TESTING OF A LARGE-SCALE MECHANICAL COTTONSEED DELINTER: RESULTS AND IMPROVEMENTS

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Abstract

Traditionally, mechanically delinted seed retains 1-2% residual linters whereas acid removes all linters and is primarily used for production of planting seed. The need for a process that cleans the lint off cottonseed has been of interest to inventers and the cotton industry for some time. Most of the early inventions focused on mechanical processes such as reginning the seed or using abrasives, scraping, or scouring. Even though a majority of the early cottonseed delinting patents and inventions focused on mechanical methods, other processes were patented such as a flammable liquid and flame, a flame treatment apparatus or acid. The main arguments for using acid were that the mechanical processes damaged the seed (i.e. crushing or getting too hot and killing germination) and/or did not remove all of the lint. Consequently, acid delinting became, and still is, the primary means of producing planting quality seed. The use of an acid, for delinting cottonseed, may be desirable in removing lint for planting seed but is not a desirable process from an environmental perspective or if the seed were to be used as a protein source for humans.

Historically, cottonseed has not been a viable source of protein for humans due to gossypol. However, a researcher at Texas A&M University was able to silence the gene responsible for gossypol production in the cottonseed allowing for its potential use as human protein source. Simultaneously, cottonseed companies were expressing an interest in a non-acid delinting process due to regulatory (environmental), safety and maintenance issues (corrosiveness) with running acid delinting plants. Hence, the need to produce a non-acid delinting process had renewed interest from industry.

This research reports on data obtained from processing large volumes of cottonseed through a large-scale mechanical delinter based on the successful bench-top archetype. Parameters measured include Lint Residue (%) and Germination (%), processing time (3, 6, or 9 min), and seed discharge location (feed side or air side).

Testing involved processing 10 lb lots for 3, 6, or 9 minutes and recording the residual lint (%) and germination. Seed discharge occurred at the fuzzy seed inlet and at the opposite end of the fuzzy seed inlet (air pull side). Results indicate that the seed seemed more polished when discharged from the fuzzy seed inlet than the air pull side. The rationale for cleaner seed from the inlet was due to the air pull drawing the fuzzy cottonseed down the 8-ft length of the delinter away from the inlet. As the seed became clean, it travelled back towards the inlet due to the wrapped wire scrubbing brushes which acted similar to an augur by conveying the seed against the flow of air. Residual lint was less than 1% for all processing times with the 9 min time having the lowest residual lint regardless of where the seed was discharged. Seed loss in the system ranged between 5 to 15% depending on the discharge end and time of processing.