

**COMMERCIAL CULTIVAR RESPONSE TO VARYING RATES OF NITROGEN IN THE
MID-SOUTH****J.P. McNeal****D.M. Dodds****M.T. Plumblee****C.A. Samples****S. Davis****B.R. Wilson****Mississippi State University****Mississippi State, MS****Abstract**

Upland cotton (*Gossypium hirsutum*, L.) response to and utilization of fertilizer nitrogen is a function of application timing, rate, and source. Additionally, fertilizer nitrogen effects on plant height, leaf area, boll number, and yield are well known. However, continued research with respect to fertilizer nitrogen effects on cotton is warranted due to the release of new cultivars on a nearly annual basis.

An experiment was conducted at the R.R. Foil Plant Science Research Center in 2017 in Starkville, Mississippi to determine the effect of five fertilizer nitrogen rates on four PhytoGen cotton cultivars. Plots measuring 12 m x 3.9 m¹ were planted with a cone planter on 08 May 2017 at 111,195 seed/ha⁻¹ on beds spaced 97 cm⁻¹ apart. The test-site was comprised of a Leeper silt loam (Fine, smectitic, nonacid, thermic vertic epiaquepts) soil. Fertilizer nitrogen rates of 0, 45, 90, 135, & 180 kg ha⁻¹ were applied in a single application when plants reached pinhead square to four PhytoGen cotton varieties: PHY 330 W3FE, PHY 450 W3FE, PX 3122-99W3FE, & PX 4444-52W3FE.

Rated parameters included stand counts, first fruiting branch (FFB), final plant height, total number of nodes, nodes above cracked boll (NACB), gin turnout, and lint yield. Ratings for each parameter represent the mean of five plants sampled per plot. The center two rows of each plot were harvested and weighed on October 2017. The experiment was set up as a factorial arrangement of treatments with four replications within a randomized complete block design. Plant height was found to vary significantly due to cultivar ($P < 0.0001$), and fertilizer nitrogen rate ($P < 0.0001$). PHY 450 W3FE had an average height of 86 cm⁻¹. Additionally, 135 kg N/ha⁻¹ and 180 kg N/ha⁻¹ (not significantly different at $P = 0.05$), yielded a mean plant height of ≥ 88.4 cm⁻¹. Gin turnout was found to vary significantly and independently as a function of both cultivar ($P < 0.0001$) and fertilizer nitrogen rate ($P = 0.0002$). PHY 330 W3FE had a mean gin turnout of 45.6% while 0 kg N/ha⁻¹ and 45 kg N/ha⁻¹ (not significantly different at $P = 0.05$) yielded a mean lint turnout of $\geq 44.8\%$. Lint yield was found to vary significantly as a function of fertilizer nitrogen rate alone ($P < 0.0001$) with 90 kg N/ha⁻¹, 135 kg N/ha⁻¹, and 180 kg/ha⁻¹ (not significantly different at $P = 0.05$) resulting in mean lint yields of ≥ 1270.61 kg ha⁻¹.

These results indicate that mean cotton plant height and mean percent lint turnout vary as a function of both cultivar and fertilizer nitrogen rate, and lint yield vary as a function of fertilizer nitrogen rate alone. Selecting factors that maximize cotton yield is the primary means by which economic profitability is achieved. Therefore, based on these preliminary data, independent of cultivar selection we recommend applying fertilizer nitrogen at rates of 90 kg ha⁻¹ to maximize lint yield potential and minimize deleterious effects of excess nitrogen on cotton growth and development as well as other external factors.