

WHEAT RESPONSE TO INCREASED NITROGEN RATES AND PLANT GROWTH REGULATOR

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In an attempt to increase wheat grain yield, some producers are increasing nitrogen (N) rates to 160 or 180 lbs N/A and applying a plant growth regulator (PGR) to reduce plant height and lodging. Based upon University of Kentucky recommendations, wheat yield is expected to maximize at 100 lbs N/A in conventionally tilled soils and 120 lbs N/A in no-tilled soils. However, reports from producers on the effect of increasing N on wheat yield are inconsistent.

Replicated field trials were established at Princeton, KY, in 2014 and 2015 and at Lexington, KY, in 2015. The goal of the project was to gain a better understanding of the effect of increased N rates and PGR on wheat. Five N rates (0, 50, 100, 150, 200 lbs N/A), three varieties (Pioneer Brand 25R32, Pembroke 2014, Truman), and two PGR treatments applied at Feekes 5 (non-treated control, Palisade EC® (12.5 oz/A)) were evaluated. In 2014, all N was applied at Feekes 5 while in 2015 a split N application was used: one-third the total rate was applied at Feekes 3 and the remaining two-thirds was applied at Feekes 5. The three varieties were chosen because of their differences in relative maturity; Pembroke 2014 is early-maturing, Pioneer Brand 25R32 is a mid-maturity variety, and Truman is late-maturing. Stem diameter, plant height, lodging, heads per meter square, number of spikelets per head, grain yield, and test weight were measured.

The PGR reduced wheat height by one inch at Lexington in 2015 and Princeton in 2014. Although no differences in height were detected at Princeton in 2015, this was the only

location where considerable lodging occurred. Pioneer Brand 25R32 had the highest lodging: 37% of the plot was lodged for the non-treated control and 19% for the PGR treatment (Figure 1). It was also the only variety to have less lodging in the PGR treatment than the non-treated control. Lodging for Pembroke 2014 and Truman did not differ between the PGR treatment and non-treated control and was less than 5% for both treatments.

The effect of PGR on wheat grain yield was inconsistent in this trial. When all five N levels were examined, grain yield was 4.9 bu/A less for the PGR treated wheat than the non-treated control at Princeton in 2015 (Figure 2), while grain yield differences were not detected between the PGR treatment and the non-treated control at Princeton in 2014 and Lexington in 2015 (Figure 2). When the three highest N levels (100, 150, 200 lbs N/A) were examined the same results were found.

The only consistent results found in this trial were that the number of spikelets per head increased when PGR was applied and grain yield increased as N rate increased for Pembroke 2014. When all five N rates are included, 13.4 spikelets per head were produced, while only 13.1 spikelets per head were produced for the non-treated control. When the three highest N rates were examined, there were 13.8 spikelets per head for the PGR treatment and only 13.4 spikelets per head for the non-treated control. Although the increase in number of spikelets per head is consistent, there was no measurable increase in grain yield and at this point it is unclear how or why the increased number of spikelets per head is occurring.

Grain yield for Pembroke 2014 (averaged across both PGR treatment and non-treated control) continued to increase as N rate increased; grain yield was 52, 71, 82, 92, and 96 bu/A when 0, 50, 100, 150, and 200 lbs N/A were applied, respectively. For Pioneer Brand 25R32 and Truman yield was greatest at 100 lbs N/A: 90 and 81 bu/A, respectively. Differences in stem diameter, heads per meter square, or test weight were not found between the PGR treatment and the non-treated control.

Despite claims that a PGR can decrease wheat height in high N environments and that increased N rates result in greater grain yields, inconsistent results were found in this trial. This indicates that the response of PGR on wheat grain yield and plant characteristics is complex. Many variables, including weather, N rate, wheat variety, may affect the response of PGR. To ensure maximum profitability, it is critical that information on the wheat variety's response to increased N and PGR are available before implementing these practices on a large scale.



Wheat nitrogen rate and plant growth promoter study. Princeton, 2014

