

# **Yield Measurements in Cotton using the Agleader Yield Monitor**

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## **Introduction**

Precision farming is a farming strategy that uses new technology, such as yield monitoring and global positioning systems (GPS) to more precisely monitor and manage within-field variability. Initially, it is important to determine if the degree of variability within the field is a problem. Most Georgia fields have differences in soil properties that affect yields.

Until recently, within-field variability of cotton was not measurable due to the lack of a viable cotton yield monitor. New monitors are now reaching the level of reliability and accuracy to warrant a look at their potential as additions to cotton pickers here in Georgia. One monitor is currently available to farmers. The Agleader Cotton yield monitoring system can be bought as a option on Case Cotton Pickers or can be retrofitted on John Deere or Case pickers using provided instructions. The Farmscan, Microtrak and Agriplan (formerly Zycom) cotton yield monitors are only available as retrofits onto existing cotton pickers. Agriplan also has a cotton stripper model.

Each yield monitor uses the same principle to measure cotton yield. The sensor consists of two sets of eyes that are placed on each side of a cotton chute, directly opposite each other. One set of eyes sends an optical signal (light) to the other set of eyes and when cotton breaks the beams of light, the sensor detects it. The amount of light blockage can be correlated to the weight of cotton.

## **Objectives**

1. Install an Agleader cotton yield monitor on a 4-row picker
2. Compare the cotton weight measured by the Agleader yield monitor to the cotton weight measured using truck scales.

## **Methods and Materials**

The Agleader sensors were installed on two-chutes of a 4-row 9965 John Deere cotton picker, per recommendations by the Agleader installation manual. The two chutes were removed and holes were cut-out to mount each pair of sensors facing each other on the front and back of the chutes. An Agleader yield monitor console was mounted in the cab and connected to the cotton picker's power supply. The sensors and GPS receiver, placed on the picker roof, were connected to the console. As cotton yield was measured, the yield data and GPS coordinates were recorded and placed in a file on the monitor. Each time the monitor was shut down, the data on the file was automatically downloaded onto a flash memory card. The memory card was

downloaded onto a personal computer for analysis and yield mapping.

Approximately 83 acres of cotton were harvested in two fields. Once the cotton picker had a full basket of cotton, the picker was driven up to a boll buggy that was sitting on truck scales. The cotton picker basket was dumped into the boll buggy and the weight of the boll buggy recorded. At the same time, the weight measured by the yield monitor was recorded and compared to the weight from the truck scales. The boll buggy cotton was then dumped into a module builder. The cotton yield sensors were calibrated by weighing 3 loads of cotton and running the calibration routine on the Agleader yield monitor console.

## Results

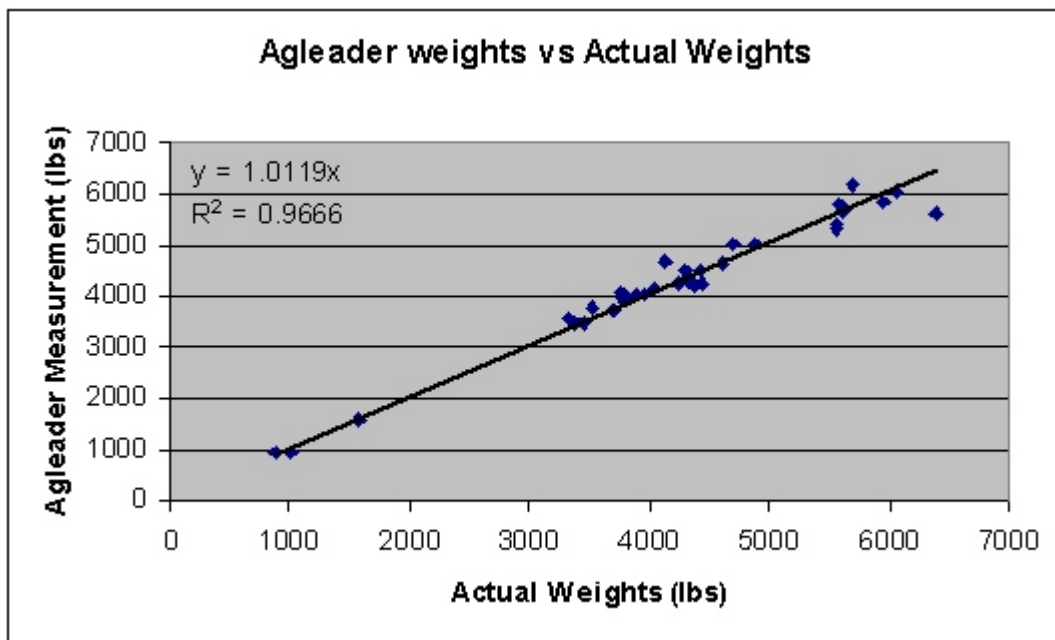
Installation of the console, sensors, and GPS took about 4 hours including the time to cut holes in the chutes and mount the sensors. The most difficult part of installation is making sure the holes are in good alignment so that the sensors facing each other are aligned correctly. Agleader claims that the sensors can be misaligned somewhat and still work. However, care was taken in our installation to line the sensors up and there were no problems associated with misalignment.

