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**AGRICULTURAL EXPERIMENT STATION**

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MISSISSIPPI

**SEPARATION OF COCKLEBURS FROM ACID-DELINTED COTTONSEED**

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Research has made it possible for farmers to have practically cocklebur-free cottonseed for planting if they use acid-delinted seed. The Seed Technology Laboratory at Mississippi State University has shown that at least three types of seed cleaners will do a creditable job of removing cocklebur. The indented cylinder separator was found to be especially effective with practically no loss of cottonseed during the process. This type of separator is the same machine used in separating certain grain-weed seed mixtures and in length-sizing hybrid seed corn. The research included five lots of Mississippi grown acid-delinted cottonseed varieties, all heavily contaminated with cockleburs.

Mechanical harvesting has resulted in more cockleburs being harvested along with cotton. During ginning many of the burs are despined. These cockleburs then accompany the cottonseed through either the mechanical-delinted or the acid-delinting process. Since mechanically-delinted seed does not flow freely through precision seed cleaning equipment, successful separation of the burs from the cottonseed is not possible. Although the number of cockleburs remaining is seldom great enough to prevent sale by state law, it is often greater than the farmer wishes to buy and greater than allowed in Mississippi Certified seed.

On the other hand the acid-delinting process renders the cottonseed free of linters, leaving the seed as free flowing as grain. In this condition cottonseed lends itself to cleaning as does any free flowing seed, with efficiency of cleaning depending on the differences in physical characteristics between the crop seed and the

contaminant.

Prior to the experiments reported here, the cottonseed was passed through a two-screen cleaner (Clipper) as a part of the commercial process of acid-delinting. This cleaner was set up with a size 18 round hole top screen and a 9 x 3/4 oblong screen on the bottom. Enough air was supplied to remove light weight inert material and immature cottonseed. No loss of plantable cottonseed occurred either due to screening or aspiration in the process.

The effectiveness of this operation in removing cockleburs without the loss of planting seed may be noted in Table 1.

After the delinting-cleaning process was completed, the seed lots were taken to the Seed Technology Laboratory where various methods and equipment were used in attempting to separate the remaining cockleburs from the cottonseed. Only the most promising are reported.

Table 2 shows results of tests with the Simon-Carter Precision Grader equipped with each of two sizes of cylindrical screens, a 13 oblong and a 14 oblong. Each test consisted of six observations with a total of about 20 pounds of seed used per test. The equipment as used separated seeds differing in thickness, size 14 having perforations 1/64 inch wider than size 13.

At present any lot of Mississippi Certified Blue Tag seed is not permitted to contain over one cocklebur per two-pound sample, or in terms of Table 2, 10 cockleburs per 20-pound sample. With this standard as a yardstick it will be noted that the 13 slotted screen removed cockleburs effectively in all lots except Number 2, with the cottonseed losses of less than 5%. Although losses were reduced through use of the 14 screen, separations were not comparable.

Another trial included the use of an indented cylinder separator, specifically a Simon-Carter-Flow unit equipped with a size 22 cylinder. This was a commercial size unit which was used after preliminary trials with the laboratory unit showed promise. Approximately 600 pounds of seed of each lot was used. Results are shown in Table 3. An examination of this table shows that the separation is as

near perfect as can be expected in a mechanical separation process. Even 3 burs per 100 pounds of cottonseed (the entire 100 pounds were analyzed) is much less than the maximum figure of 50 per 100 pounds allowed under certification regulations. It will be further noted that cottonseed losses are negligible on all except Lot 5. The higher loss in this lot was a result of operating the separator at the maximum capacity of 100 pounds every 3 minutes (equivalent to 2000 pounds per hour). The first four lots were fed through the machine at about one-half this rate.

The effectiveness of the indented cylinder in separating despined cockleburs from acid-delinted cottonseed was due to the difference in length of the two components. The cottonseeds were removed from the mixture by the lifting action of the indents and the centrifugal force of the rotating cylinder. The only cockleburs which were lifted with the cottonseed were immature burs or burs having both ends broken off.

Presently, the gravity table is sometimes used to separate cockleburs from acid-delinted cottonseed. It is quite effective as shown in Table 4 where the results of the lots are reported. The chief disadvantage is that cottonseed losses usually run between 10 and 25 percent where a close separation is desired. On the other hand, the gravity separator has an advantage not enjoyed by the grader or the cylinder. Since cockleburs tend to be of less specific gravity than cottonseed, they move off the separator along with the lighter weight cottonseed. The net effect is that the heavier seed is bagged for planting while the less valuable seed is removed with the cockleburs.

**Summary**

In summary, it appears possible that the use of an air-screen cleaner and a good thickness grader, length grader, or gravity separator can provide the farmer with acid-delinted cottonseed virtually free of cockleburs.

Research is continuing in the Seed Technology Laboratory toward the separation of cockleburs from mechanically delinted seed but to date a truly effective method has not been found.

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This research is the result of the cooperative effort of the Mississippi Seed Improvement Association and its growers, processors, equipment manufacturers, and the Mississippi Agricultural Experiment Station.

**Table 1. Separation of cockleburrs from cottonseed by the air-screen cleaner during the acid-delinting process.**

Seed lot	Variety	Percent <sup>1</sup> cottonseed loss	Number cockleburrs removed per 100 lbs. seed	Number cockleburrs remaining per 100 lbs. seed
1	Stoneville 7	2.2	637	275
2	Delfos 9169	2.3	509	369
3	DPL-15	5.4	493	77
4	DPL-15	4.2	333	68
5 <sup>2</sup>	DPL-15	4.8	205,083	1336

<sup>1</sup>Includes inert material, cockleburrs, and very immature cottonseed.

<sup>2</sup>Extra burrs were added to this lot at the time of ginning. All other lots were natural contaminations.

**Table 2. Separation of cockleburrs from acid-delinted cottonseed by a Simon-Carter Precision Grader, Laboratory Test Model.**

Seed lot and cylinder size	Percent cottonseed loss	Number cockleburrs removed per 20 lbs. seed	Number cockleburrs remaining per 20 lbs. seed
Lot 1, Size 13	3.30	45	1
Size 14	0.25	37	8
Lot 2, Size 13	1.90	113	27
Size 14	0.19	69	71
Lot 3, Size 13	4.70	23	1
Size 14	0.35	16	7
Lot 4, Size 13	3.10	18	0
Size 14	0.28	14	4
Lot 5, Size 13	2.90	145	3
Size 14	0.34	130	18

**Table 3. Separation of cockleburrs from acid-delinted cottonseed by a Simon-Carter Uni-Flow indented cylinder separator.**

Seed lot	Percent cottonseed loss	Number cockleburrs removed per 100 lbs. seed	Number cockleburrs remaining per 100 lbs. seed
1	0.33	274	1
2	0.29	366	3
3	0.80	77	0
4	0.06	68	0
5	4.60	1333	3

**Table 4. Separation of cockleburrs from acid-delinted seed by an Oliver Gravity Separator.**

Seed lot	Percent cottonseed loss	Number cockleburrs removed per 100 lbs. seed	Number cockleburrs remaining per 100 lbs. seed
3	20.0	75	2
5	24.0	1335	1