INITIAL INVESTIGATION OF CEREAL RYE AND HAIRY VETCH COVER CROPS IN COTTON PRODUCTION COMPARED TO CORN/COTTON ROTATION

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Abstract

In research supported by the Mississippi Cotton Incorporated State Support Program (MCISSP) and Cotton Incorporated, an initial investigation of cover crops (cereal rye and hairy vetch), was began at the Delta Research and Extension Center (DREC) to compared potential cover crops and continuous cotton to a corn/cotton rotation. Earlier research at the DREC found an average yield advantage for cotton following corn compared to cotton following cotton of 14-18% and about 20% in the Centennial Rotation. Negative yield responses were observed in years where July-August rainfall was above normal and the bool rot became an issue. Cover crops are again gaining in prominence, yet most reports fail to include an economic analysis needed by producers. While a practice may look good and maintain yields, the costs of the practice or practices has been key to a producer's adoption of the practice. The research at Stoneville included both hairy vetch (legume) and cereal rye (non-legume) and a no cover crop control along with the rotation system. Two nitrogen (N) rates were also included for comparison of legume vs non-legume. The legume overs the possibility of added nitrogen being fixed and released for the cotton crop, while the non-legume grass crop could tie up any potentially available N and reduce the soil available N for the cotton crop. Treatments in the study consisted of 1) corn/cotton rotation [1:1]; 2) continuous cotton with no cover crop; 3) continuous cotton with a legume cover crop [CT-v-CT-v]; continuous cotton with cereal rye cover crop [CT-r-CT-r]; and continuous cotton with alternating legume and non-legume cover crop [CT-v-CT-r or CT-r-CT-v]. The system were arranged as a split plot with four replications with the cover crop system as the whole plot and two N rates (80 and 120 lb N/acre) as the subplot. Each 4-row subplot was harvested with a commercial 2-row spindle picker adapted for plot harvest. Grab-samples were taken at the time of harvest, weighed, and later ginned through a 10-saw micro-gin to determine lint percentage and subsequently lint yield. Cover crops were drill-seeded into beds that had been prepared after harvest. Land preparation included disking, subsoil tillage, fertilizer application, hipping, followed by "do-alling" and rolling. The small seed drill was adjusted in order to apply some down pressure on the drill rows that were not on the tops of the beds. The goal was to end up with three rows on the top of the bed and a row on either side of the bed. Planting would follow in the spring after burn-down with no additional spring tillage. Cotton lint yields are shown in Figure 1 for 2019 for each system.

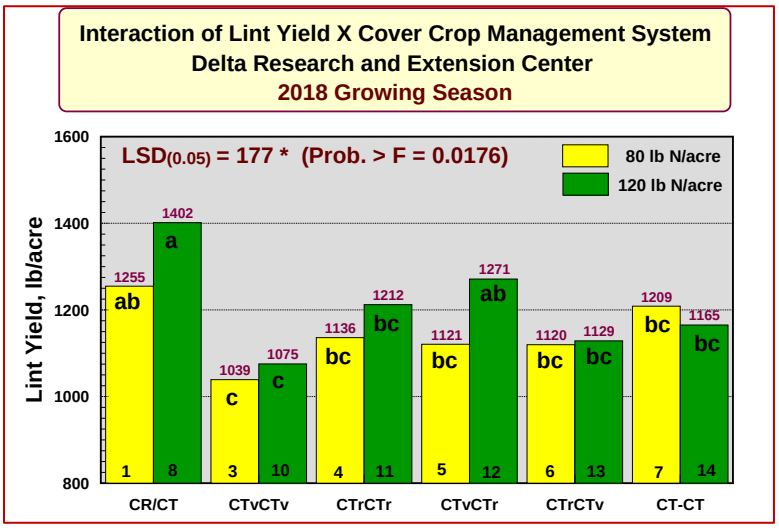

Figure 1: Summary of lint cotton yields from an initial investigation of cover crops compared to corn/cotton rotation, DREC, 2018

In the 2018 growing season, N rate appeared to have no effect on lint yield where cover crops were involved but was significant in the cotton/corn rotation system. Figure 2 illustrates lint yields averaged across N rates as there was no significant interaction. The vetch cover crop treatments had significantly lower yields compared to the CR/CT rotation system. Figure 2 does show statistical analysis for both a split plot and randomized complete block analysis.

