Palmer Amaranth Control in Cotton in 2018

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At least three sound cotton weed management systems are available providing consistently effective weed control and those include 2,4-D, dicamba, and Roundup/Liberty programs. Timely applications and use of residual herbicides remain a critical component of each system. Additionally, stewarding pesticides with a focus on making on-target applications and understanding where not to apply dicamba or 2,4-D is critical for long-term sustainability. Our focus with this circular is to help growers implement sound programs for the control of Palmer amaranth, minimize cotton injury, and make on-target pesticide applications. ***The Georgia Cotton Commission, Cotton Incorporated, and Industry are primary funding sources!!***

STEP 1: BURNDOWN: Palmer amaranth must not be emerged when planting, regardless of cotton cultivar planted.

Standard programs using Valor (before Palmer emergence), Direx, and Gramoxone + Direx are advised. Dicamba or 2,4-D would be beneficial for primrose, horseweed, and radish. All weeds and cover crops with the exception of cereal grains should be killed ≥ 10 d before planting. No plant back interval exists for XtendiMax or Engenia in XtendFlex cotton; other cultivars may be planted 30 d after 1" of rainfall. No plant back interval exists for Enlist Duo or Enlist One in Enlist cotton; other cultivars may be planted 30 d after application, and 0.5" of irrigation between application and planting is beneficial.

STEP 2: Preemergence (PRE) applications: Include 2 active ingredients for better control (Fig 1), less crop injury, and less herbicide selection pressure.

PRE'S	HERBICIDE RATES ASSUME TIMELY SEQUENTIAL POST APPLICATIONS AND DIRECTED LAYBY
1) Brake F16 **2) Direx + Warrant** **3) Reflex + Direx** **4) Reflex + Warrant**	**1) Brake F16** contains fomesafen and fluridone; 1 pt/A is an effective rate for most soils. Fluridone requires significant rain/irrigation to become fully active. **2) Warrant:** For most soils, 32-40 oz/A is in order; however, use 48 oz/A for Roundup only systems. Very effective on spiderwort and pigweeds. **3) Direx:** For most soils the ideal rate is 10-20 oz/A; lower rates on sands or under intense irrigation. Avoid diuron PRE if it was applied within 14 d of planting as a burndown. **4) Reflex:** For most soils, ideal rate is 10-12 oz/A when in these tank mixtures. NOTE: Add paraquat if pigweed is emerged. If mixing paraquat with Brake F16, a jar test is strongly advised.

STEP 3: Sequential POST's are needed for many fields. Applications below assume Palmer amaranth 3 inches or smaller.

POST 1 ~15 d after PRE[1]	POST 2 ~ 15 d after POST 1[1]
LIBERTY OR LIBERTY + ROUNDUP SYSTEMS[2]	
Liberty + Roundup + Dual Mag. or Warrant[3,4] *or* **Liberty + Dual Mag or Warrant or Staple**	**Liberty + Dual Mag. or Warrant** ***(No 3-way mix suggested late season)***
ENGENIA OR XTENDIMAX SYSTEMS – XTENDFLEX COTTON	
Engenia 12.8 oz/A or XtendiMax 22 oz/A + glyphosate[5]	**Engenia 12.8 oz/A or XtendiMax 22 oz/A + glyphosate**
ENLIST DUO OR ENLIST ONE SYSTEMS – ENLIST COTTON	
Enlist Duo 4.75 pt/A[3] ***or*** **Enlist One 2 pt/A + glyphosate[6]** ***or*** **Enlist One 2 pt/A + Liberty[6]**	**Enlist Duo 4.75 pt/A[3]** ***or*** **Enlist One 2 pt/A + glyphosate** ***or*** **Enlist One 2 pt/A + Liberty**

Comments

[1]Day interval assumes PRE residual herbicides were ideally activated.

[2]Glytol LibertyLink, XtendFlex, or Enlist Cotton Cultivars. UGA data suggests tolerance to Liberty is as follows: Glytol LibertyLink > Enlist > XtendFlex>>>Widestrike.

[3]Mixes of Liberty + Roundup + residual are the most effective option for weed control; however, more injury occurs with 3-way mixes. Leaf shed and 25% injury has been noted.

[4]Mix may provide less grass control than Roundup but more control than Liberty alone, especially for goosegrass. Use full rate of Roundup. Base Liberty rate on pigweed size.

[5]Warrant may be added and will improve weed control; however, more injury occurs with 3-way mixes. Leaf shed and 25% injury has been noted. Visit web sites (on back) for latest information on tank mixtures, adjuvants, and drift reduction agents.

[6]Warrant or Dual Mag may be added and will improve weed control; however, more injury occurs with 3-way mixes. Visit web sites (on back) for latest information on tank mixtures, adjuvants and drift reduction agents.

STEP 4: Layby NEEDS TO BE DIRECTED and not overtop.

