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MISSISSIPPI SOYBEAN PROMOTION BOARD
PROJECT NO. 20-2017 (CONT)
2017 ANNUAL REPORT

Title: Weed Management Programs for Mississippi Soybean Production

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BACKGROUND AND OBJECTIVES

Glyphosate-resistant Palmer amaranth and Italian ryegrass represent the largest threats to crop production in Mississippi. Palmer amaranth competes for nutrients, water, light, and space because of its rapid, upright growth habit and allelopathic properties.

Large populations of GR Italian ryegrass jeopardize burndown herbicide programs. Fields with GR Italian ryegrass not controlled at burndown will contain significant residue at planting. Residue will impede planting practices, contribute to competition between soybean seedlings and GR Italian ryegrass, and hinder herbicide programs due to inadequate coverage.

Herbicide-resistant (HR) weed species continue to spread across Mississippi and the U.S. Large populations of HR weeds can threaten weed management programs. Novel herbicides and technologies such as dicamba-, 2,4-D-, and 4-HPPD-resistant soybean have recently been or are approaching commercialization. Therefore, it is important to identify effective weed management programs using these new herbicide-resistant technologies to prevent competition and yield reductions in Mississippi soybean.

With three new herbicide-resistant technologies introduced to soybean production within one or two years, problems with off-target herbicide movement, or drift, will likely escalate as fields in proximity are planted with different herbicide-resistant technologies. Off-target herbicide movement can be a serious problem, especially when applications are made under windy conditions or when ambient factors are favorable for volatilization and redeposition.

Herbicide drift is most often the result of improper application, and depending on the susceptibility of plants to a specific herbicide, injury can occur at a considerable distance from the target. Understanding soybean response to off-target herbicide movement is imperative, especially in areas where soybean representing multiple herbicide-resistant technologies are grown in proximity.

Research was conducted with the following objectives.

1. Evaluate new and/or currently registered herbicides and herbicide-resistant soybean technologies for positioning into Mississippi weed management programs.
2. Characterize the effects of (a) planting date, (b) maturity group, or (c) cultivar on soybean performance following exposure to sub-lethal rates of dicamba at multiple growth stages.
3. Evaluate soybean agronomic performance and yield following sequential herbicide programs targeting GR Italian ryegrass.

REPORT OF PROGRESS/ACTIVITY

Objective 1 – 2017

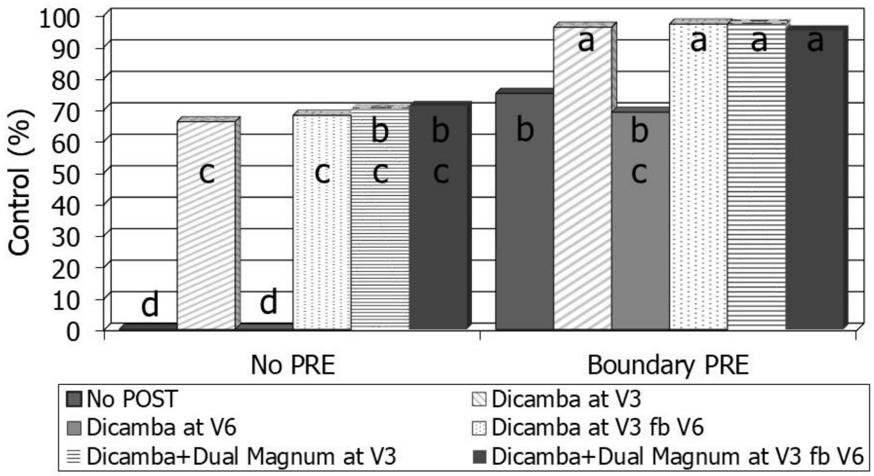
Twenty-two studies were conducted at the Delta Research and Extension Center in 2017 to evaluate new and/or currently registered herbicides and herbicide-resistant soybean technologies for positioning into Mississippi weed management programs. Unfortunately, many of these studies focused on the efficacy of pre-mixes of currently registered herbicides or generic formulations of commercial herbicides. "New" herbicides under evaluation are Enlist Duo (glyphosate plus 2,4-D choline), Enlist One (2,4-D choline), flumioxazin plus pyroxasulfone plus metribuzin (Fierce MTZ), a liquid formulation of pyroxasulfone (Zidua SC), and a new premix of pyroxasulfone plus fluthiacet-methyl (Anthem Maxx).

Engenia, Xtendimax with VaporGrip, and FeXapan with VaporGrip (dicamba) were evaluated in the first year of original research not requiring contracts between MSU and the manufacturers. Other studies evaluated herbicide applications in HPPD-resistant soybean being developed by Bayer Cropscience and Syngenta.