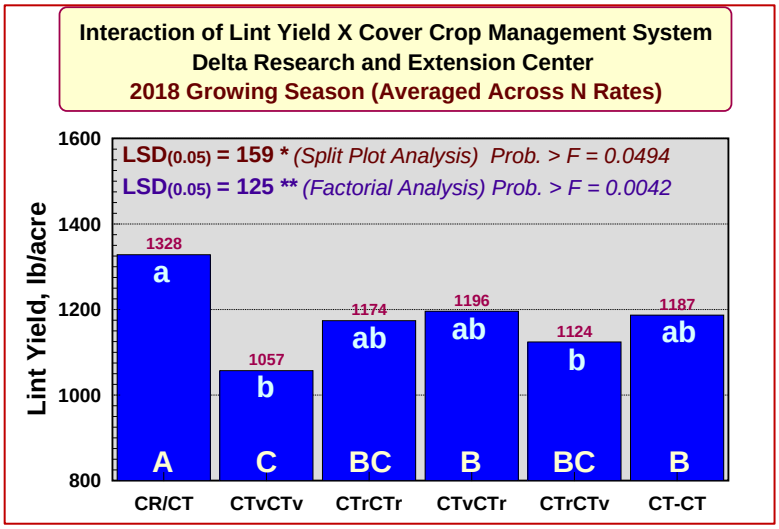

Figure 2: Summary of lint cotton yields averaged across N rate from an initial investigation of cover crops compared to corn/cotton rotation, DREC, 2018

The cover crops were again planted following cotton harvest and land preparation in the fall of 2018 prior to the 2019 growing season. The fall was much wetter than normal and cover crop planting was delayed. The cover crops never got good growing conditions. Spring growth was again hampered by unusually wet conditions. Rainfall in the first six month of 2019 exceeded 50 inches. Lint yields are shown in Figure 3 and show similar patterns as the previous year. The highest lint yields were found in the corn/cotton rotation system with the 80 lb N/acre rate numerically better than the 120 lb N/acre rate. Overall lint yields were lower and the total rainfall for the year was greater than 80 inches (normal = 52 inches).

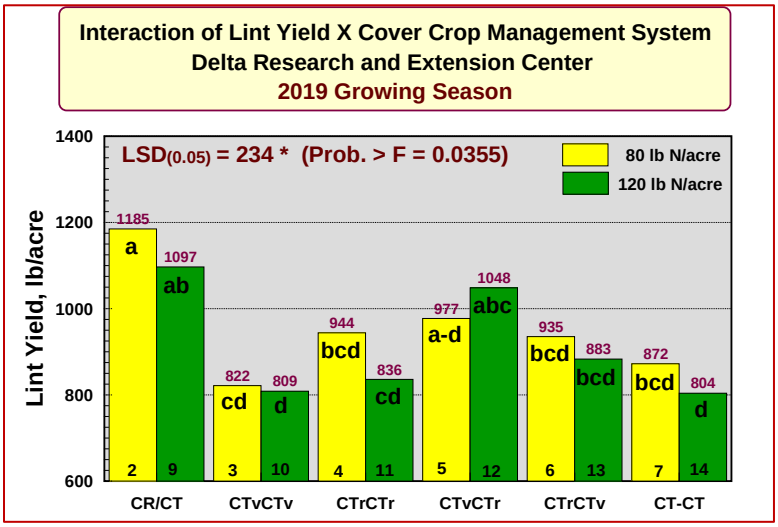

Figure 3: Summary of lint cotton yields from an initial investigation of cover crops compared to corn/cotton rotation, DREC, 2019

The lowest lint yields were again observed in the hairy vetch plots. Of the two cover crops in 2019, hairy vetch did look better than the cereal rye but neither would have been deemed acceptable by most producer standards. The main effect of cover crop system, averaged across N rates, is shown in Figure 4. The CR/CT rotation system had significantly higher lint yields compared to most of the other systems but not statistically greater than the CT-v-CT-r system (12.6% difference).

