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Solid State Fermentation of *Sauropus androgynus* using *Aspergillus niger* and *Rhizopus Oryzae*

Elfariza Abdul Rahim[a], Mohd Nizam Yusof[a*]

Structured Abstract

Background: Solid-state fermentation (SSF) has emerged as a sustainable bioprocess for enhancing the nutritional properties of various raw materials, offering significant applications in food and feed industries. This study investigates the potential of *Sauropus androgynus*, a nutritionally rich and underutilized plant, to improve its nutritional profile through SSF using *Aspergillus niger* and *Rhizopus oryzae*.

Methods: *S. androgynus* leaves were dried, powdered, and used as the substrate for SSF. The process was carried out in Erlenmeyer flasks inoculated with *A. niger* and *R. oryzae.* Three moisture levels (10 mL, 20 mL, and 30 mL of sterile water) were tested to determine optimal fermentation conditions. The fermentation process lasted 5 days at 30°C, with samples analyzed at regular intervals for changes in crude protein using Dumas method while determine crude fiber using Weende method, carbon, nitrogen, and other elemental compositions. The experiments aimed to identify the most effective fungal strain and moisture conditions for improving the leaves' nutritional profile.

Results: Fermentation with *A. niger* resulted in a significant increase in crude protein content, from 18.19% in fresh leaves to a peak of 24.17%. A notable reduction in crude fiber was observed, with values decreasing from 12.39% to 2.33% under optimized conditions. In contrast, *R. oryzae* exhibited moderate enhancements in nutritional properties, with crude protein reaching 15.25% and crude fiber reduced to 4.63%. Variations in moisture levels significantly influenced fermentation efficiency, with optimal results obtained at 20 mL for *A. niger*.

Conclusion: In conclusion, this study underscores the potential of SSF as a practical and eco-friendly approach to managing nutrient-rich foliage while addressing the rising costs of livestock feed. The findings suggest that *S. androgynus* leaves, when fermented with *A. niger* under optimized conditions, can serve as a high-protein, low-fiber feed supplement. The successful application of SSF not only enhances the nutritional value of agricultural byproducts but also contributes to sustainable waste management practices, reducing environmental impacts and supporting circular agriculture.

Keywords: Solid-state Fermentation, *Sauropus androgynus*, *Aspergillus niger*, *Rhizopus oryzae*, Nutritional Enhancement

*Correspondence: nizamyusof@uitm.edu.my

[a] School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia