

## ABSTRACT

Shantania Natalie (01034210024)

### **EFFECTS OF SUBSTRATE ENHANCERS AND FERMENTATION PERIOD ON PROTEIN CONTENT IN TUNA WASTE FERMENTATION WITH *Saccharomyces cerevisiae* AND *Bacillus subtilis***

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The large production of tuna in Kota Bitung, North Sulawesi can generate significant amounts of organic waste during processing, which holds potential for transforming into valuable products. This study explores the effect of different substrate enhancers (pineapple peel and molasses) and fermentation durations (0, 1, 3, and 5 days) on tuna waste fermented with *Saccharomyces cerevisiae*, *Bacillus subtilis*, or a combination of both. This study aims to analyze the quality of extracted protein from fermented fish alongside controlling spoilage indicators such as total volatile base nitrogen (TVBN) and trimethylamine (TMA). The research was conducted in two stages. In the preliminary phase, the growth curves of *S. cerevisiae* and *B. subtilis* were studied, along with the proteolytic activity of various pineapple parts (peel, core, crown). Pineapple peel exhibited the highest proteolytic activity and was selected for subsequent trials. A three-way ANOVA was performed to assess the effects of microbial strain, substrate enhancer, and fermentation time. Results showed that molasses was able to suppress the formation of TVBN and TMA while still having to increase the yield of extracted protein. The optimal treatment was achieved using *S. cerevisiae* with molasses for one day, resulting in a 129.23% protein increase compared to the control, with TVBN and TMA values of 11.08 mgN/100 g and 5.11 mgN/100 g, respectively, well within the safe limit consumption.

Keywords : *Bacillus subtilis*, fermentation, molasses, pineapple, protein, *Saccharomyces cerevisiae*, TMA, tuna waste, TVBN

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