ABSTRACT

Helda Syafitri. 24020121130116**. Potential of Keratinase Enzymes from Symbiotic Bacteria of Freshwater Sponges *Eunapius carteri* in the Unhairing Process of Leather Tanning**. Supervised by Wijanarka dan Hermin Pancasakti Kusumaningrum.

The leather tanning industry in Indonesia continues to grow in line with increasing demand for cow, goat, and sheep leather, but it still relies on the use of hazardous chemicals such as sodium sulfide, which causes environmental pollution. Environmentally friendly alternatives can be developed through the use of keratinase enzymes as biocatalysts in the unhairing process. This study aims to explore the potential of the freshwater sponge symbiont bacterium *Eunapius carteri* from the Porong River, Sidoarjo, East Java, as a producer of keratinase, determine the optimal pH and temperature conditions, and test the enzyme's effectiveness in removing animal hair from hides. A total of 30 isolates were obtained and selected, with isolate EC-32 chosen due to its highest proteolytic index. Enzyme activity tests were conducted at pH levels of 5, 7, 9, and 11, and temperatures of 20°C, 30°C, and 40°C. The results showed the highest activity at pH 9 and 40°C, with an activity of 6.2374 ± 0.1188 U/mL, a protein concentration of 3.85 ± 0.014 mg/mL, and a specific activity of 1.62 U/mg. The application of the enzyme in the unhairing process showed varying effectiveness on each type of skin, with optimal results at pH 9 and 40°C within 24 hours, where goat hair was completely removed (100%), sheep hair was nearly completely removed (94.82%), and cow hair was only partially removed (66.82%). The difference in effectiveness is influenced by skin thickness, collagen density, and hair follicle characteristics. This study concludes that EC-32 isolate has the potential to be an effective and environmentally friendly source of keratinase enzymes to replace chemicals in the unhairing process in the leather tanning industry.

Keywords: *keratinase, unhairing, Eunapius carteri, freshwater sponge, leather*