Crop and urban systems

Adaptability of the breeding phenology of birds of prey occupying nest boxes in the study areas for biological control of the common vole in agricultural environments in Castilla y León (Spain)

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Adaptation during the breeding season is a key aspect of the ecology of raptors, particularly those, like barn owl (*Tyto alba*) and common kestrel (*Falco tinnunculus*), that rely on prey with cyclic populations, such as the common vole (*Microtus arvalis*). These rodents exhibit significant population fluctuations, which can directly impact the availability of food for specialized predators and, consequently, the timing and success of their breeding. Nest boxes have proven to be valuable tools for studying and monitoring raptor populations in agricultural environments, allowing us to investigate how these birds adapt their breeding patterns to changes in prey abundance. The peak energy demand for raptors that aims to increase their hunting rate coincides with their breeding season, from egg-laying to fledging. Given the potential of raptors as biological control agents for vole pests comparable to other phytosanitary measures, it is relevant to determine the duration and persistence of their predatory impact, as well as its temporal alignment with periods of peak pest pressure when the control is most needed.

This study explores the adaptive capacity of nest-box raptors during the breeding season, focusing on their response to changes in vole abundance. By analysing field data, we aim to determine whether these birds possess behavioural adaptations in their breeding phenology that optimize reproductive success under variable prey conditions. This research may contribute to our understanding of the efficacy of biological control as an integrated pest management strategy for vole pests, particularly in agricultural landscapes where predator-prey dynamics may be influenced by human activities.