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COTTON MANAGEMENT AND YIELD MONITORING USING PRECISION TECHNOLOGIES

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Abstract

Cotton (*Gossypium hirsutum*) crop yields have been shown to vary within fields. Spatial variability of yield and plant growth vary due to many factors such as: pests, weather, soil type, and slope. Precision farming technologies such as harvester mounted yield monitors and Global Positioning System (GPS) allow for site-specific management of crops. With the combination of soil and landscape information and plant growth monitoring during the growing season, better production management practices may be possible.

Various plant structure measurements were made on cotton plants which were related to eventual cotton lint yield. Cotton plant mapping allows for a continual record of structure and fruiting sites throughout the season. One system commonly used in Tennessee to acquire such data is the COTMAN Expert System. This system involves plant mapping, current and long-term weather information, and field-to-farm management schemes to determine plant growth, applications of plant growth regulators (PGRs), insecticides, defoliants, and harvest aids, and harvest scheduling. COTMAN data were collected in soil delineated management zones for two consecutive years (2000 and 2001) for both precision, plots where management could be adjusted if necessary due to COTMAN and other analyses, and whole-field management, plots where management corresponded with the rest of the field. A plot in each management zone for precision and whole-field control were sampled weekly. Along with COTMAN data, insect scouting, nodes above cracked boll information, and various boll counts and measurements were completed to attempt to explain yield variability across and within soil zones delineated based on soil series, slope, and depth to fragipan in a 40 acre cotton field in West Tennessee.

The MIXED MODEL (PROC MIXED) and the VARIOGRAM (PROC VARIOGRAM) showed significant differences in zone yield in 2000 and differences in plot yield in 2000 and 2001. In both years the poorer drained soil plots yielded less than the other plots. The use of management zones based on soil mapping units were not very useful except in the case of the poorly drained zone which had reduced plant stands. In 2001, precise management in the poorly drained zone resulted in lower yield compared to the adjacent field management plot. Further refinement of management zone delineation and the use of precision technologies should produce a better managed crop and higher profits.