

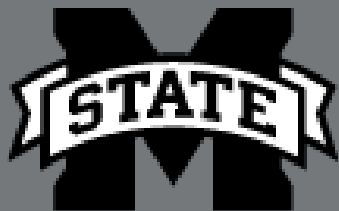
Weed Control in a Mixed Trait World

Jason A. Bond

Delta Research and Extension Center
Stoneville, MS

Phone: (662) 769-0268

E-mail: jason.bond@msstate.edu



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DELTA RESEARCH AND EXTENSION CENTER

Acknowledgment

- ADAMA USA
- AMVAC Chemical
- BASF Corporation
- Bayer CropScience
- Crop Production Services
- Dow Agrosiences LLC
- DuPont Crop Protection

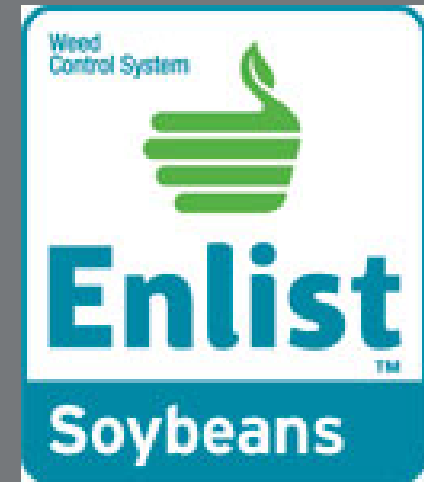


- FMC Corporation
- Gowan Company
- Jimmy Sanders, Inc.
- Horizon Ag
- Monsanto
- Riceco LLC
- Syngenta Crop Protection
- United Phosphorus, Inc.
- Valent USA Corporation



Herbicide Technologies in Soybean

- Conventional
- Roundup Ready
- LibertyLink
- Roundup Ready 2 Xtend
- Enlist
- Balance GT
- MGI



Trait Summary

| |  | |  | |  | |  | |
|-------------|---|-----------|--|-----------|---|-----------|---|-----------|
| | Cotton | Soybean | Cotton | Soybean | Cotton | Soybean | Cotton | Soybean |
| Glyphosate | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes |
| Glufosinate | No | No | Yes | Yes | Yes | Yes | Yes | No |
| Dicamba | No | No | No | No | No | No | Yes | Yes |
| 2,4-D | No | No | No | No | Yes | Yes | No | No |

Wrong Resistance Trait

Cotton

Soybean



Application Timings

Flexstar GT:

| Preplant | PRE | Minimum-POST | Maximum-POST | Weed size |
|----------|-----|--------------|--------------|-----------|
| Yes | Yes | Emergence | 45 d PHI | Range |

Liberty 280, etc.:

| Preplant | PRE | Minimum-POST | Maximum-POST | Weed size |
|----------|-----|--------------|-------------------|-----------|
| Yes | Yes | Emergence | < R1 growth stage | Range |

XtendiMax, Engenia, FeXapan:

| Preplant | PRE | Minimum-POST | Maximum-POST | Weed size |
|----------|-----|--------------|-----------------|------------|
| Yes | Yes | Emergence | R1 growth stage | ≤ 4 inches |

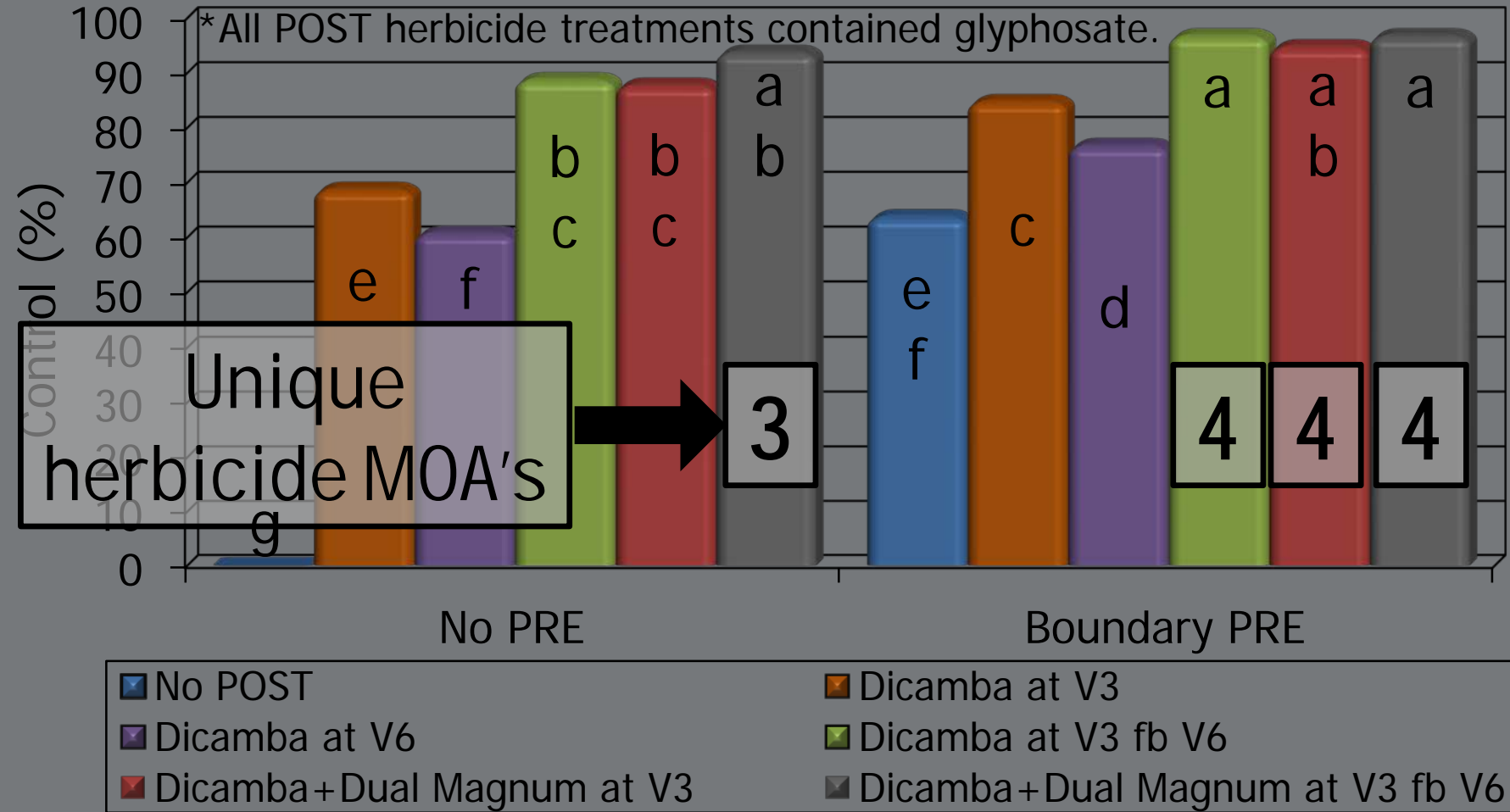
Enlist Duo, Enlist One:

| Preplant | PRE | Minimum-POST | Maximum-POST | Weed size |
|----------|-----|--------------|-----------------|------------|
| Yes | Yes | Emergence | R2 growth stage | 3-6 inches |



Application Timings

Palmer amaranth control 14 d after final POST application to V6 soybean in 2016 and 2017



Application Timings

Two applications of Liberty 280 at
29 OZ/A spaced 1 wk apart



Initiated 2 WAP



Initiated 3 WAP



Initiated 4 WAP

Herbicide Mixtures/Additives



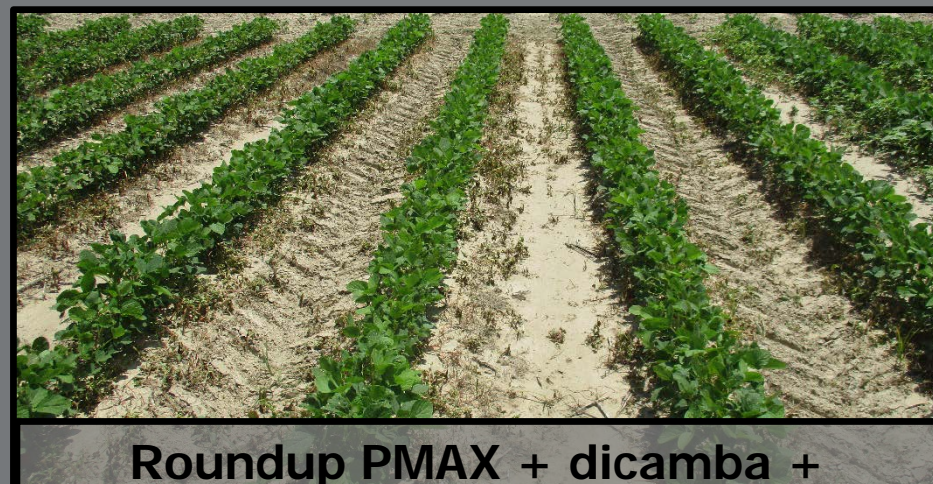
Nontreated



Roundup PMAX + dicamba at V3



Roundup PMAX + Warrant Ultra V3



**Roundup PMAX + dicamba +
Warrant Ultra V3**

Rainfall/Irrigation Free Period

| Product | Rainfast |
|-------------|--|
| Flexstar GT | Rainfall shortly after application may reduce performance. |

| Product | Rainfast |
|-------------|---|
| Liberty 280 | Liberty 280 is rainfast four hours after application. |

| Product | Rainfast | Rainfall free Period |
|-----------------------|----------|--|
| XtendiMax, FeXapan | 4 hours | DO NOT make application if rain is expected in next 24 hours. |
| Engenia | 4 hours | DO NOT apply Engenia if rain is expected within 24 hours after application. |

| Product | Rainfall | Irrigation |
|---------------------------|--|--|
| Enlist Duo, Enlist One | DO NOT make application if rain is expected in the next 24 hours. | DO NOT irrigate treated fields for at least 24 hours after application. |



