

**PERFORMANCE OF GLYTOL™ AND GLYTOL™+LIBERTYLINK® COTTON IN CALIFORNIA AND ARIZONA****R. Humphries****S. Wright****L. Trolinder****H. Moser****J. Holloway****Bayer CropScience****Shafter, CA****Abstract**

Bayer CropScience has developed in-house GlyTol™ glyphosate tolerant technology for cotton, expressing the *2mepsps* gene. By conventional breeding, Bayer CropScience has combined GlyTol cotton with LibertyLink® technology to produce stacked herbicide tolerant cotton varieties. Contingent upon regulatory approvals, GlyTol and GlyTol + LibertyLink cotton are planned for commercial release in the US in 2009 and 2010, respectively.

Field trials with GlyTol and GlyTol + LibertyLink cotton were conducted in-house in 2007. Field trials were also conducted with third parties in 2008. Results from these trials showed no adverse effects on GlyTol or GlyTol + LibertyLink cotton plant height, boll shape, yield or fiber quality following four applications of full rates of a number of commercial glyphosate formulations.

GlyTol cotton will provide cotton growers in California and Arizona with new cotton varieties that have season-long tolerance to a number of different commercially available glyphosate herbicide formulations. The combination of the GlyTol + LibertyLink technologies will provide US cotton growers with new cotton varieties that offer season-long tolerance to both a number of glyphosate herbicide formulations and Ignite® herbicide. Results from replicated field trials conducted in California and Arizona in 2007 and 2008 are presented here.

**Materials and Methods**

In 2007, GlyTol cotton was evaluated at Shafter, CA; in 2008 both GlyTol and GlyTol + LibertyLink cotton were evaluated at four locations: Fresno, CA; Five Points, CA; Shafter, CA; and Maricopa, AZ. Replicated small plot trials consisted of an untreated control and seven different glyphosate formulations, each replicated four times. Plot sizes were a minimum of 4 rows x 40 ft. Four applications of herbicide were made at the following application timings: 2-4 leaf stage, 6-8 leaf stage, lay-by and 50% open. All glyphosate formulations were applied at the rate of one pound of active ingredient per acre in an application volume of 15 gallons of water per acre. Weeds were controlled with best management practices in all plots. Following each herbicide application, plots were evaluated for phytotoxicity and plant height. Before defoliation, plots in the 2008 Shafter, CA trial were assessed for abnormal 'parrot-shaped' bolls. Random samples of 25 bolls were harvested by hand from each plot at crop maturity to provide lint samples and to estimate lint percent. The middle two rows of each plot were then mechanically harvested and weighed for yield calculations. Lint samples were HVI tested for quality parameters. Data were analysed using Scout's ARM 7 from Gylling Data Management, Inc. For the 2008 across location averages, only treatments 1 and D were used from the Shafter, CA trial and only treatments B and C were used from the Five Points, CA; Fresno, CA; and Maricopa, AZ trials (Figures 2 and 6).

Treatment	2007 Shafter, CA (GlyTol Cotton)	2008 Shafter, CA (GlyTol+LibertyLink cotton)	2008 Five Points, CA; Fresno, CA; Maricopa, AZ
I	Untreated Control	Untreated Control	Untreated Control (GlyTol cotton)
A	Glyphosate	Glyphosate	Glyphosate (GlyTol cotton)
B	Glyphosate	Glyphosate	Untreated Control (GlyTol + LibertyLink cotton)
C	Glyphosate	Glyphosate	Glyphosate (GlyTol + LibertyLink cotton)
D	Glyphosate	Glyphosate	Ignite 280 (GlyTol + LibertyLink cotton)
E	Glyphosate	Glyphosate	Ignite 280 + glyphosate (alternating applications) (GlyTol + LibertyLink cotton)
F	Glyphosate	Glyphosate	Glyphosate and Ignite 280 (alternating applications) (GlyTol + LibertyLink cotton)
G	Glyphosate	Glyphosate	Ignite 280® + glyphosate (tank mix) (GlyTol + LibertyLink cotton)

### Results

The plant height data for the 2008 formulation trial conducted in Shafter, CA did not yield any significant differences in final plant height between the control and any of the glyphosate formulations applied. (Figure 1).

