

Challenges and opportunities in the utilization of dry-fractionated pea starch as a gelling agent: a case study on jelly candies

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Introduction

Dry fractionation is primarily known as a technology for extracting plant proteins. However, this process also produces considerable amount of starch-rich fraction, which is currently neglected and mainly destined for animal feed. In this study, we investigated the gelling and physicochemical properties of dry-fractionated (DF) pea starch and compared them to gelatin and corn starch. Jelly candies were produced with these gelling agents, and a rheological characterization was performed.

Methods

Amylose and amylopectin, water absorption (WAI) and solubility indexes (WSI), and the Least Gelling Concentration (LGC) were determined on the ingredients. Jelly candy formulations were based on the LGC results. Starch concentrations increased by 4% increments, as smaller increases showed no significant rheological differences. Rheological characterization included amplitude sweep tests to define the linear viscoelastic region (LVR); yield stress and strain at the LVR limit were used to construct a texture map. Frequency sweep and shear rate ramp tests were also performed.

Results

DF pea starch showed a higher amylose content and WSI than corn starch. The LGC values were 16 % for DF pea starch, 12 % for corn starch, and 6 % for gelatin. DF pea starch jelly candies showed higher viscosity and more resistance to shear stress than corn starch ones, due to their higher amylose content. However, DF pea starch gels had poorer structural recovery, suggesting lower flexibility and elasticity under deformation. Corn starch gels recovered better and were more elastic. Rheological texture map indicated that DF pea starch candies were mushy, corn starch ones were rubbery, and gelatin-based candies were tough.

Conclusion

Rheological analysis showed that DF pea starch forms a weaker gel, but blending it with corn starch may help replicate gelatin texture. As a co-product of protein extraction and often underutilized, DF starch offers a sustainable opportunity for new product development.

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