

**PRELIMINARY INVESTIGATION OF THE
CLEANING OF GIN MOTES**

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Abstract

This report compared the value added to "motes" by various cleaning machine sequences at the gin. Three studies were conducted with spindle-picked cotton. Study 1 confirmed the typical amount of lint cleaner waste produced by two lint cleaners as 28.8 pounds per bale. Study 2 established typical waste remaining after minimum cleaning with one cylinder cleaner as 69.6% and progressively decreased to 39.9, 30.9, and 27% as one, two and three stages of lint cleaning were added. Study 2 also indicated that additional cylinder cleaners may be advantageous to provide more cleaning of the raw material before lint cleaning. Monetary value, based on current market prices for 28.8 pounds of motes per bale increased from \$1.58 to \$4.20 per bale as cleaning levels increased. Study 3 compared cylinder cleaner equipped with wire mesh or grid rods and found no difference. Monetary values ranged from \$2.67 to \$4.68 per bale as lint cleaners were added. The studies collectively indicate that profit from lint cleaner waste varies substantially and that additional research is required to establish firm guidance.

Introduction

Cotton consists of three primary components--cottonseed, fiber, and foreign matter. Cottonseed are usually marketed in bulk by the ton while fiber is sold in 480 to 500 pound bales. Foreign matter consists of mostly plant parts and fibrous material. The fibrous material comes primarily from lint cleaner waste and is commonly referred to as "motes" by the ginning industry. These "motes," as they are incorrectly known in the industry, are cleaned at the gin or at another facility. Most gins that reclaim their lint cleaner waste clean it with at least one stage of a modified cylinder cleaner which is normally used for cleaning raw seed cotton. Some gins use two stages of cylinder cleaners and some also use one or more stages of saw-type lint cleaning to produce a finished product.

The amount of material removed from ginned lint with lint cleaners varies with the cottons condition at harvest, harvesting practices, varieties, number of lint cleaners, and grades of cotton being ginned. When multiple stages of saw-type lint cleaners are used, the first lint cleaner removes the most weight. Typical quantities of waste removed by

one, two, and three stages of lint cleaning, respectively, are 22, 30, and 36 pounds for spindle-picked cotton (Mangialardi, et al., 1994). Even larger amounts are removed from machine-stripped cotton. Lint cleaner waste from relatively clean cotton contains a greater percentage of lint than that from more trashy cottons. Non-lint content of the lint cleaner waste for one, two, and three stages of lint cleaning, respectively, averages about 75, 70, and 67%, respectively. The non-lint material is composed of true motes (aborted ovules), leaf particles, grass, stems, bark, bracts, and seed-coat fragments.

Motes are generally classed as types 1 through 7, with type 1 being called a "reginned" mote (Dawkins, 1996). It is white in color with considerable pin trash. The 1996 market value was about 60 cents per pound. Type 2 is also classified as "reginned" but is not as good qualitatively as type 1 and was valued at 50 cents per pound in 1996. Type 3 has a low middling (off white) color and is leafy. Type 4 is light gray, leafy, and contains some seed fragments. Type 5 and 6 are gray, leafy, and have seed-coat fragments. Type 7 are raw minimally cleaned gin run motes. Market values for all mote classifications are highly variable and the following were used for the study:

Type	Value, \$ per pound
1	0.60
2	0.50
3	0.25
4	0.20
5	0.15
6	0.08
7	0.08

Watson and Holder (1966) developed a machine to reclaim usable fibers from lint cleaner waste. Tests showed that the machine reclaimed an average of 72% of the usable fibers and removed 84% of the foreign matter from the gin loss cotton in one stage of processing. These tests also showed that processing slightly improved the length distribution of the fibers and made it feasible to spin a mix consisting of 100% reclaimed fibers. Although manufacturing waste was high and yarn strength and appearance were relatively low when only reclaimed fibers were used in the yarns, such fibers should perform satisfactorily in mixes used to manufacture low count yarns and fabric constructions. They also reported that buyers offered an average of 1.5 cents per pound for unprocessed motes and 6.7 cents per pound for cleaned motes. Based on these prices and adjusted for weight loss, the value of ginned loss cotton increased by more than \$5.00 per bale after having been passed through the reclaimer once. They also noted that not many dealers are willing to purchase motes that contain large quantities of trash, thus some cleaning is normally done at the gin before motes are sold. Although this article was written in 1966, little has changed except the price and end uses of lint cleaner waste.

