SAAFoST
SOUTH AFRICAN ASSOCIATION for FOOD SCIENCE & TECHNOLOGY

CONGRESS 2021

Welcome to SAAFoST's 24th Biennial International Virtual Congress

20 – 22 September 2021

Curative Efficacy of Slightly Acidic and Alkaline Electrolyzed Water Treatments Against *Botrytis Cinerea* and *Penicilium Expansum*: A Case Study on 'Granny Smith' Apples

Nandi Elana Nyamende[1,2], Zinash A. Belay[1], Zanephyn Keyser[2], Ayodeji Oyenihi[3], Oluwafemi J. Caleb[1]

[1]Agri-Food Systems and Omics Laboratory, Post-Harvest and Agro-Processing Technologies (PHATs), Agricultural Research Council (ARC) Infruitec-Nietvoorbij, Cape Town, South Africa. [2]Cape Peninsula University of Technology, Faculty of Applied sciences, Department of Food Science and Technology, Cape Town, South Africa. [3]Cape Peninsula University of Technology, Faculty of Applied sciences, Functional Foods Unit, Cape Town, South-Sudan

Abstract

Botrytis cinerea and *Penicilium expansum* are one of the major causes of rotting in apple during post-harvest storage and cause a significant economic loss. Over the years, intensive fungicide and chlorine applications have raised heightened concerns on residual levels in human and the environment. Thus, this study aimed to investigate the use of electrolyzed water (EW) treatments as an alternative approach for fruit disease/decay management: 'Granny Smith' apples as a case study. The curative efficacy of slightly acidic electrolyzed water (SA-EW) with pH 6.0; oxidation-reduction potential (ORP, > 750 mV) and slightly alkaline electrolyzed water (Sal-EW) with pH 11; ORP, - 800 mV was compared to chlorinated water against *B. cinerea* and *P. expansum in vivo*. Apples were inoculated on opposite ends with spores of *B. cinerea P. expansum* using a sterile 3 mm cork-borer. The inoculants were allowed to air dry for 5-6 h and incubated at 20 °C for 20 h to allow for spore germination. After spore fixation, the inoculated apples were dipped in varying concentrations (100 mg L^{-1} , 200 mg L^{-1} and 300 mg L^{-1}) of Ews for varying durations (10 and 15 min) and stored at 15 °C for 9 days. Measurement of the lesion zone were carried out every 3 days for apples stored at 15 °C**.** Both SA-EW and SAI-EW treatments had significantly reduced lesion zones of decay across all concentrations in comparison to the control ($p \leq 0.05$). The curative efficacy against *B. cinerea* and *P. expansum* was most effective at the highest concentration of 300 mg L^{-1}, followed by 200 mg L^{-1} for treated apples. However, the treatment was not effective for the lowest concentration of 100 mg L^{-1}. These findings therefore suggest the potential of combining SA-EW and Sal-EW treatments with other hurdle techniques for a synergistic anti-fungal effect against *B. cinerea* and *P.expansum* for better preservation of apples.

Biography: Nandi Elana Nyamende

Nandi Elana Nyamende is a research and development enthusiast with interest in proffering cutting-edge research solutions in the food industry. She is enrolled for her final year MSc student in the department of Food Science & Technology at the Cape Peninsula University of Technology. She is a NRF DAAD recipient for PhD studies in 2021 and currently works at the Agricultural Research Council in the Agri- Food Systems and Omics Laboratory, Post-harvest and Agro-processing Technologies Team (PHATs). Her research interests include postharvest non-thermal treatments, pathological and physiological disorders in the

pome fruit industry in South Africa and addressing food security. Her research expertise is in electrolyzed water treatments, food bioactives, processing, and polymerase chain reactions (PCR) and food microbiology**.**