WIDESTRIKE COTTON VARIETY TOLERANCE TO IGNITE APPLICATIONS IN TEXAS D. A. Mott G. D. Morgan J. D. Kerns Texas AgriLife Extension Service Texas A&M University College Station, TX

<u>Abstract</u>

PhytoGen 375 WRF, Widestrike®; RoundupFlex® is a variety that has rapidly gained market share since 2007 because of its very good yield stability over South, Central and East Texas as well as other areas of the Cottonbelt. Also, Phytogen has new varieties containing the WideStrike® technology that are and will likely be planted on more acres. This Widestrike® technology, second generation Bt technology by Dow AgroSciences, has some inherent crop tolerance to glufosinate herbicide (Ignite), a broad spectrum, post-emerge herbicide. Although Phytogen Seed nor Bayer CropSciences, maker of Ignite, recommend the application of Ignite over-the-top of Phytogen Widestrike varieties, growers in many areas utilizing this as an additional postemergence weed management tool. Specifically, some growers are utilizing Ignite herbicide to help with their glyphosate resistant weed problems or to broaden their weed management options. This trial was established to determine the effects (weed control and phytotoxicity) of broadcast Ignite herbicide applications and tank-mixtures would have on Phytogen 375 WRF performance in Texas. The six treatment trial was initiated in Burleson county in 2010 in a replicated (4) trial in irrigated cotton. The treatments included multiple rates, application timings, and tankmixtures. Ignite 280 applications at 22 oz/a or 29 oz/a caused minimal damage to pinhead stage cotton. Significant crop injury was observed when Ignite 280 was applied to cotton at the early flowering stage. However, yield losses were only observed from the 29 oz/a application at the flowering stage. No differences in lint quality were observed.

Introduction

PhytoGen has been producing cottonseed for over 25 years since it began with Pima and Acala cotton in the Western U.S. They entered the upland cotton seed market about 10 years ago with their PhytoGen[®] cottonseed varieties. Since their introduction, they have made good strides in variety development and gaining market share. Following their agreement with Dow AgroSciences in 2004, PhtyoGen introduced cotton varieties with Widestrike[®] technology, a unique lepidopteran insect resistant transgenic technology. WideStrike contains a two-gene Bt technology that provides protection against various lepidopteran insect pests throughout the season. This technology does not provide total control against Lepidoptera pests, but generally provides enough control to prevent the need to overspray with traditional worm insecticides. In addition, level of control varies through the season and amongst pest species.

For 2011, PhytoGen will have a minimum of seven varieties with WideStrike technology and many are stacked with Roundup Flex technology. One inherent trait linked to the WideStrike technology is some level of tolerance to the broad-spectrum herbicide, glufosinate. Glufosinate is the active ingredient in the cotton herbicide Ignite[®] that is manufactured by Bayer CropSciences as well as other brands of herbicide. Therefore, both glufosinate and glyphosate (Roundup) can be applied over of the Phytogen Widestrike varieties. Bayer CropSciences has developed a unique herbicide resistant technology in cotton called Liberty Link[®] Cotton (LL). With the LL technology, producers are able to apply the broad-spectrum herbicide Ignite[®] over-the-top of Liberty Link cotton throughout the growing season and not sustain damage from the glufosinate. Varieties containing the LL technology have not consistently performed well in the Upper Gulf Coast region of Texas, and the LL technology is not currently stacked with Roundup Flex technology.

Herbicide-resistant cottons have revolutionized cotton production since Roundup Ready[®] cotton was first introduced by Monsanto and DeltaPine in 1996, by allowing broad-spectrum, control with over-the-top convenience. Because of the effectiveness and ease of use of this technology, growers rapidly adopted it in cotton and other crops as well, including corn and soybeans. This led to widespread, repeated use of glyphosate applications yearly and has subsequently resulted in numerous weed species becoming tolerant/resistant to glyphosate. The initial weed species that made Texas cotton growers stand up and take notice was, when the prolific weed species, common waterhemp, was first documented to be resistant to glyphosate in 2007. As a result, growers began looking at other options to

help manage the glyphosate resistant common waterhemp. One option was to use Ignite® herbicide which has a relatively wide spectrum of activity, including common waterhemp, as an option for over-the-top application in Phytogen Widestrike cotton varieties. Similar trials have been conducted throughout the Southeastern and Delta regions of the Cotton Belt on Palmer amaranth. However, growing conditions are considerably different than many of the higher precipitation cotton production regions, and a common waterhemp was the target weed species. Therefore, the trial was initiated to evaluate the efficacy, crop injury, and cotton lint yield and quality from multiple rates, timings, and tankmixtures with Ignite over-the-top of Phytogen 375 WRF.

It should be noted that neither Bayer CropScience nor Dow AgroSciences stands behind the application of Ignite herbicide over-the-top of Widestrike, Round-up Flex cotton.