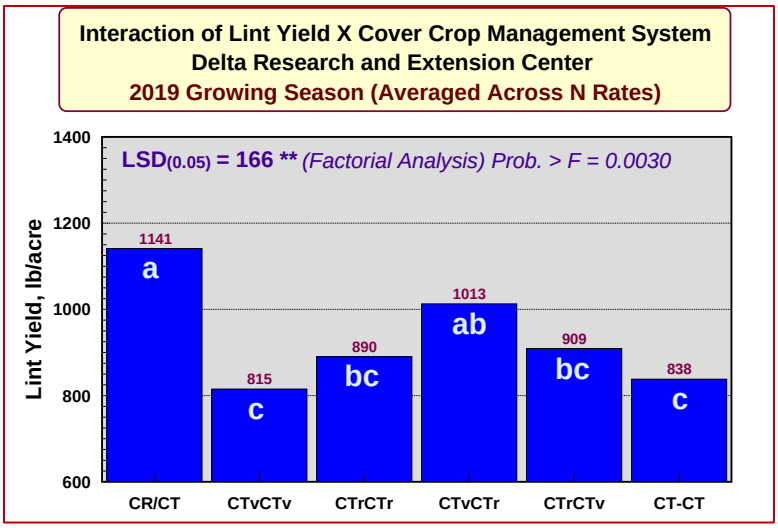

Figure 4: Summary of lint cotton yields averaged across N rate from an initial investigation of cover crops compared to corn/cotton rotation, DREC, 2019

The seasons have gotten progressively worse with respect to getting cover crops planted. Cotton harvest was delayed and cover crops were not planted in the Fall of 2019. This is the same issue faced by producers in the state as well. Many cotton modules remained in the field in early 2020 due to wet field conditions. During the harvest season, emphasis was placed on getting the crop harvested with as little damage to fields and equipment as possible. Figure 5 provides a list/summary of factors to be considered by producers in order to successfully integrate cover crops in the production system. Careful consideration is needed before complete adoption.

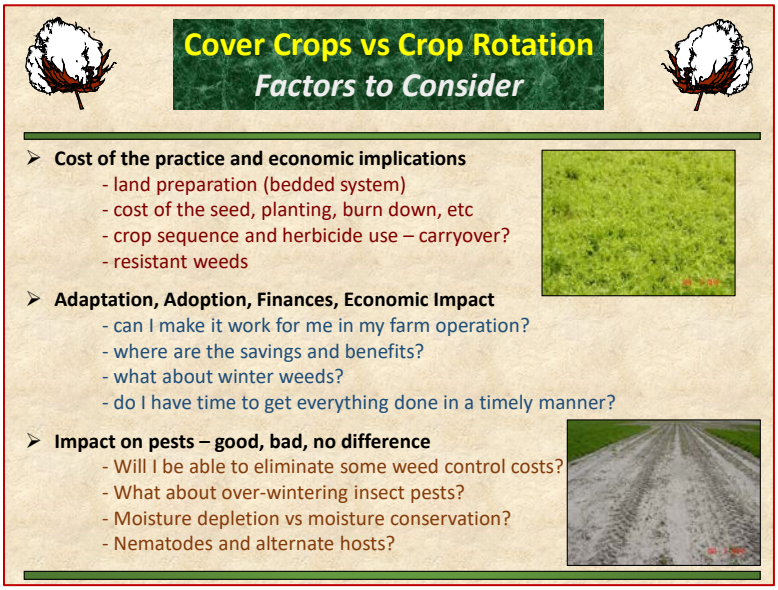

Figure 5: Cover Crops vs Crop Rotation – Factors to Consider