



The spread of *Xylella fastidiosa* in the south-eastern Iberian Peninsula: combining spatial and regional geographical approaches

^{1*} Oliver Gutiérrez-Hernández & ² Luis V. García

¹ Department of Geography, University of Málaga

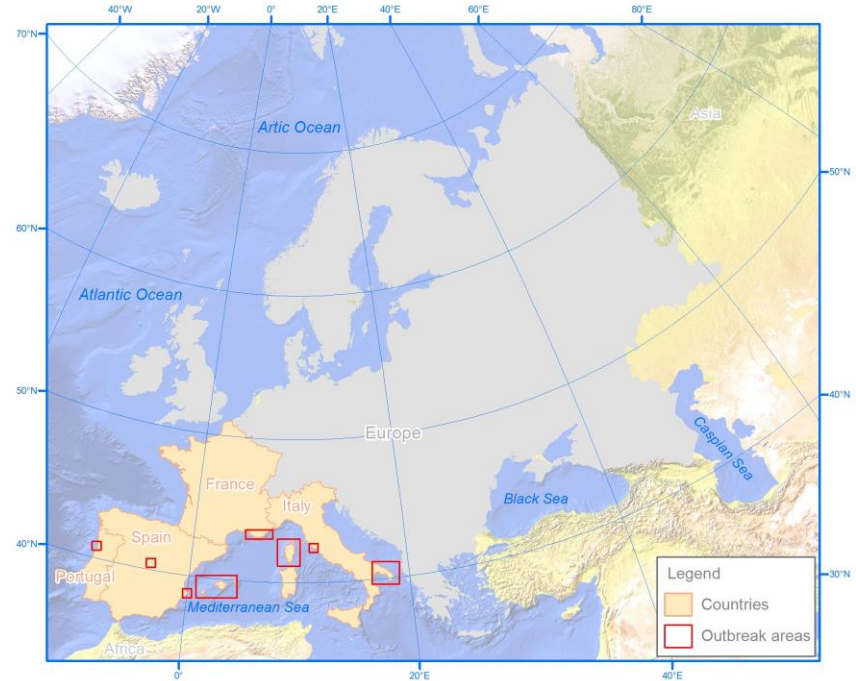
*Corresponding author: olivergh@uma.es

² Institute of Natural Resources and Agrobiology of Seville (IRNAS), Spanish National Research Council (CSIC)

INTRODUCTION

- The detection of the bacterium *Xylella fastidiosa* in southwestern Europe **Fig.1** evidences the risks and potential effects of invasive plant pathogens at the crop, landscape, and regional scales.
- In Spain, the first detection of *X. fastidiosa* occurred in the Balearic Islands in 2016 in three cherry trees reared in a nursery. On July 6, 2017, *X. fastidiosa* was detected for the first time in the Iberian Peninsula. The Spanish authorities notified the presence of *X. fastidiosa* subsp. *multiplex* on almond trees in Alicante province (Valencian Community, Spain).
- This study aims to combine spatial and regional geographical approaches to analyse the spread of *X. fastidiosa* in the south-eastern Iberian Peninsula.

Figure 1: Outbreaks of *Xylella fastidiosa* in Europe
(update:13/04/2021)



MATERIAL & METHODS

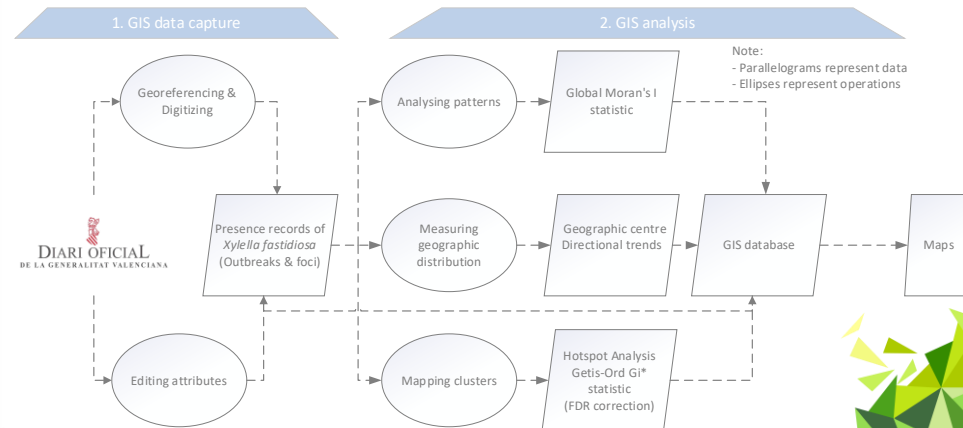
- The territory of Alicante province is the study area **Fig.2**. This province is located in the south-eastern Iberian Peninsula, in the southern part of the Valencian Community, Spain. In this area, almond plants are the dominant host plants infected, but so are other host plants typical of the Mediterranean region.

