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Conference Abstract

Edible insect farming and the risk of biological invasions: a global trait-based assessment.

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Abstract

Insect farming is promoted as a sustainable alternative to traditional livestock, offering substantial reductions in land, water, and feed use while generating fewer greenhouse gas emissions. However, the escape or release of farmed insects into non-native environments may create significant biological invasion risks, with consequences for biodiversity, human well-being, and economies. This study provides the first systematic assessment of the ecological characteristics influencing the likelihood of edible insects becoming invasive, and identifies species not yet reported as invasive that could present

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risks if farmed outside their native ranges. We evaluated 1,030 species (943 native and 88 introduced) spanning six insect orders (Coleoptera, Lepidoptera, Hymenoptera, Hemiptera, Orthoptera, and Blattodea) in a multidimensional functional space. Our analyses highlight the importance of both larval and adult diet breadth, macroecological factors such as temperature and humidity, and native-range distribution size as predictors of invasion potential. Using machine learning, we identified species with high invasive risk, with Orthoptera, Lepidoptera, Hemiptera, and Hymenoptera being the groups most likely to become invasive. By combining ecological variables with predictive modeling, this work provides a framework for invasion risk assessment and delivers practical guidance to support sustainable insect farming while minimizing ecological threats.

Keywords

Ecological traits, invasion risks, edible insects, sustainability of food production systems

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Conflicts of interest

The authors have declared that no competing interests exist.