

Forecasting the future global distribution of Sarta Longhorned Beetle (SLB) under climate change scenarios.

Umer Hayat ^{1,2}

¹ Department of Plant Protection, Fujian Agriculture and Forestry University, Fuzhou, China.

² Sino-France Joint Laboratory for Invasive Forest Pests in Eurasia, Beijing Forestry University, Beijing 100083, China.

Abstract

Background: Accurate assessment of the risk of establishing insect pests is crucial for national plant protection organizations. This precision is essential in negotiating international trade agreements for forestry-related commodities, which may carry pests and lead to unintended introductions in importing countries.

Methodology: This study employed a correlative niche model to assess and map the global patterns of potential establishment for *Aeolesthes sarta* commonly known as Sarta Longhorned Beetle (SLB), under current and future climates. This insect is a significant pest affecting tree species such as *Populus*, *Salix*, *Acer*, *Malus*, *Juglans*, and other hardwood trees. Notably, it is also categorized as a quarantine pest in countries where it is not currently present. The correlative model, MaxEnt, utilized species occurrences and spatial climatic data, providing insights into the species' distribution based on observed data and environmental conditions.

Results: The projected potential distribution from the MaxEnt model aligns well with the currently known distribution of SLB. MaxEnt predicts that most central regions are suitable for its distribution, excluding the extreme northern and southern hemispheres, central African countries, and the northern part of Australia. The model accurately predicts the known distribution of SLB in the Asian continent, and its projections suggest a slight overall increase in the global distribution range of SLB with future changes in climate temperature, primarily concentrating in the central and northern hemispheres. Furthermore, the model anticipates suitable conditions in Europe and North America, where SLB is currently not present.

Conclusion: The main environmental variables associated with the distribution of SLB at a global level were average annual temperature and precipitation rate. The predictive models developed in this study offer insights into the global risk of SLB establishment and can be valuable for monitoring potential pest introductions in different countries. Additionally, policymakers and trade negotiators can utilize these models to make science-based decisions regarding pest management and international trade agreements.

Keywords: Pest risk analysis, *Aeolesthes sarta*, species distribution modeling, MaxEnt, insect pest, quarantine pest, climate change.