



PGRs on malt barley

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Overall, all PGRs reduced lodging in some site-years on CDC Copeland malt barley. Moddus showed the largest reduction in lodging followed by Ethrel, although the Ethrel response was not consistent. Manipulator affect on lodging was inconsistent and quite minor in reducing lodging.

In malt barley, lodging can negatively affect grain quality such as germinative energy and plump kernels, reducing the chance of being accepted for malting. The objective of this study was to determine if Ethrel (ethephon), Manipulator (chlormequat chloride), or Moddus (trinexapac-ethyl) application can reduce malt barley lodging in western Canada, whether seeding rate interacts with PGR application, and if there are any non-target effects on agronomics such as yield or plant height, and pre-malting quality.

Manipulator is registered on spring, winter and durum wheat in Canada. In the spring of 2020, registration was also granted for application to barley and oat. However, farmers growing malt barley and milling oat should consult with their grain buyer before application of Manipulator as malsters are not currently accepting malt barley treated with a PGR.

Moddus is registered in many countries, but is not yet registered in Canada. Ethrel is registered on spring and winter wheat.

Manipulator, Moddus, and Ethrel were tested at Lacombe and Lethbridge, Alberta, Indian Head and Scott, Saskatchewan, and Brandon, Manitoba over 3 years from 2014 through 2016. CDC Copeland malt barley was direct seeded into standing stubble with 107 lbs. N per acre (120 kg/ha) applied at seeding. CDC Copeland is rated as Intermediate for lodging. Tilt (propiconazole) fungicide was applied at flag leaf to limit the potential effects of disease development.

CDC Copeland was seeded at 20, (200), 30 (300), and 40 seeds per square foot (400 seeds/m²). PGR applications occurred between GS 30-33 for Manipulator and Moddus and GS 37-49 for Ethrel, and were also compared to a non-PGR treated control.

PGRs had limited effects on lodging and malt barley quality

Increased seeding rate caused a linear decrease in tillers per plant, height, days to maturity, protein and kernel weight. There was no interaction of seeding rate with PGR application on any of the measured variables across locations.

Of the three PGRs applied, only Ethrel caused a significant increase in the number of productive tillers produced per plant, but only by less than half a tiller per plant on average, and would not likely be agronomically significant. This is a positive result because increased tillering can result in delayed maturity, increasing the need for a desiccant which is not accepted by the Canadian malt barley industry, or a later harvest which can cause exposure to weather that causes grain quality loss.

Ethrel significantly reduced plant height by 2 inches (5 cm) and Moddus significantly reduced height by 1.57 inches (4 cm) compared to the no PGR treatment. Manipulator did not significantly reduce plant height. Again, these reductions are not likely agronomically significant.

Moddus and Manipulator did not significantly affected kernel plumpness, but Ethrel reduced kernel plumpness by 4%. The malt quality standard for kernel plumpness is 90%. This level was sometimes achieved at individual site-years for all treatments, but not when averaged across site-years. With kernel plumpness close to the 90% threshold in this research, a reduction in plumpness of 4% resulting from Ethrel application could make the difference between meeting that threshold or not. However, only 8/15 site-years had applications of Ethrel within the target window, and late applications could have affected kernel plumpness.

Ethrel and Moddus significantly reduced kernel weight, but by small amounts and perhaps agronomically insignificant. Ethrel reduced kernel weight by about 2.5 g/1000 seeds. Moddus reduced kernel weight by less than 1 g/1000 seeds.

Ethrel increased days to maturity in 60% of comparisons by about 3 days. Moddus and Manipulator had limited effects on maturity.

Lodging occurred at eight out of fifteen site years, with lodging scores averaging ≤ 3.6 on a scale of 0 to 9 at these sites. Across site-years, Moddus showed the largest number of lodging reductions and scale of reductions. Ethrel reduced lodging in 36% of comparisons, while Manipulator had inconsistent effects. While Moddus worked the best, it's not registered on barley in Canada.

In other research, Manipulator response has been shown to be variety specific, so it is possible that varieties other than CDC Copeland would show a reduction in lodging.

Effects of PGR on lodging were variable and not always predictable, nor were they always effective. In some heavier lodging environments Moddus provided the largest benefit.

None of the products affected yield, or grain protein.

As a risk mitigation strategy, Moddus and Ethrel were most likely to reduce lodging, with Moddus showing the most promise of the 3 products tested. However, PGR application, primarily Ethrel in this research, resulted in increased tillering, delayed maturity, and decreased kernel weight (also for Moddus) and plumpness, may increase harvest frustration and increase risk for meeting malt quality thresholds. Farmers should ensure that the PGR is registered for the intended use, and ensure that it complies with grain buyer and KeepItClean requirements.

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