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# Spatiotemporal variation of the greater horseshoe bat (*Rhinolophus ferrumequinum*) diet in Western France : applications to chirosurveillance and conservation strategies

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## Abstract

A detailed knowledge of the diet composition of insectivorous bat species is of primary importance to understand their ecology, and to evaluate their role as agents of biological pest control in farmlands. It is also critical in terms of conservation needs as insectivorous bats are exposed to toxins (pesticides, antihelminths...) by ingestion of pollutants through foraging. Because of their high trophic level, exceptional longevity and large amount of preys ingested per night, bats are very sensitive to this issue. We have developed a rigorous high throughput metabarcoding approach based on a universal COI minibarcode that enables to simultaneously identify bats and their preys from guano samples. This parallel identification of predators and preys provides a rapid, resolute and cost-effective screening tool to accurately describe the spatiotemporal variation of insectivorous bat diets. We have applied this approach to the greater horseshoe bat (*Rhinolophus ferrumequinum*), a near-threatened species that experiences high anthropic pressures because it roosts in buildings during summer and it uses agricultural fields as foraging sites. Guano samples were collected in six maternity colonies in Western France every two weeks throughout the maternity period, when the greater horseshoe bat females gather to give birth and raise the young. It is a very energy-intensive period, where the females and the new-born are very fragile. This

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study provides a detailed description of the greater horseshoe bat diet and of its variability throughout contrasted landscapes (hedgerows, crops, meadows ...) and during a critical period for reproduction. Our results highlight the possibility of using the greater horseshoe bat as a sentinel for chiro-surveillance and as a natural biological pest control agent. They also give insights into the links between landscape, ecotoxicology and diet, what will lead to improved recommendations for further design of conservation strategies.