

SC Soybean Board 2021 Final Report

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Proposal Description: Herbicide tolerant soybean account for greater than 95% of the varieties planted in South Carolina. Dicamba tolerant varieties were commercialized for release in 2016. The dicamba herbicide products were not approved for use until the following year. Dicamba herbicide is very effective on several broadleaf weeds including Palmer amaranth, sicklepod, and morningglory. In cotton and soybeans, Liberty (glufosinate) was used extensively before the introduction of dicamba herbicide to manage Palmer amaranth. Multiple in-season applications were sometimes needed to manage glyphosate-resistant Palmer amaranth leading to resistance concerns to Liberty. Dicamba must also be applied before weeds exceed a certain growth stage (For example, Palmer amaranth must be treated before 4 inches in height). Overlapping soil residual herbicides reduces the intensity of the weed flushes. Therefore, there are fewer weeds for the postemergence herbicides to control. Fewer weeds present at the time of application reduces the likelihood of resistance development. The challenge with dicamba postemergence tank mixes is the restrictions on the label. Some tank mix partners interfere with the built-in volatility reducing components in the herbicide and cannot be added. In this case, a non-dicamba herbicide option would be the most effective option. In addition, if spraying near sensitive areas, towns, and natural areas containing endangered species, a non-dicamba herbicide program would be the best. A complete herbicide program with flexibility is needed such that we do not rely on dicamba alone or tank mix with glyphosate or Liberty to control these weeds because of ongoing resistance documented in other states.

Project Objectives:

1. To evaluate selected dicamba based herbicide programs on troublesome weeds in soybean.
2. To disseminate these research results to South Carolina soybean growers through field days and grower meetings.

Project Procedures: Field studies were conducted at the Edisto Research and Education Center. The experimental design was a randomized complete block with 4 replications (plot size is 4 rows by 40 ft). An untreated control was included as a visual reference for comparison of weed density in the treated plots. The trial was planted on June 25, 2021. The preemergence herbicide (Envive at 4.0 oz/A) was applied on the same date. The herbicide programs in this study are listed in Table 1. The two postemergence herbicide were applied on July 13, 2021 at the V2-V3 leaf growth stage, and August 2, 2021 at the V6-V7 leaf growth stage. Weed control and soybean visual injury evaluations were collected at POST1, POST2, 16 days after POST2, 30 days after POST2. Soybeans were harvested on October 27, 2021 using a small plot combine harvester.

Table 1. Dicamba Soybean Herbicide Programs in this study:

	POST1	Rate/A	POST2	Rate/A
1	Glyphosate + Xtendimax	32 oz + 22 oz	Glyphosate + Xtendimax	32 oz + 22 oz
2	Glyphosate + Cobra + Dual Magnum	32 oz + 12.5 oz +16 oz	Glyphosate + Warrant	32 oz + 12.5 oz + 3 pt
3	Glyphosate + Reflex	32 oz + 16 oz	Glyphosate + Xtendimax	22 oz + 32 oz

4	Liberty + Dual Magnum	32 oz + 16 oz	Liberty + Warrant	32 oz + 48 oz
5	Glyphosate + Xtendimax + Dual Magnum	22 oz + 32 oz + 16 oz	Glyphosate + Xtendimax + Classic	32 oz + 22 oz + 0.5 oz
6	Glyphosate + Xtendimax + FirstRate	22 oz + 32 oz + 0.3 oz	Glyphosate + Xtendimax + FirstRate	32 oz + 0.3 oz
7	Glyphosate + Prefix	32 oz + 2 pt	Liberty + Warrant	32 oz + 3 pt
8	Glyphosate + Liberty + Zidua	32 oz + 32 oz + 2 oz	Glyphosate + Warrant	32 oz + 32 oz
9	Liberty + Dual Magnum	32 oz + 16 oz	Liberty + Glyphosate	32 oz + 32 oz
10	Untreated Check			

Results and Discussion: All treatments were highly effective (93% or better) in controlling Palmer amaranth, annual morningglory, and other broadleaf weeds in the study area (Tables 2-4, Figure 1). Broadleaf signalgrass control was lower in the Liberty + Dual Magnum treatment at the POST2 application date (91%). However, control improved to 100% at 16 days after the POST2 treatment of glyphosate + Liberty. With the uncertainty presented by regulatory bodies on dicamba availability in 2022, the treatments in this study without dicamba showed that we can still manage Palmer amaranth in South Carolina.

Table 2. Percent weed control 2 weeks after preemergence application (7-13-21, POST1 application date)

TRT	POST1	POST2	AMAPA	IPOLA	BRAPP
1	Roundup + Xtendimax	Roundup + Xtendimax	100	100	100
2	Roundup + Cobra + Dual Mag.	Roundup + Warrant	100	99	100
3	Roundup + Reflex	Roundup + Xtendimax	100	98	100
4	Liberty + Dual Mag.	Liberty + Warrant	100	98	100
5	Roundup + Xtendimax + Dual Mag.	Roundup + Xtendimax + Classic	100	98	100
6	Roundup + Xtendimax + FirstRate	Roundup + Xtendimax + FirstRate	100	100	100
7	Roundup + Prefix	Liberty + Warrant	100	98	100
8	Roundup + Liberty + Zidua	Roundup + Warrant	100	99	100
9	Liberty + Dual Mag.	Roundup + Liberty	100	96	100
	LSD (0.05)		NS	NS	NS

Abbreviations: AMAPA, Palmer amaranth; IPOLA, Pitted morningglory; BRAPP, Broadleaf signalgrass.

Table 3. Percent weed control 20 days after POST1 application (8-2-21, at the POST2 application date)

TRT	POST1	POST2	AMAPA	IPOLA	BRAPP
1	Roundup + Xtendimax	Roundup + Xtendimax	100	100	100
2	Roundup + Cobra + Dual Mag.	Roundup + Warrant	100	98	100
3	Roundup + Reflex	Roundup + Xtendimax	99	96	100
4	Liberty + Dual Mag.	Liberty + Warrant	100	98	91
5	Roundup + Xtendimax + Dual Mag.	Roundup + Xtendimax + Classic	100	98	100
6	Roundup+ Xtendimax + FirstRate	Roundup + Xtendimax + FirstRate	100	100	95
7	Roundup + Prefix	Liberty + Warrant	100	99	96
8	Roundup + Liberty + Zidua	Roundup + Warrant	100	96	100
9	Liberty + Dual Mag.	Roundup + Liberty	100	93	91
	LSD (0.05)		NS	3	7

Abbreviations: AMAPA, Palmer amaranth; IPOLA, Pitted morningglory; BRAPP, Broadleaf signalgrass.

Table 4. Percent weed control 16 days after POST2 application.

TRT	POST1	POST2	AMAPA	IPOLA	BRAPP
1	Roundup + Xtendimax	Roundup + Xtendimax	100	100	100
2	Roundup + Cobra + Dual Mag.	Roundup + Warrant	100	100	100
3	Roundup + Reflex	Roundup + Xtendimax	100	100	100
4	Liberty + Dual Mag.	Liberty + Warrant	100	100	100
5	Roundup + Xtendimax + Dual Mag.	Roundup + Xtendimax + Classic	100	100	100
6	Roundup+ Xtendimax + FirstRate	Roundup + Xtendimax + FirstRate	100	100	100
7	Roundup + Prefix	Liberty + Warrant	100	100	100
8	Roundup + Liberty + Zidua	Roundup + Warrant	100	100	100
9	Liberty + Dual Mag.	Roundup + Liberty	100	100	100
	LSD (0.05)		NS	NS	NS

Abbreviations: AMAPA, Palmer amaranth; IPOLA, Pitted morningglory; BRAPP, Broadleaf signalgrass.

Table 5. Percent weed control 30 days after POST2 application.

TRT	POST1	POST2	AMAPA	IPOLA	BRAPP
1	Roundup + Xtendimax	Roundup + Xtendimax	100	100	100
2	Roundup + Cobra + Dual Mag.	Roundup + Warrant	100	100	100
3	Roundup + Reflex	Roundup + Xtendimax	100	100	100
4	Liberty + Dual Mag.	Liberty + Warrant	100	100	100
5	Roundup + Xtendimax + Dual Mag.	Roundup + Xtendimax + Classic	100	100	100
6	Roundup+ Xtendimax + FirstRate	Roundup + Xtendimax + FirstRate	100	100	100
7	Roundup + Prefix	Liberty + Warrant	100	100	100
8	Roundup + Liberty + Zidua	Roundup + Warrant	100	100	100
9	Liberty + Dual Mag.	Roundup + Liberty	100	100	100
10	Check	Check	0	0	0

Abbreviations: AMAPA, Palmer amaranth; IPOLA, Pitted morningglory; BRAPP, Broadleaf signalgrass.

No significant soybean injury was observed. The soybean yields varied 36 to 47 bu/A across the treatments. No differences were noted between the treatments (1-9) except for the untreated check. Plot pictures are shown in Figure 1 (16 days after POST2 application).

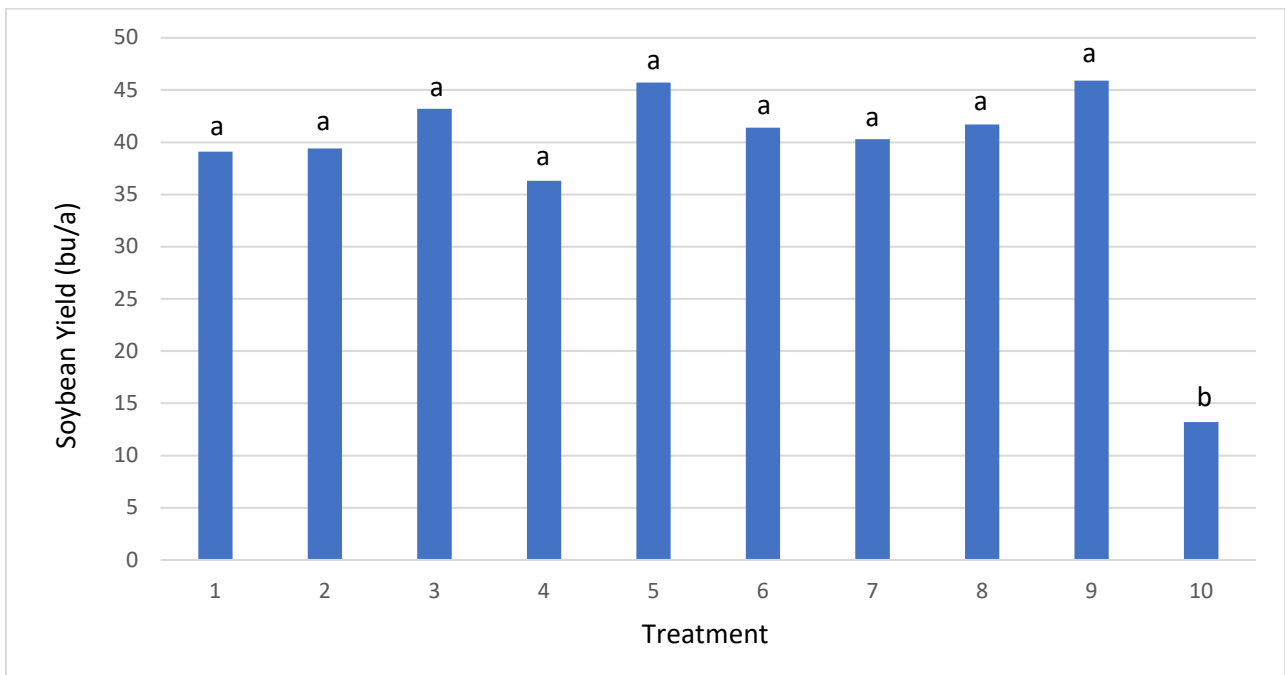


Figure 1. Soybean yield response to the herbicide programs. Significant differences are indicated by different letters above the bars.

