



Innovation to Manage Glyphosate-Resistant Palmer amaranth

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Palmer amaranth RoundTable
Little Rock, Arkansas, Dec. 13-14, 2007





IGNITE	IGNITE 280
32 oz →	22 oz
40 oz →	29 oz
60 oz →	43 oz



▪ 1.67 lbs glufosinate-ammonium

▪ 2.34 lbs glufosinate-ammonium

Best Management Practices

- Know Your Weed Management Options
 - Start Clean
 - Utilize a PPI (yellow herbicide) prior to planting
 - Depending on weed species, pressure, etc., use a Preemergence herbicide behind the planter
 - Plan on a residual material at layby
 - Use Ignite 280 in the LibertyLink trait system

Manage resistance with Ignite

- IGNITE 280 herbicide, in the LibertyLink[®] trait system, provides fast, non-selective control of more than 100 grasses and broadleaf weeds in cotton.
- The LibertyLink system, with IGNITE 280 herbicide, is the only logical rotational alternative to Roundup Ready cotton where weed resistance is a concern.
- In LibertyLink cotton, IGNITE 280 can be applied as a pre-plant burndown, over-the-top post-emergent, hooded, or post-directed.



Manage resistance with Ignite

- IGNITE 280 can be tankmixed with other contact, systemic and residual herbicides to fit field-by-field needs.
- In a Roundup Ready system, IGNITE 280 can be applied under a hood as part of a program to control glyphosate-resistant weeds.



Managing Glyphosate-Resistant Palmer amaranth



Trials of:

**Dr. Stanley Culpepper UGA
2006 & 2007 Macon County, GA**

**Contributed by
Herb Young & Chris Hopkins
Bayer CropScience 2007**

Palmer amaranth Resistance to Glyphosate



Documented in over 20 GA Counties



“Has potential of being the worst problem since the boll weevil.” - Dr. Stanley Culpepper, UGA



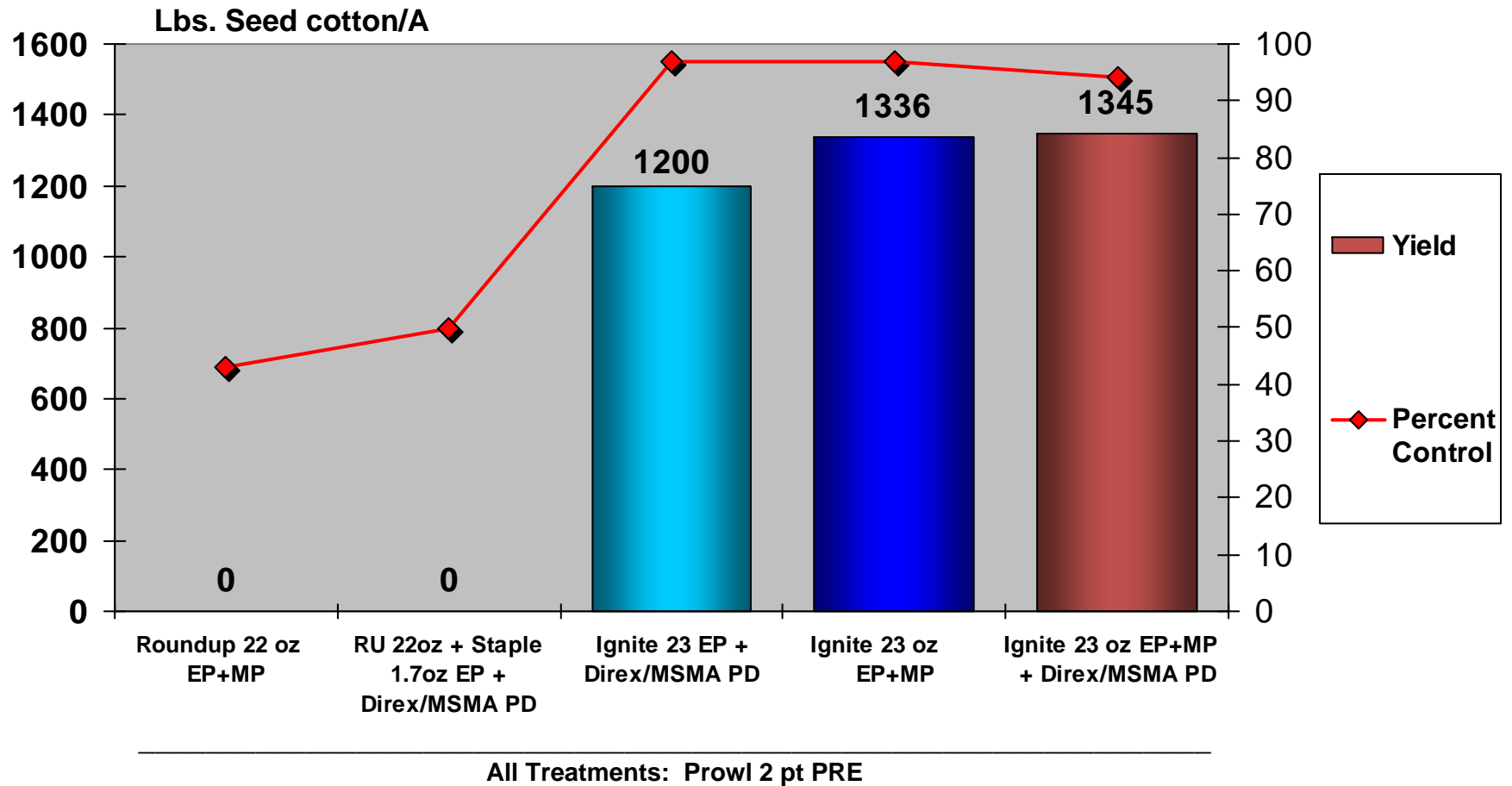
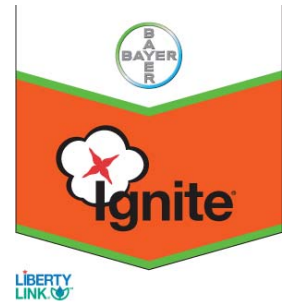
Projection to be state-wide in Georgia has been reduced from 10 years to 3 years.