Thirty-three loads of cotton in two fields (Field 1 and Field 2) were picked and weighed to compare to the yield monitor results. Agleader claimed that the sensors do not get dirty and that any dust build-up is automatically compensated for in the software. Therefore, the sensors were cleaned only once in each field. The Agleader yield measurement was in close agreement to the weights measured by the truck scales (Figure 1). The correlation coefficient ( $r$ ) between yield measured by the yield monitor and yield weighed by the truck scales was 0.98 ( $r^2 = 0.97$ ). The slope of the regression line was 1.0119. The mean absolute percent error for each load was 3.9 %.

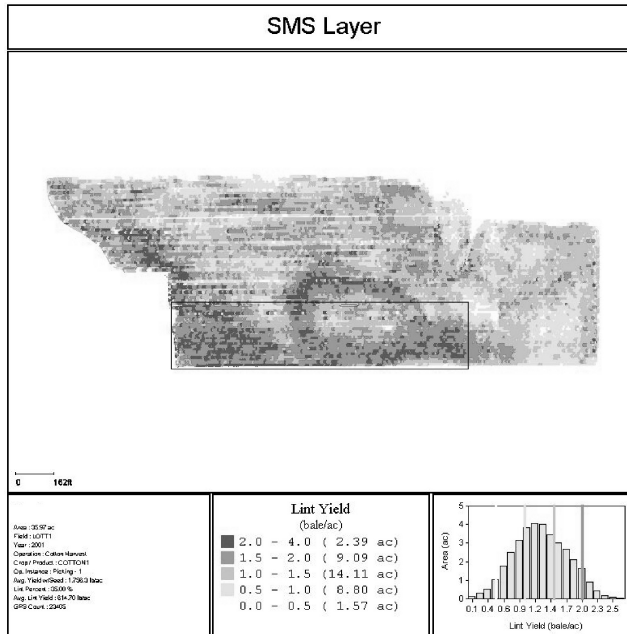
A yield map was created for each field using the SMS Basic software that is supplied for a fee with the Agleader system (Figures 2 and 3). The figures shown are outputs of the SMS software. The legend can be changed by the user to show different ranges and present seed weight per acre or lint weight per acre. A histogram is also provided to show the distribution of yield within a field. Average yield for field 1 and field 2 were 1.3 and 1.2 bales per acre, respectively, assuming a turn-out of 35%. High and low yielding areas are easily identified and can be further investigated to determine whether site-specific management of lime and/or nutrients would help improve the fields performance. Although neither field had a center-pivot irrigation system, the farmer of field 1 used a cable-tow system to irrigate a portion of the southern side of his field (area encircled on Figure 2). That portion of the field showed that the irrigation had a dramatic effect on increasing his yield.

## Conclusions

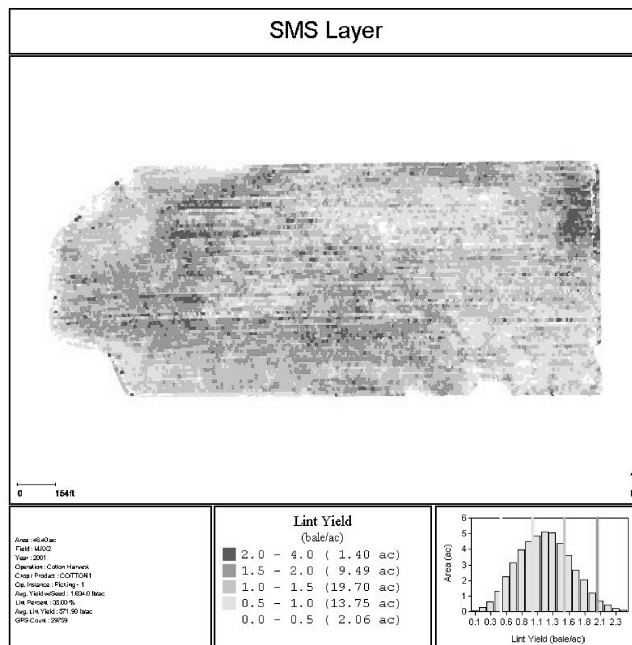
The Agleader yield monitor is a useful tool in identifying high and low yielding areas within a field. The system was relatively easy to install, and was easy to operate. Measured yield came very close to actual yield values measured with truck scales. Farmers interested in yield monitoring their fields should get good results from the Agleader cotton yield monitor.



**Figure 1** Agleader yield compared to actual yield measured with truck scales.



**Figure 2** Field 1 yield map from SMS software package by Agleader. Irrigated area is shown in block.



**Figure 3** Field 2 yield map from SMS software package by Agleader.