IMPACT OF HARVEST AID APPLICATION TIMING ON BOLL OPENING, YIELD, AND FIBER QUALITY

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Abstract

A common recommendation when scheduling harvest aids is to apply when there are 4 nodes above the first position cracked boll to the uppermost first position harvestable boll (NACB), a method studied extensively in previous studies (Bednarz et al., 2002; Faircloth et al., 2004; Siebert and Stewart, 2006; Bynum and Cothren, 2008). Producers in Oklahoma often face challenges when scheduling harvest aid applications. Whether due to an immature crop, detrimental weather conditions, or a combination of the two, it is not uncommon for applications to be made outside of the previously identified recommended growth stages. The existing recommendations were generated from trials conducted 20 years ago or later. Further, there is a lack of harvest aid scheduling data for northern areas of the southwest region. To address this, and to provide updated information to cotton producers in Oklahoma, a further study on the impact of harvest aid applications at various crop maturity levels based on NACB is needed.

An experiment was conducted at the Caddo Research Station in Fort Cobb, OK, in 2020. The objectives of this study were to evaluate boll opening, yield, and fiber quality resulting from harvest aid applications made at various NACB values. Plots were located in a center pivot irrigated field planted with PhytoGen 300 W3FE at a rate of 43,700 seeds per acre. The harvest aid mixture used in this experiment included 16 oz ac^{-1} of tribufos and 32 oz ac^{-1} of ethephon, and was applied with a CO_2 pressurized backpack sprayer at 15 GPA through TeeJet® XR11002 flat fan tips. Application timing treatments consisted of eight timings based on NACB and were targeted to iniate once plant reached 8 – 7, 7 – 6, 6 – 5, 5 – 4, 4 – 3, 3 – 2, 2 -1 and 1 – 0 NACB. Application timings were based on average NACB counts from 7 plants per plot, and a non-treated control (NTC) was also included. A randomized complete block design was utilized, with 4-row plots, 9 m in length, and four replications of each treatment. On the day of harvest aid application, measurements of NACB, open bolls, and closed harvestable-sized bolls were taken from 7 plants within the middle two rows of each plot. Open bolls were then measured every 3-4 days after the harvest aid application. Data was also collected from the NTC beginning on the same day of the last application timing (2.2 NACB). Approximately 20 days after harvest aid application, each plot was harvested. The middle two rows of each plot were harvested using a John Deere 484 (John Deere, Moline, IL) stripper that did not include a bur extractor. The harvested burcotton from the whole plot harvest was weighed, and subsamples from each plot were sent off to be ginned at the University of Tennessee Microgin in Jackson, TN, and classed at the USDA classing office in Memphis, TN. Analysis of variance was conducted using PROC MIXED in SAS (v. 9.4). Means were separated using Fisher's Protected LSD at alpha = 0.05.

Similar to previous studies, 4 NACB and 60% open bolls occurred nearly simultaneously. Yield was not impacted by harvest aid application timing, and the only physical fiber property affected was uniformity, although there was no pattern related to application timing and all values were above 82%. Applications made closer to 4 NACB allow for natural senescence and boll opening to occur, and it was observed that these treatments had advanced natural defoliation as well as boll opening and likely require lower rates of harvest aid products if temperatures remain

favorable. Although in the event of adverse weather (i.e. early freeze), or an immature crop, applications prior to 4 NACB may be an option to achieve adequate boll opening while not sacrificing yield or physical properties of fiber quality. Additional research utilizing a cotton striper that included a bur extractor or a cotton picker is needed to determine the effect of these various application timings on leaf and color grades of cotton.

References

Bednarz, C. W. and Nichols, R. L. 2005. Phenological and morphological components of cotton crop maturity. Crop Sci., 45(4), 1497-1503.

Bynum, J.B. and Cothren, J.T. 2008. Indicators of Last Effective Boll Population and Harvest Aid Timing in Cotton. Agron. J., 100: 1106-1111.

Faircloth, J.C., Edmisten, K.L., Wells, R. and Stewart, A.M. 2004. The Influence of Defoliation Timing on Yields and Quality of Two Cotton Cultivars. Crop Sci., 44: 165-172.

Siebert, J.D., and A.M. Stewart, 2006. Correlation of Defoliation Timing Methods to Optimize Cotton Yield, Quality, and Revenue. J. Cotton Sci. 146-154.