Spring Wheat Response to Nitrogen Fertilizer with the Addition of a Plant Growth Regulator Applied at Various Crop Stages

Farmers in northwest Saskatchewan have experienced higher than average grain yields in the past few years. To maintain these higher grain yields, farmers are increasing their nitrogen (N) fertilizer applications in an effort to maximize yield potential. However, many of the popular CWRS wheat varieties grown in Saskatchewan are not lodge resistant and the N fertilizer applications required to maximize yield potential can lead to crop lodging. To control plant height of cereals under high input management systems, European farmers use PGRs; however, they have only recently been registered for use in western Canada. Manipulator, distributed by Engage Agro (commercially available in 2015), is a gibberellin synthesis inhibitor, which, when applied at the proper application timing, reduces stem elongation and increases straw strength, thus reducing plant height and lodging risk.

This demonstration was conducted at the AAFC Scott Research Farm in 2015. The demonstration was set up as a 3 x 4 factorial in a randomized complete block design with four replicates.

PGR applications applied at Zadoks (Z) 31 and Z39 reduced plant height by 8.5% and 7%, respectively. However the early application (Z21) did not differ from the untreated check. A yield increase was anticipated between the significantly shortened plants (Z31 and Z39 treatments) and high N rates applications compared to the untreated check. However, yield was not significantly affected by either PGR application timing or N rate. A general trend was noted though, with an increase in yield with increased N rate and PGR applications compared to the untreated check. On average, the PGR applications produced 4043 kg/ ha (60 bu/ac) while the untreated check produced 3845 kg/ha (57 bu /ac). A greater yield increase may have been reported if there had been a greater difference in height, as Zhang et al. (2004) found that water use efficiency increased in shorter plants allowing the yield to be less effected by drought stress.

A decline in thousand kernel weights and bushel weights was highly correlated to the timing of PGR application (Figure 1), indicating that the later applications significantly reduced seed quality. The cause for this decline could be attributed to the environmental conditions (drought) or it may be a side effect of the PGR applications.

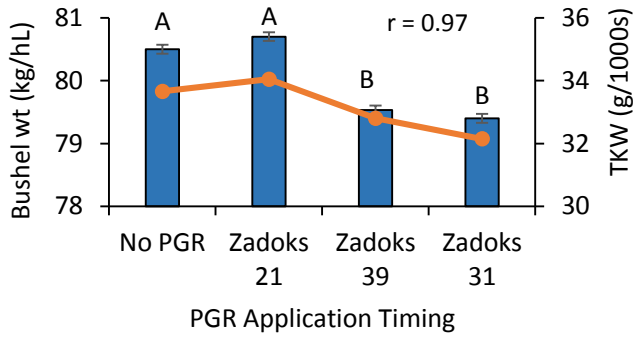

Figure 1. The effect of PGR application timing on wheat seed bushel weights (kg/hl) and thousand kernel weights (g/1000s). Labels with the same letter are deemed statistically similar.

The N rates had little effect on yield, but it did significantly influence seed protein. N rate applications of 150% and 125% resulted in a higher protein content of 4.7% and 2.7% compared to the control (100%) (Figure 2b).

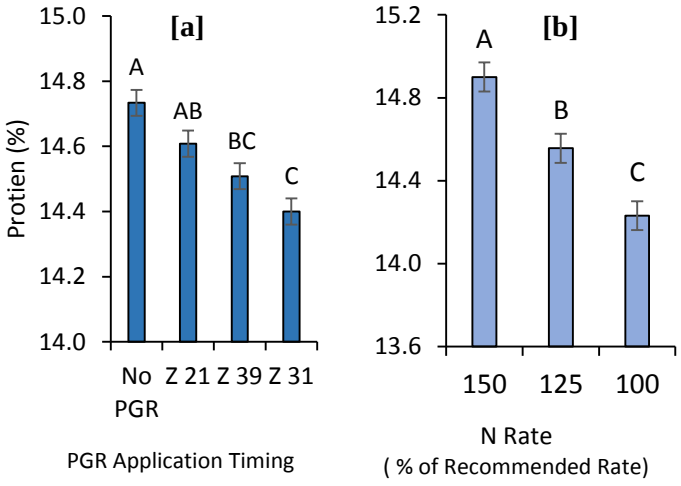

Figure 2. The effect of PGR application timing [a] and nitrogen (N) rate on wheat seed protein content (%) [b]. Labels with the same letter are deemed statistically similar.

In all, it is important to note that although there was a slight yield benefit from PGR applications, the decline in seed quality may outweigh the yield benefit associated with PGR. The effect of PGR on seed quality should be further studied in order to determine its influence on seed quality.

Read the full report at: http://www.westernappliedresearch.com/research/warc-annual-reports/2015/

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