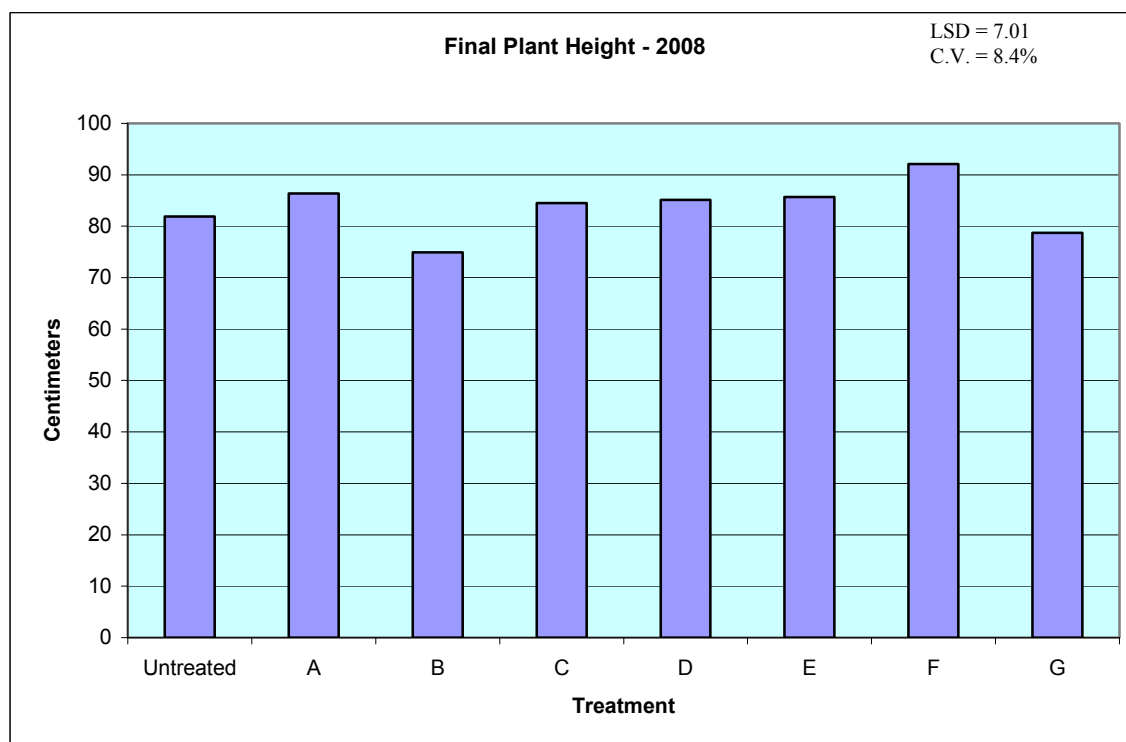


Figure 1. Plant height of GlyTol + LibertyLink cotton following four applications of different formulations of glyphosate herbicide.

In 2008, plant height comparisons from two trials in California and one trial in Arizona did not show any significant differences between the glyphosate treated plots and the untreated control. When averaged across the three locations, plant heights were essentially equal between the glyphosate treated plots and the control, 95.4 and 98.7 centimeters, respectively. The standard deviations were 7 for the control plots and 6 for the treated plots (Figure 2).