Research has been conducted annually since 2010 at different sites in the Mississippi Delta to evaluate weed control programs in the Roundup Ready Xtend weed control system, which was developed by Monsanto. Original research with Roundup Ready 2 Xtend soybean was conducted in 2016; however, herbicide applications in this research included dicamba applied as Clarity because the newest formulations had not received labeling at the time the research was established. Two studies initiated in 2016 were repeated in 2017, but Engenia was substituted for Clarity in the second year in treatments prescribing dicamba applications.

One study evaluated application timings for Engenia in PRE/POST weed control programs. In this study, Boundary was applied PRE to one half of the plots. Postemergence treatments included Roundup PowerMax plus Engenia in single and sequential applications to V3 and V6 soybean with and without Dual Magnum. Figure 1 demonstrates that a PRE treatment was critical for Palmer amaranth control in Roundup Ready 2 Xtend soybean at 14 days after the first POST treatment. Additionally, the inclusion of Dual Magnum in mixtures of Roundup PowerMax plus Engenia applied to V3 soybean controlled more Palmer amaranth than mixtures with no Dual Magnum.

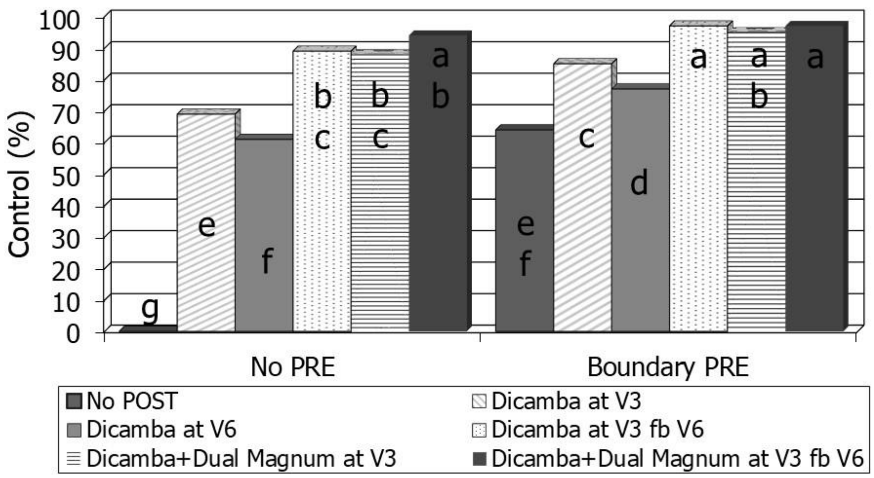
Figure 1. Palmer amaranth control 14 days after initial POST application to V3 soybean in a study evaluating weed control programs in Roundup Ready 2 Xtend soybean at Stoneville, MS, in 2016 and 2017.



*All POST herbicide treatments contained glyphosate.

A sequential POST application was applied when soybean reached the V6 growth stage. Figure 2 demonstrates that two POST applications of Roundup PowerMax plus Engenia controlled more Palmer amaranth than a single application at 14 days after the sequential POST applications. Palmer amaranth control 14 days after the sequential POST application was best with treatments containing at least three effective herbicide modes of action. For example, Palmer amaranth control with sequential treatment of Roundup PowerMax plus Engenia plus Dual Magnum with no PRE treatment was similar to control observed with the same POST treatment following Boundary PRE. The Palmer amaranth population at the research site contained approximately 60 to 70% glyphosate-resistant individuals. Therefore, the Roundup PowerMax treatment contributed some level of control to these weed control programs. Unfortunately, Palmer amaranth control was not 100% with any treatment, so additional herbicide treatments would be required for complete control.

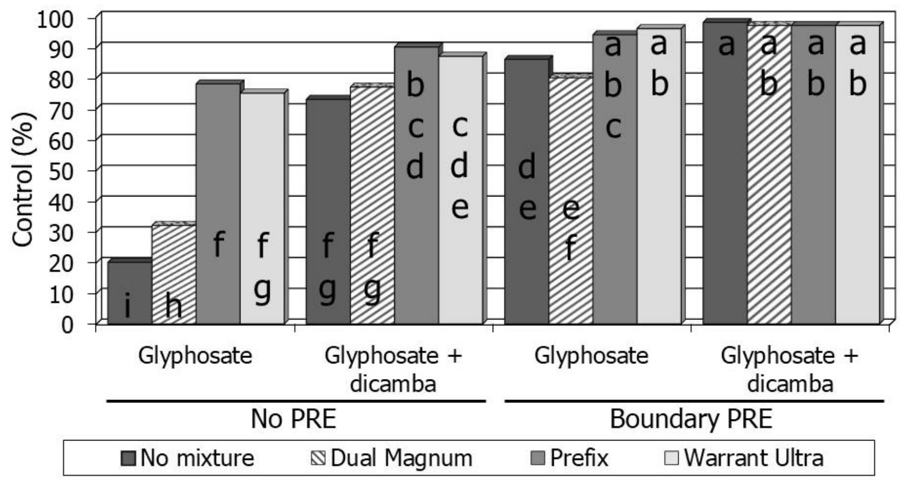
Figure 2. Palmer amaranth control 14 days after the sequential POST application to V6 soybean in a study evaluating weed control programs in Roundup Ready 2 Xtend soybean at Stoneville, MS, in 2016 and 2017.



