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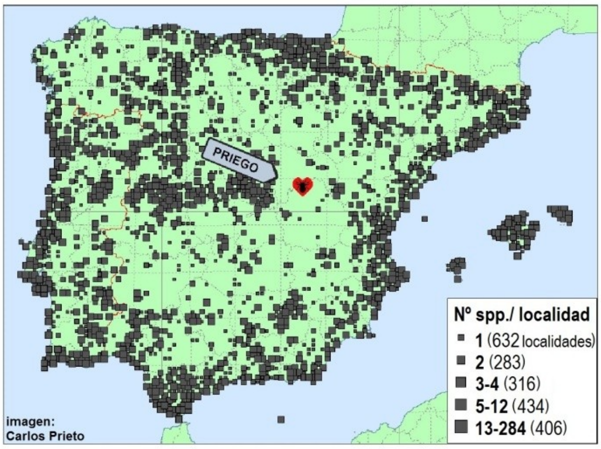
PLAZA BATALLA DE LEPANTO, 1



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Patrones de diversidad de Araneae en un gradiente de prácticas de cultivo en olivares: vinculados entre patrones del paisaje, prácticas de gestión e interacciones entre especies

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El cultivo del Olivo (*Olea europaea* L., 1757) es una actividad agrícola de gran importancia en la región mediterránea. El olivo es susceptible al ataque de plagas que pueden causar serias pérdidas de cosecha. Entre la comunidad de artrópodos del olivar, las arañas son depredadores que ocupan el nivel trófico más alto, y cazan principalmente insectos en todos sus estados. Por lo tanto, pueden ser útiles agentes de control natural de las plagas del olivo; sin embargo, la intensificación de las prácticas agrícolas puede afectar su abundancia y efectividad. Aspectos como la conservación de un paisaje agrícola heterogéneo y el mantenimiento de infraestructuras ecológicas pueden verse como parte de una estrategia para lograr la sostenibilidad y promover el control biológico de la conservación.

Los objetivos principales de este trabajo fueron estudiar los patrones de diversidad de Araneae a través de un gradiente creciente de prácticas de cultivo del olivar, estudiar el efecto de las infraestructuras ecológicas como fuentes de alimentos no presa en la supervivencia y el comportamiento de Araneae, estudiar los mecanismos de alimentación de Araneae, y desarrollar herramientas que tengan como objetivo promover la diversidad de Araneae en el agroecosistema del olivar.

La estructura de los ensamblajes de Araneae bajo diferentes prácticas agrícolas se estudió mediante el muestreo de olivares seleccionados en el noreste de Portugal en los niveles de sueño, tronco y dosel, así como las áreas seminaturales adyacentes (matorrales mediterráneos). Se usaron el diseño experimental, la cantidad de piedras en el suelo, el porcentaje de vegetación, la humedad y el manejo del cultivo para modelar los patrones de diversidad encontrados en el olivar y el paisaje circundante. Se investigó el efecto de las infraestructuras ecológicas y los mecanismos de alimentación de Araneae mediante ensayos

Distribution of *Bactrocera oleae* (Rossi, 1790) throughout the Iberian Peninsula: a maximum entropy modeling approach

