



MaxEnt model for predicting potential distribution of ticks in the western Kanto region of Japan*

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Land-use patterns, climatic factors, and wildlife distributions have been suggested to have a role in shaping vector tick distributions. In the Tokyo metropolis and surrounding prefectures, these factors have rapidly changed over the last few decades. Here, we estimated the potential distributions of ticks based on the data of a 7-year tick survey at 134 sites in western Kanto, Japan. We focused on 6 tick species (*Amblyomma testudinarium*; *Haemaphysalis flava*; *H. kitaokai*; *H. longicornis*; *H. megaspinoso*; and *Ixodes ovatus*) using Maximum Entropy (MaxEnt) modeling based on the annual precipitation, snow depth; remote-sensing land-use patterns (Forest connectivity; Agricultural land; Urban; Open water; Deciduous broad-leaf forest; Deciduous needle-leaf forest; Evergreen broad-leaf forest; Evergreen needle-leaf forest; Bamboo forest; Grassland; Bareland), and the distributions of five common wildlife species [sika deer (*Cervus nippon*); wild boar (*Sus scrofa*); raccoon (*Procyon lotor*); raccoon dog (*Nyctereutes procyonoides*); masked palm civet (*Paguma larvata*)].

Our tick survey collected 24,546 individuals of 4 genera and 16 tick species (Doi *et al.* 2021). Notably, our MaxEnt models indicated that forest connectivity was most important for the 6 species under study. In addition, the raccoon distribution strongly affected 5 species, with the exception of *A. testudinarium*. For *A. testudinarium*, warm winter climate, bamboo forest, and wild boar distribution were the strongest contributory distribution factors. Raccoons frequently use both forest and human residential areas and the wild boar is also recently reported to be found in the city frequently. The urban wildlife and forest patches in urban and peri-urban areas are suggested as the most important factors determining the human-tick interface.

Keywords: Species distribution model, ticks, urban wildlife, raccoon, wild boar

Reference

Doi, K., Kato, T., Tabata, I. & Hayama, S. (2021) Mapping the potential distribution of ticks in the western Kanto region, Japan: Predictions based on land-use, climate, and wildlife. *Insects*, 12, 121095.
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