



Forensic techniques used to differentiate origins of invasive beetles

Stable isotopes of elements are in everything. The abundance of different isotopes in plants and animals can vary depending on where they grow, or on their nutrition. Stable Isotope Ratio Analysis (SIRA) is an analytical technique that allows the isotopes naturally present in a sample to be measured. SIRA has been used for a number of years to map the production and origin of samples of plants and animals. Wood-boring larvae assimilate isotopes from wood as they feed. Hence, isotope signatures of beetles may provide clues about the geographic origin of the emerged adults. This information can be used in planning phytosanitary measures where adult beetles are found.

Previous investigations have shown the potential to use SIRA to determine whether a specimen of a non-native species developed in the area in which it was found or whether it arrived as an adult from elsewhere. The aim of the project 'Use of Stable Isotope Ratio Analysis (SIRA) for the identification of invasive species native in alien environments' was to validate the use of SIRA as an arthropod tree-pest decision tool to inform phytosanitary response.

The project focussed on *Anoplophora glabripennis* (Asian longhorn beetle), a wood-boring quarantine pest in Europe and North America. The identification of a beetle with a local isotope signature would involve destruction of trees in order to eradicate the pest that probably developed from an egg laid locally one or two years earlier. The identification of a beetle with a foreign isotopic signature would rather involve the tracing of imported host wood to determine whether other adults may have emerged. The project used specimens from different geographic regions, i.e. 11 locations in China (total number of specimens 55) and 6 locations in Europe (Italy, total number of specimens 28). A statistical model for identifying the source of beetles based on SIRA results was created. Asian longhorn beetles that emerged from European wood can be identified in *at least* 95% of cases. At the same time beetles that emerged in China can be identified in approximately 30% of cases. This performance allows for less severe control measures to be applied to a proportion of interceptions while maintaining high protection against this invasive species.

[Project ID:](#) Use of Stable Isotope Ratio Analysis (SIRA) for the identification of invasive species in alien environments