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Transforming oil palm wastes into value-added fish feed

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Abstract: Fish consumption is projected to continue rising rapidly due to the increasing human population and is expected to reach 183 megatons by 2031. Therefore, feed production requires a stable and sustainable supply chain to maintain food security. However, the availability of feed ingredients is limited due to a heavy reliance on imports. To reduce this food import dependency, alternative feed ingredients such as oil palm decanter cake (OPDC) can be utilized. However, OPDC has incomplete nutrients, a high crude oil content, and low digestible protein, making it unsuitable for fully replacing commercial fish feed. This study aims to achieve a significant reduction in fat content by subjecting OPDC to solid-state fermentation (SSF) by Ganoderma lucidum and characterizing the parameters. Factors such as effect of initial moisture content, substrate loading, and inoculum loading have been investigated. The outcomes showed an initial moisture content of 80%, 125 g of OPDC, and 15 mycelia discs of *Ganoderma lucidum* were found as optimal conditions. This resulted in approximately a 7% reduction in crude fat, from 13.64% in raw OPDC to 6.49% in fermented OPDC after 25 days of fermentation at 30°C. The fermented OPDC with optimal characteristics were then formulated and tested for the fish feed using red hybrid tilapia (Oreochromis spp.). A feeding trial was conducted for two months and the tilapia fish demonstrated consistent feed acceptance throughout the period. Findings also found out that the body weight gained were nearly comparable to the commercial feed group, thus showing the potentiality of fermented OPDC to be incorporated in the fish feed diets. In summary, the inclusion of oil palm waste as a part of feed ingredients may be key for addressing the food crisis and overcoming the environmental challenges caused by the oil palm industry.

Keywords: Food Security, Fish Feed, Oil Palm Wastes, *Ganoderma lucidum*, Solid-State Fermentation.