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Spatial model of suitable invasion territories of the Harlequin Ladybird in Armenia

Shoghik Ghazaryan[1*], Hasmik Torosyan[1], Varos Petrosyan[2], Marine Arakelyan[1]

[1] Faculty of Biology, Yerevan State University, Yerevan, Armenia

[2] A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow, Russia

ABSTRACT

The harlequin ladybird *Harmonia axyridis* (Pallas, 1773) a globally invasive coccinellid species, has recently invaded Armenia (2016), raising concern regarding its future ecological consequences. Widely accidentally introduced in many regions as a biological control agent against aphids and coccids, but *H. axyridis* has subsequently demonstrated strong dispersal capabilities, broad ecological tolerance, and aggressive intraguild predation., Currently, the species has since spread across 10 provinces of the country with the exception of Armavir and Vayots Dzor. To assess its potential distribution and identify key environmental factors of its establishment, we developed a species distribution model (SDM) using MaxEnt based on recent species occurrence records in Armenia and a set of bioclimatic and topographic variables. Outcomes indicated that high habitat suitability in the northern and central parts of Armenia, where urban infrastructure, fruit production systems, and vegetation heterogeneity dominate the landscape. Habitat suitability was consistently low at higher elevations (>2100 m), likely due to reduced food availability and limited overwintering sites such as human infrastructure. The predicted distribution aligns with the ecological features of *H. axyridis*, particularly its preference for anthropogenic habitats, overwintering in artificial structures and tolerance of a wide range of climatic conditions. These findings are consistent with patterns of global invasion trend of species observed in other invaded regions and indicate favorable conditions for ongoing spread in Armenia. This study provides the first predictive spatial assessment of *H. axyridis* in Armenia and highlights the importance of integrating regional ecological data into SDMs. Our findings suggest a high invasion risk of the species in Armenia and highlight the need for ongoing monitoring.

Keywords: *Harmonia axyridis*, Armenia, potential distribution, habitat suitability

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[*]Corresponding Author:

Shoghik Ghazaryan, Faculty of Biology, Yerevan State University, 0025 Yerevan, Armenia.
Email: shoghik.ghazaryan@ysu.am