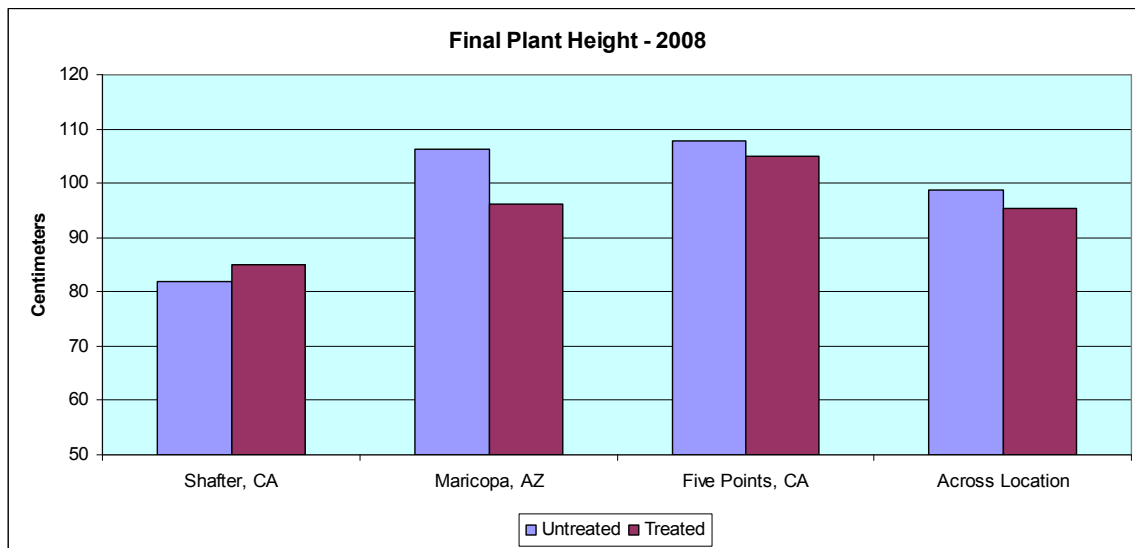


Figure 2. Final plant heights of GlyTol + LibertyLink trials at three locations in 2008.

A visual assessment of abnormally shaped bolls was conducted in the 2008 formulation trial conducted in Shafter, CA. Twenty-five bolls from each plot were evaluated and the number of abnormal bolls recorded. The data show that there was no significant difference between any of the glyphosate treatments and the control. The standard deviation for the assessment was 1.96 (Figure 3).

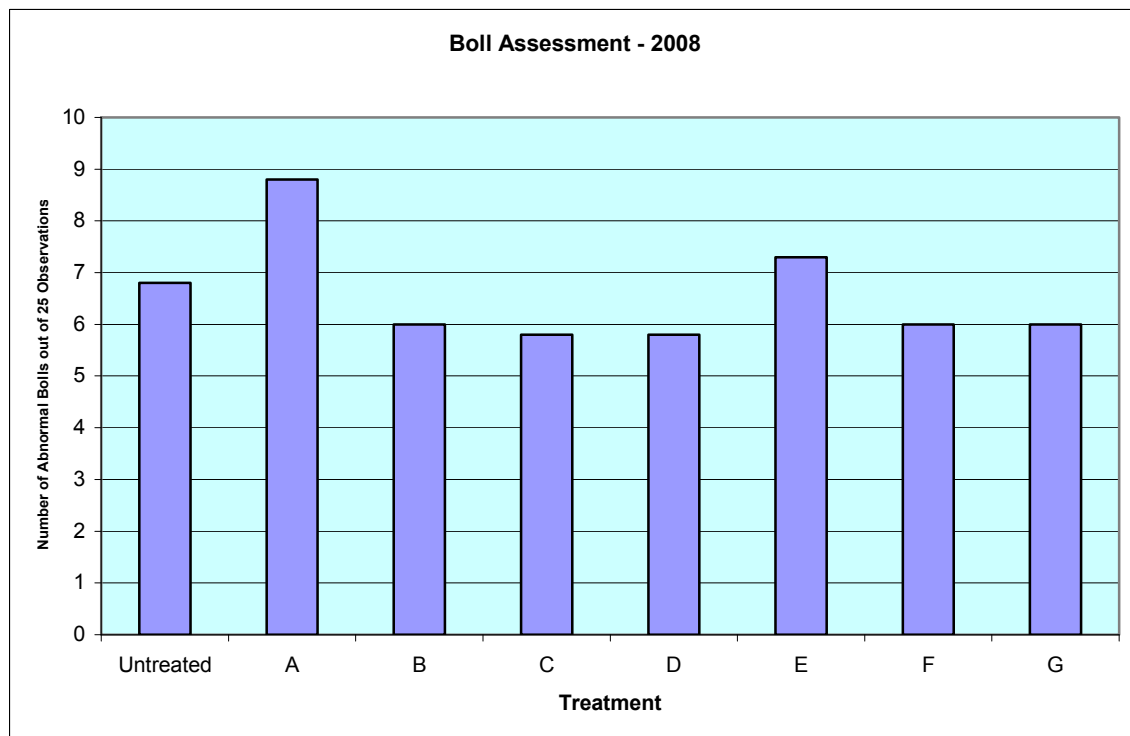


Figure 3. Boll type GlyTol + LibertyLink cotton following three applications of different formulations of glyphosate, Bayer CropScience R&D farm Shafter, CA.

2007 results at Shafter, CA, showed no significant differences in lint yield between any of the glyphosate formulations and the untreated control. The untreated control yielded 1385 pounds of lint per acre and the trial LSD (.05) was 223 pounds per acre (Figure 4).

