ABSTRACT

EVALUATING THE INFLUENCE OF BIOCLIMATIC VARIABLES ON THE POTENTIAL DISTRIBUTION OF ALLIUM IN THE PHILIPPINES

Grace R. Nulud
University of the Philippines, 2019

Adviser: Dr. Benjamin M. Vallejo Jr.
Reader: Dr. Gay Jane P. Perez

Anthropogenic climate change is projected to alter the geographic distribution of crops. However, there have been few studies modeling the impact of climate change on the distribution of crops. Detailed and reliable information about the potential distribution of crops could provide important information that could help to evaluate the impact of climate change, and be used as basis in formulating appropriate science-informed adaptation policies, strategies, and measures. This study identified the key variables highly correlated with the distribution of two economically important crops in the Philippines: *Allium cepa* and *Allium sativum*. Maximum entropy approaches using the MaxEnt modeling algorithm was used to predict the potential distribution of *Allium* under A1B and A2 scenarios (correspond to RCP 6.0 and RCP 8.5, respectively) for the year 2030, 2050, and 2100, using the occurrence records from the Philippine Statistics Authority and bioclimatic variables with 30" resolution from WorldClim datasets. The relative importance of the environmental variables was evaluated using Jackknife tests. The robustness of model predictions was evaluated using the Area under the receiver operating characteristic curve (AUC) statistics. The results show that the more influencing variables are temperature annual range and precipitation seasonality. The model performed better than random with an average test AUC value of 0.75 for *Allium sativum* and 0.64 for *Allium cepa*. It is forecasted that *Allium cepa* will likely benefit from the future climate as its probability of suitability is projected to increase over time; the suitable areas will remain on the same location, having Region II and III as the most suitable regions. However, *Allium sativum* will likely be impacted due to changes in climate and its potential distribution is projected to continue to shift in location from Region I in 2030, to Region II in 2050, and Region III in 2100; its suitability area is projected to eventually decrease. This is the first study to model and map the potential distribution of *Allium* in the Philippines using MaxEnt, and it provides an initial understanding on how the distribution of crops will be affected by climate change. Results can be applied in various ways, such as the identification of additional localities where *Allium* may grow substantially; and the selection of priority area for cultivation of *Allium*.