

COTTON LEAF GRADE AS INFLUENCED BY COTTON DEFOLIATION AND VARIETIES**Zachary P. Eder****Gaylon D. Morgan****Texas A&M AgriLife Extension Service****College Station, TX****Dan Fromme****Texas AgriLife Extension****Corpus Christi, TX****D.A. Mott****Texas A&M AgriLife Extension Service****College Station, TX****Fred Bourland****University of Arkansas - Northeast Research and Extension Center****Keiser, AR****Abstract**

Defoliation of cotton, (*Gossypium hisrutum* L.) has been referred to as more art than a science by industry leaders. The remnants of leaf material in harvested cotton can significantly increase leaf grade values and result in dockage to the producer. Cotton classed through the USDA-AMS Classing office in Corpus Christi, Texas has reported increases in leaf grade values beginning in 2000, which have resulted in significant financial loss by Texas producers. The impacts of the agronomic variables were studied during the 2010 to 2012 growing seasons and data collected were used to identify possible contributors to increasing leaf grade, including leaf pubescence and harvest-aid treatments. Harvest-aid and harvest-aid by variety trials were initiated in 2010, 2011, and 2012. Variety by harvest-aid trials provided an approach to analyze the combined impact of both factors. All samples were ginned on a miniature gin in Lubbock, and fiber analyses were conducted with HVI. Wide ranges of percent defoliation and desiccation levels were obtained with the harvest-aid treatments but had no significant impact on leaf grade during 2010, 2011, or 2012. In the variety by defoliation trial, hairy leaf varieties of cotton had higher mean leaf grade values than the smooth leaf variety across multiple levels of defoliation in 2010, 2011 and 2012. Overall leaf grades were lower in 2011 due to more suitable weather conditions between harvest-aid application and harvesting.

Introduction

Cotton leaf grade is a visual estimation of the amount of plant material in a lint sample on a scale of 1 to 7, with 1 being the ideal score (Larson and English, 2001). Plant material in harvest lint is waste, and can result in price dockage for the producer because additional processing is required to remove the plant material. Currently, several factors are believed to negatively influence the leaf grade values: 1. the level of leaf defoliation and desiccation prior to harvest; 2. the varietal characteristics, such as leaf hairiness, bract hairiness, and leaf and bract size. The efficacy of chemical defoliation can be an unpredictable process but is vital for the harvest efficiency and to minimize dockage from plant materials (Valco and Snipes, 2001). Factors impacting defoliation vary from harvest-aid selection, plant condition, weather prior to and during application, spray coverage, canopy density, translocation, and varietal traits (Cathey, 1986, Oosterhuis et al., 1991). Additionally, hairier varieties are suspected of contributing to higher leaf grades through a "velcro effect". Currently, the leaf hairiness of commercial cotton varieties is assigned by a subjective rating system (smooth to very-hairy); however, inconsistencies exist between varietal ratings available to producers.

Materials and Methods

Comparisons of harvest-aid treatments by leaf grade were conducted from 2010-2012 in the Upper Coastal Bend of Texas and at the TAMU research farm using replicated variety trials. Additionally, leaf hairiness by defoliation was conducted in the Coastal Bend region during this time period. All trials were four rows wide by 40 feet long. Treatments were applied with a Lee Spider sprayer with 11 GPA using XR flat fan tips. Percent defoliation, desiccation and green leaf were rated at 7 and 14 days after treatment. Untreated check was rated as zero and complete absence of leaves was 100%. Plots were mechanically harvested with a spindle picker. Samples were ginned in a miniature gin, and leaf grade and fiber quality parameters were processed at the Fiber and Biopolymer Research Institute using HVI analysis. In the defoliation trials, treatments were superimposed over a field of

Phytogen 375WRF. Twenty defoliation treatments were applied to obtain a wide range of defoliation and desiccation levels in 2010, whereas only sixteen defoliation treatments were selected for the 2011 and 2012 trials. For the leaf hairiness by defoliation trials, five defoliation treatments were used, intended to produce diverse defoliation levels, in a four replication, split-block design. The trial was conducted in Colorado County with Stoneville 5458B2RF, a hairy leaf variety, and DynaGro 2570B2RF, a smooth leaf variety. In 2011 and 2012, a variety by defoliation trial was conducted in Burleson County using, smooth leaf varieties, DeltaPine 0935 B2RF, and FiberMax 1740 B2F, and hairy leaf varieties, DeltaPine 0949 B2RF and Stoneville 5458 B2RF. ANOVA was performed and means separation using LSD with $P=0.05$ (data not shown). Kruskal-Wallis was used to identify significance between leaf grades.

Results and Discussion

Defoliation Trial

A wide range of defoliation and desiccation levels were obtained with the selected defoliation treatments. Despite the range of defoliation levels, no differences were observed in leaf grade values. The 2010 and 2012 seasons had leaf grades of 3 and 4, while in 2011 leaf grade values did not rise above 2. Low leaf grades in 2011 were the result of weather conditions more suitable for harvest, compared to 2010 and 2012.

Variety Hairiness by Defoliation

A good range of defoliation levels were obtained with the 5 defoliation treatments and efficacy was comparable for the smooth leaf and hairy leaf varieties. Leaf grade values were consistently lower across all defoliation levels for the smooth leaf variety. Leaf grade ratings were greater than 2 regardless of the defoliation level or variety hairiness. Though 2011 weather conditions were suitable for low leaf grade, there was a variety effect on the scores in all years.

Summary

The results indicate that cotton leaf grade was not influenced by the defoliation or desiccation levels. Leaf hairiness, however, influenced leaf grade more than defoliation when environmental conditions were conducive for higher leaf grades. The differences between years indicate specific environmental conditions, such as rainfall after harvest-aid applications, increased the probability by modifying leaf grades.

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