Influence of Genotype and Harvest Year on Starch Properties of Malting Barley

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In brewing, maximizing starch-to-sugar conversion ensures efficiency and alcohol yield. Starch must first undergo gelatinization, which renders it soluble in the mash. Due to premature thermal inactivation of amylolytic enzymes, high starch gelatinization temperature (T_g) can hinder solubilization during mashing, leading to incomplete starch-to-sugar conversion. Although genotype and environment are known to influence starch T_g, no systematic studies have examined these effects in Canadian malting barley genotypes and how they impact brewing yield. This study investigated the impact of genotype and harvest year on starch physicochemical properties in five commercially significant Canadian malting barley genotypes harvested over three years (2023–2025). Thermal properties of isolated starches were analyzed using Differential Scanning Calorimetry, and particle size distribution was measured by laser diffraction. Harvest year significantly ($p < 0.05$) influenced starch T_g, whereas genotype significantly affected the gelatinization energy demand (enthalpy). The volumetric distribution of small and large granules was significantly affected by harvest year and genotype. Further studies will clarify how other factors influencing starch thermal properties, e.g., crystallinity, amylopectin structure, and the amylose-to-amylopectin ratio, are altered by the combined effects of environment and genotype, aiming to devise brewing regimes that can maximize brewing yields from all batches of malting barley.