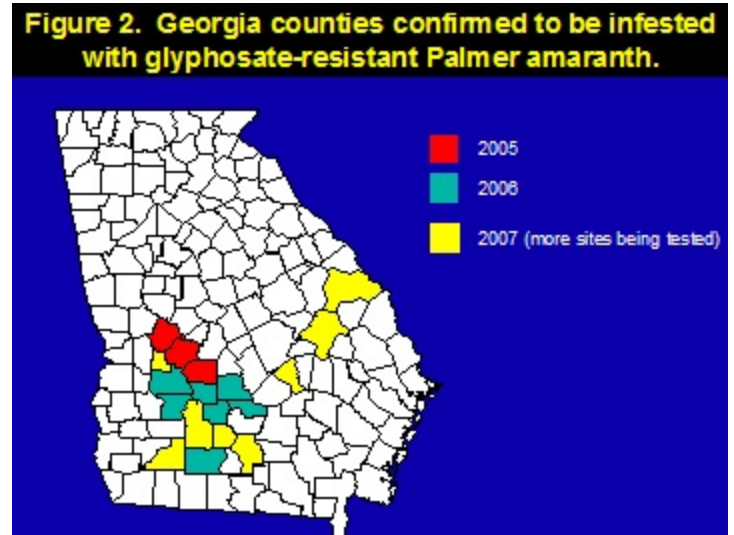
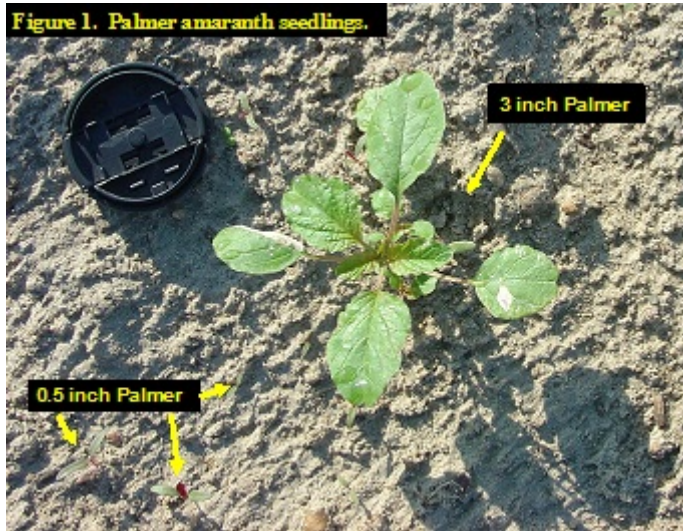


University of Georgia Herbicide Programs for Controlling Glyphosate-Resistant Palmer Amaranth in 2008 Cotton

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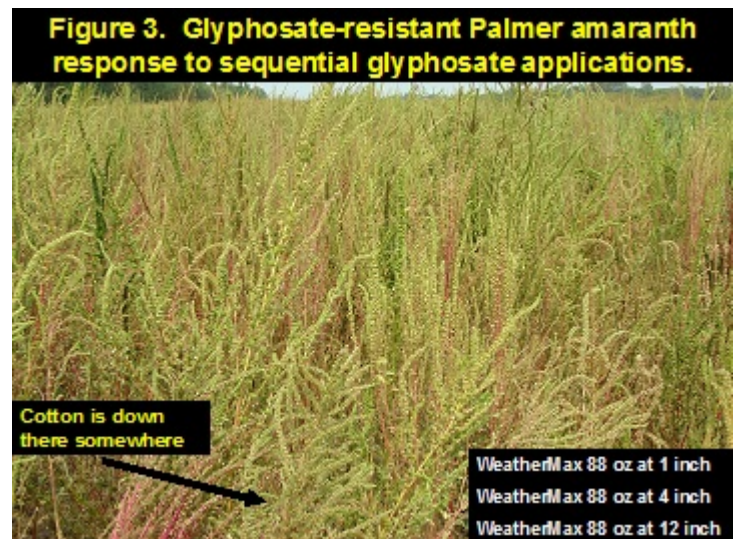
Glyphosate-resistant Palmer amaranth (pigweed) is Georgia's most problematic weed in cotton and currently infests at least 13 counties (Figures 1 & 2). Two Palmer amaranth per 20 row feet of cotton can reduce yield at least 23%, and a single female plant in Macon County produced 450,000 seeds when competing with cotton for the entire season. Spread of this resistant pest is rapid through traditional means such as custom harvesting, lack of cleaning equipment, and spreading of infested material such as gin trash, but the resistant trait is likely moving most rapidly via pollen.



Resistant populations can no longer be controlled by glyphosate at any practical rate, if at all (Figure 3).

This pest threatens both conservation tillage and cotton production. Growers who have resistant Palmer amaranth must adopt aggressive management programs. More importantly, growers who do not have resistance must delay its arrival as there are *no economical programs to manage this pest in cotton*.