Materials and Methods

A field study was conducted at the Texas AgriLife Research and Extension Center near Snook, Texas (Burleson County). Plot size was 4 rows (40") by 40' long, with 4 replications arranged in a randomized complete block design. The herbicides were applied at 11 gal/A with water as the carrier. Applications were made with a self-propelled Lee Spider sprayer using 8002 fan tips on a 20 inch spacing applied foliar at a speed of 4 MPH. See Table 1 for additional treatment information.

Treatments included various over-the-top applications of Roundup PowerMax and Ignite 280 herbicides at various rates and combinations to PhytoGen 375 WRF cotton that was planted on April 23, 2010 (Table 2). Application A was applied on June 2 to cotton that was at match-head square stage and application B was applied on July 5 which was at early bloom. The main weed broadleaf weed species included Palmer amaranth and sharp-pod morningglory. The main grass species was Texas panicum.

Table 1. Summary of background application information for the herbicide treatments.

	Application		
	Α	В	
Date	June 2	July 5	
Crop Stage	Matchhead Sq	Early Bloom	
Air Temp (°F)	85	97	
Relative Humidity (%)	71	53	
Wind Direction (MPH)	0.2 E	4.5 ESE	

Table 2.	Summary	of treatment	rates for the	herbicide	treatments t	for both	application dates.
	2						11

	Application Rate (fl oz/ac)		
Treatment	Α	В	
Untreated Check			
Roundup WeatherMax	32	32	
Ignite 280	22		
Roundup WeatherMax		32	
Ignite 280	29		
Roundup Weather Max		32	
Ignite 280	22	22	
Ignite 280	22	29	

Data collected from each plot included stand counts on May 13, visual phytotoxicity ratings and percent weed control 14 days following application A and 8 days following application B. The center two rows of each plot were mechanically harvested on September 23 with a picker to determine lint yield. The data was analyzed with ARM 8 using LSD at 5% level.

Results and Discussion

All herbicide treated plots were better than the untreated check at each evaluation date for both grass and broadleaf weed control (Figures 1 and 2). The only difference in percent control among any herbicide treated plot was at 14 DAT-A, the RU@ 32 oz provided better broadleaf control, 97.5%, than one of the Ignite @ 22 oz treatments, 94.8%. None of the other herbicide treatments were significantly different from one another at any rating date.

There were no differences in phytotoxicity ratings among any of the treatments following application A (Figure 3). Included among these treatments were Ignite @ 22 and 29 oz/ as well as tank mixtures with RU. However, following application B, both of the treatments that received Ignite, 22 and 29 oz, showed significantly higher percent phytotoxicity damage than the untreated check or the treatments that only received Roundup. Although Ignite @ 22 fb Ignite @ 22 had significantly higher phytotoxicity following application B than the RU and untreated check treatments, it was significantly less than Ignite @ 22 fb Ignite @ 29 oz, which had the highest percent phytotoxicity of any of the treatments among both application dates (Figures 3).

The untreated check, 1161 lbs/a, out-yielded both treatments that received Ignite at application B, Ignite @ 22 oz fb Ignite @ 22, 1011 lbs/a, and Ignite @ 22 oz fb 29 oz, 987 lbs/a, respectively (Figure 3). In addition, the RU @ 32 oz fb RU @ 32 oz, 1127 lbs/a, out-yielded the Ignite @ 22 oz fb 29 oz, 987 lbs/a, respectively. The Ignite @ 29 oz fb RU @ 32 oz had a higher strength value than any of the other treatments. No other differences in fiber quality were observed.



Figure 1. Summary of percent broadleaf weed control following the 2 application dates (LSD, P=0.05).

Summary

From this study, it is evident that applications of Ignite herbicide over-the-top of Widestrike cotton can lead to adverse effects on flowering cotton plants. Visual phytotoxicity was visible following the second application of Ignite and more damage was observed with the higher rate. Also, the Ignite treatments had moderate numbers of flared squares compared to no flared squares in the RU treated plots. This data also demonstrates that there can be negative yield effects to applying Ignite over-the-top of Widestrike cotton at the early flowering stage. The effects from the Ignite appear to cause greater yield loss with the later the application(s) timings and at higher rates.

Therefore, if producers are interested in using Ignite herbicide in their Phytogen Widestrike cotton varieties, it would be advised to use it earlier in the growing season, probably prior to bloom, and use the lower labeled rates. As previously stated, neither Bayer CropScience nor does Dow AgroSciences stand behind applications of Ignite herbicide over-the-top of Widestrike RF cotton.





Figure 2. Summary of percent grass control following the 2 application dates (LSD, P=0.05).

Figure 3. Summary of percent foliar phytotoxicity ratings following the 2 application dates (LSD, P=0.05).

Acknowledgements

This project was funded by the Texas State Support Committee through Cotton Incorporated. Also, appreciation is extended to John Kerns and Zach Eder for their assistance in this project. In addition, seed was provided by Dow CropSciences.