Thesis Title IMPROVEMENT IN THE FEED VALUE OF WATER HYACINTH (*Eichhornia crassipes*, Mart.) BY FERMENTATION WITH FILAMENTOUS FUNGI (*Pleurotus ostreatus*)

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## ABSTRACT

The objective of this study was to improvement the feed value of water hyacinth by fermentation with filamentous fungi(*Pleurotus ostreatus*). The 2x2 factorial experiment in Randomized Complete Block Design (RCB) was used in this study. Two factors were studied at 2 different levels; inoculum size of fungus (A) used in fermentation at 5% (A0) and 10% (A1) of water hyacinth weight and length of water hyacinth (B) at normal length (B0) and 1/4 of normal length (B1). During the course of fermentation, protein content of the biomass was determined at days 5,10,15 20 and 25. In addition, other factors were also studied . including pattern of essential amino acids in water hyacinth after fermentation, fermenting conditions such as pH and temperature and cost of fermented water hyacinth production.

Results of the study showed that both inoculum size and length of water hyacinth used in fermentation affected protein content with highly significant interaction ($P<0.01$) at 10 days of fermentation. Fermented water hyacinth at 10 and 15 days gave satisfactory results, when time used for fermentation and protein content yielded in water hyacinth after fermentation were also considered. Protein content in water hyacinth after 10 days of fermentation using water hyacinth at 1/4 of normal length was higher than that when water hyacinth at normal length was used at both levels of inoculum size of fungus (5% and 10% of water hyacinth weight) ($P<0.05$). Moreover, when compared with water hyacinth before fermentation, protein content was increased by 14.04% and 9.36%, respectively. On the contrary, protein content at 15 days of fermentation received from using water hyacinth at normal length was higher than that received when used water hyacinth at 1/4 of normal length for both inoculum size 5% and 10% of water hyacinth weight ($P<0.05$). Protein content when compared with water hyacinth before fermentation was increased by 17.13% and 18.16%, respectively.

When pattern of essential amino acids in water hyacinth after fermentation was studied, it was found that the amino acid composition met the FAO reference requirement except for sulphur-containing amino acids such as methionine and cystine, and tryptophan which were present in low quantity.

Study on condition of fermentation indicated that pH of water hyacinth tended to decrease during the period of

fermentation. The value of pH during fermentation ranged from 3.85 to 6.90 with the pH values at 10 and 15 days of fermentation being 5.10-5.80 and 4.80-4.95, respectively. Temperature in the pile of fermenting water hyacinth varied with ambient temperature. The range of temperature during fermentation was 30.0-37.0 C with temperature in the pile at 10 and 15 days being 30.50-36.50 and 31.10-38.25 C, respectively.

Estimation of fermented water hyacinth production cost found the cost per gram of crude protein produced from using inoculum size 5% and 10% fermented 10 days with water hyacinth at 1/4 of normal length to be 0.168 and 0.184 baht. The cost per gram of crude protein produced from using inoculum size 5% and 10% fermented 15 days with water hyacinth at normal length was 0.201 and 0.208 baht.

This research finding could be used as a guideline and fundamental data for further research and development for fermented water hyacinth production employing appropriate process, inoculum and chemical used in fermentation with consideration in terms of both quantity and quality of protein recieved after fermentation as well as economical benefit.