



Tropentag, September 14-16, 2022, hybrid conference

“Can agroecological farming feed the world?
Farmers’ and academia’s views”

Climate change and macadamia tree production in Malawi

EMMANUEL ZUZA¹, YOSEPH ARAYA², ANDREW EMMOTT³

¹*The Open University, United Kingdom*

²*The Open University, School of Environment, Earth and Ecosystem Sciences,*

³*Neno Macadamia Trust,*

Abstract

Global climate change is altering the suitable areas of crop species worldwide, with cascading effects on people and animals reliant upon those crop species as food sources. Macadamia is one of these essential lucrative crop species that grows in Malawi. Here, we used an ensemble model approach to determine the current and future distribution of macadamia production areas across Malawi in relation to climate. For future distribution of suitable areas, we used the climate outputs of 17 general circulation models (GCMs) based on two climate change scenarios (RCP 4.5 and RCP 8.5). The precipitation of the driest month and isothermality were the climatic variables that strongly influenced macadamia’s suitability in Malawi. We found that these climatic requirements were fulfilled across many areas in Malawi under the current and future conditions. Suitable areas for macadamia production are predicted to shrink by -18% ($17,015\text{ km}^2$) and -21.6% ($20,414\text{ km}^2$) based on RCP 4.5 and RCP 8.5, respectively, with much of the suitability shifting northwards. This means that some currently productive areas will become unproductive in the future, while current unproductive areas will become productive. Notably, suitable areas will increase in Malawi’s central and northern highlands, while the southern region which is mostly lowlands will lose most of its suitable areas (100% losses). Therefore our current and future projections provide critical evidence of the potential negative impacts of climate change on the suitability of macadamia production in the country. We recommend developing area-specific adaptation strategies to build resilience in the macadamia sector in Malawi under climate change.

Keywords: Climate change, ensemble model, macadamia, representative concentration pathways