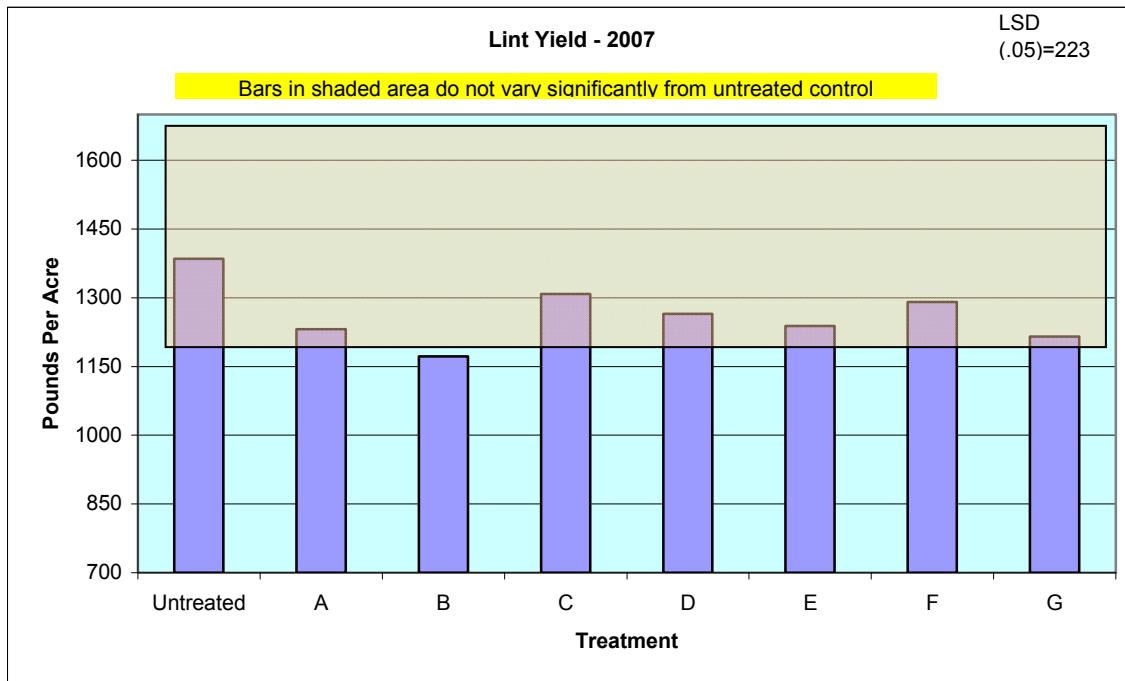


Figure 4. Lint yield of GlyTol + LibertyLink cotton following four applications of different formulations of glyphosate, Bayer CropScience R&D farm Shafter, CA.

2008 results at Shafter, CA showed no significant differences in lint yield between the control and the glyphosate treated plots. The control yielded 872 pounds of lint-per-acre and the LSD (.05) for the trial was 87 pounds (Figure 5).