*All POST herbicide treatments contained glyphosate.

The second study evaluated mixtures of Engenia with Roundup PowerMax and/or other herbicides. Boundary was applied PRE to one half of the plots. Postemergence treatments included Roundup PowerMax or Roundup PowerMax plus Engenia with and without the addition of Dual Magnum, Prefix, or Warrant Ultra. Figure 3 demonstrates that, regardless of whether a PRE treatment was utilized, Palmer amaranth control was greater following Roundup PowerMax plus Engenia than with Roundup PowerMax alone at 14 days after POST treatment. The addition of Prefix or Warrant Ultra improved Palmer amaranth control except in plots where these herbicides were mixed with Roundup PowerMax plus Engenia and applied following Boundary PRE. Problematically, barnyardgrass control was lower when Warrant Ultra or Prefix were included with Roundup PowerMax or Roundup PowerMax plus Engenia compared with when the PPO herbicide product was not included (data not presented).

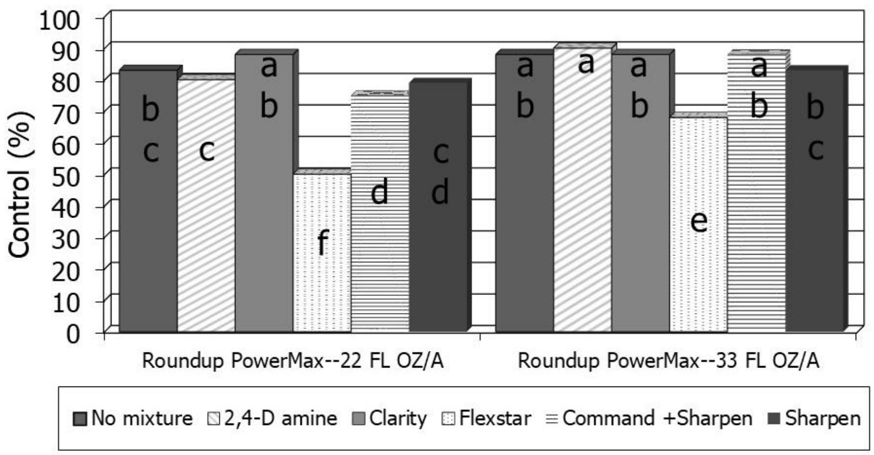
Figure 3. Palmer amaranth control 14 days after application of herbicide mixtures applied to V3 soybean in a study evaluating herbicide mixtures in Roundup Ready 2 Xtend soybean at Stoneville, MS, in 2016 and 2017.



Poor barnyardgrass control in plots treated with glyphosate plus PPO herbicides has been observed for several years at DREC. Research was conducted in 2016 and 2017 to evaluate barnyardgrass control with herbicide mixtures containing different rates of glyphosate and applied at different application timings. Treatments were arranged in a three-factor factorial within a randomized complete block design with four replications. Factor A was application timing and included an early application to barnyardgrass that was 3 inches in height and a late application to barnyardgrass that was 12 inches in height. Factor B was Roundup PowerMax rates of 0, 22, and 33 FL OZ/A. Factor C was herbicide mixture that consisted of no mixture, 2,4-D amine, Clarity, Flexstar, Command plus Sharpen, and Sharpen.

Pooled across application timings, barnyardgrass control 21 d after treatment (DAT) increased when glyphosate rate was increased from 22 to 33 FL OZ/A for mixtures with 2,4-D amine, Flexstar, and Command plus Sharpen. Reductions in barnyardgrass control 21 DAT with the addition of a herbicide mixture to glyphosate was only observed when Command plus Sharpen was added to Roundup PowerMax at 22 FL OZ/A and when Flexstar was added to glyphosate at 22 and 33 FL OZ/A. Because of the inconsistencies in barnyardgrass control, glyphosate-based herbicide treatments should include Roundup PowerMax at 33 FL OZ/A with applications to barnyardgrass ≤ 3 inches.

Figure 4. Barnyardgrass control 21 days after application of herbicide mixtures in a study evaluating herbicide mixtures with different rates of glyphosate at Stoneville, MS, in 2016 and 2017.



*Data pooled across application timings to 3- and 12-inch barnyardgrass.

Different formulations of dicamba are now registered for application in Roundup Ready 2 Xtend soybean. These include Engenia, Xtendimax with VaporGrip, and FeXapan with VaporGrip Research from 2017 confirmed that weed control was similar with each of these three dicamba formulations (data not presented). This indicates that growers in Mississippi have options of their choice of dicamba herbicides in Roundup Ready 2 Xtend soybean.

