EVALUATION OF A BENCH-TOP MECHANICAL DELINTER

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Abstract

As research projects associated with uses of glandless cottonseed as a protein source for aquaculture and human nutrition have increased, there is a need to process cottonseed in ways that minimize and/or eliminate potentially hazardous chemicals or methods, such as acid cottonseed delinting.

This study evaluated a bench-top mechanical delinter for efficacy in lint removal, visible mechanical damage to the seed, and germination. The bench-top model was developed to evaluate operational settings and abrasive materials on a small scale to determine the materials needed for in developing the large-scale prototype. The primary components of the bench-top delinter are the rotating drum, Scrub Brushes, lint removal system, and cottonseed input and output systems. The basic principle of operation consists of seed being fed into a counter-clockwise rotating drum lined with an abrasive material. Inside the drum, one or two Scrub Brushes are rotating clockwise and "scrubbing" the lint from the seed. The lint removed from the seed exists the drum through a fan system pulling air from the seed input opening through the drum and out the top-half of the back of the unit. The lint is then removed from the air stream using a cyclone and collected in a catch container. The seed remains in the drum until the predetermined operational time has been reached at which point, the seed exists through an opening in the back lower-half of the unit.

For this study, the focus was on the number of abrasive Scrub Brushes and the type of abrasive material lining the rotating drum. Testing consisted of operating the unit for 5 or 10 minutes using one or two Scrub Brushes and six different drum-linings. The six drum-lining materials evaluated were: 1) 3M Purple Scotch-Brite™, 2) 3M Clean and Strip ™, 3) 3M Brushlon 80 ™, 4) No material (metal surface of drum), 5) Nylon brush 0.04 bristle, and 6) 0.04 Nylon brush with 12 wire brushes. A total of four replications were performed for each treatment combination with seed and lint collected after each run. The collected seed was sent for analysis to a local lab. Results indicated the most efficient lint removal occurred with the 3M Purple Scotch-Brite and 3M Clean and Strip material using two Scrub Brushes for 10 minutes, followed by the nylon and wire brush combination, nylon brushes, 3M Brushlon, and No Material, respectively. Even though the Purple Scotch-Brite and Clean and Strip materials performed well, they were more problematic to clean after each run compared to other treatments evaluated. The best overall treatment considering both performance, potential durability, and ease of cleanout was the combination nylon/wire brush setup using two Scrub Brushes for 10 minutes. The results obtained will be implemented in constructing the large-scale prototype model.