Landscape composition influences honeybee colony dynamics in an intensive cereal farming system

Mickaël Henry, Jean Francois Odoux, Fabrice Requier, Thierry Tamic, Clovis Toullet, Emilie Peyra, Pierrick Aupinel, Vincent Bretagnolle

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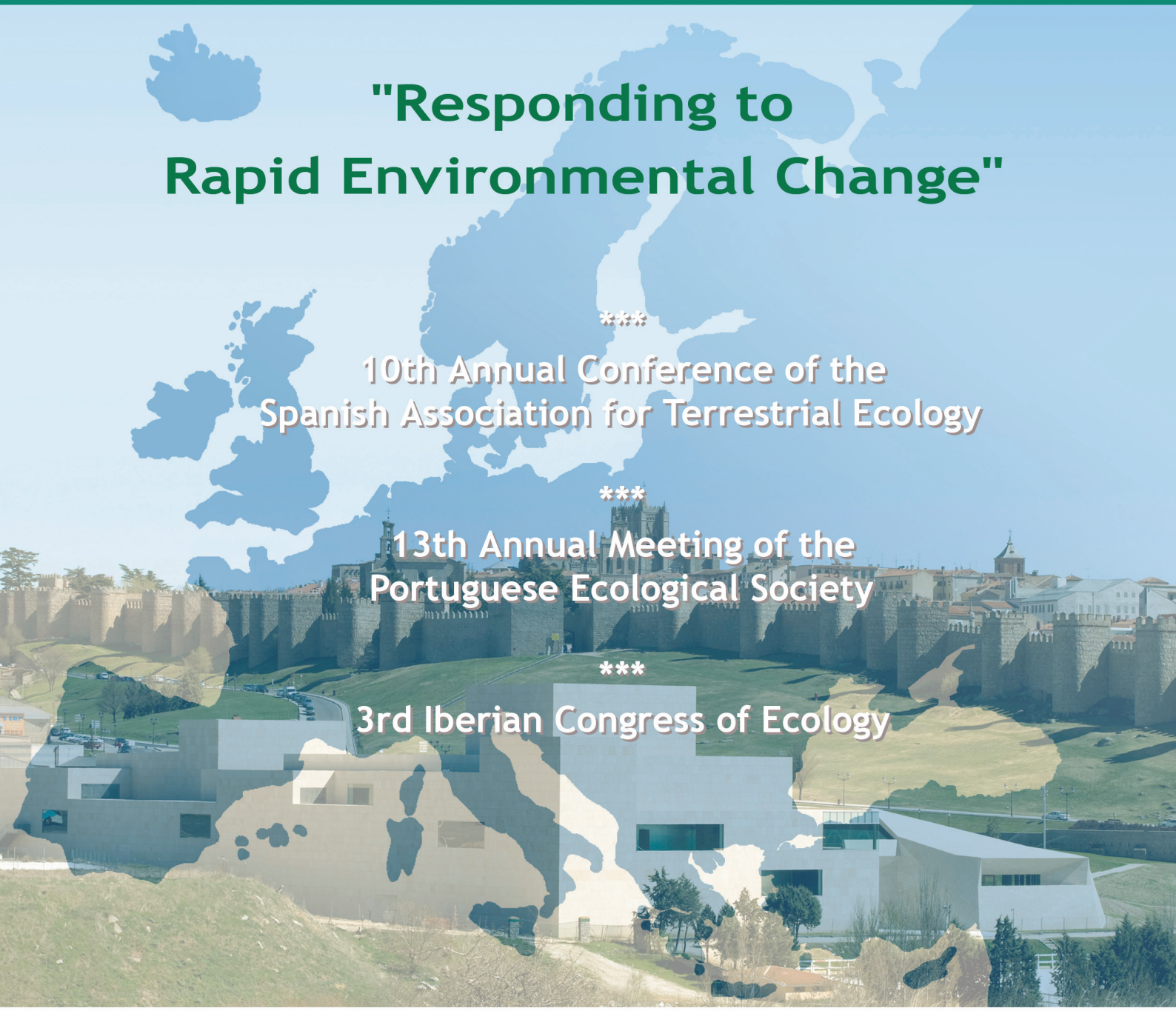

"Responding to Rapid Environmental Change"

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10th Annual Conference of the
Spanish Association for Terrestrial Ecology

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Portuguese Ecological Society

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3rd Iberian Congress of Ecology

ABSTRACT BOOK

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S.02-06-O

Landscape composition influences honeybee colony dynamics in an intensive cereal farming system.

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We report the results of a monitoring program initiated in western France three years ago to determine (i) how the composition of an intensive cereal openfield landscape influences honeybee colony development and performance and (ii) whether honeybees may be used as a model species to assess the management efficiency of natural habitat remnants. Fieldwork was undertaken in a 45000-ha long-term biological research facility where the geographical information on land use and farming practices is censused and updated annually. In this system, floral resources available to honeybees peak during oilseed rape (Mars-April) and sunflower (July) blooming periods. Therefore, we expected the long food shortage period spanning from early May to late June would exert strong constraints on colony dynamics, but that the presence of semi-natural habitat remnants in the proximity of apiaries would buffer those constraints by providing bees with alternative, steady-state, flower resources. During the last three years, a total of 150 colonies have been shared out into 30 locations and monitored for a complete season each. Colony dynamics was described using common indicators: brood quantity, population size and honey reserves. Pollen gathered by foraging bees was also analysed for identifying the main plant resources. Most of these biological parameters were strongly influenced by a complex interplay between semi-natural habitats and cropped areas. The results will be presented and discussed in relation with a contemporary research program on sustainable agricultural systems.

S.02-07-O

Impact of habitat fragmentation and invasions on pollinators: A meta-analysis.

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Among the different drivers of the global change, habitat fragmentation and biological invasions are considered in certain regions to be the main causes for the biodiversity crisis (D'Antonio 1992; Dukes and Mooney, 1999; McNeely, 2001) and there is high concern on the impact they pose on pollinators and the pollination service they provide (Buchmann and Nabhan 1996, Biesmejer et al. 2006, Potts et al. 2010). Changes in pollination patterns, due to effects on pollinators' abundance and richness and on their behaviour might also have important consequences for the persistence of many flowering plants. The growing literature addressing the effects of habitat fragmentation and biological invasions on pollination throws different even contradictory results, which makes it timely to synthesize the available information to find out if there is a clear pattern of global pollination decline. Meta-analysis techniques provide a quantitative tool for conducting such synthesis (Rosenberg et al. 2000). The aim of this study was to address the following questions: 1) do habitat fragmentation and biological invasions affect pollinators' abundance, richness and visitation rates similarly?; 2) are there taxonomic differences in pollinator responses to these global change drivers?; 3) which component of habitat fragmentation affects pollinators the most?; and 4) do animal invasions differ from plant invasions in their effect to native pollinators? Habitat fragmentation and invasions affected pollinators similarly and the effect was negative only for visitation rates. Vertebrates in fragmented habitats and other insects but bees and bumblebees in invaded habitats were the taxonomic groups that most altered their visitation rates. The disturbance of the surrounding matrix appeared to be the component of habitat fragmentation that most affected pollinators. On the other hand, the negative impact of invasions on pollinators resulted to be mainly due to invasive animals and not to invasive plants.