Current market prices for gin cleaned motes range from 8 to 60 cents per pound and offer considerable financial advantages to the ginner. However, little research has been done on the best way to clean motes and retain both quality and quantity of material. The bedding, automotive, and furniture industries use large quantities of cotton batting composed of about 60% linters (short fibers left on the cottonseed at the gin) and 40% cotton waste. It is usually desirable to remove sticks and other large trash particles with mote cleaners to make the waste more marketable. If undesirable waste materials are removed, the increased value of the cotton per pound should more than compensate for the weight loss attributed to cleaning (Holder, et al., 1967).

The purpose of this study was to evaluate the cleaning effectiveness of various gin machines on lint cleaner waste.

Methodology

Three separate studies were conducted. In Study 1, 50 bales of cotton were processed through three different models of gin stands and one or two stages of saw-type lint cleaning to determine the amount of lint cleaner waste removed. In Study 2, the material obtained from Study 1 was processed through various combinations of cylinder cleaners and lint cleaners in order to establish the cleaning efficiency of the machine sequence as well as the final grade of the lint cleaner waste. In Study 3, comparisons were made between using standard grid bars in a cylinder cleaner and using woven wire mesh. These combinations were also used with two stages of lint cleaning.

Study 1

For Study 1, from 19.0 to 40.4 pounds of lint cleaner waste were removed per 500 pounds of lint for various combinations of gin stands and lint cleaners as shown below:

Gin stand	Lint cleaners*	Lint cleaner waste/bale
A	1 (9)	28.5
A	2 (13)	40.4
B	1 (9)	19.0
B	2 (13)	24.3
C	1 (3)	25.2
C	2 (3)	32.6

* Numbers in parenthesis indicate the number of bales.

The average amount of lint cleaner waste removed per bale was 28.8 pounds. This lint cleaner waste contained a large amount of foreign matter and was classed as type 7 gin motes with a value of about 8 cents per pound. The \$2.30 value per bale of ginned lint is rather small, especially when transportation costs are considered. In addition, the market for these "raw" gin motes is limited. In order to profit under these market conditions, motes must be cleaned

somewhat at the gin. After one stage of lint cleaning, about 24.2 pounds of marketable motes were obtained as compared to 32.4 pounds after two stages of saw-type lint cleaning.

Study 2

In Study 2, the impact of one or two cylinder cleaners and a cylinder cleaner in combination with either one, two, or three stages of saw-type lint cleaning was assessed on the amount of reclaimed fiber (turnout) from the lint cleaner waste. With one stage of cylinder cleaning, 69.6% of the lint cleaner waste was retained. With the addition of one, two, and three stages of lint cleaning to a cylinder cleaner, 39.9, 30.9, and 27.0% of the lint cleaner waste was retained as shown below:

Gin stand with one or two lint cleaners	Lint remaining after cleaning, %, with machine treatment			
	Cylinder cleaner (CC)	CC + 1-Lint cleaner	CC + 2-Lint cleaners	CC + 3-Lint cleaners
A	75.9	45.4	35.7	31.3
B	62.4	34.1	26.0	22.2
C	73.1	40.5	31.7	28.2
Mean	69.6	39.9	30.9	27.0

There were significant differences in the amount of lint retained and the resulting monetary value as a function of gin cleaning treatments as shown below:

Machine	Turnout, %	Grade	Value, \$ per bale**
Cylinder cleaner	69.6	6.0	1.58
Cylinder cleaner + 1-Lint cleaner	39.9	3.6	3.50
Cylinder cleaner + 2-Lint cleaners	30.9	2.5	3.58
Cylinder cleaner + 3-Lint cleaners	27.0	1.6	4.20

**Value = turnout times price times 28.8 pounds per 500-lb bale

The difference in value per bale correlates directly with the quantity of lint cleaner waste removed; this suggests that some models waste more fiber than others. In essence, cleaning lint cleaner waste with a cylinder cleaner and three stages of saw-type lint cleaning produced only about 1/4 of the original lint cleaner waste for market.

