Significantly improved residual broadleaf weed control properties.
- New active ingredients target troublesome weeds in peanut
  - Postemergence control of annual and perennial grasses
  - Improved control of perennial nutsedges
  - Improved broadleaf weed control
Prior to 1986, what were the control options for escaped annual grasses?

What were control options for any perennial grass?

Fluazifop (Sec. 18 in 1986), sethoxydim (Sec. 3 label in 1987), fenoxaprop (for a couple of years), clethodim, and fluazifop (eventually a Sec. 3 label).

Outstanding efficacy and minimal crop injury.

Controlled the most competitive group of weeds in peanut – grasses.

The stunning technological break-through of the postemergence graminicides has been largely forgotten.
All dinoseb uses in peanut were cancelled prior to the 1987 season.

- Health concerns to those exposed to herbicide during handling and application.
- Source of significant confusion and emotional dismay among peanut growers.
- Effectively replaced by paraquat, which is still commonly used.
LONG-FORGOTTEN(?) EVENTS THAT AFFECTED WEED CONTROL IN PEANUT: ALACHLOR CONTROVERSY

- Alachlor was never banned on peanut and is still registered.
- Peanut industry was concerned about alachlor.
  - Newly discovered alachlor metabolites in harvested peanut and some questioned whether those new metabolites caused tolerance to be exceeded.
  - Public discussions of chronic effects of alachlor residues in food crops, particularly for children.
- Peanut industry assumed ‘quasi-regulatory role’; i.e. issued contracts with growers that prohibited alachlor use on peanut.
- Complexity of this situation and misinformation among many parties caused hard-feelings, mistrust, and strained professional relationships.
BASICALLY, NOBODY LIKES CHANGE – ESPECIALLY THE PEANUT GROWER
Suddenly, there was an urgent need for new foundation-type herbicides. *For once, everybody in the peanut industry was listening and in agreement.*

- Imazethapyr
- Imazapyric
- Diclosulam
- Flumioxazin

These herbicides are far better than dinoseb and alachlor.

Peanut growers have greatly benefitted.
WHAT DOES THIS ALL MEAN

- Peanut growers have better weed control knowledge and tools than what was available 30+ years ago.
- Weed control is much better and consistent than 30+ years ago.
- These weed control improvements provide better yield protection than systems 30+ years ago.
DANGERS OF WEED CONTROL COMPLACENCY

- Presently, there is too much reliance on herbicides, instead of an integrated/balanced weed control system.
- Very limited number of new active ingredients.
- There will be a recurrence of something similar to the ‘Alachlor Situation’ with a version of the “Mayhem Man” lurking in the shadows. Confusion will reign - again.
Weeds and weed populations quickly adapt to selection pressure

- Man-made selection pressure of weed biotypes that are resistant to herbicides.
- Population shifts towards species that are naturally tolerant to specific herbicides.
### Troublesome Weed Comparisons - 1980 vs. 2013

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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fl. beggarweed</td>
<td>Palmer amaranth</td>
<td>Fl. beggarweed</td>
<td>Palmer amaranth</td>
<td>Fl. beggarweed</td>
<td>Palmer amaranth</td>
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<tr>
<td>2.</td>
<td>Texas millet</td>
<td>Fl. pusley</td>
<td>Sicklepod</td>
<td>Cowpea</td>
<td>Sicklepod</td>
<td>Bengal dayflower</td>
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<tr>
<td>3.</td>
<td>Sicklepod</td>
<td>Bengal dayflower</td>
<td>Nutsedges</td>
<td>Hairy indigo</td>
<td>Bristly starbur</td>
<td>Fl. beggarweed</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Bristly starbur</td>
<td>Fl. beggarweed</td>
<td>Bristly starbur</td>
<td>Groundcherry</td>
<td>Nutsedges</td>
<td>Nutsedges</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Cocklebur</td>
<td>Sicklepod</td>
<td>Texas millet</td>
<td>Bengal dayflower</td>
<td>Texas millet</td>
<td>Spurge</td>
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</tbody>
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- Palmer amaranth is now the most troublesome weed of peanut and it was not even mentioned in 1980.
- Texas millet is no longer considered to be among the most troublesome weeds in peanut.
- Take home message: This is a fluid situation – things change in a hurry. Avoid weed management complacency.
FINALLY, WE NEED TO REMEMBER THOSE WHO ACTUALLY STARTED THE PEANUT PRODUCTION SUCCESS STORY

OUR PREDECESSORS
THE VISION OF A PRODUCTION PACKAGE

GROWING PEANUTS IN GEORGIA
A PACKAGE APPROACH

Prepared by
Ronald J. Henning and J. Frank McGill
Extension Agronomists – Peanuts
L. E. Samples
Extension Engineer
Charles Swann
Extension Agronomist – Weed Control
Samuel S. Thompson
Extension Plant Pathologist
Herbert Womack
Extension Entomologist

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Tal C. DuVall, Director