

New barley varieties have improved agronomics that will allow producers to increase nitrogen (N) rates to achieve higher yields, while maintaining malt quality protein levels. The objective of this study was to determine optimum nitrogen fertilizer recommendations for the production of new malt barley varieties in comparison to a recent industry standard variety. The small plot trials were conducted at Melfort, Prince Albert, Swift Current, and Yorkton, SK from 2020-2022. The malt barley varieties AC Metcalfe (old), AAC Synergy (new), and CDC Bow (new) were each tested at 60, 120, 180, and 240 lb/ac of soil + fertilizer N. Each location also received 26.8 lb P<sub>2</sub>O<sub>5</sub>/ac and 13.4 lb K<sub>2</sub>O/ac with every treatment.

The trial site-years were separated into high and low yielding groups and analyzed separately. On average, the high yielding group produced 4980 kg/ha (92.6 bu/ac) of grain at 12% protein and the low yielding group produced 2176 kg/ha (40.5 bu/ac) of grain at 15% protein. Drought was responsible for the low yields. Under low yielding environmental conditions, varietal yields were unresponsive to added N and grain protein levels were excessive for malt quality. However, grain protein was still lower for the newer varieties AAC Synergy and CDC Bow compared to AC Metcalfe. This implies that AC Metcalfe would require less N compared to the newer varieties. Under high yielding environmental conditions, the yield of AAC Synergy and CDC Bow were more responsive to added N than AC Metcalfe (Figure 1). Grain protein for AC Metcalfe reached 12.5% when soil + fertilizer N reached 164 lb/ac (Figure 2). In contrast, 208 lb N/ac was required for AAC Synergy to reach 12.5% protein. Assuming protein levels more than 12.5% are not acceptable for malt, 44 lb/ac more N could be applied to AAC Synergy compared to AC Metcalfe before being rejected for malt. However, doing so would be risky and uneconomical. Under a good economic scenario with \$0.47/lb N and \$5.20/bu malt barley price, AAC Synergy could receive 22 to 30 lb N/ac more than AC Metcalfe, depending on risk tolerance. Under poorer economic conditions, assuming \$1.18/lb N

and \$6.67/bu malt barley price, AAC Synergy would require only 12 lb N/ac more than AC Metcalfe. AAC Synergy will require more N than AC Metcalfe assuming both malt varieties are valued the same. However, exactly how much more will depend on environmental and economic conditions. In contrast, optimum rates of N would not vary much between the newer malt barley varieties AAC Synergy and CDC Bow, as their yield and protein responses to added N were essentially the same.

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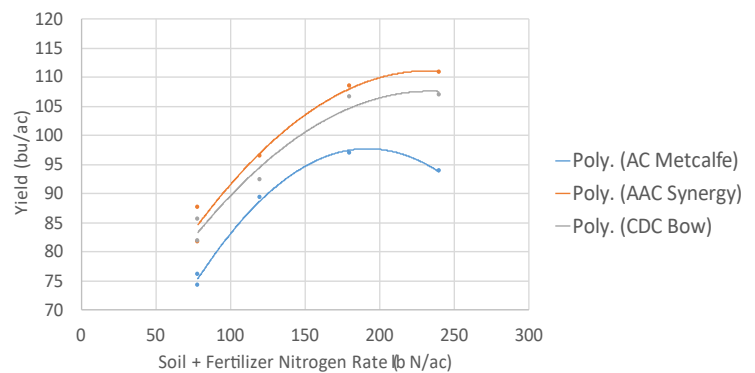


Figure 1. Effect of increasing N on seed yield of three malt barley varieties for high yielding site-years.

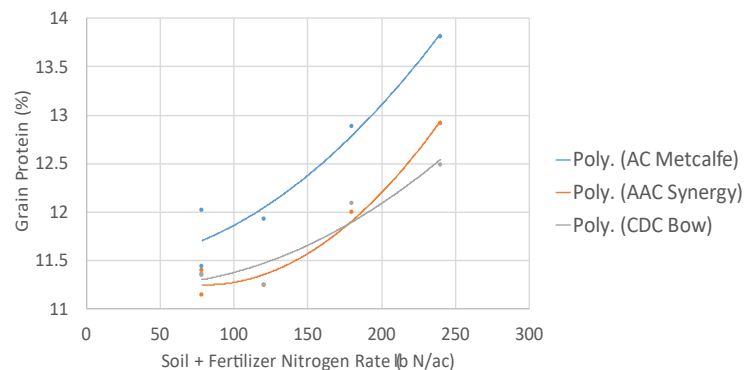


Figure 2. Effect of increasing N on grain protein of three malt barley varieties for high yielding site-years.