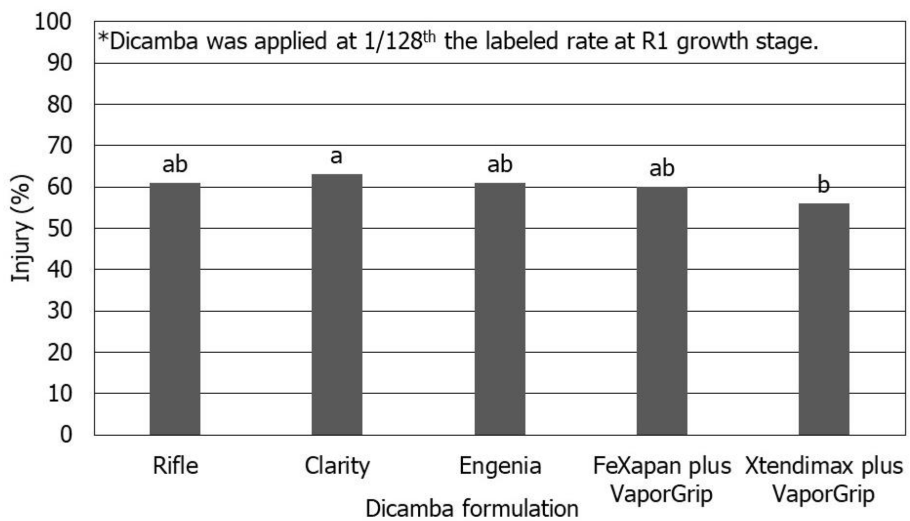
Objective 2 – 2017

Roundup Ready 2 Xtend soybean varieties are grown in proximity to those representing other herbicide-resistant technologies, creating the potential for problems with off-target movement. Therefore, research was conducted to characterize the soybean response to exposure to sub-lethal rates of different dicamba formulations and to evaluate the performance of soybean cultivars representing different soybean maturity groups following multiple exposures to a sub-lethal rate of dicamba.

Two studies were conducted in 2017 at MSU-DREC to evaluate the influence of dicamba formulation and maturity group on soybean performance following exposure to a sub-lethal rate of dicamba. The experimental design for both studies was a randomized complete block with four replications. The dicamba formulation study evaluated Rifle [dimethylamine salt (DMA)], Clarity [diglycolamine salt (DGA)], Engenia [N, N-Bis-(aminopropyl) methylamine (BAPMA)], FeXapan plus Vapor Grip (DGA), and Xtendimax with Vaporgrip (DGA) at 0.0039 lb ae/A (1/128th of labeled rate) applied at the R1 soybean growth stage. Treatments in the maturity group study were arranged as a two-factor factorial. Factor A was maturity group and consisted of varieties representing maturity groups IV (Asgrow 4632) and V (Asgrow 5332). Factor B was timings of dicamba exposure and included no dicamba and dicamba at V3 followed by (fb) R1 (V3/R1), V3 fb R3 (V3/R3), and R1 fb R3 (R1/R3) soybean growth stages. Dicamba was applied as Clarity at 0.0039 lb/A.

Figure 5 demonstrates soybean injury 28 DAT was greater with Clarity than with Xtendimax plus VaporGrip; however, injury with all treatments was ≥56%. Rifle, FeXapan with VaporGrip, and Engenia injured soybean similar to both Clarity and Xtendimax with VaporGrip. Soybean yield following exposure to Engenia and FeXapan plus VaporGrip was lower than that following exposure to Rifle and Xtendimax plus VaporGrip, but all dicamba formulations reduced soybean yield to ≤ 59% of the nontreated control (data not presented).

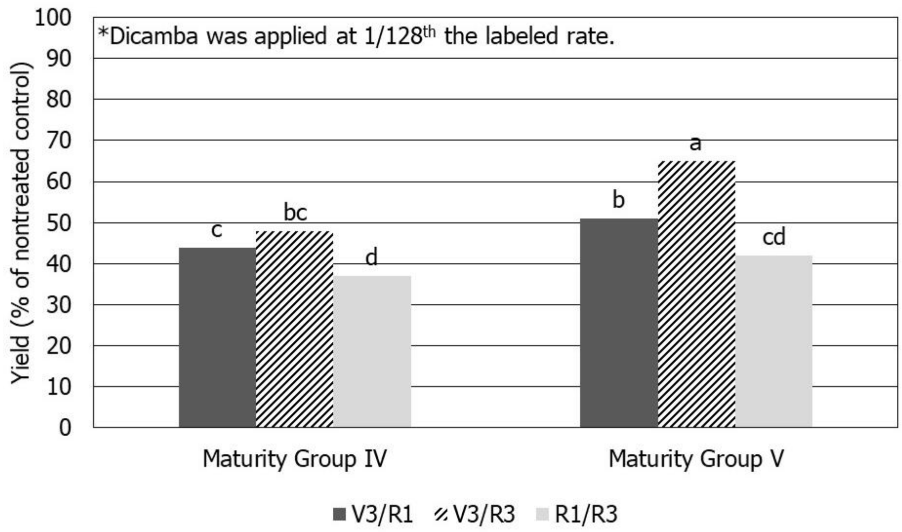
Figure 5. Soybean injury 28 days following exposure to sub-lethal rate of dicamba in a study characterizing soybean response to dicamba exposure at Stoneville, MS, in 2017.



