IntelliGin—

Improved Cotton Ginning Technology

High-quality cotton can come at high costs to the farmer and, ultimately, the consumer. One reason is that all cotton goes through the same cleaning and drying sequence—without regard to differences in moisture content, color, or foreign matter. The result: lower quality cotton and higher loss of lint.

Improved ginning technology developed by ARS scientists may soon correct this.

"We have developed a computerized system to automatically measure the quality of cotton at various stages of gin processing," says W. Stanley Anthony, who heads the U.S. Cotton Ginning Research Unit at Stoneville, Mississippi. [See also "Improved Ginning for Better Cotton," *Agricultural Research,* December 1992, pp. 16-18.]

"Sensors determine the quality of incoming cotton and send the information to a computer. Once the color of the cotton, foreign matter, and moisture content are known, the software decides the best sequence of machine-cleaning and drying to get the best market quality and value."

The gin process control system also considers the performance characteristics of gin machinery, such as foreign matter removal, fiber loss, and fiber degradation.

The system allows ginners to customize their ginning process for each farmer so as to increase farmer profits. For instance, if a farmer knows the market price for various grades of cotton in advance, the ginner can integrate the actual market price with initial cotton quality information and determine the sequence needed to optimize dollar returns for that farmer.

Before this invention, assessing the effect each ginning process would have on cotton properties was nearly impossible. Now, the new gin control system determines when cotton needs two lint cleaners and when it needs only one. It also uses the pricing schedule of whatever merchant is going to handle the cotton for the farmer.

"It prepares the cotton to meet market prices," says Anthony.

Research at field gins from 1994 to 1997 shows that finetuning ginning operations nets cotton farmers additional profits of $10 to $20 per bale. One gin in Alabama increased returns to farmers by $16.72 per bale on about 42,000 bales in 1994, worth over $700,000. In 1995, the increased per-bale return was $21.

And the process control system saves the ginner nearly $1 per bale in reduced energy costs.

Anthony and others at the Stoneville lab developed eight different patents involving the process control system. ARS agricultural engineers Richard Byler and Oliver McCaskill, who is now retired, are co-inventors on some of them.

The patents cover automated cotton extraction and grading equipment, automated sampling devices, electrical moisture sensors, automated calibration devices, automated directional valves for seed cotton and lint, computer simulation software, optimization software, machinery performance characteristics models, and related inventions.

The control system technology for cotton ginning has been licensed exclusively to Zellweger Uster, an equipment manufacturer, and will be commercially available in 1998 under the trade name IntelliGin.—By **Tara Weaver,** ARS.

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Cotton's Path Through the IntelliGin

- Module feeder—Compacted cotton as it comes from the field begins processing here. Video camera and moisture sensors in the feeder relay information about color, trash, and moisture to a computer.
- Dryers—Cotton may bypass the dryers completely or dryer temperatures may be adjusted higher or lower, depending on instructions from the computer.
- Cylinder cleaners and stick machine—One or more stages may be needed, depending on the intended market quality of the cotton.
- Gin stand—Removes fibers from the seeds. Sensors again relay quality information to the computer.
- Lint cleaners—The computer controls the number of cleaners to achieve the best end quality and value.
- Bale press—Sensors measure the final quality immediately before the cotton fiber, or lint, is pressed into 500-pound bales ready for marketing.