ABSTRACT

Bela Nanda Arifiani, 24020222120011. Optimization of POME Hydrolysis Using a Mold Consortium for Bioethanol Production with Saccharomyces cerevisiae and *Pichia sp.* Through Response Surface Methodology (RSM) under the guidance of Endang Kusdiyantini and I Made Sudiana

The increasing global energy demand is still dominated by fossil fuels, even though their availability is increasingly limited and their use has a negative impact on the environment. Bioethanol is a renewable energy source that has the potential to replace fossil fuels. However, the use of food-based raw materials causes social and economic problems. Therefore, this research aims to replace these food staples by utilizing liquid waste from the palm oil industry, Palm Oil Mill Effluent (POME) as a substrate in bioethanol production. POME has a high organic content, especially carbohydrates and lipids, making it a potential carbon source for fermentative microorganisms. This study was conducted through the stages of isolation and selection of molds producing hydrolytic enzymes with multilevel dilution. Next, hydrolysis of the substrate with a mold consortium (*Pleurotus cystidiosus* and D33) to produce simple sugars as measured by the DNS method. Then, fermentation was carried out for 72 hours using the yeast Saccharomyces cerevisiae and Pichia sp. to produce bioethanol. Optimization of process parameters (mold concentration, POME concentration, and pH) was carried out using the Response Surface Methodology (RSM) method. Based on the research results, 3 mold isolates (D31, D33, and D41) were obtained. Isolate D33 had the highest cellulolytic activity with an IAE value of 1.02 and produced the highest glucose compared to other isolates. Optimization using RSM showed that the interaction between factors influenced the increase in reducing sugar and ethanol content produced. The optimum conditions were obtained at a combination of 50% substrate concentration, 6 mold plugs, and pH 5. The results of RSM optimization produced reducing sugar and bioethanol of 40,220 ppm and 5.38%, respectively. This study shows that POME has the potential to be used as an alternative substrate in the production of bioethanol based on agro-industrial waste.

Keywords: *Bioethanol, Mold Consortium, POME, RSM, Saccharomyces cerevisiae,*