# EVALUATION OF THE COTMAN PROGRAM: FOCUS GROUP AND QUANTITATIVE SURVEY METHODS

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## Abstract

The COTMAN system has been used for in-season monitoring of plant development and making end-of-season management decisions based on crop maturity. This research effort sought feedback from cotton consultants on the usability of COTMAN software. Results will be used to help guide future direction of agricultural systems research and software development. Cotton consultants representative of their peers were identified and six were recruited to each of two focus groups: COTMAN users and COTMAN non-users. The focus group meetings were conducted in conjunction with the Cotton Consultants Conference at the 2010 Beltwide Cotton Conferences. Although considerable knowledge regarding reasons for non-use of the system was ascertained, the leading barrier to use of the COTMAN system was that the amount of time for data collection and data entry was prohibitive. However, both focus groups found that NAWF and heat unit tracking is beneficial information for cotton production management whether or not used with COTMAN software. Some of the specific enhancements that groups requested for COTMAN were related with robust handheld computer equipment rather than the COTMAN system or software. In-field user support, education, demonstration and applied research were also identified as areas for improvement. In addition to evaluation of the COTMAN program, this research reports on the methodology used to evaluate the development of agricultural software using mixed qualitative and quantitative methods.

## Introduction

COTMAN is an in-season cotton (*Gossypium hirsutum*) crop information and monitoring system used to track physiological development and crop maturity to provide guidance on optimal timing of insecticide and defoliation applications in order to improve economic returns and environmental sustainability (Oosterhuis and Bourland, 2008). The core components of COTMAN have been the subjects of extensive research with results available from many geographic locations, researchers, and targeted pests across the cotton belt. It has been available as PC software since 1994, designed for use by producers, consultants and researchers. End-of-season decisions rely on identifying physiological maturity, the date that plants reach Nodes Above White Flower (NAWF) equal to 5, and then accumulating daily heat units (DD60s) until critical thresholds are reached when bolls are resistant to insect damage, and when defoliation can occur without penalizing yield and quality. The relative maturity of fields can be used to schedule defoliation in preparation for harvest. The COTMAN software does not include any official

guidelines for irrigation termination but some users have developed their own guidelines utilizing maturity and heat unit information. Users typically record individual plant NAWF counts on handheld electronic devices in the field and then transfer the data to a PC where the data is analyzed to produce reports.

The objective of this research is to assess the strengths and weaknesses of COTMAN from the crop consultant's perspective--to identify barriers and incentives for adoption, assess usability, identify educational and support needs, and direct efforts for future software development and delivery. Literature reviews revealed no evaluation studies of agricultural production software utilization.

## Methodology

The study used two focus groups, consultant COTMAN users and consultant COTMAN non-users, with six participants each. The focus group meetings were conducted in conjunction with the Cotton Consultants Conference at the Beltwide Cotton Conferences, New Orleans, on January 4, 2010. Participants were recruited from a pool of 421 active consultants from 12 states in the southeast, mid-south and southwest who were asked to complete a baseline survey on characteristics and willingness to participate. TurningPoint, an audience response system, was used to collect quantitative data while traditional focus group techniques were used to collect qualitative data. During each focus group session, data collection was supported through the use of a digital audio recorder, a note-taker recording key responses on flip charts, and an observer (with cotton production experience) who likewise served as a recorder of content and context.

Consultants in each group responded to a closely aligned set of questions. Quantitative questions with pre-defined response choices were presented at the beginning of each 1.5-hour session and the same questions were addressed later as moderator-introduced discussion topics. Not all qualitative discussion questions have comparable quantitative response questions. Frequency distributions were prepared for response choices to the quantitative questions. Qualitative data analysis computer software (NVivo, 2010) was used to develop models of the focus group discussion results.

## Results

Participants in both groups were primarily from the mid-south with some representation from Texas. COTMAN users had 5 to 15+ years experience as a cotton crop consultant while all of the non-users had 15+ years experience. Four of six COTMAN users had 10 or more years experience with the software. Users served 3-10 clients with acreage predominately in the 10,000-20,000 range. All of the non-users served more than 10 clients with half covering over 20,000 acres. Consultant COTMAN non-users were generally familiar with the COTMAN system and some had previously used the software.

### What are Incentives to Use COTMAN?

Consensus of both the user and non-user consultant groups was that the major incentive to use COTMAN is to establish defoliation timing, with secondary incentives to time insecticide and irrigation termination. All three of these were viewed as saving money for their clients.