Since considerable non-lint material appeared to be in the lint cleaner waste after a single stage of cylinder cleaning, some of the samples (gin stand A and B) were processed through a second stage of cylinder cleaning as shown below:

Turnout (%) after grid-type cylinder cleaners			
Gin stand	Lint cleaner	1-Cylinder cleaner	2-Cylinder cleaners
A	1	72.7	60.6
A	2	76.7	65.7
B	1	59.7	46.6
B	2	64.0	50.5
Average	-	68.3	55.8

Waste removed by the second cylinder cleaner was almost all leaf material and was quite similar to the waste from the first stage of cylinder cleaning.

Study 3

In Study 3, the grid bars on a cylinder cleaner were replaced with wire mesh and their efficiencies compared. In addition, two stages of lint cleaning were added to some of the treatment combinations. There was no difference between the cylinder cleaner equipped with grid bars and the cylinder cleaner equipped with wire mesh in terms of lint retention. There appeared to be some “hairyng over” with the wire mesh but none was observed with the grid. Results are shown below:

Mote cleaning				
Machine	Grid/ Mesh	Lint,%	Grade	Value, \$ per bale*
Cylinder cleaner	Grid	61.9	5.0	2.67
Cylinder cleaner	Mesh	60.4	5.0	2.61
2-Cylinder cleaners	Grid	49.3	4.5	2.49
2-Cylinder cleaners	Mesh	49.3	4.2	2.70
3-Cylinder cleaners	Mesh	43.9	4.0	2.53
2-Cylinder cleaners with 2-Lint cleaners	Mesh	26.1	1.0	4.51
3-Cylinder cleaners with 3-Lint cleaners	Mesh	27.0	1.0	4.66

* Value = turnout times price times 28.8 pounds per 500-lb bale

About 61% of the lint was retained from the single stage of cylinder cleaning. With two stages of cylinder cleaning about 49% of the lint cleaner waste was retained. For three stages of cylinder cleaning, about 44% of the lint was retained. When two lint cleaners were added in addition to two stages of cylinder cleaning equipped with wire mesh, about 26% of the lint was retained. Likewise, when three

stages of cylinder cleaning with wire mesh were used in addition to two lint cleaners, about 27% of the lint was retained. As the lint cleaner waste was processed through multiple stages of seed cotton cleaning, considerable cleaning continued to occur. Thus, the use of multiple stages of cylinder cleaning before the lint cleaning process should greatly reduce the wear and tear that occurs on the lint cleaner. The grade continued to improve as the lint cleaners were added. Inspection of the data indicated that a full-grade difference occurred between gin stand/lint cleaner models.

Summary

Lint cleaner waste is a valuable byproduct of cotton ginning. This report compared the value added to “motes” by various cleaning machine sequences at the gin. Study 1 confirmed the typical amount of lint cleaner waste from two lint cleaners as 28.8 pounds per bale. Study 2 established typical waste remaining after minimum cleaning of one cylinder cleaner as 69.6% and progressively decreasing to 39.9, 30.9, and 27% as one, two and three stages of lint cleaning were added. This indicated that additional cylinder cleaners may be advantageous to provide more cleaning of the raw material before lint cleaning. Monetary value per bale, based on 28.8 pounds of motes, increased from \$1.58 to \$4.20 as cleaning levels increased. Study 3 compared cylinder cleaners equipped with wire mesh to those with grid rods and found no difference. Monetary values increased from \$2.67 to \$4.68 per bale as lint cleaners were added. The studies collectively indicate that the profit from lint cleaner waste varies substantially and that additional research is required to establish firm guidance.

Disclaimer

Mention of a trade name, propriety product or specific equipment does not constitute a guarantee or warranty by the U.S. Department of Agriculture and does not imply approval of a product to the exclusion of others that may be suitable.

References

Holder, S. H., Jr., O. L. McCaskill, and E. H. Shanklin. 1967. Effects of reclaimed gin-loss cotton on lint quality and spinning performance. U.S. Department of Agriculture Marketing Research Report 808.

Mangialardi, Jr., G.J., R.V. Baker, D.W. Van Doorn, B.M. Norman, and R.M. Sutton. 1994. Lint Cleaning. pp. 102-119 in W.S. Anthony and William D. Mayfield, eds. 1994. Cotton Ginners Handbook. U. S. Department of Agriculture, Agricultural Handbook 503, 348 pp.

Watson, H. And S.H. Holder, Jr. 1966. Reclaiming gin-loss cotton. U.S. Department of Agriculture Production Research Report. No. 91. 14 pp.