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Evaluation of Rhizopus fermented rice bran as feed in Red Tilapia juveniles, Oreochromis sp.

Nurin Munirah Mohammad Allawi & Rohana Mat Nor

Structured Abstract

Background: Rice bran (RB) is an abundant agro-industrial waste that is generated during the rice milling process. Improper management of the bran can lead to economic and environmental burdens, as it contributes to the accumulation of agricultural waste and may pose disposal challenges. RB is known to be highly nutritious, containing various beneficial components, however, its potential as a valuable resource is underutilized due to certain challenges, such as high insoluble fiber and unstable fatty acid content.

Methods: In this study, Rhizopus was employed as an inoculum in solid-state fermentation (SSF) of RB samples. Both fermented and unfermented RB were subjected to proximate analysis to determine its nutritional composition. Subsequently, the RB samples were processed into pellet form to be fed to red tilapia juveniles, and their growth parameters were closely monitored and recorded. The commercial pellet was used as a positive control. A GC-MS analysis was conducted on the meats of juvenile tilapia from all the treated groups to assess the levels of polyunsaturated fatty acids (PUFAs), as health indicators.

Results: The proximate analysis revealed a significant increase of more than 45% in protein content and a significant decrease of approximately 70% in insoluble crude fibre in treated RB. Despite the initial palatability issue, the evaluation of the treated RB feed in tilapia juveniles demonstrated a comparable growth rate to that of the control groups. Moreover, the PUFAs content in tilapia fed with microbial-treated RB was over 12 times higher than in the control groups. This substantial improvement in PUFAs content indicates an enhanced fish health status, which is crucial for growth and overall well-being.

Conclusion: The findings indicate a substantial improvement in the nutritional value of RB achieved through the enzymatic process facilitated by *Rhizopus*. These results offer promising evidence for enhancing the nutritional value of RB, making it a potential resource for aquafeed, thus contributing to sustainable agriculture and waste utilization.

Keywords: Rice bran, *Rhizopus*, solid state fermentation, *Oreochromis* sp., PUFAs

*Correspondence: 2021101457@student.utim.edu.my
Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia