

COTTON VARIETY PERFORMANCE IN NC: WHAT IS THE COST OF IMPROPER VARIETY SELECTION?

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Abstract

Variety selection has become one of the most important decisions that a cotton producer can make in a given season. This decision alone determines the maximum genetic yield potential for a given field for that year. Once seed is planted, the maximum genetic potential is determined. Maximizing or capturing the genetic potential is then left to the environment and management once seed is planted. Variety decisions are made based on several criteria including, yield potential and stability, fiber quality, transgenic or other genetic traits, maturity and growth characteristics, leaf hairiness, vigor, disease tolerance, etc. Variety decisions are best made when considering the most yield-limiting factor in a particular field, which is most commonly water in NC, but can include other factors such as nematodes, weed control, etc. Growers should be cautious in making field by field observations of variety performance and should rather focus on data from large-plot on-farm trials as well as small-plot official variety trials, where varieties are compared under the same environmental conditions and management. Additionally, growers should understand that yield stability is more important than performance in an individual trial that is local, as the ability of variety to perform well compared to others across a broad range of factors is one of the best indicators of stable performance. Lastly, growers should evaluate variety data with a clear understanding of a given year's general environmental behavior. For example, evaluating variety performance in a wet year across the state may not reveal accurate variety performance information for dry years.

Growers in NC are fortunate to have two robust programs for which to evaluate cotton variety performance. Official Variety Trials (small-plot) are conducted in six to seven environments each year and include approximately 40 varieties from various germplasms, and represent all trait packages available. Beginning in 2015, the NC On-Farm Cotton Variety Performance Evaluation Program also adds approximately 15 environments where the top-performing two varieties from each of seed company are represented. Collectively, these programs provide a robust platform for which to effectively evaluate variety performance in a single year.

A thorough analysis of the cost of improper variety selection was conducted in 2015 and 2016 using both of the aforementioned programs as a platform for cost comparisons. The information below in regard to 2015 variety performance was extracted from Collins and Edmisten (2016). Various scenarios of variety comparisons were used to illustrate multiple degrees of error or accuracy in making variety decisions. These scenarios were as follows: comparing the top-performing variety to the bottom-performing variety in each trial, comparing the average of the top 30 percent of varieties to the bottom 70 percent of varieties in each trial, comparing the average yield of all varieties performing above average in a given trial to the average of those performing below the trial average, and lastly and most accurately, comparing the average of varieties in the statistically highest yielding group to the average of those performing statistically different from the top-yielding variety. In 2015, assuming the current average price of \$0.65 per pound of lint with no discounts nor premiums for lint quality, the average cost of improper variety selection ranged from \$66 to \$156 per acre, depending on the degree of error in on-farm trials, and \$90 to \$224 per acre depending on the degree of error in official variety trials. In the 2016 on-farm trials, the average cost of improper variety selection ranged from \$74 to \$173 per acre, depending on the degree of error. Therefore, a 1500-acre producer could have lost \$99,000 to \$135,000 in potential revenue in 2015, and \$111,000 in 2016, when making only a small mistake in variety selection. Another scenario that was investigated was the cost to producers of failing to plant multiple varieties to hedge against risks with no consideration given to how varieties should be positioned varieties in environments that would maximize yield potential (i.e. planting only a single variety across all fields and environments in a given year). Depending on the variety planted in 2015, this mistake in variety selection resulted in losses of \$13 to \$85 per acre on average in on-farm trials and \$29 to \$159 per acre on average in official variety trials, with losses occurring in 18 to 65 percent of environments in on-farm trials and 33 to 100 percent of environments in official variety trials. In the 2016 on-farm trials, depending on the variety planted, losses ranged from \$0 to \$94 per acre on average, with losses occurring in 0 to 67 percent of environments. Assuming a producer chooses their variety based on the method with

the lowest degree of error and plants the best-performing variety on average on all their acres, a 1500-acre producer would incur losses in potential revenue ranging from \$19,500 to \$43,500 with losses occurring on 18 to 33 percent of their acres in 2015, and no losses in 2016 which is a rare scenario, however every other variety in 2016 resulted in losses.

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References

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