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Insights on corn characteristics and processing conditions for gluten-free pasta production

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Flours from corn, together with rice flours, are the most common ingredients in gluten-free pasta production. Despite the high variability in amylose content and chemical composition among varieties, the selection of corn for gluten-free pasta production is currently based solely on the absence of gluten, while neglecting the evaluation of both chemical and physical characteristics of the raw material. In this context, this study aimed at investigating the role of amylose content and particle size of flour on the cooking quality of corn pasta.

Three corn varieties different in amylose content were used: conventional (CONV; 18% amylose), waxy (W; 2% amylose) and amylomaize (H; 40% amylose), the latter alone or in combination with CONV (50:50). For each corn varieties, two flours from different seed regions were obtained during milling: a fine meal (F) from the external part of the kernel (less than 150 microns), and a coarse meal (C) from the inner part (300-500 microns). Samples were characterized for their chemical composition and starch pasting properties. Dried gluten-free pasta (containing 0.3% of mono-diglycerides) was produced using the extrusion-cooking technology with or without a pre-gelatinization step. Pasta quality was evaluated after cooking at optimal cooking time.

As expected, the low retrogradation tendency of W (measured by viscoamylograph) accounted for the lower cooking quality pasta compared to CONV. Despite the nutritional benefits of amylomaize (i.e. high resistant starch content), H flour resulted in a brown pasta, which was unable to withstand cooking, showing the highest amount of broken pasta in the cooking water. The bad pasta making performance of H was due to its starch characteristics, that showed low degree of gelatinisation during the heating process, as highlighted by the pasting properties. The cooking behavior of H pasta did not improve when a pre-gelatinization step was carried out before the extrusion-cooking step. On the contrary, pasta aspect and its cooking behavior improved when H flour was mixed to 50% of CONV.

The coarse particle size of C sample negatively affected the quality of the pasta, suggesting that a remilling step is necessary for pasta production. The best results were obtained in presence of re-milled C, likely do to the higher presence of protein compared to dusted meal (7% vs 5%).

Further study will focus on the evaluation of the resistant starch in the cooked pasta contained different levels of high amylose corn from the remilled coarse meal.

Learning Objectives

- Amylose content plays a key role in corn pasta
- High amylose corn needs to be blended to conventional corn
- Re-milled coarse meal is preferred to fine meal

Abstract Submission Topical Categories

Primary Category 3] Grains: Formulating for Health and Wellness

[Secondary Categories 3]

Gluten-/allergen-free