A directed or hooded application is needed for all cultivars thereby improving farm sustainability through improved weed control while reducing cotton injury and selection pressure to topically applied herbicides. Fig. 2 and 3 tell the future for those relying too heavily on topically applied herbicides. Direx + MSMA (best for pigweed) or Roundup + Direx are great directed options; adding Envoke improves morningglory control greatly. For grasses, make sure to utilize Roundup.

Figure 1. Number of emerged Palmer amaranth per acre 21 d after planting.

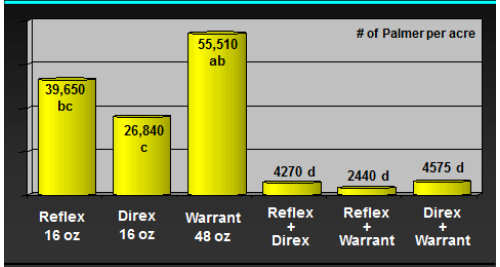

Fig 2. Large Acreage – Photo After Year 3!

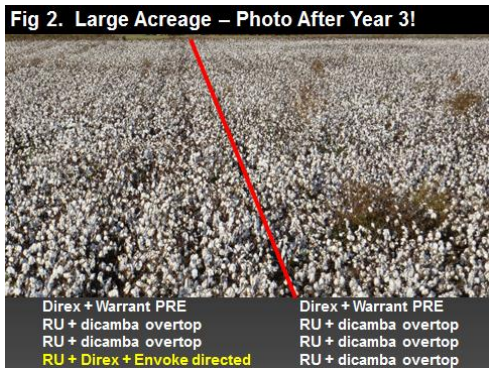

Fig 3. Virgin Palmer response to RU + dicamba.

Table 1: WEB SITES:

1. Enlist Duo or Enlist One: www.EnlistTankMix.com
2. Engenia: www.engeniatankmix.com
3. XtendiMax: www.xtendimaxapplicationrequirements.com

STEPS TO IMPROVE ON-TARGET AUXIN HERBICIDE APPLICATIONS

1. Most broadleaf vegetables, fruits, nuts, and tobacco are very sensitive to dicamba and 2,4-D, avoid applications near sensitive crops (Fig 4/5).
2. Apply in winds between 3 to 10 mph; drift distances can still be large. Land terrain & wind direction relative to the sprayer have huge impacts on drift.
3. Max boom height above canopy or pest is 24". Drift distances can be cut nearly in half with a 24" boom height compared to one at 50".
4. Sprayer ground speed influences drift greatly. Suggest staying under 10 mph. Absolutely no aerial applications!
5. Use only labeled spray tip, PSI, and GPA. One GA study noted a reduction of 60% when following label compared to standard flat fan tip.
6. Label clearly restricts any application being made with winds toward any sensitive crop. When no sensitive crop is downwind then buffers for 1X rate of labeled dicamba products is 110 ft and for 1X labeled rates of 2,4-D products is 30 feet.

SPECIFIC STEPS FOR ENGENIA, FEXAPAN, OR XTENDIMAX

1. Person responsible for in-crop application must have attended the Using Pesticides Wisely Classroom Training.
2. All applicators (person making application) must have attended Using Pesticide Wisely Classroom Training or Extension Agent one-on-one training.
3. Dicamba application information must be documented for each application, obtain form/guidelines from your local Extension agent.
4. DO NOT add AMS in with dicamba as this will increase volatility greatly. Also, only mix dicamba with approved products, see website (Table 1).

SPECIFIC STEPS FOR ENLIST DUO OR ENLIST ONE

1. Person responsible for an in-crop application of Enlist Duo or Enlist One must have attended the Using Pesticides Wisely Training.
2. Only mix 2,4-D choline with approved products, see website (Table 1).

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Fig 4. Visual Sensitivity Scale for Dicamba in GA-2018

Lower	Moderate	Severe	Extreme
Broccoli	Cantaloupe	Cotton	Grapes*
Cabbage	Canola*	Pepper	Lima Bean
Kale	Cucumber	Tomato	Southern Pea
Mustard	Peach	Watermelon	Snap Bean
Pecan	Peanut		Soybean
Turnip	Squash		Sweet potato*
			Tobacco*
>1/75X	1/75-1/300X	1/300-1/800X	< 1/800X

Herbicide Rate of Visually Detectable Injury

For relative comparison, tomato, squash, and watermelon response to Roundup for visual damage would be in the "lower" category.

*Data from literature; all other data generated in over 70 UGA field experiments.

Fig 5. Visual Sensitivity Scale For 2,4-D in GA-2018

Lower	Moderate	Severe	Extreme
Broccoli	Cantaloupe	Pepper	Cotton
Cabbage	Canola	Tomato	Grapes*
Kale	Cucumber	Watermelon	Lima Bean
Mustard	Soybean		Southern Pea
Onions	Squash		Snap Bean
Peach			Sweet potato*
Peanut			Tobacco*
Pecan			
Turnip			
>1/75X	1/75-1/300X	1/300-1/800X	< 1/800X

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