MISSISSIPPI SOYBEAN PROMOTION BOARD

Improving Herbicide Efficacy and Residue Penetration of Herbicides Using Common Adjuvants for Weed Control in Soybean, **Project 64-2022**

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Background/Objectives: Adjuvants are a necessary part of making herbicide programs work effectively for the control of broadleaf weeds and grasses, the first time. With decreasing economic margins, improving the return-on-investment for anything purchased for the spray tank must improve for long-term viability. Herbicide resistant weeds have led to increased problems for weed management in soybean production, resulting in a greater investment of money and time to effectively manage these populations. Each time a weed population is not effectively controlled, it risks contributing to the persistence of herbicide resistant weeds. This proposed project would explore commonly available adjuvants from Mississippi retailers to evaluate overall herbicide efficacy and weed control. Results from this study will improve guidance for farmers as to which adjuvants are the most effective when required for use on the label. Furthermore, this study will evaluate new adjuvant types compared to older ones to assess if they stack up compared to accepted adjuvant types. Research will also be conducted to ensure that soil-applied herbicides are able to penetrate through dense cover crop residues by incorporating non-ionic surfactants or organosilicone adjuvants. Data from these studies will be made available with publication on-line and in Extension materials. Results from the study will be adapted for an easy-to-use guide to improve adjuvant purchases at the farm level.

Objective 1: Evaluate herbicide efficacy and weed control of several commonly available adjuvants for control of Amaranthus spp., prickly sida (teaweed), and barnyardgrass.

Objective 2: <u>Research the effectiveness of non-ionic surfactants and silicone-based herbicides at</u> penetrating through cover-crop and crop residues to improve soil contact and herbicide efficacy for soilapplied herbicides.

Objective 3: <u>Develop an easy-to-use guide for soybean farmers to aid in making adjuvant purchases for specific herbicide programs in Mississippi.</u>

Objective 1 Progress:

- Soybean AG47XFO were planted 5/4/22 (North Farm) and 5/20/22 (Brooksville)
- Both sites were overseeded with weed species of interest to ensure viable populations
 - North Farm 5/10/22 with teaweed
 - Brooksville 5/20/22 with barnyardgrass
- Herbicide applications were made 6/14/22
- Data were collected 6/22/22, 6/28/22
- Data were collected 7/7/22, 7/14/22, 7/21/22
- Data were input and organized
- Plots were maintained throughout the quarter
- Harvest data were collected and analyzed
- Weed control data were analyzed
- Study complete
- Thesis preparation underway

Objective 2 Progress:

- Ryegrass cover-crops were terminated 5/3/22
 - Fresh weights biomass samples collected 5/3/22

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- Dry weight biomass weights collected 5/13/22
- Soybean AG47XFO were planted at the following locations and dates:
 - Verona 5/17/22
 - Ramsey 5/18/22
 - Brooksville 5/19/22
- Herbicide applications were made and canopy penetration samples were collected at each site on the planting dates listed above
- Spray samples were processed in the laboratory on 5/23-5/25
- Data were collected
 - Ramsey: 5/26/22, 6/3/22, 6/9/22, 6/17/22, 6/22/22
 - Brooksville: 5/27/22, 6/2/22, 6/8/22, 6/15/22, 6/21/22
 - Verona: 5/27/22, 6/3/22, 6/9/22, 6/17/22, 6/23/22
- Data were input and organized
- Plots were maintained throughout the quarter
- Harvest data were collected and analyzed
- Weed control data were analyzed
- Deposition and penetration data were analyzed
- Cover crop biomass data were analyzed
- Study completed
- Thesis preparation underway

Objective 3 Progress:

- Data were collected on the dates listed above and will be used to compile this guide at the end of the project
- Guide is in preparation as part of Ms. Baker's thesis preparation

Impacts and Benefits to Mississippi Soybean Producers:

Data from these experiments can be used to improve efficiency of herbicide application in cover crop systems Mississippi soybean production systems. Growers can utilize these data to make more informed decisions with regard to adjuvant use and herbicide applications. Finally, data may also be used as a guide for adjuvant selection in herbicide systems.

End Products:

- Ms. Sydney Baker will graduate with a M.S. degree from Mississippi State University in August 2023 educated young people entering the agricultural workforce is the greatest benefit we can provide
- A M.S. thesis will be provided to the MSPB with grateful acknowledgement of funding in support of Ms. Baker's education
- Multiple presentations at professional conferences including the Southern Weed Science Society annual meeting
- A guide for adjuvant use based upon results from these experiments
- Multiple publications in the form of scientific abstracts

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Figure 1. Dye concentration at soil level when herbicides applied to cover crop systems with varying adjuvants in Verona, MS.



Graphics: