Demonstrating Use of High-Residue, Cover-Crop Conservation Tillage Systems to Control Glyphosate Resistant Palmer Amaranth

2011 Final Report Summary, USDA-CIG and CI Project #09-590

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In 2011, Auburn University & the USDA-ARS Soil Dynamics Lab, Clemson University, University of Georgia, and University of Tennessee continued a project investigating the effect of a high-residue, cover crop system for managing glyphosate-resistant Palmer amaranth. As was the case in 2009 and 2010, the participating scientists included Dr. Andrew Price, Dr. Mike Marshall, Dr. Stanley Culpepper, and Dr. Larry Steckel. During the course of the 2011 season, financial hurdles were encountered due to the original CI grant budget having to be corrected later in the year. The primary hurdle was that the CI subcontracts set forth in 2010 did not carry over into 2011 and the requirement to reflect the need for that was due to ignorance about this requirement of the PI, Dale Monks, at Auburn University. However, this was rectified during the late fall of 2011. After efforts were made to resolve this situation and set up the appropriate sub-contacts with the respective universities, the cooperating scientists forfeited CI funds for the University of Georgia and the University of Tennessee. This was primarily due to the tight time schedule (created by the above-mentioned oversight) that resulted in February. At this point of 2012, the University of Georgia and the University of Tennessee have fulfilled their roles in this project and, thus, their part in this project has been completed.

During spring cotton plot establishment in 2011 in fall-planted cover crops and tillage subplots, weather extremes played a major role in how well cotton in these areas grew during the early season. Drought conditions persisted well into the summer for the southeastern Alabama and central and southwestern Georgia locations, while heavy rain in Tennessee was more the norm according to the U.S. Drought Monitor for May 2011. Biomass measurements were generally good at all the locations and high rye biomass provided a very effective tool in suppressing the overall growth of Palmer amaranth which was similar to rye plus tillage (see Illustration 1).

With respect to rye biomass, Palmer amaranth, and cotton yields (where available), the general trends were very similar. As biomass increased, so did Palmer amaranth management (decreased density/ha) but seed cotton yield was less responsive (Figure 1). In the SC location, Palmer amaranth density was extremely high, a quite nebulous scientific statement without an appropriate scale for comparison; however, Palmer density was 3 to 5 times higher when no-tillage was left fallow compared to the same tillage system with the rye cover. The same trend was not seen at the Barbour Co. location in Alabama or at two of the UGA locations; however, Palmer density at the GA locations was far less when compared to the other states' sites (Table 1).

Field days and producer interaction. In order to highlight activities and results from the CI and USDA CIG funding, the project was discussed with producers at the Pee Dee REC annual summer field day in early August and again at Edisto REC in early October. Producer response to this project has been positive especially in areas where Palmer amaranth has completely taken over the fields and a glyphosate-only system no is no longer effective. In all four states, results from this project have been part of the focus of highlighting economically and environmentally sustainable options for producers when dealing with glyphosate-resistant Palmer amaranth. This has been conducted through on-farm visits, county production meetings across the southeastern U.S., and at national and international venues like the Beltwide Cotton Conferences in Atlanta, GA and Orlando, FL. A field day in the early summer in Barbour Co., Alabama provided an opportunity for Dr. Price and Dr. Mike Patterson to discuss the efforts that have been underway to help producers through funding from the USDA-CIG and Cotton Incorporated.

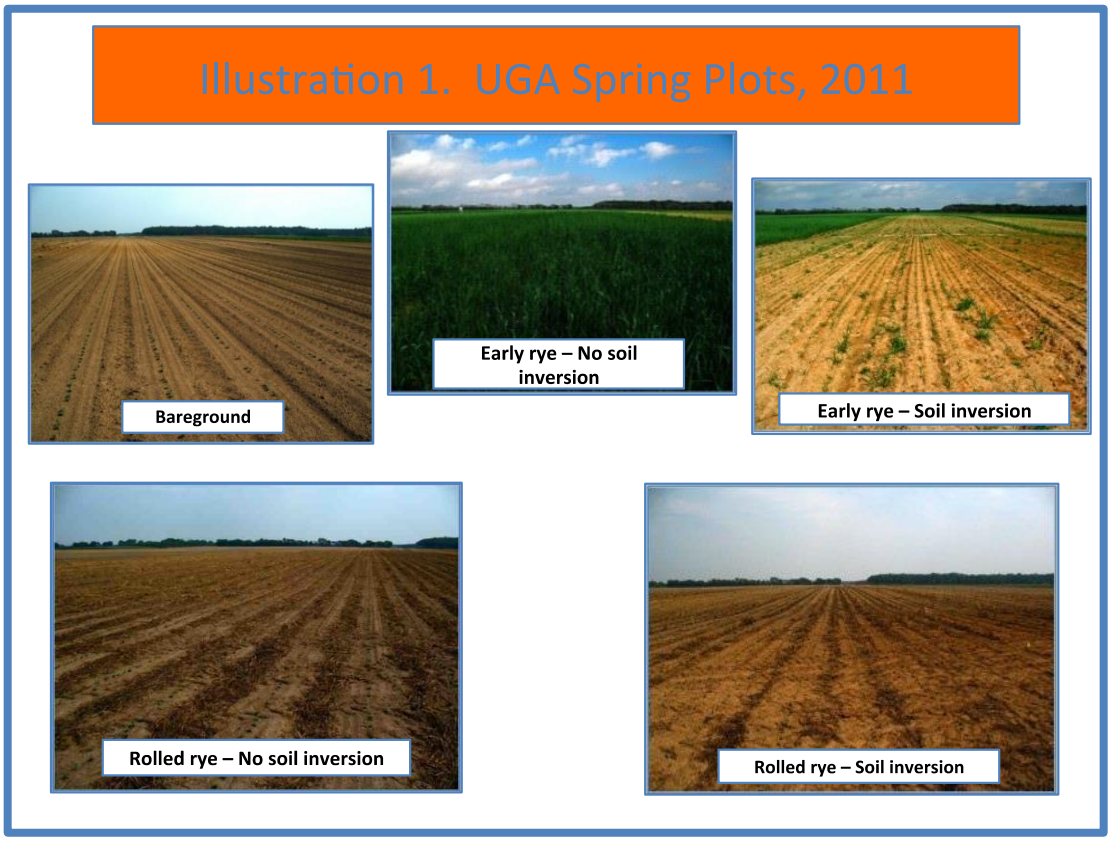

Figure 1. Rye and tillage effect on Palmer amaranth density (plants/ha), 2011

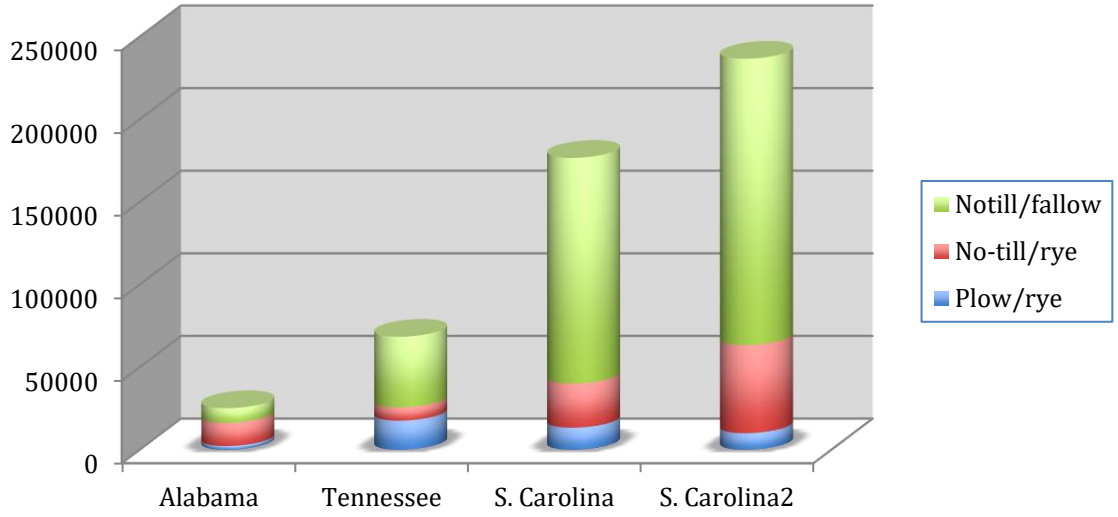

Table 1. Average rye biomass, Palmer amaranth, and seed cotton yield response to different weed management systems, 2011.

Location*	Rye biomass	Palmer density	Seed cotton yld.		
	kg/ha	plants/ha	kg/ha		
Barbour Co. AL (WS)					
Bottom plow/rye	3100	2266	1775		
No-till/rye	6065	14049	1792		
No-till/fallow	0	8837	1790		
***Widestrike technol.**					
Tipton Co. TN (WS)					
Bottom plow/rye	1643	17600	2242		
No-till/rye	1406	18000	2273		
No-till/fallow	0	42799	2267		
***Widestrike technol.**					
Worth Co. GA (RR)					
Bottom plow/rye	6790	0	NA		
No-till/rye	5400	120	NA		
No-till/fallow	0	23	NA		
***Roundup Ready Technol.**					
Seminole Co. GA (LL)					
Bottom plow/rye	2300	18	NA		
No-till/rye	13,500	26	NA		
No-till/fallow	0	125	NA		
***Liberty Link Technol.**					
Screven Co. GA (RR)					
Bottom plow/rye	5670	75	NA		
No-till/rye	2610	1303	NA		
No-till/fallow	0	1137	NA		
***Roundup Ready Technol.**					
Calhoun Co. SC (RR)					
Bottom plow/rye	5340	13333	1203		
No-till/rye	4628	26667	1098		
No-till/fallow	0	136667	1083		
***Roundup Ready Technol.**					
Lee Co. SC (Liberty Link)					
Bottom plow/rye	3338	10000	571		
No-till/rye	1531	53333	459		
No-till/fallow	0	173333	619		