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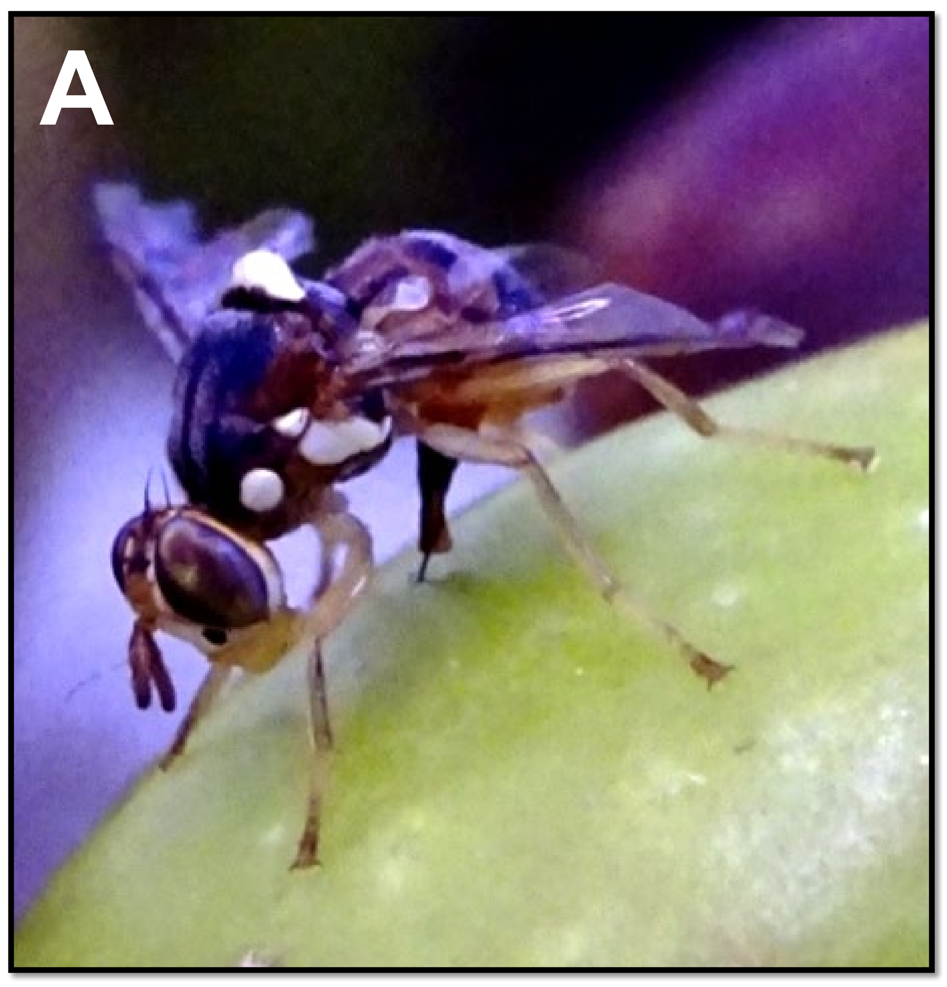
Introduction

The Iberian Peninsula is a great production area of olives. The fruit production can be severely affected by the olive fruit fly, *Bactrocera oleae* (Rossi, 1790) (Diptera) (Fig.1A). Detailed geographical distribution maps of *B. oleae* are essential for their integrated management. Data available are dispersed and centralization of this information for the Iberian Peninsula is currently lacking. The OBJECTIVE of this work was to provide two distribution maps of *B. oleae* throughout mainland Spain and Portugal, one based on the occurrence sites and another based on its bioclimatic habitat suitability.



