COMPARISON OF LARGE-PLOT AND SMALL-PLOT REPLICATED VARIETY TRIALS IN THE SOUTHEASTERN COASTAL PLAIN

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Introduction

Variety selection is the first and perhaps the most important management decision a grower makes each season. Variety decisions are now more complex due to the fact that many new varieties are now offered for sale with fewer years of public testing than most growers, consultants, and university personnel need for proper evaluation. One way to increase the confidence in variety choice decisions is to increase the number of locations within a given year a variety is grown. Increasing the number of locations within a given year will expose a new cotton cultivar to as many different growing conditions, management inputs, soil types, and environmental stresses as possible, and hopefully expose any problems associated with the performance of a cultivar before it reaches growers' fields. In recent years, growers have expressed to industry leaders a desire to have more information to help them make better seed purchase decisions. Questions exist among cotton researchers and their clientele on which method of variety testing is best for the southeastern coastal plain. Therefore, large-plot and small-plot replicated cultivar trials were conducted in five separate locations throughout South Carolina to compare variety testing methods and to determine the best method to evaluate cotton varieties in South Carolina.

Materials and Methods

Small- and large-plot replicated variety trials were established at five separate locations during the 2012 growing season. Trial locations were selected based on historical and projected cotton acreage in a given area and differences in soil types and management inputs. Trial locations planted were Dillon (Minturn, SC), Florence (PDREC), Lee (Elliott, SC), Calhoun (St. Matthews, SC), and Hampton (Lena, SC) counties. Large-plot trials consisted of 10 popular commercial varieties planted in a randomized complete block design with 4 replications. Large-trial plot size consisted of 2 to 4 rows (38 or 40 inch rows) per variety x 350 to 500 feet long. Small-plot trials consisted of 50 to 54 varieties that were split into early and late-maturity trials (24 to 28 varieties/trial). Experimental design was a randomized complete block with 4 replications. Plot size consisted of 2 rows (38 or 40 inch) x 40 feet long. Large- and small-plot replicated trials were planted on the same day with the same planter in adjoining areas in the same field. Both small- and large-plot trials were managed by cooperators with the same production practices and inputs. All plots in both small- and large-plot trials were harvested with a case 1822 plot picker within the same week and seedcotton was ginned on a 10-saw gin to determine gin turnout. Fiber quality will be determined. Due to environmental problems, the Hampton county trial was not harvested in 2012.

Summary

The relative lint yield rankings of the 10 common varieties planted in both the large- and small-plot trials were similar when evaluated under both testing scenarios. Phytogen 499WRF was the highest yielding variety in the large-plot replicated trial and the small-plot trials compared to the other varieties evaluated. Yield rankings were similar in the large-plot trials and early-maturity small-plot trials across locations with the following order (PHY 499WRF > AM 1511B2RF > FM 1944GLB2 > DPL 0912B2RF > PHY 375WRF). Yield rankings were similar in the large-plot trials and late-maturity small-plot trials, with the highest yielding varieties (PHY 499WRF > DPL 1252B2RF > DPL 1137B2RF > AM 1511B2RF > ST 5458B2RF) and lowest yielding varieties (FM 1944GLB2 > PHY 375WRF > PHY 565WRF) performing similarly in both trials. The only exception was DPL 1050B2RF, which performed better in the small-plot replicated trials.

The overall lint yield in the small-plot trials (1573 and 1675 lbs/acre for the early- and late-maturity small-plot trials, respectively) was higher than in the large-plot trials (1304 lbs/acre). Small-plot trials were initially placed on highly productive, uniform locations in the field. Large-plot trials crossed several different soil types and productivity levels due to their large plot size. Also, small-plot yields may have gained a yield advantage due to the inclusion of many end row plants from the numerous alleys needed to plant and harvest the trials in the total yield calculations. The overall variability of the trials decreased with the replicated large-plot trials (decreased CV (%) and LSD values) compared to the small-plot replicated trials. Large plots trials cover such a large area of land that lower

yielding areas of the field included in the harvest rows may have been less important to the precision of the trial compared to the inclusion of lower yielding areas in small-plot trials. The number of varieties evaluated was greatly reduced and the amount of seed, labor, time, and money invested in the trials was significantly increased when conducting large-plot replicated trials compared to small-plot replicated.