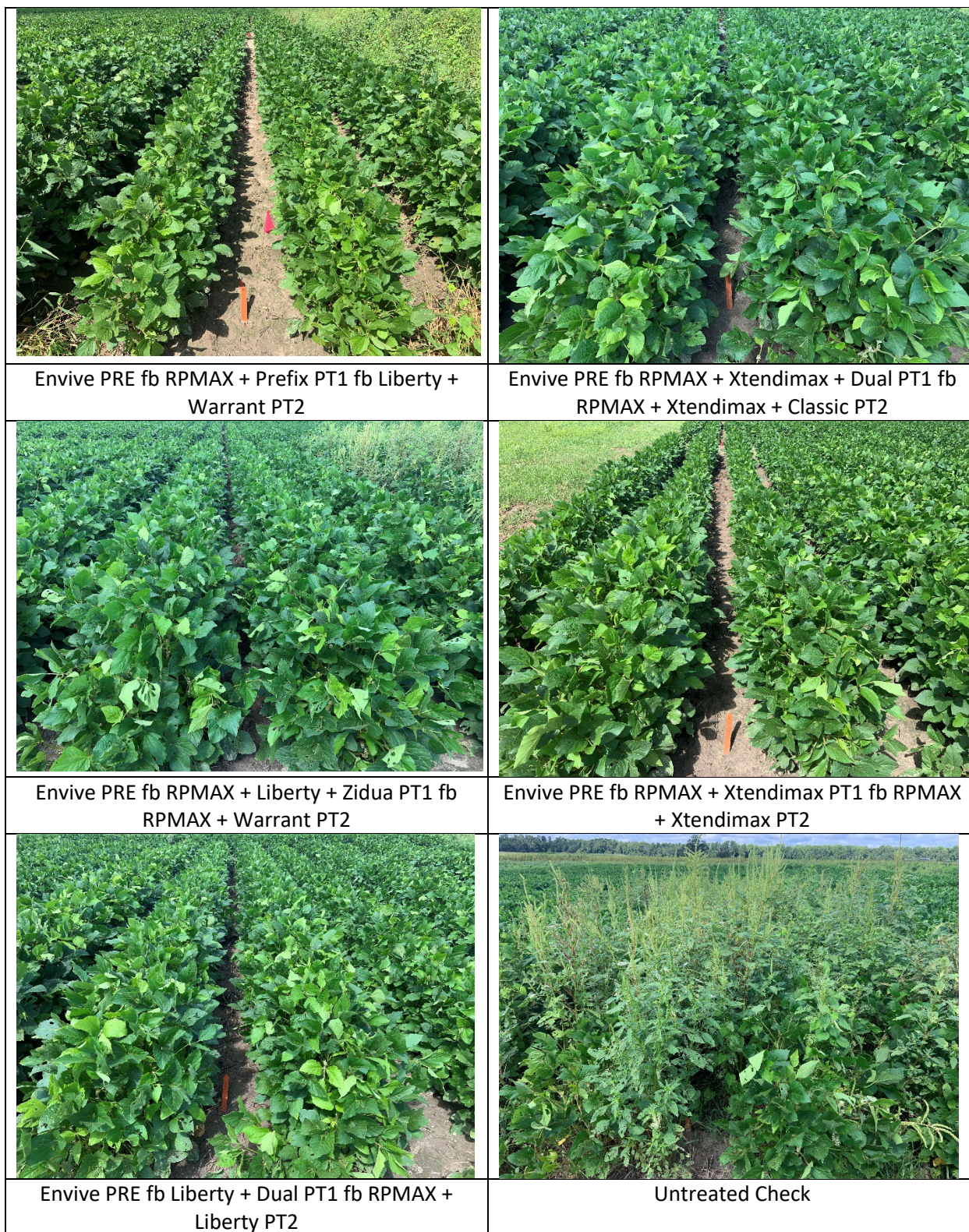


Figure 1. Treatment photos taken on August 18, 2021.