At 28 and 48 d after the last application, soybean injury exhibited by soybean varieties representing maturity groups IV and V was similar for each dicamba exposure timing (data not presented). Within each maturity group, differences in injury were detected among the dicamba exposure timings. For example, injury 28 d after the last application was similar for V3/R1 and V3/R3 dicamba exposure timings on maturity group IV soybean; however, dicamba at V3/R3 injured maturity group V soybean more than dicamba at V3/R1. For both maturity groups, injury 28 d after the last application was greatest with R1/R3 dicamba exposure timings. Yields of maturity group V soybean were greater than those for maturity group IV soybean following dicamba at V3/R1 and V3/R3 (Figure 6). For both maturity groups, greatest yield reduction was caused by dicamba at R1/R3.

Although differences in soybean injury 28 DAT and yield were observed following exposure to a sub-lethal rate of different formulations of dicamba, no clear pattern in response was detected. Furthermore, soybean injury and yield reductions were severe with all dicamba formulations. Although injury was similar between soybean varieties representing maturity groups IV and V for each dicamba exposure timing, agronomic performance varied between the varieties. Yield reductions were greater for maturity group IV compared with V for two (V3/R1 and V3/R3) of the dicamba exposure timings. Exposing both varieties to dicamba multiple times during reproductive growth stages (R1/R3) produced the most severe yield reductions.

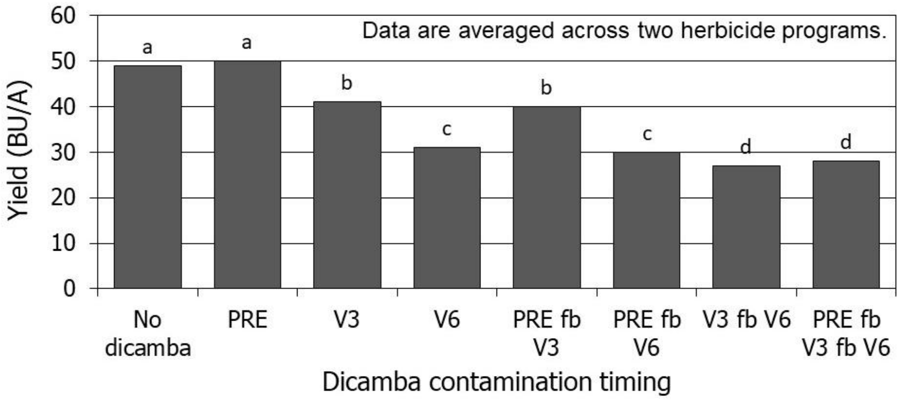
Figure 6. Soybean yield following multiple exposures to sub-lethal rate of dicamba in a study characterizing response of soybean varieties representing different maturity groups to dicamba at Stoneville, MS, in 2017.



Dicamba is difficult to remove from sprayer components during rinsing procedures; therefore, LibertyLink and Roundup Ready cropping systems are susceptible to injury from dicamba if spray equipment is not thoroughly sanitized. Therefore, research was conducted to characterize the effects of dicamba as simulated tank contamination in Roundup Ready 2 and LibertyLink herbicide programs. Two studies were conducted in 2017 at MSU-DREC to evaluate simulated dicamba tank contamination in non-Roundup Ready Xtend herbicide programs. The experimental design for both studies was a split plot with four replications. Whole plots were herbicide programs and included no herbicide program and Boundary PRE fb Roundup PowerMax or Liberty (depending on study) plus Prefix fb Roundup PowerMax or Liberty plus Zidua. Subplots were dicamba contamination timings and included no dicamba, PRE, V3, V6, PRE fb V3, PRE fb V6, V3 fb V6, and PRE fb V3 fb V6. Dicamba was applied as Clarity at 0.0039 lb ae/acre (1/128 labeled use rate).

In both studies, soybean injury 14 and 28 d after the last herbicide application was greatest with dicamba contamination timings that included V3 and V6 growth stages (V3 fb V6 and PRE fb V3 fb V6) (data not presented). Soybean yield was not influenced by herbicide program in either study, and the yield response to dicamba contamination timing reflected injury data. Soybean yield was lowest with dicamba contamination timings that included both V3 and V6 growth stages (Figure 7). Although soybean yields following dicamba contamination at V3 or PRE fb V3 were greater than those with any timing that included the V6 growth stage, dicamba contamination at V3 or PRE fb V3 reduced yield ≥17% compared with the no dicamba treatment.

Figure 7. Soybean yield following a study characterizing response of soybean to simulated tank contamination of dicamba at Stoneville, MS, in 2017.



