# EVALUATING GROWTH CHARACTERISTICS OF MODERN COTTON VARIETIES IN NORTH CAROLINA

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## Abstract

Cotton (*Gossypium hirsutum* L.) varieties vary greatly in terms of growth characteristics including seed size, seedling vigor, maturity, and growth potential, which can affect management decisions during planting, and decisions regarding management with plant growth regulators. The NC On-Farm Cotton Variety Evaluation Program, which began in 2015 and is implemented by county agents in producer's fields across the state, has established a means of evaluating these parameters across a broad range of environments. Additionally, this on-farm program allows producers to compare growth characteristics of known varieties to that of newly released varieties. Seedling vigor was collected at the 2-4 leaf stage in seven environments by measuring shoot fresh weight of 10 seedlings per plot. Plant height was measured from 10 plants per plot in six environments when all varieties within each environment reached physiological cutout (NAWF<4). Varieties included Phytogen 340 W3FE, Phytogen 350 W3FE, Delta Pine 1646 B2XF, Deltapine 1916 B3XF, Stoneville 5471 GLTP, Stoneville 4550 GLTP, NexGen 4936 B3XF, NexGen 3522 B2XF, Dyna-Gro 3605 B2XF and Dyna-Gro 1702 GLT. All varieties were managed equally within each environment, according to NCSU Extension recommendations.

As expected, there was a noticeable and quantifiable differences in varieties regarding seedling vigor and growth potential. Seedling vigor, as measured by shoot fresh weights per 10 seedlings, ranged from 22.8 to 29.6 g/10 plants. Stoneville 5471 GLTP and Dyna-Gro 1702 GLT were the statistically highest seedling vigor compared to all other varieties tested. Seed size (number of seed per lb, as printed on the commercial bag) was closely correlated to seedling vigor ranking ($R^2$=0.6958), as the largest seeded varieties ranked highest in seedling vigor, which illustrates that seed size is a fairly precise predictor of seedling vigor if both warm and cool germination percentages are at acceptable levels. Seedling vigor was somewhat inversely related to end-season growth potential, measured as plant height. Some of the smallest-seeded varieties resulted in the statistically tallest plants at cutout (Dyna-Gro 3605 B2XF and Deltapine 1646 B2XF), while larger-seeded (greater early season vigor) varieties ranked lower in terms of plant height. This multi-environment assessment of growth potential allows for a loose categorization of varieties into groups regarding how they should be managed with plant growth regulators (PGRs). Varieties exhibiting the greatest growth potential require more aggressive PGR management when conditions favor excessive growth, whereas shorter-statured earlier maturing varieties do not require much PGR management, as they have less growth potential and reach cutout quicker.

Future research will continue to investigate season-long cultivar growth differences in multiple environments across North Carolina and with various PGR regimes to improve at-planting and in-season management strategies.

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