IMPROVED FIBER QUALITY FROM GIN PROCESS CONTROL

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Abstract

Improving the basic properties of cotton fibers has long been a goal in the development of seed varieties. Longer, stronger fibers are necessary in the high speed processing in the modern textile mill. Preserving the fiber quality that is inherent in the genetic traits of the plant can also be an approach to improve fiber properties. Many studies have been done over the years that show the influence of the ginning process on cotton fibers.

In 1997 Zellweger Uster, Inc signed an agreement with the USDA to manufacture and market the gin process control system designed by the USDA Stoneville, MS gin laboratory. The system makes real time measurements of color, trash, and moisture. It is also controls the seed cotton and lint cleaner bypass valves. Decision making software algorithms determine optimum process flow based on financial information from a producer loan chart. Monitoring stations are located at the module feeder, after the gin stand and at the battery condenser before the bale press. The stations continuously sample the flow of cotton and measurements are made every six seconds. Information is shown to the ginner via a control console using graphical displays.

In 1997 three beta site gins used the IntelliGin system during the cotton season. During the 1998 season five additional sites installed the system. The gins are located throughout the mid south and southeast. This paper is a report on the results from trials conducted during the 1998 gin season. At each site the gins were operated with and without engaging the IntelliGin system. Tests were conducted by choosing identical modules from the same producer, same field and same seed variety. Modules were processed completely through the gin making sure all the cotton was processed and baled before the second module was processed.

Test Results

Samples were collected during the tests and tested on the AFIS and HVI instruments. During the processing of the module, weight turnout tests were conducted to determine the additional pounds gained by using gin process control system. Figure 7 shows the results from the five test sites turnout trials. The average increased turnout from the five sites was 18.5 pounds. Figure 8 highlights the AFIS Nep results showing the reduced nep levels when using the IntelliGin system. The short fiber was also reduced by almost 2% when the gin process control system was being used. The upper quartile length was increase by one full staple length (.03 inches). These results are shown in figures 9 and 10.

The samples were also tested on the HVI instrument and the results were compared to the regional USDA classing office for each particular gin. The length and strength results were grouped to show how the percent of bales ginned at the IntelliGin site compared with the classing office results. Figures 11 and 12 results show that using the IntelliGin system reduced the percent of short staple length and weak bales and increased the percent of longer staple length and stronger bales.

The gin sites provided many different configurations of equipment for the system to control. Figure 13 details all the gin configurations that were used during the 1998 season. One of the interesting trials were to compare gins using one and two lint cleaners with and without the IntelliGin system. Figure 14 details the comparison between gins in the trial using one and two lint cleaners, the results are without the IntelliGin system engaged. The one lint cleaner cotton had reduced neps, reduced short fiber content and increased fiber length. Trials were then done to compare the gin using only one lint cleaner with and without the IntelliGin system. Figure 15 shows that even using one lint cleaner, the gin using process control could reduce the nep count, short fiber content and increased overall fiber length.

Conclusion

Gins using the IntelliGin system made significant improvements in fiber length and strength on the cotton they processed. Process control also reduced the short fiber content in the cotton ginned using the IntelliGin system. Reduced nep content and increased gin turnout was also advantages of cotton processed with the IntelliGin system. These overall improvements can also be seen in gins using only one lint cleaner.

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IntelliGin System Results
1998 Gin Turnout Trials

Location	Increased Turnout
1	33.5
2	15.6
3	19.7
4	15.8
5	7.7
Average	**18.5 lbs/bale**