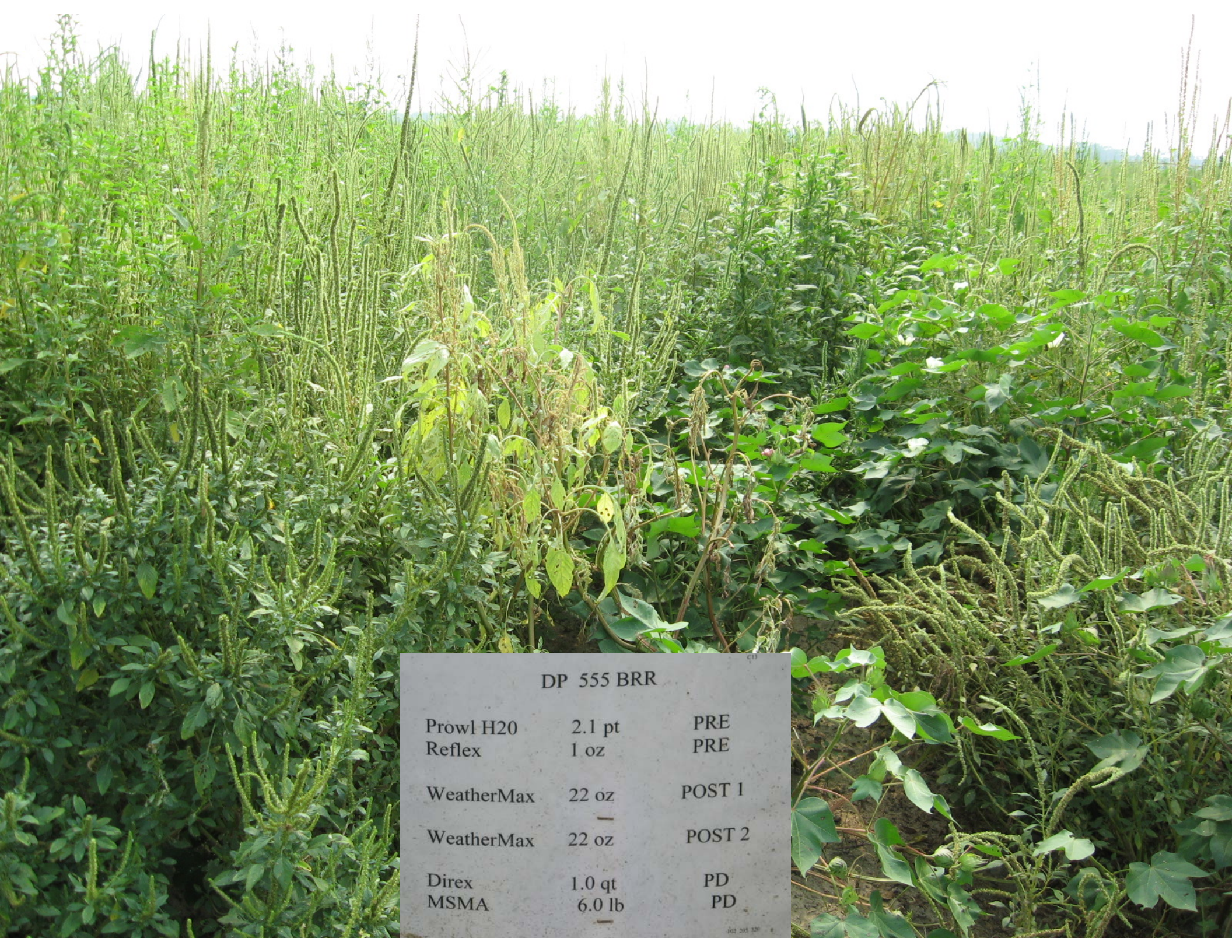
LibertyLink[®] Cotton and Ignite[®] 280 have provided control of glyphosate-resistant Palmer amaranth.

Glyphosate-Resistant Palmer amaranth

2006 Dr. Stanley Culpepper, UGA Macon County, GA



EP: Early Post application to 2" Palmer amaranth.
Limited second weed flush due to drought.
Mid-season control evaluation: 6/17/2006



DP 555 BRR

Prowl H20	2.1 pt	PRE
Reflex	1 oz	PRE
WeatherMax	22 oz	POST 1
WeatherMax	22 oz	POST 2
Direx	1.0 qt	PD
MSMA	6.0 lb	PD



Liberty Link

Prowl H2O	2.1 pt	PRE
Ignite	23 oz	POST 1
Ignite	23 oz	POST 2
Direx	1 qt	PD
MSMA	2 lb	PD



Liberty Link

Direx	2.0 pt	PRE
Reflex	1.0 pt	PRE
Ignite	23 oz	POST 1
Ignite	23 oz	POST 2
Ignite	29 oz	PD

Laudis Herbicide



Laudis 3.5 SC (Tembotrione + BCS Proprietary Safener)

A new standard in crop safety. No limitation in rotation to key crops:

- Cereal Grains (4 months), Soybean (8 months), Cotton & Sorghum (10 months)

Postemergence application (VE-V8) in corn.

Control of both grass and broadleaf weeds

Novel active ingredient. Allows growers to break the weed-resistance cycle by introducing a unique chemistry mode-of-action to their fields.

Has in-season residual activity.

Can be used in mixtures and programs with other herbicides.



- GlyTol will offer additional weed control choices for cotton producers seeking a glyphosate weed control system
- H2 stacked cotton (LibertyLink + GlyTol) will provide improved weed control options over current standards while providing a solution for the control of tough to manage or resistant weeds
 - Improves the sustainability of bio-tech weed control

Regulatory

- GlyTol - regulatory approvals are expected in launch year (2009)
 - At launch; US, Canada and possibly Korea and Mexico
 - End of the 2009 season – Japan and Australia and possibly Europe

H2 Cotton – US launch 2010*



- ◆ Tolerance to both glufosinate ammonium and glyphosate
- ◆ Advantages over RR and LL alone
- ◆ More flexibility for weed control

* Anticipated launch subject to regulatory approvals

Herbicide Tolerance US Trials 2007



Twinlink Cotton – US launch 2012*



- ◆ Two gene product (Cry1Ab + Cry2Ae)
- ◆ Equivalent to BG2

◆ 2007 development (field trials and bioassays):

- IRM fit
- Efficacy
- Pest spectrum
- Seasonal patterns of expression
- Trait x variety interactions

* Anticipated launch subject to regulatory approvals

New Technologies

Existing



In the Pipeline

- Liberty Link Technology stacked with proprietary glyphosate herbicide tolerant technology



- Competing proprietary dual *Bt* insect resistance technology



- Abiotic stress tolerance

Plus exclusive licensing agreement with Senesco to enhance quality & yield

Mid-South & Southeast Variety Pipeline

Year	Early	Mid	Full
2006	ST 4554B2RF ST 4664B2RF		ST 6611B2RF ST 6622B2RF
2007	ST 4427B2RF	ST 5327B2RF ST 5283B2RF	
2008	STX 4498B2RF STX4596B2RF STX4678B2RF	STX5458B2RF	STX6351B2RF
2009	4 candidates	2 candidates	5 candidates
2010	6 candidates	5 candidates	2 candidates
2011	12 candidates	13 candidates	5 candidates

- Recent Developments in Trait Technology:
 - Agreement with Stine Soybean to Release Liberty Link Varieties.
 - Agreement to develop new herbicide tolerant soybeans
 - Tolerance to isoxaflutole (Balance Pro) and other “HPPD-inhibitor herbicides”.
 - First product will be soybeans with tolerance to glyphosate and “HPPD-inhibitor herbicides” (isoxaflutole).
 - Followed by a triple-stack with Bayer’s glufosinate tolerance.
 - Bayer has full freedom to operate in the development of other HPPD-inhibitor tolerant crops (including cotton).