### What are Barriers to Using COTMAN?

The primary barrier identified by the non-users was the time required for data collection and data entry. They indicated that their clients were unwilling to pay for that service. The user group also identified time involved in data collection, but that was secondary to other perceived barriers. They viewed unmet education, demonstration and research needs as the primary barriers to adoption. They specifically identified the need for on-farm demonstrations and applied research, and they felt that university and extension personnel should be better educated on the program and do more to promote the system.

**What Type of Cotton Production Management Software Functions would be Useful?**

This question was asked only of the non-user group. Useful functions included the integration of COTMAN data and reporting into other software and the provision of data collection hardware that has a screen readable in bright sunlight.

**Do You Think COTMAN is Missing Important Functions or Features?**

This topic was addressed both as a quantitative response question and as a discussion question. All of the non-user consultants responded that they did not know whether COTMAN is missing features, and a majority (4 of 6 users) responded "no". In discussion, however, both groups identified some missing features, primarily related to specific report items and report generation features in the COTMAN software. Users also felt that there should be a feature to allow web download of daily temperatures for heat unit accumulation.

**Does COTMAN have Features that are not needed?**

This topic was addressed both as a quantitative response question and as a discussion question. All but one user selected "no", COTMAN is not missing features. The non-user group response was evenly split between "no" and "yes". Group discussion identified only a few items, primarily related to the pre-flower (SquareMan) portion of COTMAN.

**What Aspect of COTMAN Needs the Most Improvement?**

This topic was addressed both as a quantitative response question and as a discussion question. Six response choices were presented (Figure 1). The majority of users indicated that data collection was most in need of improvement. Half of the non-user group also identified data-related problems for improvement.

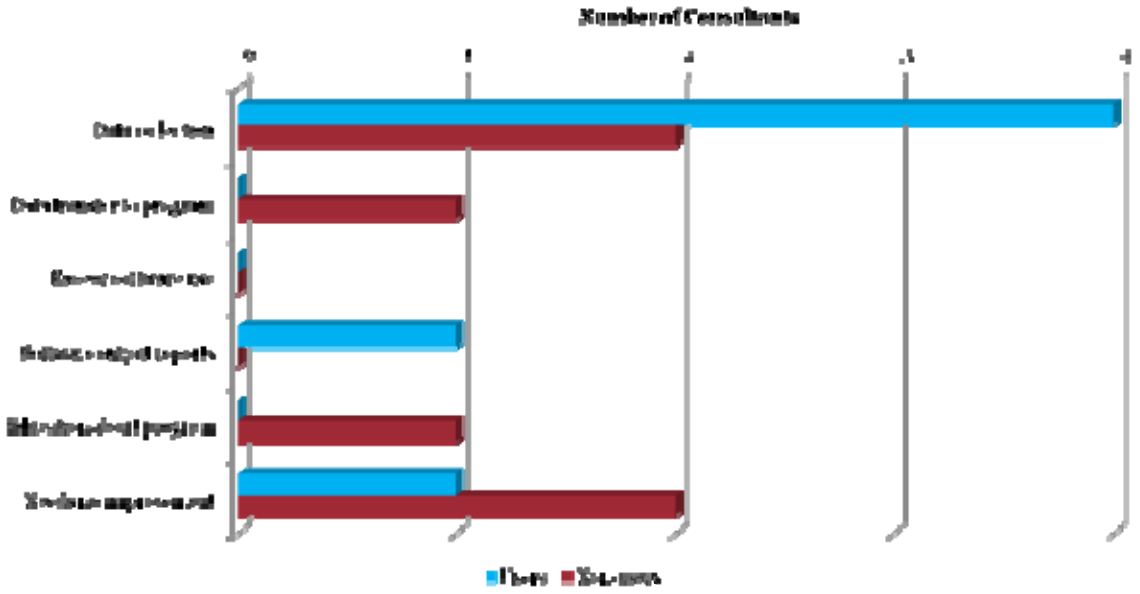

Figure 1. Consultant user and non-user responses, aspect of COTMAN that needs the most improvement

When the groups discussed the question, the non-users again identified data improvement needs. They wanted a streamlined data entry process, but they also emphasized hardware improvements for data collection and better methods to secure data from loss. Users also identified data-related improvements including better hardware and ability to download temperature data. However they also emphasized the need for improved research, demonstration and education, including annual extension demonstrations with economic analysis of yields and net returns obtained by using the COTMAN system.

**In a Perfect World what would be the Ideal Support and Interface?**

This question was asked of the COTMAN user group only. Consultants expressed a desire to be able to use audio input for plant monitoring data, to be able to use GPS coordinates in the field to direct scouts, and to tie into NDVI (Normalized Difference Vegetation Index) values.