Objective 3 – 2017

A study to evaluate soybean response to GR Italian ryegrass present at planting was initiated in November 2016 and designed as a randomized complete block with four replications. Treatments included termination of GR Italian ryegrass with two or three herbicide applications initiated 2 and 4 weeks prior to soybean planting. Treatments were applied throughout the fall and winter during 2016 and 2017.

Due to prolonged wet and cold conditions during winter of 2017, an adequate population of Italian ryegrass to adequately test the stated objective was not achieved. Furthermore, in March 2017, preliminary data from greenhouse research conducted in cooperation with scientists at the USDA-ARS Lab. in Stoneville indicated that some GR Italian ryegrass populations in Mississippi had evolved resistance to clethodim. Clethodim has been the primary herbicide treatment to control GR Italian ryegrass during burndown.

Because research planned for 2017 was met with severe challenges due to lack of adequate Italian ryegrass at the research site and potential clethodim-resistant populations that were identified, no data was collected for Objective 3 in 2017. Clethodim-resistant Italian ryegrass was confirmed in October 2017 in follow-up research, which was also conducted in cooperation with USDA-ARS scientists. Populations of clethodim-resistant Italian ryegrass have been identified in Bolivar, Coahoma, Humphreys, Leflore, Sunflower, Washington, and Yazoo counties.

Therefore, studies originally proposed to evaluate interaction of soybean and Italian ryegrass were deemed lower priority than those evaluating management programs for multiple-resistant Italian ryegrass. Although environmental conditions have been challenging during winter 2017-18, ongoing research is evaluating Italian ryegrass control measures in the absence of clethodim.

IMPACTS AND BENEFITS TO MISSISSIPPI SOYBEAN PRODUCERS

Mississippi has averaged 1.98 million acres of soybean over the past five years, and a majority of soybean-producing counties contain at least one GR weed species. The data generated from this research will allow producers to implement effective control options for GR weeds, become aware of developing resistance problems, receive information on prevention and control tactics for resistant weeds, and allow Mississippi soybean producers to remain competitive regionally while improving economic returns.

Publications (32):

1. McCoy, J. M., G. Kaur, B. R. Golden, J. M. Orlowski, D. R. Cook, and J. A. Bond. 2017. Nitrogen fertilization of soybean affects root growth and nodulation on two soil types in Mississippi. Commun. Soil Sci. Plant Anal. [Online]. Available at https://doi.org/10.1080/00103624.2017.1421649 doi: 10.1080/00103624.2017.1421649
2. McCoy, J. M., G. Kaur, B. R. Golden, J. M. Orlowski, D. R. Cook, and J. A. Bond. 2017. Nitrogen fertilization of soybeans in Mississippi increases seed yield but not profitability. Agron. J. (*In Press*)
3. Schwarz, L. M., J. K. Norsworthy, L. N. Steckel, D. O. Stephenson, IV, K. Bradley, and J. A. Bond. A midsouthern consultant's survey on weed management practices in soybean. Weed Technol. (*In Press*)
4. Nandula, V. K., P. Tehranchian, J. A. Bond, J. K. Norsworthy, and T. W. Eubank. 2017. Glyphosate resistance in common ragweed (*Ambrosia artemisiifolia* L.) from Mississippi. Weed Biol. Manag. 14:45-53.
5. 2017 Weed Control Guidelines for Mississippi. 2017. Mississippi State University Extension Service Publication P-1532.
6. Bond, J.A., D.M. Dodds, B.R. Golden, J.T. Irby, E.J. Larson, B.H. Lawrence, D.B. Reynolds, J.M. Sarver. 2017. 2018 Weed Management Suggestions for Mississippi Row Crops. Mississippi State University Extension Service Publication P-3171. 80 pp.
7. Bond, J.A., J.T. Irby, D.B. Reynolds, D.M. Dodds. 2017. Auxin Herbicide Reference Guide. Mississippi State University Extension Service Publication P-3051. 4 pp.
8. Falconer, L., J.T. Irby, J. Orlowski, T.W. Allen, J.A. Bond, N.W. Buehring, A.L. Catchot, D. Cook, B.R. Golden, J. Gore, L.J. Krutz, and H.C. Pringle. 2017. Soybeans 2018 Planning Budgets. Mississippi State University Extension Service Publication P-3166.
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10. Bond, J. A. 2017. Control Italian ryegrass early. [Online] Available at http://www.mississippi-crops.com/2017/01/20/control-italian-ryegrass-early/ (01/20/2017)
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12. Bond, J. A. 2017. Enlist and Xtend: at what growth stages can I spray? [Online] Available at http://www.mississippi-crops.com/2017/03/08/enlist-and-xtend-at-what-growth-stages-can-i-spray/ (03/08/2017)

