ABSTRACT

Gayo Arabica coffee, an important commodity in Central Aceh District, faces real challenges due to climate change. The close relationship between coffee and climate makes the description of agroclimatic suitability crucial. Analysis of climate parameters and agroclimatic suitability based on climate models is expected to provide the most appropriate adaptation strategies or measures to deal with future climate change. Research methods include testing the performance of climate models using Root Mean Square Error (RMSE) statistics. Analysis of climate parameters including precipitation type, precipitation and air temperature trends, and Schmidt-Ferguson climate type distribution. Then, mapping of agroclimatic suitability through weighting. In addition, an analysis of the physical and taste qualities of current Arabica coffee at two different altitudes was conducted. The final section continued with adaptive strategies to deal with climate change. The results show that the Central Aceh region has an equatorial rainfall pattern and Schmidt-Ferguson climate types A and B. During the baseline period (2014-2023), the S2 (moderately suitable) class category dominated the Aceh Tengah area with an area of 356,528.21 ha (79.33%), followed by the S3 (marginally suitable) class with 58,797.79 ha (13.08%) and the S1 (highly suitable) class with 34,076.35 ha (7.58%). However, during the projection periods I and II, there was a change in the area of agro-climatic suitability, which was influenced by an increase in air temperature. In the projection period I (2033-2042), the area of S1 increased by 36 653.18 ha (8.16%), S2 by 345 720.30 ha (76.93%), S3 by 66 876.99 ha (14.88%) and N by 151.65 ha (0.03%). Then, during projection II (2043-2052), the area of S1 became 31,148.33 ha (6.93%), S2 by 329,473.55 ha (73.31%), S3 by 88,239.37 ha (19.63%) and N by 541.02 ha (0.12%). Recommended adaptation strategies include the use of adaptive varieties, the construction of bench terraces, the planting of lamtoro and applying ameliorants (dolomite lime, biochar, organic materials) to arabica coffee plants in Central Aceh. The quality of arabica coffee beans still meets SNI 01-2907-2008 and has a specialty coffee label according to SCAA (Specialty Coffee Association of America) standards.

Keywords: Climate Change, SSPs, Schmidt-Ferguson, Baseline, Strategy, Quality and Taste.

ABSTRAK

Kopi arabika gayo, komoditas penting di Kabupaten Aceh Tengah, menghadapi tantangan nyata akibat perubahan iklim. Hubungan erat antara kopi dan iklim menjadikan gambaran kesesuaian agroklimat sangat krusial. Analisis parameter iklim dan kesesuaian agroklimat berdasarkan model iklim diharapkan dapat menghasilkan strategi atau langkah adaptif yang paling tepat untuk menghadapi perubahan iklim di masa depan. Metode penelitian meliputi uji performa model iklim menggunakan statistik *Root Mean Square Error* (RMSE). Analisis parameter iklim meliputi tipe curah hujan, tren curah hujan dan suhu udara serta sebaran tipe iklim Schmidt-Ferguson. Kemudian, pemetaan kesesuaian agroklimat melalui pembobotan. Selain itu dilakukan juga analisis kualitas mutu fisik dan cita rasa kopi arabika saat ini pada dua ketinggian yang berbeda. Bagian akhir dilanjutkan dengan strategi adaptif menghadapi perubahan iklim. Hasil menunjukkan bahwa wilayah Aceh Tengah memiliki pola hujan ekuatorial dan tipe iklim Schmidt-Ferguson A dan B. Selama periode *baseline* (2014-2023), kategori kelas S2 (cukup sesuai) mendominasi wilayah Aceh Tengah dengan luas 356.528,21 ha (79,33%), diikuti kelas S3 (sesuai marginal) sebesar 58.797,79 ha (13,08%) dan kelas S1 (sangat sesuai) sebesar 34.076,35 ha (7,58%). Namun, selama periode proyeksi I dan II, terjadi perubahan luas wilayah kesesuaian agroklimat, yang dipengaruhi oleh peningkatan suhu udara. Pada periode proyeksi I (2033-2042), luas wilayah S1 menjadi 36.653,18 ha (8,16%), S2 sebesar 345.720,30 ha (76,93%), S3 sebesar 66.876,99 ha (14,88%) dan N sebesar 151,65 ha (0,03%). Kemudian selama proyeksi II (2043-2052), luas wilayah S1 menjadi 31.148,33 ha (6,93%), S2 sebesar 329.473,55 ha (73,31%), S3 sebesar 88.239,37 ha (19,63%) dan N sebesar 541,02 ha (0,12%). Strategi adaptasi yang disarankan meliputi penggunaan varietas adaptif, pembuatan teras bangku, penanaman lamtoro, dan pemberian amelioran (kapur dolomit, biochar, bahan organik) pada tanaman kopi arabika di Aceh Tengah. Kualitas biji kopi arabika masih memenuhi SNI 01-2907-2008 dan memiliki label *specialty coffe* menurut standar SCAA (*Specialty Coffee Association of America*).

Kata Kunci: Perubahan Iklim, SSPs, Schmidt-Ferguson, *Baseline*, Strategi, Mutu dan Cita Rasa.