

FIELD CLEANER EFFECTS ON EFFICIENCY, SEED COTTON LOSS AND FIBER QUALITY DURING HARVEST SEASON

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Abstract

Field cleaners (bur extractors) are an effective way of reducing foreign matter in stripper harvested cotton. It has been shown that 55% to 60% of the foreign material can be removed by bur extractors, which ultimately increases seed cotton stored per module and reduces ginning costs for the producer. Previous data from laboratory studies and small field plots had indicated seed cotton losses and fiber quality changes due to bur extractors were not a major concern. Increased use of bur extractors has at times resulted in questions from producers about excess seed cotton loss and fiber quality effects. Several previous studies have been conducted which targeted improvements in field cleaner efficiency via adjustments and operating parameters of the cotton stripper thus reducing seed cotton loss. A large-plot field study was established to evaluate the effects of various harvest dates on yield and fiber quality. This project provided an opportunity to evaluate field cleaning efficiency over an extended harvest period. 'Paymaster 2336 Roundup Ready' cultivar cotton was harvested with and without a field cleaner on Sept. 22, Oct. 12, Nov. 14, Dec. 18, 2000 and Jan. 22, 2001. The cotton was ginned at the USDA-ARS Cotton Ginning Research Laboratory, Lubbock, TX. A split-plot layout in a randomized complete block design with three replications was used. Harvest dates were considered as the main plot, and harvest method (field cleaner or no field cleaner) as sub-plots. Seed cotton fractionation and moisture samples were collected at the trailer and at the gin stand, and lint samples were collected after 2 lint cleaners. A 50-lb lot of lint from each sub plot was submitted to the Texas Tech International Textile Center for fiber analysis and spinning. Gin data indicated that the trash per bale ranged from 984 lb for the Sept. 22 harvest to 832 lb for the Jan. 22 harvest date for non-field cleaned cotton while the field cleaned cotton ranged from 535 lb to 471 lb for the same harvest dates. The foreign material for both harvest methods decreased as the harvest season progressed, however, the trend was more pronounced for the non-field cleaned cotton. Higher trash levels at the early harvest dates were due to higher moisture contents of the foreign matter. Main effect of lint yield averaged 573 lb/acre without a field cleaner and 548 lb/acre with a field cleaner, a significant difference of 25 lb. Varying yield reductions associated with field cleaning for harvest dates was noted. For the harvest dates of Sept. 22, Oct. 12, Nov. 14, Dec. 18, and Jan. 22, lint yields were reduced by field cleaning by 17, 25, 8, 50, and 19 lb/acre, respectively. Field cleaner losses incurred in the Sept. 22, Nov. 14, and Jan. 22 harvest dates are considered acceptable to producers. The loss incurred on Oct. 12 would be considered marginally acceptable, whereas the Dec. 18 harvest date would not be an acceptable loss. These random yield reductions are apparently related to excess seed cotton removal by the field cleaner, the reasons for which are unclear. Precipitation received during the harvest season resulted in fiber quality losses beginning with the Nov. 14 date. The color grade was significantly lower for the harvest dates beginning with Nov. 14 while field cleaning slightly improved the color grade for the last 2 harvest dates. Leaf grade and HVI trash were significantly lower for the Sept 22 and Oct. 12 harvest dates. The field cleaner had no effect on leaf grade and HVI trash at these 2 harvest dates but on the last 3 harvest dates the field cleaner slightly improved leaf grade and HVI trash. Staple length was about 1/32 inch longer for the Sept 22 and Oct. 14 harvest dates than for the last 3 harvest dates. A small increase in staple length was found for field cleaned cotton for all of the last 4 harvest dates. Micronaire was not significantly affected by harvest date or harvest method. HVI strength and uniformity were significantly reduced at the later harvest dates but were not generally affected by field cleaning. The incidence of bark contamination was significantly affected by field exposure, as over 75% of the lint samples were classed as light bark for the Nov. 14, Dec. 18 and Jan. 22 harvest dates compared to no light bark grades for the Sept. 22 and Oct. 12 harvest dates. Field cleaning had no significant effect on light bark incidence. Although loan values were significantly affected by the harvest dates, up to 6 cents /lb, field cleaning had a smaller effect, increasing the loan rate by about 1 cent/lb. Advanced Fiber Information System (AFIS) and spinning test data indicated that reductions due to field cleaning across all dates were found for nep counts, visible foreign matter, and total dust. Short fiber content by weight was significantly less for field cleaned cotton for the Nov. 14, Dec. 18 and Jan. 22 harvest dates. This study indicates that during the harvest season, field cleaning can affect yield. When averaged across all harvest dates, the yield reduction was 4.4%, and ranged from 1.5 to 8.5%. Field cleaning generally had small but significant effects on some HVI fiber properties while AFIS and yarn properties (nep count, visible foreign matter, and dust levels) were significantly reduced.