13. Bond, J. A. 2017. Enlist and Xtend: what are the herbicide rates? [Online] Available at http://www.mississippi-crops.com/2017/03/01/enlist-and-xtend-what-are-the-herbicide-rates/ (03/01/2017)
14. Bond, J. A. 2017. Enlist and Xtend: what boom specifications are required? [Online] Available at http://www.mississippi-crops.com/2017/03/16/enlist-and-xtend-what-boom-specifications-are-required/ (03/16/2017)
15. Bond, J. A. 2017. Enlist and Xtend: what buffers are mandatory? [Online] Available at http://www.mississippi-crops.com/2017/03/29/enlist-and-xtend-what-buffers-are-mandatory/ (03/29/2017)
16. Bond, J. A. 2017. Enlist and Xtend: what can I spray and on which crops can I spray it? [Online] Available at http://www.mississippi-crops.com/2017/02/24/enlist-and-xtend-what-can-i-spray-and-on-which-crops-can-i-spray-it/ (02/24/2017)
17. Bond, J. A. 2017. Enlist and Xtend: what mixtures are approved? [Online] Available at http://www.mississippi-crops.com/2017/03/23/enlist-and-xtend-what-mixtures-are-approved/ (03/23/2017)
18. Bond, J. A. 2017. Preplant intervals for 2,4-D and dicamba applied as burndown in Mississippi. [Online] Available at http://www.mississippi-crops.com/2017/03/17/preplant-intervals-for-24-d-and-dicamba-applied-as-burdown-in-mississippi/ (03/17/2017)
19. Bond, J. A. 2017. Spring tillage ineffective for glyphosate-resistant Italian ryegrass control. [Online] Available at http://www.mississippi-crops.com/2017/02/17/spring-tillage-ineffective-for-glyphosate-resistant-italian-ryegrass-control/ (02/17/2017)
20. Bond, J. A., D. Reynolds, D. M. Dodds, and J. T. Irby. 2017. Online auxin herbicide training starts February 13. [Online] Available at http://www.mississippi-crops.com/2017/02/03/online-auxin-herbicide-training-starts-february-13/ (02/03/2017)
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22. McCoy, J. M., B. R. Golden, J. A. Bond, D. Cook, and M. S. Cox. 2017. Soybean yield and biomass response to supplemental nitrogen fertilizer. Pages 14-15 in Mississippi State University Delta Research and Extension Center 2016 Annual Report. Stoneville, MS: Delta Research and Extension Center.
23. Pieralisi, B., J. M. McCoy, B. R. Golden, J. A. Bond, M. S. Cox, and D. Cook. 2017. Soybean nodule inhibition and root growth as influenced by nitrogen source and nitrogen rate. Pages 12-13 in Mississippi State University Delta Research and Extension Center 2016 Annual Report. Stoneville, MS: Delta Research and Extension Center.
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25. Nandula, V. K., D. A. Giacomini, J. D. Ray, J. A. Bond, L. E. Steckel, and P. J. Tranel. 2017. Glyphosate-resistant *Echinochloa* spp. from Tennessee and Mississippi: molecular analysis. Weed

Science Society of America Annual Meeting. 6-9 Feb 17. Tucson, AZ. [Online]. Available at http://wssaabstracts.com/public/45/proceedings.html

26. Nandula, V. K., G. Sharma, T. Tseng, and J. A. Bond. 2017. Investigations into suspected clethodim-resistant johnsongrass and Italian ryegrass from Mississippi. Weed Science Society of America Annual Meeting. 6-9 Feb 17. Tucson, AZ. [Online]. Available at http://wssaabstracts.com/public/45/proceedings.html
27. Peeples, J. D., H. M. Edwards, T. L. Phillips, J. A. Bond, and S. Garris. 2017. Efficacy of herbicide programs in Balance GT soybean. Proc. South. Weed Sci. Soc. 70:77-78.
28. Phillips, T. L., J. D. Peeples, H. M. Edwards, B. H. Lawrence, H. T. Hydrick, and J. A. Bond. 2017. Herbicide mixtures for late burndown application in soybean. Proc. South. Weed Sci. Soc. 70:12-13.
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30. Steckel, L. E., J. A. Bond, G. B. Montgomery, T. L. Phillips, and V. K. Nandula. 2017. Glyphosate-resistant barnyardgrass in Tennessee and Mississippi. Proc. South. Weed Sci. Soc. 70:182-183.
31. Walker, D. C., D. B. Reynolds, and J. A. Bond. 2017. Comparison of non-STS, STS, and BOLT soybean (*Glycine max*) susceptibility to Grasp (penoxsulam) and Regiment (bispyribac). Proc. South. Weed Sci. Soc. 70:238.
32. Walker, D. C., D. B. Reynolds, and J. A. Bond. 2017. The effect of Grasp (penoxsulam) and Regiment (bispyribac) concentration on BOLT soybean (*Glycine max*) growth and yield. Proc. South. Weed Sci. Soc. 70:98.

