

## ABSTRACT

Climate change such as rising temperatures and changes in rainfall patterns, results in changes to the agroclimatic suitability classes for oil palm cultivation. North Aceh Regency as one of the largest contributors of oil palm commodities in Aceh Province, is vulnerable to global climate change. Information on the agroclimatic suitability level for oil palm cultivation is needed to aid in adaptation and mitigation efforts in response to future climate change. This research utilizes rainfall observation data from 17 rain gauge stations in North Aceh Regency and its surroundings for the period of 2014-2023. Additionally, it employs monthly average air temperature data from 5 meteorological stations in Aceh Province, projected rainfall and air temperature data under the SSP2 scenario using the MIROC6 model with a spatial resolution of  $0.1^\circ \times 0.1^\circ$ , and elevation and slope data. The agroclimatic suitability analysis for oil palm is calculated based on the weighting method of all parameters, including rainfall, air temperature, number of dry months, elevation, and slope. The analysis is then performed spatially using the ArcGIS 10.8 application. The research results show that during the baseline period (2014-2023), class S2 (moderately suitable) dominates with a percentage of 63.35%, followed by class S1 (highly suitable) at 31.30% and class S3 (marginally suitable) at 5.35%. During projection period I (2026-2035), there is a change in area distribution: class S1 becomes 47.91%, S2 becomes 49.99%, and S3 becomes 2.10%. Projection period II (2036-2045) also experiences a change in area distribution, with class S1 becomes 43.24%, S2 becomes 53.64%, and S3 becomes 3.12%. To determine the quality of oil palm production in relation to the current agroclimatic suitability, To determine the quality of oil palm production in relation to current agroclimatic suitability, data was collected on samples of fresh fruit bunches (FFB) from oil palm in the mature phase in oil palm plantations located in two different sub-districts to analyze the oil content in the mesocarp. Laboratory test results indicate average oil content percentages in the mesocarp of 66.3%, 57.7%, and 70.7%. These values fall into the above-standard, standard, and above-standard categories, respectively.

Keywords: climate change, spatial, period, scenario, strategy