ABSTRACT

Tasrari Qolbi Nur Kholis. 24020222130043. **Bioprospecting of Bioactive Compounds from *Anabaena* sp. Derived from the Mangkang Mangrove Ecosystem Using LC-HRMS as In Silico Candidates for Neurodegenerative Drugs** (Supervised by Siti Nur Jannah and Hermin Pancasakti Kusumaningrum)

Neurodegenerative diseases such as Alzheimer's and Parkinson's are progressive disorders of the nervous system whose prevalence continues to increase worldwide. Cyanobacteria, particularly *Anabaena* sp., are known to produce various bioactive compounds with neuroprotective potential, including antioxidant, anti-inflammatory, and enzyme inhibitory activities involved in neurodegenerative diseases. This study aimed to analyze the potential of bioactive compounds from *Anabaena* sp. Mangkang as candidates for neurodegenerative disease drugs through in silico approaches using QSAR and molecular docking against AChE and MAO-B targets. The study began with the isolation and identification of *Anabaena* sp. through morphological analysis and 16S rRNA gene sequencing. The profile of bioactive compounds was obtained using LC-HRMS analysis. The compound data generated from LC-HRMS were further analyzed using *machine learning*-based QSAR methods with Random Forest, Gradient Boosting, Extra Trees, and XGBoost algorithms to predict inhibitory activity against AChE and MAO-B targets. The best model was selected based on statistical validation parameters such as R^2, Q^2, and RMSE. Compounds with the best prediction results were subsequently analyzed using molecular docking to evaluate binding affinity and molecular interactions with the target proteins. The results showed that the QSAR model was capable of predicting the biological activity of bioactive compounds from *Anabaena* sp. Several compounds identified through LC-HRMS were predicted to exhibit high inhibitory activity against AChE and MAO-B targets, as indicated by their IC50 values. Molecular docking results demonstrated that these compounds possessed strong binding affinities toward the target proteins and formed interactions with important active-site residues within the binding pocket.

Keywords: *Anabaena* sp., QSAR, *molecular docking*, neurodegenerative, AChE, MAO-B, *in silico*.