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# SCREENING AND INVESTIGATING STARCH STRUCTURE AND ENZYMATIC DEGRADABILITY IN A WHEAT MAGIC POPULATION

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Starch degradation is an important feature of starch processing both on nutritional or industrial aspects. Starch degradability can be impacted by starch structure and composition that is in turn influenced by genetic and environmental conditions. The common challenges faced by studies investigating the “structure-degradability” interaction include the experimental condition limiting the number of samples and the interdependency between the various structural features of native starch. This study aimed to tackle these two challenges by (1) developing a method allowing enzymatic accurate and reproduceable hydrolysis screening of large sample sets and (2) combining this method to a multivariate analysis to untangle the “structure-degradability” complexity.

From a 4-way MAGIC (Multi-Allelic-Genetic-InterCross) population (CSIRO, Australia), 224 wheat starches from 156 cultivars were accessed for their structural attributes and degradation profiles, followed by a hierarchical clustering on principal components (HCPC) to explore the role of structural features in degradation. The results suggested that the enzymatic hydrolysis of MAGIC wheat starch was biphasic with degradability varied from 63.6% to 79.9%. The HCPC highlighted the impact of the combination between granule size distribution and amylopectin chain length distribution on degradation kinetics (Figure 1), as well as a negative correlation between amylose content and hydrolysis rate, which may therefore provide important information to improve starch selection for specific end-uses.

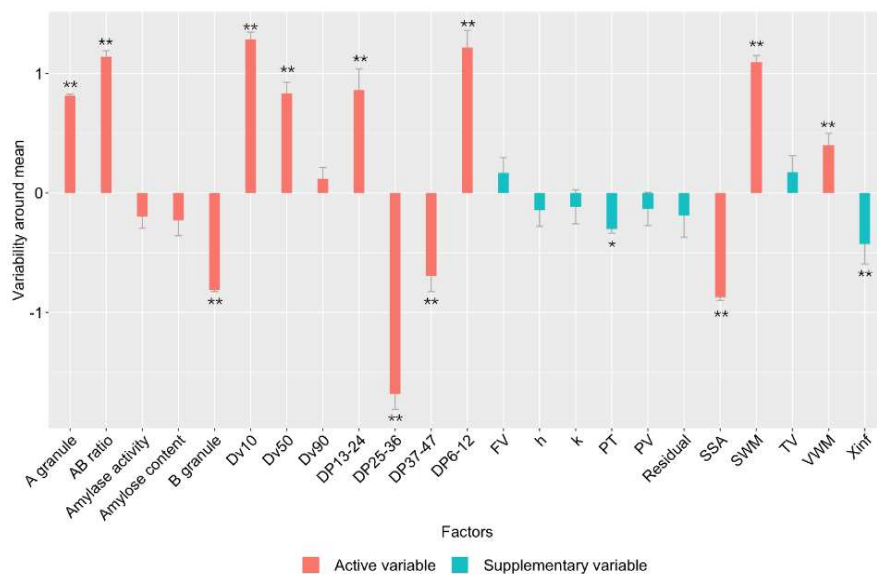


Figure1: Group of starches where the final hydrolysis extent ( $X_{inf}$ ), particle size distribution (A granule, B granule, AB ratio) and chain length distribution (DP6-12, DP 13-24, DP25-36, DP37-47) were significantly presented. \* and \*\* indicate significance at the  $p < 0.05$  and  $p < 0.01$  levels, respectively. Dv10, Dv50, Dv90, maximum particle diameter below which 10%, 50% or 90% of the sample volume exists; FV, final viscosity; PT, pasting temperature; PV, peak viscosity; Residual, residuals of the regression model of h and k; SSA, specific surface area; SWM, surface weighted mean; TV, trough viscosity; VWM, volume weighted mean.