SEEDS

The OARDC Research Enhancement Competitive Grants Program

Developing high-quality gluten-free bakery products

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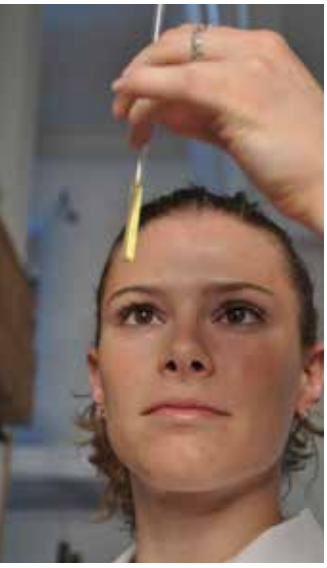
BACKGROUND For individuals afflicted with Celiac disease, the consumption of wheat products causes an allergic reaction that reduces nutrient absorption and increases the individual's risk for nutrient-related diseases, such as anemia. Affecting an estimated 1 in 133 individuals in the United States, the only treatment for Celiac disease is a life-long adherence to a gluten-free lifestyle. The gluten-free food industry has already expanded in response to greater awareness of Celiac disease and is expected to reach $5.5 billion by 2015. Because gluten is the structural protein in wheat that gives bread its open-cell crumb structure and flexibility, food gums have commonly been used to bind water and provide additional structure to gluten-free bread. However, published research has not studied the gums alone, but in conjunction with alternative proteins contributing to the overall variability of the gum behavior.




OBJECTIVES

The objective of the research was to observe the physicochemical effect of adding gum to rice cassava bread. The study continued with the investigation of the interaction between starch, proteins (soy protein isolate and egg whites), and water in the optimal gum-added rice cassava bread formulation. This was necessary since there is a great variability in previously published research on the performance of gums in gluten-free bread. The goal was to use the results to create a superior gluten-free baked product that can be commercialized.

In order to analyze the behavior of gum in rice cassava dough, two hydroxypropyl methylcelluloses (HPMC) and xanthan gums were investigated at 0, 2, 3, and 5 percent. The properties of the dough were first analyzed by comparing the flow behavior and water binding profile to traditional bread dough. The dough was then baked, and the loaf quality was measured using the same quality standards (such as loaf volume, texture, sensory, and water distribution) as traditional bread.

IMPACTS

The research team determined that while HPMC improved the loaf quality of the rice cassava bread, it was still of lower quality than traditional bread. While the addition of proteins and HPMC improved the rice cassava bread, there was an antagonistic interaction between the soy protein isolate and egg white solids, which reduced the HPMC's water binding ability and functionality. Only when egg white solids became the primary structural protein did the loaf quality improve compared to traditional bread.

The characterization of rice cassava dough with the addition of gums and alternative proteins has provided valuable insight in gluten-free applications and a point of reference for future work. Also, this research provided enough information to create an improved product for a Columbus-based company called Around the World Gourmet™. The results from this will accelerate the commercialization of its gluten-free bread, which will be marketplace-ready in the near future.

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March 2013 FS65-13

This research is supported in part by state of Ohio funds allocated to the Ohio Agricultural Research and Development Center of The Ohio State University.