

**Evaluating the Influence of Bioclimatic Variables  
on the Potential Distribution of *Allium* in the Philippines**

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**ABSTRACT**

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 two emissions scenarios (A1B and A2) 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 AUC and TSS 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 while *Allium sativum* will likely suffer.

**Keywords:** *Maxent, Allium, climate change*