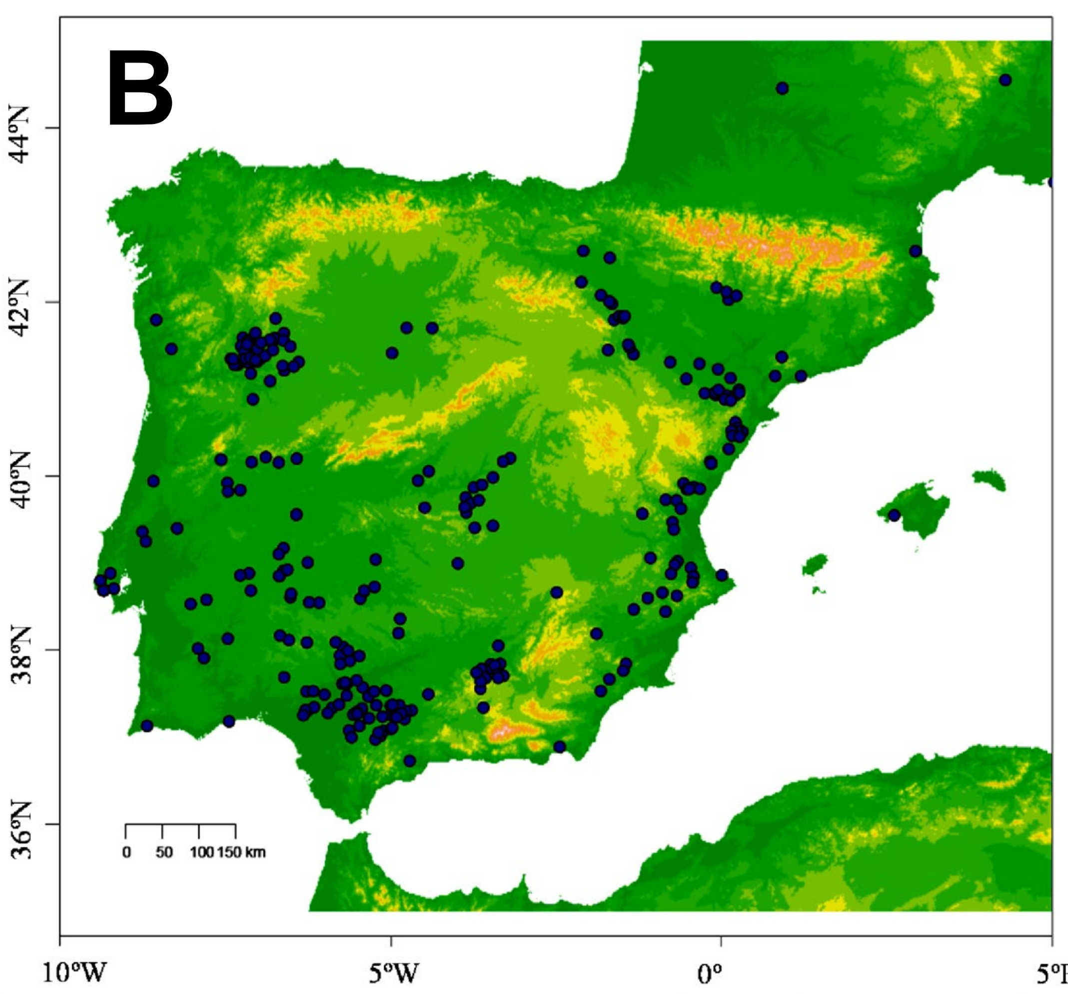


Figure 1. A: Adult of *Bactrocera oleae* attacking an olive; B: Occurrence-based distribution map of *B. oleae* throughout the Iberian Peninsula projected on a digital elevation model. Blue dots represent occurrence of *B oleae*.

Results

- ✓ The compilation of occurrence records of *B. oleae* resulted in a total of 762 records (Fig. 1B).
- ✓ Among five feature combinations used to select the optimal model (L, LQ, LQH, LQHP, and LQHPT) and eight regularization multipliers (ranging from 0.5 to 4.0), the one that achieved the lowest AICc and a ΔAICc = 0 was the linear and quadratic model (LQ) with a regularization multiplier (β) = 0.5 (Fig. 2).
- ✓ Precipitation of the coldest quarter and precipitation of driest month were the variables that most contributed to the bioclimatic model (Table 1).
- ✓ The maxent model allowed identifying three potential distribution areas in addition to the previously known occurrence range of *B. oleae* (Fig. 3).

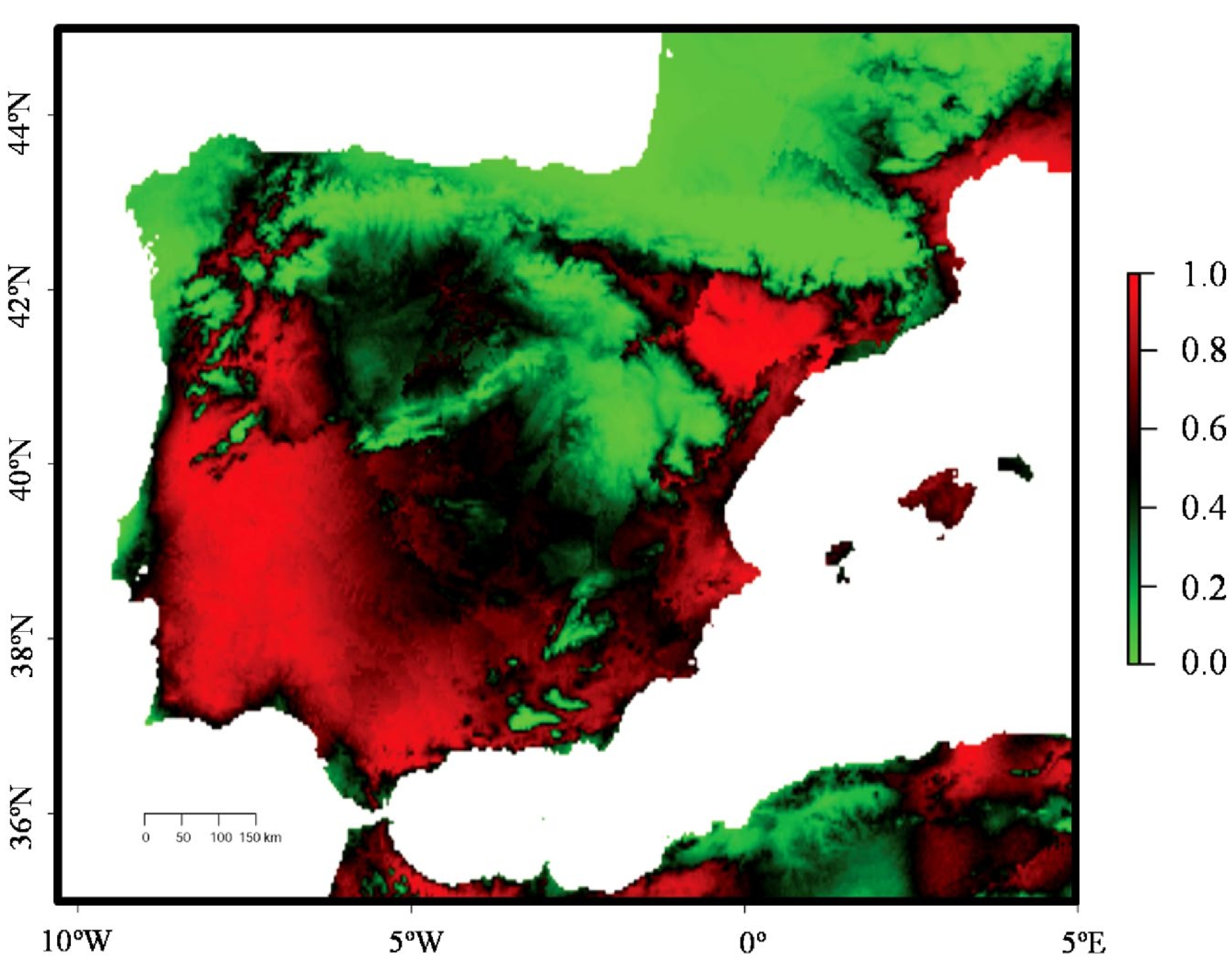


Figure 2. Mean of 20 Maxent prediction replicates using the linear and quadratic (LQ) model for the climatic suitability of *Bactrocera oleae* in the Iberian Peninsula . Reddish areas indicate higher climatic suitability (p).

Conclusions

The spread of the occurrence (actual or potential) of *B. oleae* and the extension of olive crop areas in the Iberian Peninsula make this region an excellent geographical area to investigate the processes involved in the potential dispersion/colonization of *B. oleae*. In this sense, Maxent models are suitable tools to assess shifts on habitat suitability of species under different representative concentration pathways (RCPs) on a climate change scenario.

Material and Methods

- ➢ The compilation of occurrence sites of *B. oleae* and *Olea europaea* (L.), the selection of bioclimatic drivers, and modeling processes were carried out using the environment for statistical computing R.
- ➢ Occurrence sites of *B. oleae* were collected through a bibliographic review that included scientific papers, Spanish government technical reports of *B. oleae* monitoring stations, the Global Biodiversity Information Facility online database (GBIF), and personal observations. The bioclimatic variables used were obtained from the WorldClim database.
- ➢ A maxent modeling approach, a machine-learning method that uses the principle of maximum entropy to approximate the unknown probability distribution of a species based on presence-only data was used to identify potential risk areas of *B. oleae*.
- ➢ The occurrence records of *B. oleae* used in this work correspond to presence-only data thus the background data represent pseudo-absences.
- ➢ The optimal model was assessed by selecting the one with the lowest AIC (Akaike Information Criterion) among different features and regularization multipliers.

Table 1. Percent of contribution of each selected bioclimatic driver used to model the climatic suitability for *Bactrocera oleae* in the Iberian Peninsula.