Rainfall/Irrigation Free Period

Dicamba runoff prior to planting

2,4-D runoff after crop emergence



Application Requirements

| Product | Aerial apps. | Ground speed | Spray volume | Boom height | Nozzles | Pressure |
|-------------|--------------|------------------------|--------------|---------------|----------------|---------------|
| | | mph | GPA | in | | PSI |
| Flexstar GT | Yes | ≤ 10 suggested | 15 to 20 | Not specified | High flow rate | Not specified |

| Product | Aerial apps. | Ground speed | Spray volume | Boom height | Nozzles | Pressure |
|-------------|--------------|--------------|--------------|---------------|----------------|-----------|
| | | mph | GPA | in | | PSI |
| Liberty 280 | Yes | ≤ 10 | ≥ 10 | Not specified | High flow rate | ≥ 40 |



Application Requirements

| Product | Aerial apps. | Ground speed | Spray volume | Boom height | Nozzles | Pressure |
|-----------|--------------|--------------|--------------|-------------|-----------|----------|
| | | mph | GPA | in | | PSI |
| XtendiMax | No | ≤ 15 | ≥ 15 | ≤ 24 | 26 listed | Range |
| Engenia | No | ≤ 15 | ≥ 10 | ≤ 24 | 13 listed | Varied |
| FeXapan | No | ≤ 15 | ≥ 15 | ≤ 24 | | |

| Product | Aerial apps. | Ground speed | Spray volume | Boom height | Nozzles | Pressure |
|------------------------|--------------|--------------|--------------|---------------------|-----------|----------|
| | | mph | GPA | in | | PSI |
| Enlist Duo, Enlist One | No | Varied | 10 to 15 | Varied, but ≤ 24 in | 23 listed | Range |



Sprayer Cleanout

Damage from rinsate



Damage from contaminated boom



Off-target Movement



Efficacy/Selection Pressure



Glyphosate + Prefix



Liberty 280



Glyphosate + dicamba



Glyphosate + 2,4-D

Concerns with New Technologies

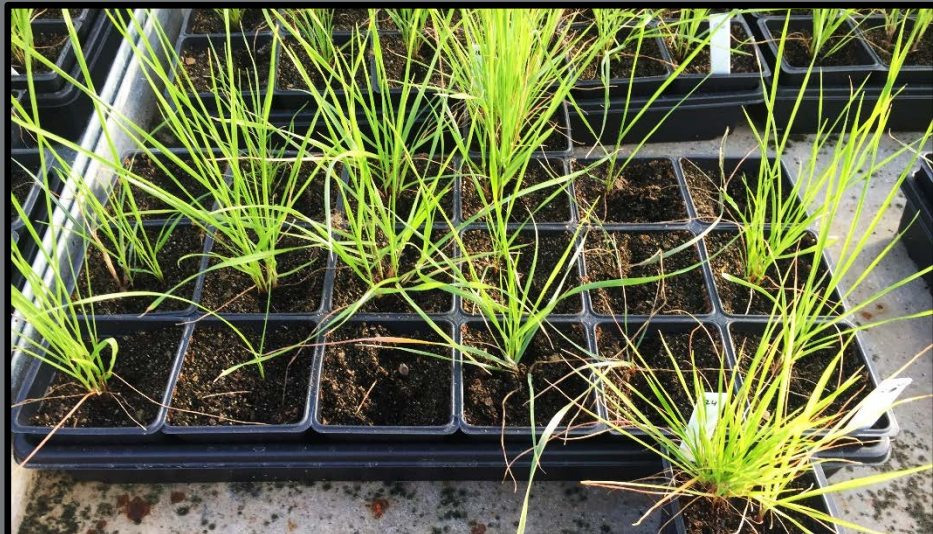
- Crop injury
 - ✓ – Physical drift
 - ✓ – Tank contamination/cleanout
 - ✓ – Volatility
- Technology management and stewardship
 - ✓ – Managing different technologies in close proximity
 - ✓ – Efficacy – All require use in a herbicide program
 - ✓ – Application over broad geography in short time
 - Rotation of technologies
 - Herbicide resistance



Herbicide-resistant Italian Ryegrass



Herbicide-resistant Italian Ryegrass



Questions?

Jason A. Bond

Delta Research and Extension Center
Stoneville, MS

Phone: (662) 769-0268

E-mail: jason.bond@msstate.edu

www.mississippi-crops.com

Follow on Twitter [@JasonABond](https://twitter.com/JasonABond)