**What is the Best Way to Support Your Use of Production Management Software?**

This topic was addressed both as a quantitative response question and as a discussion question. Four response choices were presented (Figure 2). The majority of both groups responded that face-to-face training sessions are the best way to support their software use. A software tutorial component was the second most frequent choice. No one in either group indicated that web-based training or a user discussion group is their preferred choice. Discussion of the question showed consensus in both groups that face-to-face training is one of the best software support methods--they wanted in-field training and/or training and demonstrations with actual field scenarios. In addition, both groups identified 24/7 telephone support as a support choice, noting that this support should be provided by someone who understands cotton production.

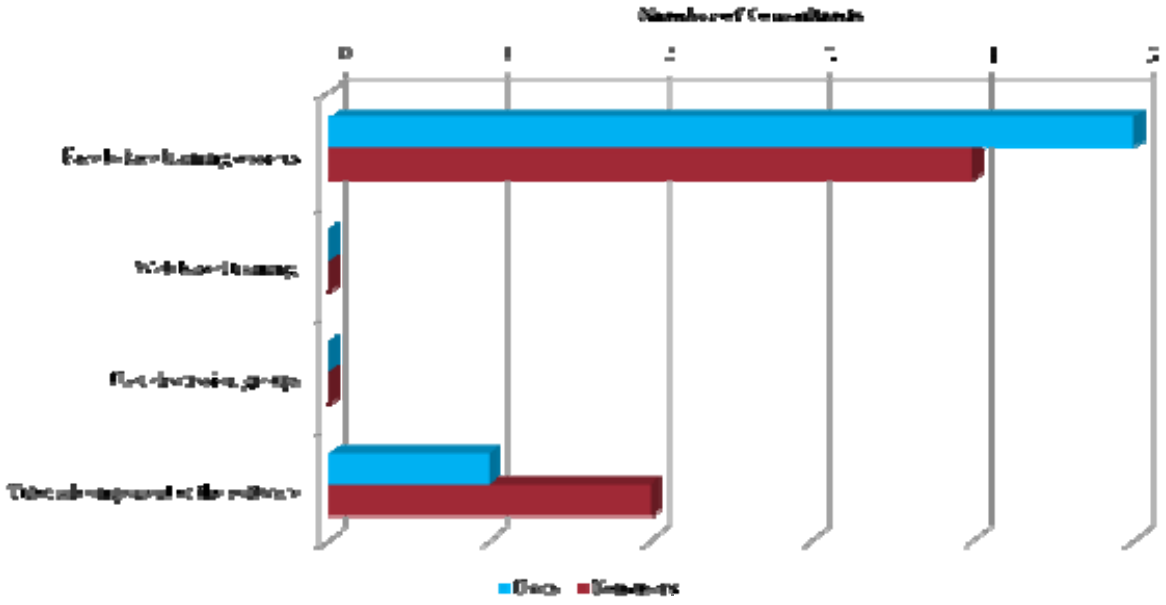

Figure 2. Consultant COTMAN user and non-user responses, best way to support production management software use

**How likely are you to Use COTMAN in the Future?**

This topic was addressed as a quantitative response question to both groups. All of the users indicated they planned to use COTMAN in the future but the majority of non-users were unsure. The non-users were asked to discuss the likelihood that they would use COTMAN or other crop management software in the future. They set conditions for use--a cell-phone sized device for field data entry, wireless data transmission, methods to secure against data loss and options to track NAWF in software other than COTMAN.

## Summary and Discussion

The mix of quantitative and qualitative data collection methods worked well in the focus group setting. The survey questions with predefined choice sets introduced the topics at the beginning of the sessions. However, they did not appear to limit the discussions, as group members identified important aspects that were not presented in the choice

sets for the topics. While the focus group study results cannot be used as estimates of a population response, they do provide invaluable information on the scope of problems and prospects for enhancing the development and usefulness of COTMAN. Consultants, both COTMAN users and non-users, find value in tracking NAWF and heat units for end-of-season management. However, the responses indicated that improvements are needed to expand adoption and use of COTMAN. Enhancements to data collection, hardware, weather tracking, and reporting of results are needed. More training and field level support are needed. With improvements, all participants indicated that they would be interested in potentially using COTMAN. Enhancing COTMAN will result in better-informed decision-making and management of cotton production in the United States. Improved efficiency in use of costly insecticides and defoliants will reduce costs of production, increase yields and result in higher profitability for cotton producers, making U.S. cotton more competitive in domestic and global markets.

## Acknowledgements

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