EFFICACY OF RECOVERY SPRAYS TO AUXIN INJURY ON COTTON

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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 0.12 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 and two months after application spray of the recovery treatments 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 more overall foliage injury and 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 variation between treatments. The 2,4-D treatments had an average higher yield than dicamba.

Introduction

Since the release of the auxin resistant seed traits in cotton, their market share has grown to over 75% in Texas and the United States. Average yield loss from the simulated auxin injury resulted in a yield reduction of nearly 50%, with the 2,4-D injury yield reduction being 13% less than the dicamba injury. With more and more acres switching to the auxin resistant trait, 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 0.12 (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, broken into three distinct groups, plant growth regulators, nutritionals and hormonal sprays. One week after the injury induced applications, July 3rd, all foliar recovery treatments were applied to create a two row by 40 ft. plots with four replicates. At first square, June 5th, treatment 10 was side-dressed into their respected plots to mimic higher fertility soils. Each trial had an untreated check (no auxin), auxin spray only, and then eight recovery treatments (Table 1). Fisher's protected least significant difference and ANOVA were used to statistically analysis the treatment yield responses.

Table 1. Treatment Chart.

Treatment Number	Rate (FL OZ/AC)	Rate (FL OZ/AC)
1	Untreated Check	
2	Auxin Herbicide (Engenia®, Enlist®)	1.28, 0.12
3	Mepiquat Chloride	18
4	D-Aspartic Acid	11.5 g/64 oz of H2O
5	L and D-Aspartic Acid	11.5 g/64 oz of H2O each
6	N-Pact	128
7	Radiate (IBA & Kinetin)	8
8	ProGibb + NutriSync Ca	6 + 64
9	Treatment 6 + Treatment 9	32
10	Liquid Side-dress K-Leaf (0-0-30)	
	+ N-Demand (10-8-8 + micro's)	128 + 64

Visual observations were made 14 days and 60 days 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 positions, internode lengths, heights, and node counts (Figure 2). Plots were harvested on October 3rd 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.

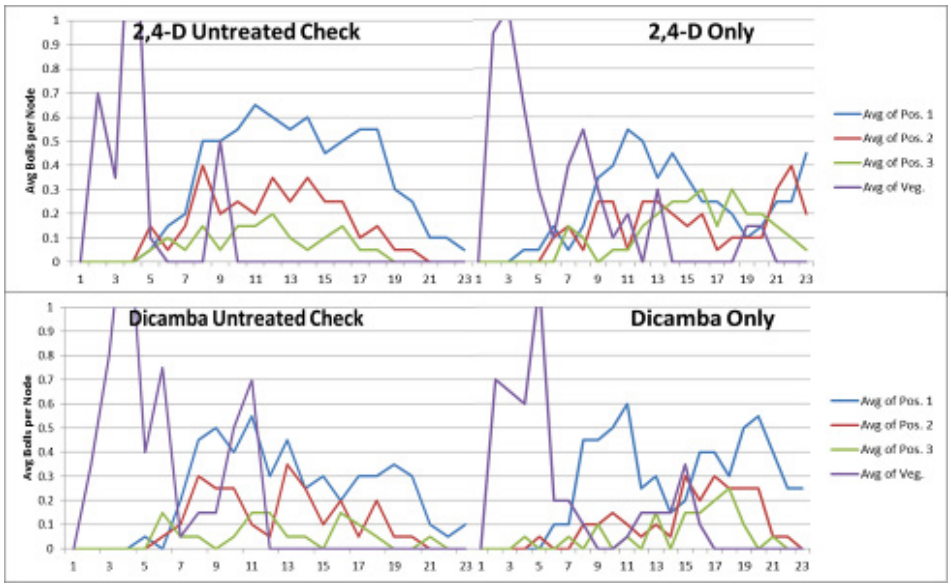

Figure 1. Plant Average bolls per Treatment,

Results and Discussion

Dicamba treatments sustained more foliage injury than the 2,4-D treatments and had a lower height to node ratio. There were no significant differences for the dicamba recovery sprays. The only significant difference for the 2,4-D recovery applications was the in season liquid side-dress and the Radiate and N-Pact foliar sprays (Figure 2). Aggregating both Auxin injury sprays scenarios, dicamba resulted in a 13.4% yield reduction, although being applied at a 20X rate. 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, 4, and 2. Treatments 10, 4, and 5 for 2,4-D, with only the D-Aspartic Acid (Treatment 4) performing similarly for both auxin injured studies.

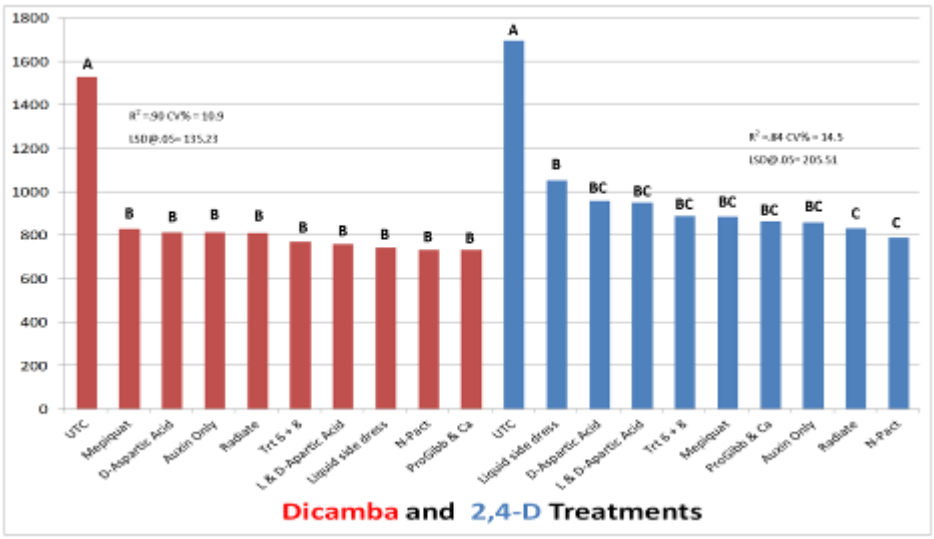

Figure 2. Yield (lbs. of lint/acre) per treatment.

The higher 2,4-D yield average was expected, as the 60 days after application visual rating drastically improved from the 14 days after application ratings compared to dicamba ratings. From the planting mapping data (Figure 1), the dicamba injured plants regained normal fruiting devolvement quicker, taking just 3 nodes. Compared with the 2,4-D injured plants, not until eight more nodes did the plants fully recover and establish first position bolls. 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 significantly the same as dicamba even at a 0.05X rate. Dicamba recovery treatments have shown no statically yield difference at this time, although there is a legitimately numerical difference. Higher fertility fields (treatment 10) as shown by the liquid side dress help minimize 2,4-D injury. Treatment of D-Aspartic Acid and Mepiquat Chloride were the only treatment higher than the auxin only treatments for both dicamba and 2,4-D trials. D-Aspartic Acid showed the highest increase, 99 pounds of lint, compared to the auxin only treatments although not significantly different.

Acknowledgements

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