RECOVERY OF COTTON AFTER SPARYED BY AUXIN HERBICIDES

James Griffin
Texas A&M University
College Station, TX
Gaylon D. Morgan
Dale Mott
Texas A&M AgriLife Extension Service
College Station, TX
Seth Byrd
Texas A&M AgriLife Extension Service
Lubbock, TX
Glenn Ritchie
Texas Tech University
Lubbock, TX

Abstract

Auxin resistant traits in cotton have become widely embraced across the Cotton Belt for management of glyphosate resistant and other troublesome weeds. With this new adoption, off target movement and spray tank contamination has become a major concern for growers, especially in South and East Texas where both XtendFlex and Enlist Cotton have significant market share. The objective of this project is to identify the efficacy of recovery sprays from induced injury of dicamba and 2,4-D. A Dicamba rate of 1.28 fl.oz/ac and 2,4-D at 0.08 fl.oz/ac were applied separately at first bloom stage of variety FM 1953 GLTP over the center two rows with a hand boom. Seven days later, numerous plant growth regulators, various nutritional and hormonal chemistries were applied with a four row hand boom.

Visual auxin injury ratings were conducted two weeks after application spray of the recovery treatments and again one week prior to application of harvest aids to assess both the amount of injury and recovery. Plant height, nodes, maturity, and planting mapping were conducted on five plants from each plot to identify exact vegetative and reproductive physiological impacts of the various treatments. Plots were mechanically harvested and fiber will be analyzed with HVI. Visual ratings of the dicamba portion resulted in less overall foliage injury but had more stunting than the 2,4-D treatments. There was no significant yield differences amongst the dicamba treatments, however the 2,4-D treatments did show more variation between treatments. The dicamba treatments had an average higher yield than 2,4-D.

Introduction

Since the release of the auxin resistant seed traits in cotton, their market share has grown to over 65% in Texas. Average yield loss from the simulated auxin injury research resulted in a yield reduction of 24%, with the 2,4-D injury being 10% greater than the dicamba injury. With more and more acres switching to the auxin resistant traits, the occurrence of off-site movement and tank contamination has risen accordingly. Herbicide off-site movement results in physiology injury of cotton plants which leads to a yield and economic loss for the cotton producer. If a product(s) can be identified to reduce herbicidal injury and yield loss, the producers will be able to recoup economic losses.

Materials and Methods

At first bloom, June 26th, dicamba and 2,4-D were applied separately at 1.28 (1/10th) and 0.08 (1/200th) fl.oz/ac rates, respectively, to mimic off-site and tank contamination scenarios. Over each of the injury induced fields, eight different products were applied, plant growth regulators, nutritionals and hormonal sprays. One week after the injury induced applications, all recovery treatments were applied to create a two row by 40 ft. plots with four replicates. Each trial had an untreated check (no auxin), auxin spray only, and then eight recovery treatments (Table 1).

Table 1. Treatment Chart.

Treatment No.		Products	Rate (FL OZ/AC)
Dicamba	2,4-D		
1	11	Untreated Check	
2	12	Auxin Herbicide	1.28, 0.08
3	13	Mepiquat Chloride	18
4	14	Pentia(Mepiquat Pentaborate)	24
5	15	Palisade (Trinexapac-ethyl)	23
6	16	Megafol (3-0-8)	24
7	17	Radiate (IBA & Kinetin)	5
8	18	CoRoN (25-0-0)	128
9	19	Finish-Line (8-4-6-.1B-.2Cu-1Mn-1Zn)	32
10	20	N-Demand 88 (10-8-8-2S-.25B-.06Cu-.25Mn-.25Zn)+	64
		Advantigro (Kinetin, IBA, GA)	4

Visual observations were made 14 days and 75 days (7 days prior to harvest aid application) after the recovery spray application. Following the harvest aid applications, five consecutive plants were removed from each plot for plant mapping. Plant mapping included the quantification of fruit position, internode length, heights, and node counts. Plots were harvested on September 27 with a 2 row spindle picker. Plot weights were recorded and subsamples obtained for fiber analysis. The cotton was ginned and fiber quality was quantified by HVI.

Results and Discussion

Visual injury ratings were higher for both treatments 14 days after the injury induced spray than the pre-harvest aid visual ratings for both Auxin herbicides. Dicamba treatments recovered and retained more foliage than the 2,4-D treatments but had a lower height to node ratio. Although there was only a statistical yield differences (P=0.05) observed between the untreated and treatments 15 and 20 for 2,4-D; there was a large numerical difference observed. Aggregating both scenarios, over a 24% yield loss occurred despite the 2,4-D being applied at a 20X lower rate of ai compared to dicamba. Despite both dicamba and 2,4-D being auxin herbicides different yield responses were observed between the recovery treatments. The assumption from this is the cotton plant physiologically processes each synthetic auxin molecule differently. The top yielding responses for dicamba were treatment 3, 7, and 10 while it was treatments 12, 17 and 18 for 2,4-D, with only the Radiate treatment (7&17) performing similarly. Interestingly, the 2,4-D alone treatment resulted in the second highest yield compared to the untreated.

The higher dicamba yield average was expected, as the pre-harvest aid visual rating drastically improved from the 14 days after application ratings (Figure 3).