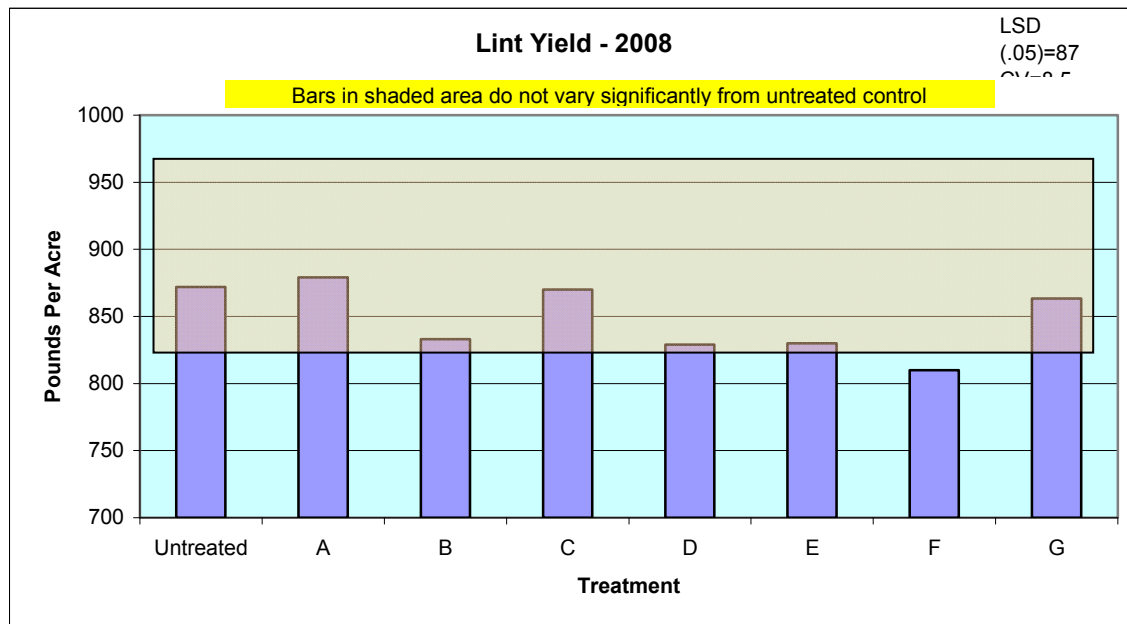


Figure 5. Lint yield of GlyTol + LibertyLink cotton following four applications of different formulations of glyphosate, Bayer CropScience R&D farm Shafter, CA.

2008 lint yield results from three locations in California and one location in Arizona did not show any significant yield difference between the untreated control plots and the glyphosate treated plots. When averaged across the four locations, the yield of the control and the treated plots were essentially equal; no statistically significant differences were detected at the individual locations or with the across location average (Figure 6).

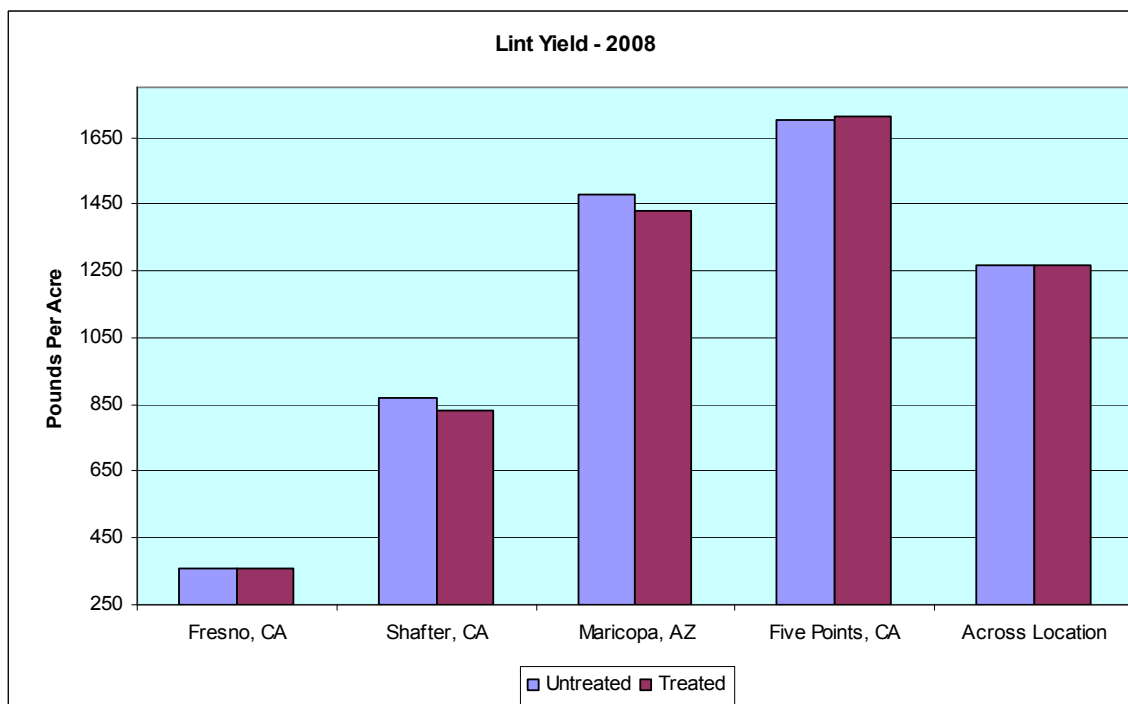


Figure 6. Lint yield of GlyTol + LibertyLink cotton following four applications of different formulations of glyphosate at four locations in 2008.

### **Discussion**

Results from these trials showed no adverse effects on GlyTol or GlyTol<sup>+</sup> LibertyLink plant height, boll shape, yield or fiber quality following four applications at full rates of a number of commercial glyphosate formulations.

### **References**

Trolinder, L., Ellis, J., Holloway, J., Baker, S. (Jan 11, 2008). *GlyTol Cotton – New Herbicide Tolerant Cotton from Bayer CropScience*. National Cotton Council of America. Beltwide Cotton Conference, 2008. *Cotton Weed Science Research*.

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