

Fermentation on Liking and Phytic Acid Concentration of Millet: A Climate Resistant Grain – A Pilot Study

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Objectives: Millet is a nutritious, climate-resistant, and low water-demand grain. It is rich in essential minerals, but also contains high concentrations of phytic acid, an antinutrient. Fermentation can decrease phytic acid but may generate flavors unfamiliar to U.S. consumers in the context of grain products. This preliminary study explored the effects of fermentation on phytic acid and liking in bread models.

Methods: Bread was made with 100% whole-wheat flour (control), and with partial substitution (10%, 20%, 30%, 40% and 50%) of unfermented and fermented (for 96 hours) millet flour. Healthy adults ($n = 8$) rated overall liking and liking for appearance, aroma, color, texture, and flavor using a 9-point hedonic scale. Information on food neophobia, willingness to eat whole grain, and bread consumption were

collected via questionnaires. Millet samples were analyzed for phytic acid concentration.

Results: Fermentation significantly reduced phytic acid (by 72%, $p < 0.05$). Overall liking was significantly lower ($p < 0.001$) in the models with 50% unfermented millet flour. For the models with fermented millet flour, we observed a significant reduction in liking starting in 40% substitution ratio and above ($p < 0.001$). Liking for appearance, aroma, color, and texture were associated with overall liking, but texture ($r = 0.83$, $p < 0.001$) and flavor ($r = 0.75$, $p < 0.001$) had the strongest association with overall liking. In general, fermented samples scored lower in texture, aroma, and flavor compared to unfermented samples. Food neophobia and other diet assessments did not correlate with liking for the breads.

Conclusions: Fermentation can lower phytic acid concentration in whole grain millet. Consumers may tolerate more unfermented millet compared to fermented millet, but a large sample size is needed to confirm this preliminary finding.

Funding Sources: NIDCD T32 Training Grant, Monell Sensory Nutrition Institutional Fund.