



Tropentag, September 15-17, 2021, hybrid conference

“Towards shifting paradigms in agriculture  
for a healthy and sustainable future”

## Effect of Lactic Acid Fermentation on Nutritional and Antinutritional Compounds in African Nightshade

FRANK SANGIJA, HAIKAEL MARTIN, MARYNURCE KAZOSI, ATHANASIA MATEMU

*Nelson Mandela African Institution of Science and Technology, Food and Nutritional Sciences, Tanzania*

### Abstract

African nightshade (ANS) is among many underexploited and neglected indigenous vegetables. If adequately utilized, the crop can improve nutritional, sensory, and keeping quality. This study assessed the effect of fermentation on the nutrients and antinutrients composition of fermented *Solanum villosum* (SV) and *S. scabrum* (SS). Both spontaneous fermentation (SF) and controlled fermentation (CF) (*Lactobacillus plantarum* and *Leuconostoc mesenteroides*) were employed. Fermented relish was prepared from the pickle with the addition of cooking oil, onions, pepper, ginger, turmeric, and cinnamon. A significant reduction in pH from 7.4–8.2 to 3.1–3.2 and an increase in titratable acidity (TTA) from 0.045–0.072% to 0.85–1.42% was observed in SF after day 30. On the other hand, a significant ( $p < 0.05$ ) decrease in pH from 7.4–8.4 to 3.1–3.5 and an increase in (TTA) from 0.04–0.07% to 0.35–0.4% was observed after 24 h in CF. A slight decrease of  $\beta$ -carotene from pickle to relish in CF (4.0–6.6%) and SF (4.4–6.6%) in all the formulations. The highest  $\beta$ -carotene content of 155.3 mg/100g was observed in SV-SF pickle  $p < 0.05$ . A significant decrease ( $p < 0.05$ ) in vitamin C for CF (88–90%) and SF (94–95%) pickles a further reduction in vitamin C was in relish making. Fermentation substantially decn phytate levels was also observed. Total phenols decreased by 26–29% and 39–43% in CF and SF, respectively. Fermentation significantly decreased chlorophyll from 52–57.8 g kg<sup>-1</sup> to 31.9–48.3 g kg<sup>-1</sup>. Also fermentation significantly reduced minerals, P (1080–1166 mg/100g to 264–439 mg/100 g), Ca (3113–3392 mg/100 g to 866–2445 mg/100g), Fe (148–185 mg/100 g to 61–82 mg/100 g) and Zn (5.5–8.0 mg/100 g 1.3–1.9 mg/100 g). Further reduction of minerals was observed in relish making. However, fermentation slightly increase nickel content from 0.26–0.29 to 0.3–0.86 mg/100 g. Fermentation can preserve ANS, with an increase in  $\beta$ -carotene and reduction in antinutrients. Both CF and SF can be recommended to small-scale farmers, small-scale processors, and households to improve their nutrition and livelihood. However, CF took a short time (3–4 days) to finish than SF (25–30days).

**Keywords:** African nightshade, antinutrients, fermented pickle, minerals, vitamin C