Technical Meetings/Training Sessions (39):

1. Mississippi Chapter of American Society of Agronomy Auxin Field day – Dicmaba efficacy in Mississippi; Pontotoc, MS (June 14, 2017)
2. Mississippi Row Crop Short Course – Weed control in a mixed-trait world; Starkville, MS (December 5, 2017)
3. Mississippi State University Extension Mid-season Update – Weed control in Mississippi in 2017; Baldwyn, MS (July 20, 2017)
4. Grenada County Grower Meeting – Managing auxin-resistant crops; Grenada, MS (March 7, 2017)
5. University of Arkansas Division of Agriculture Pigweed Symposium – Comparison of soybean technologies; Forrest City, AR (February 28, 2017)
6. Benton County Grower Meeting – Managing auxin-resistant crops; Holly Springs, MS (February 23, 2017)
7. Lee County Grower Meeting – Managing auxin-resistant crops; Baldwyn, MS (February 23, 2017)
8. Tallahatchie County Grower Meeting – Managing auxin-resistant crops; Charleston, MS (February 22, 2017)
9. Leflore County Grower Meeting – Managing auxin-resistant crops; Marks, MS (February 22, 2017)
10. Quitman County Grower Meeting – Managing auxin-resistant crops; Marks, MS (February 14, 2017)

11. Delta Ag Expo – Managing auxin-resistant crops; Cleveland, MS (January 18, 2017)
12. Yazoo County Grower Meeting – Managing auxin-resistant crops; Yazoo City, MS (January 17, 2017)
13. Noxubee County Grower Meeting – Managing auxin-resistant crops; Macon, MS (January 12, 2017)
14. Monroe County Grower Meeting – Managing auxin-resistant crops; Aberdeen, MS (January 12, 2017)
15. Bolivar County Grower Meeting – Managing auxin-resistant crops; Cleveland, MS (January 11, 2017)
16. Washington County Grower Meeting – Managing auxin-resistant crops; Stoneville, MS (January 11, 2017)
17. Tunica County Grower Meeting – Managing auxin-resistant crops; Tunica, MS (January 10, 2017)
18. BASF Engenia Symposium – What can be done different in 2018; Memphis, TN (October 25, 2017)
19. Mississippi Agricultural Consultants' Association Research Exchange – Mississippi weed control update; Stoneville, MS (October 5, 2017)
20. Dow Agrosciences Research Exchange – Sonic and Surveil performance in Mississippi soybean; Venice, LA (September 26, 2017)
21. USDA Area-wide Project Annual Meeting – Herbicide resistance in Mississippi; Fayetteville, AR (August 22, 2017)
22. Mississippi Agriculture Industries Council Certified Crop Advisor Training – Weed control issues in Mississippi row crops; Orange Beach, AL (July 28, 2017)
23. Mississippi Soybean Promotion Board Summer Meeting – Soybean response to dicamba; Stoneville, MS (July 6, 2017)
24. Dow Agrosciences Soybean Tour – Weed control in Enlist soybean; Stoneville, MS (June 28, 2017)
25. Mississippi State University Extension Service Scout School – Off-target herbicide movement and nozzle selection; Verona, MS (June 1, 2017)
26. Mississippi State University Extension Service Scout School – Off-target herbicide movement and nozzle selection; Raymond, MS (May 30, 2017)
27. Mississippi State University Extension Service Scout School – Off-target herbicide movement and nozzle selection; Clarksdale, MS (May 25, 2017)
28. Mississippi State University Extension Service Scout School – Off-target herbicide movement and nozzle selection; Stoneville, MS (May 23, 2017)
29. Mississippi State University Extension Service Agronomic Crops Staff Retreat – 2017 weed control update; Hamilton, MS (June 8, 2017)
30. Farmsource Ag Associate Training Meeting – Managing auxin-resistant crops; Greenville, MS (February 24, 2017)
31. Mississippi State University Northwest District Agriculture and Natural Resource Agent Training – Managing auxin-resistant crops; Stoneville, MS (February 16, 2017)
32. Mississippi Agricultural Consultants Association Meeting – Managing auxin-resistant crops; Starkville, MS (February 9, 2017)
33. Mississippi Agricultural Consultants Association Meeting – POST Mixtures of herbicides and additives in soybean; Starkville, MS (February 8, 2017)

34. Jimmy Sanders Associate Training Meeting – Managing auxin-resistant crops; Rayville, LA (February 9, 2017)
35. Jimmy Sanders Associate Training Meeting – Managing auxin-resistant crops; Stoneville, MS (February 6, 2017)
36. Crop Production Services Associate Training Meeting – Managing auxin-resistant crops; Stoneville, MS (February 2, 2017)
37. National Conservations Systems Cotton and Rice Conference – Weed control challenges in Midsouth soybean; Baton Rouge, LA (February 1, 2017)
38. National Conservations Systems Cotton and Rice Conference – Weed control challenges in Midsouth soybean; Baton Rouge, LA (January 31, 2017)
39. Greenpoint Ag Associate Training Meeting – Managing auxin-resistant crops; Stoneville, MS (January 30, 2017)