On the back, tables 1 and 2 are herbicide management programs for glyphosate-resistant Palmer amaranth while tables 2 and 3 are programs strongly encouraged to delay the onset of resistance. For growers producing dryland cotton in areas infested with glyphosate-resistant Palmer amaranth, the use of an Ignite-based program (Table 2) would be more effective than Roundup Ready programs if rainfall does not occur within 3 days of applying the at-plant residual herbicides in Roundup Ready programs.




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To help delay resistance, growers need to diversify crop production practices, including crop rotation and use of *herbicides with different modes of action*. Also, refer to the most recent cotton production guide or pest control handbook for herbicide rates and proper cotton sizes at time of application.

The Georgia Cotton Commission, Cotton Incorporated, and Industry are primary funding sources for this research!

Table 1. Managing Glyphosate-Resistant Palmer Amaranth in Roundup Ready (RR) Cotton.*

Preplant Incorporated (PPI) or Preemergence (PRE)	Postemergence (1- to 4-leaf cotton)	Layby Directed
<p>Dryland Production</p> <p>Prowl or Treflan PPI + Reflex PRE¹</p>	<p>Glyphosate + Dual Magnum⁴ <i>(no Palmer emerged)</i></p> <p>OR</p> <p>Glyphosate + Staple³ <i>(Palmer 1-2")</i></p>	<p>MSMA + Direx MSMA + Layby Pro MSMA + Suprend³ MSMA + Valor</p>
<p>Irrigated Production</p> <p>Diuron, Prowl², or Staple³ + Reflex PRE or Diuron + Staple³ PRE</p>		

***Hand weeding, cultivation, and/or application of Gramoxone mixtures with hooded sprayers will likely be needed.**

1. In dry land production, the addition of diuron, Cotoran, or Staple with Reflex PRE may improve control once activated by rainfall. For those growing a dryland crop using conservation tillage, an Ignite-based program is strongly encouraged (see Table 2).
2. Incorporated applications of Treflan or Prowl will be more consistent than PRE applications.
3. Make only one application of an ALS-inhibiting herbicide (Staple, Envoke, Suprend) per season. Will not control ALS-resistant Palmer amaranth.
4. Dual Magnum contains S-metolachlor. The generic brands Brawl and Medal also contain S-metolachlor. Other generic brands contain metolachlor, a mixture of R and S isomers. Per unit of product, brands containing S-metolachlor are more effective on Palmer amaranth and other weeds. Sequence contains a mixture of glyphosate + S-metolachlor.

Table 2. Managing Glyphosate-Resistant or Sensitive Palmer amaranth in Liberty Link cotton.*

Preemergence (PRE)	Postemergence (1- to 4-leaf cotton)	Layby Directed
<p>Diuron, Prowl¹, or Staple² + Reflex PRE or Diuron or Prowl + Staple² PRE</p>	<p>Ignite or Ignite + Dual Magnum³ <i>(Palmer < 2 inch)</i></p>	<p>MSMA + Direx MSMA + Layby Pro MSMA + Suprend² MSMA + Valor</p>
	<p>Ignite + Staple² <i>(Palmer < 4 inch)</i></p>	

*** Cotton cultivar must be resistant to Ignite 280 (glufosinate) herbicide or serious crop injury can occur.**

1. Incorporated applications of Treflan or Prowl will be more consistent than PRE applications.
2. Make only one application of an ALS-inhibiting herbicide (Staple, Envoke, Suprend) per season. Will not control ALS-resistant Palmer amaranth.
3. Dual Magnum contains S-metolachlor. The generic brands Brawl and Medal also contain S-metolachlor. Other generic brands contain metolachlor, a mixture of R and S isomers. Per unit of product, brands containing S-metolachlor are more effective on Palmer amaranth and other weeds. Sequence contains a mixture of glyphosate + S-metolachlor.

Table 3. Managing MODERATE to HEAVY Glyphosate-Sensitive Palmer Infestations in RR Cotton.

Preemergence (PRE)	Postemergence (1- to 4-leaf cotton)	Layby Directed
<p>Cotoran, Diuron or Prowl¹ PRE</p>	<p>Glyphosate + Dual Magnum³</p>	<p>MSMA + Direx MSMA + Layby Pro MSMA + Suprend² MSMA + Valor Glyphosate + Direx⁴ Glyphosate + Layby Pro⁴ Glyphosate + Suprend² Glyphosate + Valor</p>
	<p>Glyphosate + Staple²</p>	
<p>Prowl PRE + Cotoran, Diuron, Staple² or Reflex PRE</p>	<p>Glyphosate as needed</p>	

1. Incorporated applications of Treflan or Prowl will be more consistent than PRE applications.
2. Make only one application of an ALS-inhibiting herbicide (Staple, Envoke, Suprend) per season. Will not control ALS-resistant Palmer amaranth.
3. Dual Magnum contains S-metolachlor. The generic brands Brawl and Medal also contain S-metolachlor. Other generic brands contain metolachlor, a mixture of R and S isomers. Per unit of product, brands containing S-metolachlor are more effective on Palmer amaranth and other weeds. Sequence contains a mixture of glyphosate + S-metolachlor.
4. Mixing Direx or Layby Pro with glyphosate may reduce grass control by glyphosate, especially when grasses are large and conditions are dry.

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