

COMPARISON OF GLYPHOSATE-TOLERANT AND NON-GLYPHOSATE-TOLERANT VARIETIES IN FULL AND REDUCED TILLAGE COTTON PRODUCTION SYSTEMS

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Abstract

Glyphosate-tolerant (GT) cotton varieties continue to comprise near 90% of the acreage in Alabama. As a direct result, the use of reduced tillage systems, including strip-till and no-till, has increased from 35% to 67% since 1997. The compatibility of these two technologies has proven both economical and practical, especially as individual farm size has increased. GT varieties have many desirable agronomic traits and yield well. However, some producers have become increasingly concerned with the fiber quality of GT varieties; specifically, high micronaire (fineness) and low staple (length) versus non-GT varieties. These fiber traits may impact the cash price paid for lint and thus farm profitability. In order to quantify these concerns, a multi-year field study was begun in 2003 to investigate the interaction of tillage system and variety on yield, fiber quality, and net returns. A factorial treatment arrangement of tillage (full vs. reduced) and variety (GT vs. non-GT) in a randomized complete block design with four replications was established at three locations in Alabama. Experimental units were eight-rows by 50 ft. long. Full tillage plots were chiseled and disked (2x) prior to planting and included cultivation after crop emergence. Reduced tillage plots were strip-tilled at two locations and the third location was a true no-till system. Varieties were selected based on location and growing season. Herbicide programs for each variety followed Alabama Cooperative Extension System recommendations, and were supplemented on a case-by-case basis, if needed. Visual estimations of weed control were recorded. Seed cotton was machine harvested, weighed, and subsamples were ginned for lint turnout and fiber analysis (HVI). Net returns were calculated based on total receipts, including discounts or premiums for fiber quality, subtracted from total fixed and variable costs. A spot price of \$0.66/lb was selected and herbicide prices were the average of three Alabama chemical retailers.

At the Tennessee Valley Research and Education Center in Belle Mina, tillage system (no-till) precluded variety selection in net returns, with no differences in yield due to either variety or tillage. The reduced tillage system gave a net return of \$317/A versus \$241/A in a full tillage system. Lint yield ranged from 1030 lb/A for full tillage/non-GT variety (SureGrow® 501) to 1150 lb/A for reduced tillage/GT variety (SureGrow® 521R). Staple and fiber strength were greater in the non-GT variety, however, the GT variety had higher lint turnout. Weed control was excellent ($\geq 90\%$) in all treatments with the following species present: common bermudagrass (*Cynodon dactylon*), pigweeds (*Amaranthus* spp.), ivyleaf morningglory (*Ipomoea hederacea*), and prickly sida (*Sida spinosa*).

Yield in Shorter at the E.V. Smith Research Center showed a tillage by variety interaction, with the non-GT variety (DeltaPearl®)/reduced tillage system the top treatment (1405 lb/A). The non-GT variety/full tillage system was the lowest yielding treatment (1040 lb/A). The GT variety (Deltapine® 5415R) was more consistent, with no difference shown between tillage systems. Much like Belle Mina, fiber quality as expressed by micronaire, staple, and strength was greater for the non-GT variety. Control of goosegrass (*Eleusine indica*), bermudagrass, and pitted morningglory (*Ipomoea lacunosa*) was excellent, regardless of treatment. Control of sicklepod (*Senna obtusifolia*) was greater in the reduced tillage system versus the full tillage system. Net returns followed the same pattern as yield, with the non-GT variety/reduced tillage combination giving highest net return (\$435/A). In a reduced tillage system, variety made no difference in net returns. Similarly, a GT variety performed equally under both tillage systems.

A tillage by variety interaction was also demonstrated in Headland at the Wiregrass Research and Extension Center. The combination of non-GT variety (DeltaPearl®)/reduced tillage gave highest yield (1784 lb/A) and the lowest yielding treatment was the combination of GT variety (Deltapine® 5415R)/reduced tillage (1418 lb/A). This difference in yield can be attributed to poor control of entireleaf morningglory (*Ipomoea hederacea* var. *integriuscula*) in the GT variety where glyphosate was used. Similarly, non-GT treatments were supplemented with sethoxydim for Texas panicum (*Panicum texanum*) control. Excellent control of sicklepod and large crabgrass (*Digitaria sanguinalis*) was obtained in both varieties. Gin turnout, staple, and strength were greater with the non-GT variety in both tillage systems. The GT variety gave an equivalent net return, regardless of tillage system. However, the non-GT variety gave best return under a reduced tillage system. At this location, the non-GT variety was the best treatment, regardless of tillage system.