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## Profiling of Single and Dual Culture Fermented *Azolla*-Rice Bran Mixtures

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### Structured Abstract

**Background:** Global demand for food, driven by a growing population, underscores the importance of animal feed production. High costs and reliance on expensive imported ingredients pose challenges. To address this, research explores alternative feed bioresources like *Azolla* sp. and rice bran, along with solid-state fermentation (SSF) techniques. This study investigates lactic acid bacteria and *Rhizopus* sp. growth in fermenting *Azolla*-rice bran mixtures using SSF, aiming to observe starter culture performance, and determine proximate analysis of fermented substrates. Significance lies in reducing feed costs, improving sustainability, and enhancing waste management.

**Methods:** Methods involved preparing media, culturing LAB and *Rhizopus* sp., preparing inoculum, and solid-state fermenting *Azolla*-rice bran mixtures with LAB and *Rhizopus* sp.. Growth performances will be observed, and proximate analysis will assess moisture, ash, crude fibre, carbohydrate, total protein, and lipid content. This method aids in developing improved animal feed formulations by evaluating fermentation effects on nutrient composition.

**Results:** The LAB isolate demonstrated superior growth in both single and dual culture fermentations with the *Azolla*-rice bran mix substrate, likely due to the combined higher nutrient composition. The colony forming unit consistently increased, indicating robust LAB growth over time, whether cultivated individually or with *Rhizopus* sp.. The most significant rise in protein content occurred in the SSF of dual cultures across all substrates. *Azolla* sp. emerged as a more promising substrate than rice bran for enhancing protein content, likely because of its higher protein content. In total lipid analysis, rice bran substrates showed higher lipid content than *Azolla* sp. substrates after SSF, primarily due to the inherently higher lipid content in rice bran. In single culture SSF, *Rhizopus* sp. exhibited higher lipid content than LAB, as *Rhizopus* sp. synthesizes its own lipids for growth, while LAB relies on substrate lipids, resulting in lower lipid content.

**Conclusion:** In conclusion, the study on single and dual culture fermentation reveals insights into enhanced lipid and protein content especially in dual culture SSF, with notable growth performance of LAB isolate in co-culture with *Rhizopus* sp. as synergistic interactions between microorganisms elevate nutrient levels in dual culture fermentation, especially with the use of two substrate types.

**Keywords:** *Azolla* sp., Rice Bran, Lactic Acid Bacteria, *Rhizopus* sp., Solid State Fermentation

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