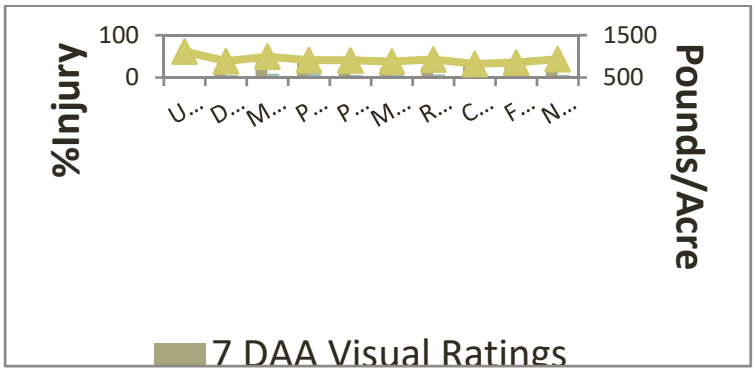

Figure 1: Visual Ratings and Yield Response from Dicamba Treatments

The lower 2,4-D yield was due to the greater affect 2,4-D had on the foliage, shown by the visual injury ratings (Figure 2), and lower boll counts (Figure 3) compared to the dicamba treatments (Figure 1).

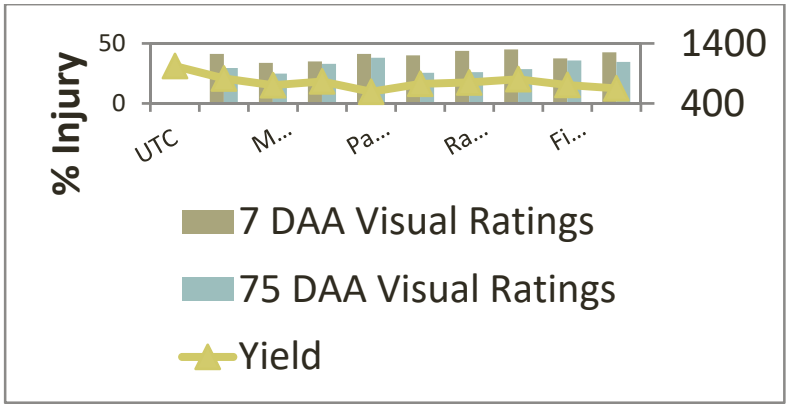

Figure 2: Visual Ratings and Yield Response from 2,4-D Treatments

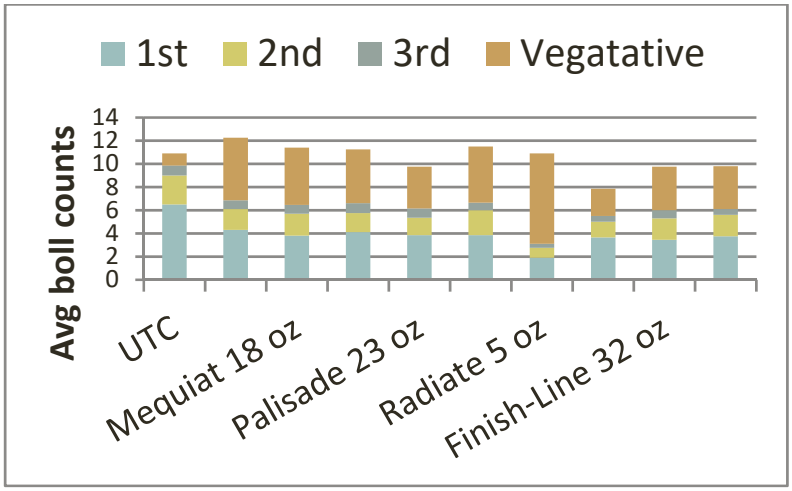

Figure 3: Average Boll Counts by Plant per Replicated Dicamba Treatment

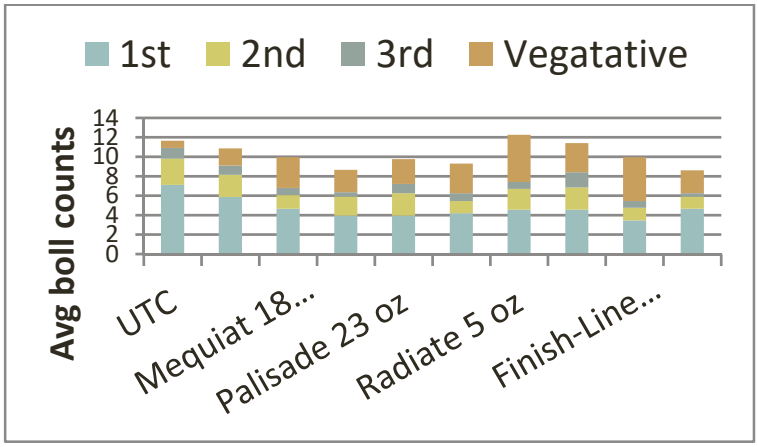

Figure 4: Average Boll Counts by Plant per Replicated 2,4-D Treatment

An interesting aspect of the study was the amount of compensation the vegetative bolls had to yield (Figure 3 & 4). This was most likely due to the study being furrow irrigated allowing the vegetative branches to continue to grow after the fruiting branch's sustained injury. It could be presumed this would not occur under greater water stress. Fiber

quality values were also evaluated but any discounts or premiums associated with individual treatments were overshadowed by individual yield results.

Summary

The 2,4-D treatments obviously injures cotton greater than dicamba even at a 20X lesser rates. Dicamba recovery treatments have shown no statically yield difference at this time, although there is a legitimately large numerical difference. 2,4-D recovery treatments Palisade® & N-Demand® tank mixed with Advantigro® did show a statically difference and need to be evaluated further. Treatment Radiate® was the only treatment in the top four yielders for both dicamba and 2,4-D trials. Hormonal recovery treatments appear to have a greater response than the nutritional treatments and need to be investigated further.

Acknowledgements

I would like to give special thank you to Cotton Incorporated for their sponsorship. Also, I appreciate the companies who donated products used in this trial.