

ABSTRACT

Anggi Maharani Damanik. 24020220120014. Optimization of The Growth of Sulfur-oxidizing Bacterial Consortium in Different Production Mediums, Sulfur Concentrations, pH, and Temperatures. Under the Supervision of Siti Nur Jannah and Yuli Siti Fatma.

Palm Oil Mill Effluent (POME) will be dangerous for the environment because it contains greenhouse gases which contribute to global warming. POME processing produces several products, one of which is biogas. The main content of biogas consists of methane (CH₄) around 50-70%, carbon dioxide (CO₂) around 25-50%, and other gas content including hydrogen sulfide (H₂S), hydrogen (H₂), dinitrogen (N₂), and steam water (H₂O). H₂S gas is detrimental to the quality of biogas so it must be removed. Reducing H₂S concentrations can be done using several methods, one of which is using biological methods using sulfur-oxidizing bacteria (SOBs). These bacteria have the ability to oxidize H₂S to reach safe concentrations. Sulfur-oxidizing bacterial consortia generally consist of several bacterial species that work together to oxidize sulfur. This research aims to determine the optimization of the growth of a consortium of sulfur-oxidizing bacteria in different production medium, sulfur concentrations, pH and temperatures. The growth of a consortium of sulfur-oxidizing bacteria consisting of *Rhizobium sp.* S3.SOB.4, *Agrobacterium pusense* S3.SOB.1, and *Agrobacterium pusense* S2.SB.1 were optimized for growth in starter medium (Thiosulfate, Nutrient Broth, and Thiosulfate + Yeast Extract), production medium (Thiosulfate, Nutrient Broth + Na₂S₂O₃, and Sulfur Oxidizer Medium), sulfur concentration (2.025 ppm, 4050 ppm, and 6.075 ppm), pH (2,3,4,5,6,7,8, and 9), and temperature (25,30,35,40, and 45 °C). The optimum production medium for the growth of the SOBs consortium is Nutrient Broth + Na₂S₂O₃ with an optimum pH of 6 and an optimum temperature range of 30-35°C. Optimum growth results in Nutrient Broth starter medium. The SOBs bacterial consortium had optimum growth in the Nutrient Broth + Na₂S₂O₃ production medium with a sulfur concentration of 6.075 ppm and a medium pH of 6 with a temperature of 30-35°C.

Keywords: Agrobacterium pusense, Desulfurization, POME, Rhizobium sp., Growth optimization