Bioclimatic variable	Percent contribution
Precipitation of coldest quarter	22.20
Precipitation of driest month	20.00
Mean diurnal range (Mean of monthly (max temp - min temp))	14.90
Min temperature of coldest month	13.80
Temperature seasonality (Standard deviation ×100)	12.30
Precipitation seasonality (Coefficient of variation)	9.10
Temperature annual range (Max temperature of warmest month - Min temperature of coldest month)	5.40
Mean temperature of wettest quarter	1.60
Mean temperature of driest quarter	0.50
Isothermality (Mean diurnal range / Temperature annual range) × 100	0.20

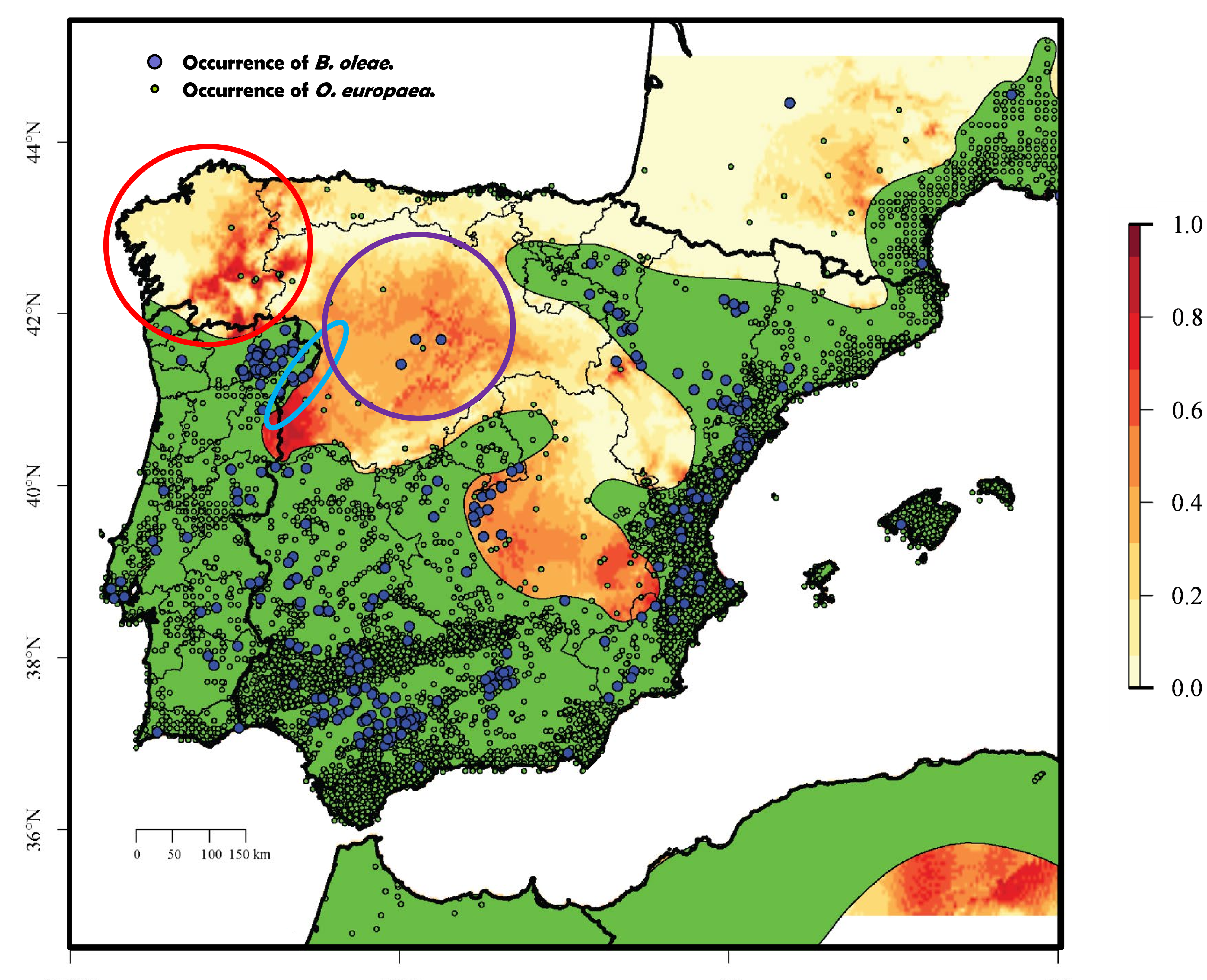


Figure 3. Modeled extended distribution (p) of *Bactrocera oleae* in the Iberian Peninsula. Black thick lines represent country administrative limits. Green areas represent the chorological map of *Olea europaea*. The red, purple, and blue circles encompass the autonomous community of Galicia, the central area of Castilla y León, and the Spanish side of the International Douro Natural Park. Reddish areas indicate higher climatic suitability (p).

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