Figure 7

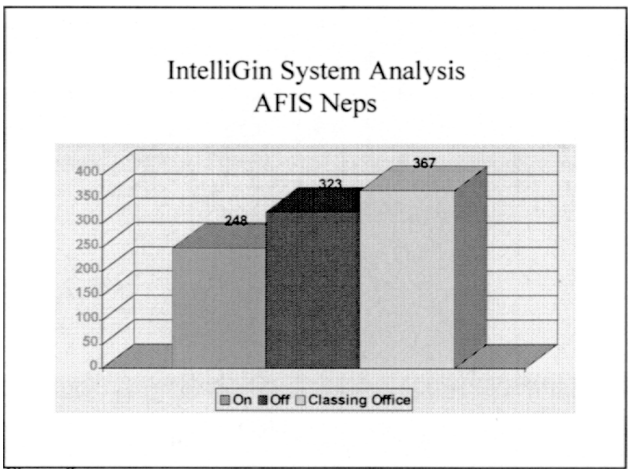

Figure 8

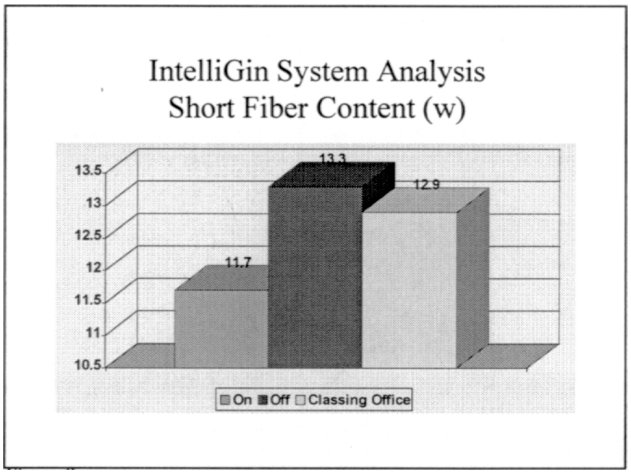

Figure 9

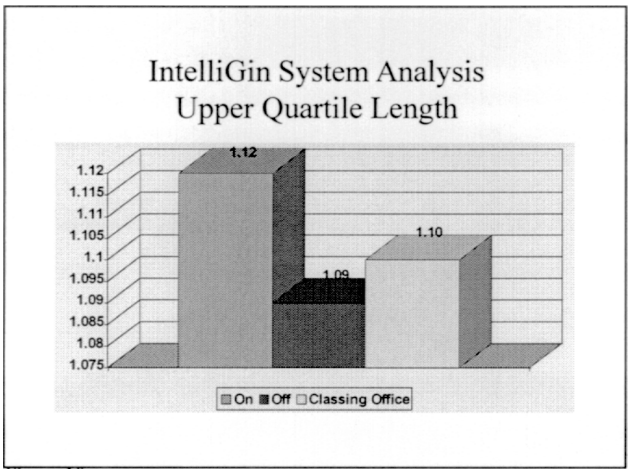

Figure 10

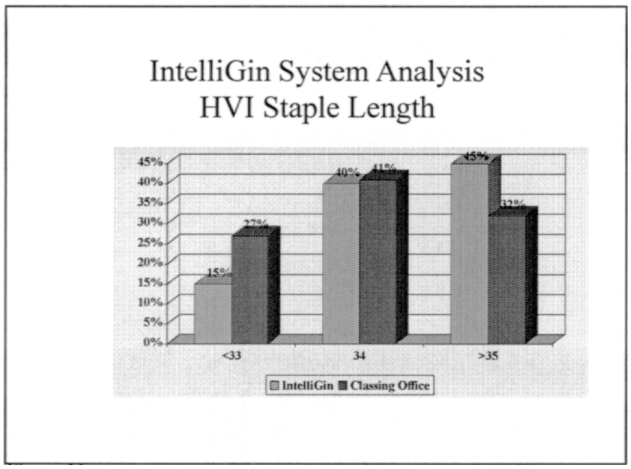

Figure 11

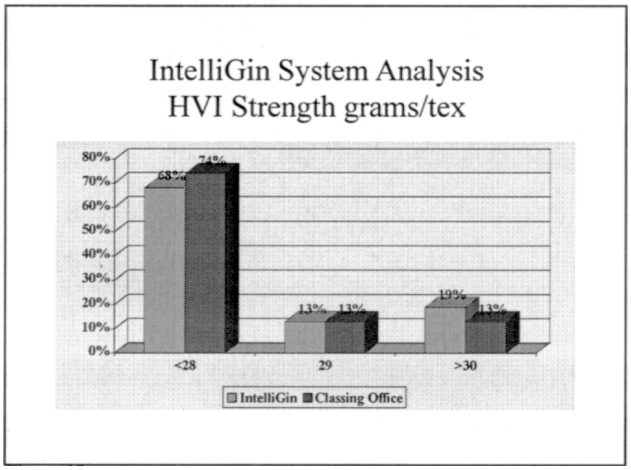

Figure 12

IntelliGin System Analysis
1998 Gin Configurations

- Lint Cleaners
  - Single
  - Double
  - Split flow
- Stick Machine
  - 1 and 2 inline
- Pre Cleaning
  - Single system
  - Split system
- Dryer's
  - Standard and short tower
  - Hot shelf
  - Fountain

Figure 13

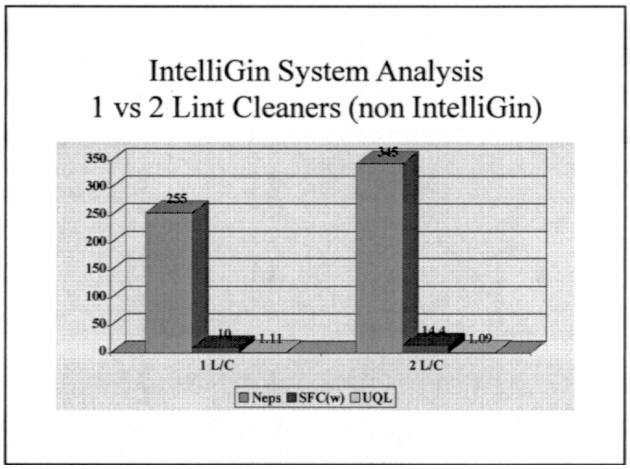

Figure 14

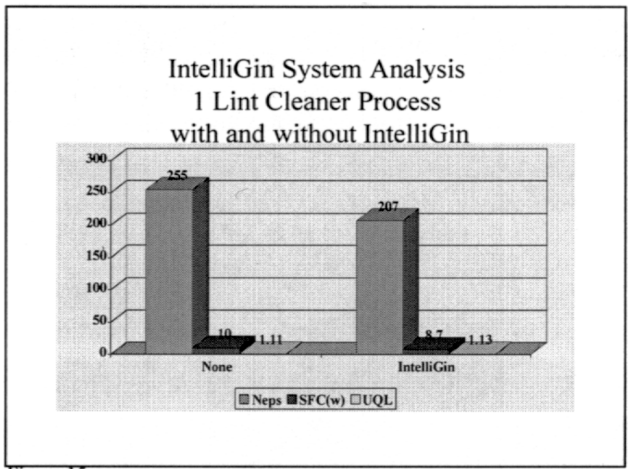

Figure 15