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Comparative analysis of alternative sanitizers for decontaminating bacterial counts on aromatic young coconuts

Latchaporn Thamteerasathian

Chitralada Technology Institute. Bangkok, Thailand

The research investigates the effectiveness of alternative sanitizers to sodium hypochlorite (NaOCl) in reducing aerobic mesophilic bacteria on the surfaces of aromatic young coconuts (Cocos nucifera L.). Various sanitizing agents, including acetic acid, hydrogen peroxide (H_2O_2), and trisodium phosphate (Na3PO4), were evaluated for their antimicrobial efficacy. Initial bacterial counts were recorded at 4.207 ± 0.484 log CFU/cm² for NaOCl, 4.673 ± 0.314 log CFU/cm² for acetic acid, 4.979 ± 0.285 log CFU/cm² for H_2O_2, and 4.132 ± 0.122 log CFU/cm² for Na_3PO_4. Sodium hypochlorite at 200 ppm for 10 minutes achieved a log reduction of 2.493. Acetic acid at 5% for 30 minutes showed the highest log reduction of 3.498, followed by H_2O_2 at 5% for 5 minutes with a reduction of 2.814, and acetic acid at 5% for 15 minutes with a reduction of 2.303. Trisodium phosphate showed modest efficacy, with 500 ppm achieving log reductions of 0.506 (5 minutes) and 0.635 (15 minutes). The study also explored combined treatments, revealing that H_2O_2 (5%) followed by acetic acid (5%) for 10 and 15 minutes resulted in log reductions of 2.856 and 2.934, respectively. All treatments demonstrated statistically significant differences ($p \leq 0.05$) compared to the control. These findings suggest that acetic acid and hydrogen peroxide are effective alternatives to NaOCl for postharvest microbial control on aromatic young coconuts. While Na_3PO_4 showed lower efficacy, its combination with other sanitizers could enhance microbial reduction. The study underscores the importance of optimizing sanitizer concentration, exposure time, and combined treatments to maximize antimicrobial efficacy while maintaining produce quality.

Biography

Latchaporn Thamteerasathian is a distinguished food science and technology professional with over a decade of experience in food production, research, quality control, and assurance. She is currently a Ph.D. candidate in Food Nutrition Innovation and Health at the Asian Institute of Technology in Bangkok, Thailand. Latchaporn holds a postgraduate certificate in International Hospitality Business Management (with Distinction) from Robert Gordon University in collaboration with the Business and Hotel Management School in Lucerne, Switzerland. She earned her M.Sc. in Food Engineering and Bioprocess Technology from the Asian Institute of Technology and a B.Sc. in Microbiology from Chulalongkorn University, both in Bangkok, Thailand. Latchaporn serves as an Assistant Professor at Chitralada Technology Institute, conducting lectures, research, and community services in food science and technology. Additionally, she is a part-time auditor specializing in food safety and quality management systems. Recognized for her cross-cultural skills, problem-solving abilities, and proficiency in food safety standards, Latchaporn is dedicated to improving food quality and safety through education and industry collaboration.