Figure 2: Study area



- The applied methods comprise two main stages **Fig.3**: 1) Integration of the *X. fastidiosa* presence records published in the Official gazette of the Valencian Community (Diari Oficial) using a Geographic Information System (GIS); 2) Apply several spatial analyses procedures.

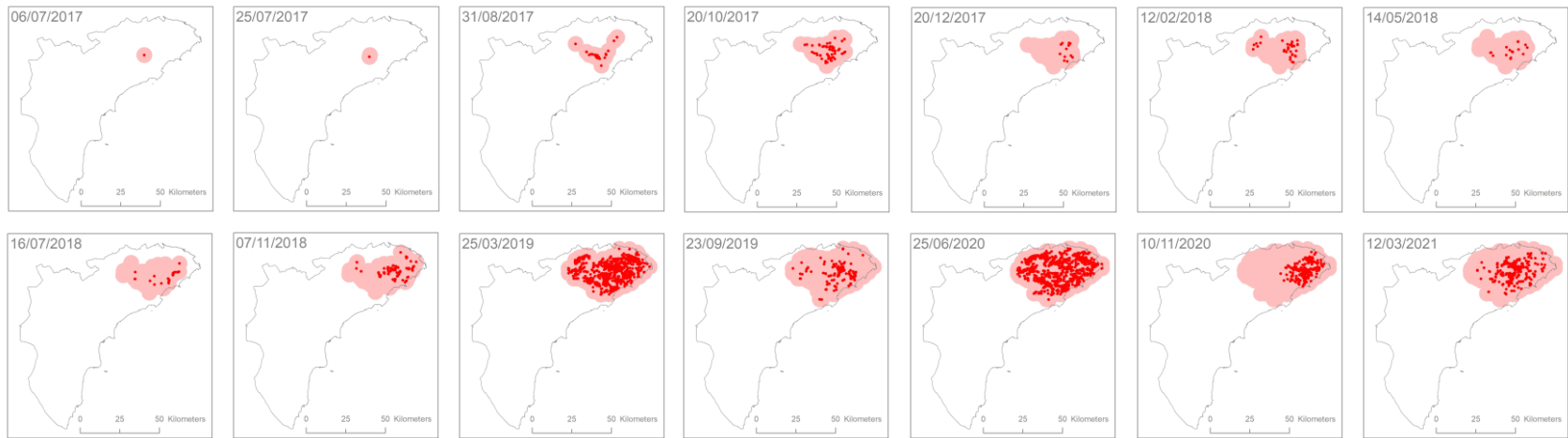
Figure 3: Workflow



RESULTS & CONCLUSIONS (1/2)

- The foci of *X. fastidiosa* are located in the northeast of Alicante province. We counted (March 12, 2021) 3.662 parcels and over 180.000 ha within the buffer zones.
- Since 2007, the spread of *X. fastidiosa* is rising, mainly near (or within) the buffer zones (5 km radius) defined by the Spanish authorities **Fig.4**.

Figure 4: The outbreaks of *Xylella fastidiosa* in Alicante province (From 06/07/2017 to 12/03/2021)

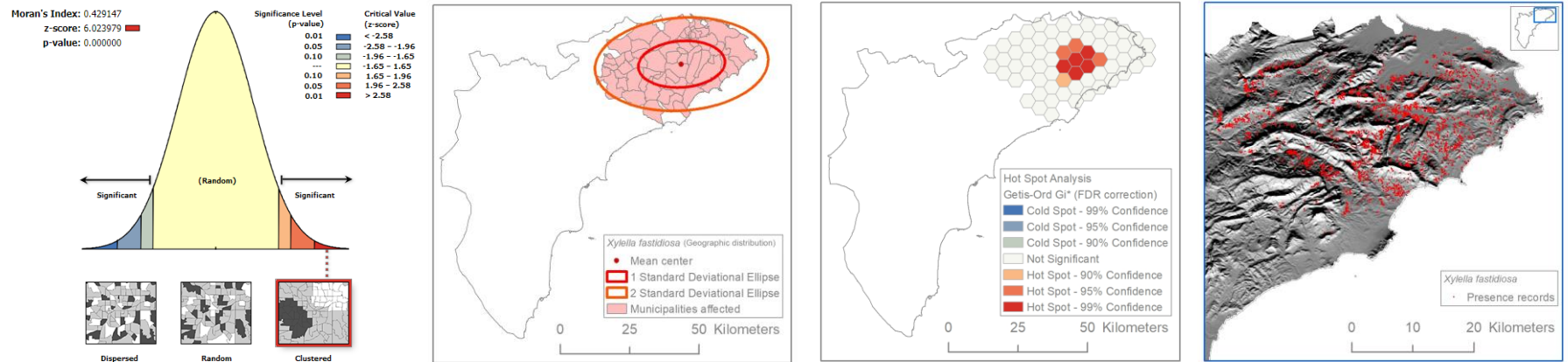


Note: the red dots represent foci in each outbreak (same date), and the light red areas represent the cumulative buffer zone (defined by a 5 Km radius from the location of the current and past outbreak).

RESULTS & CONCLUSIONS (2/2)

- The spread of *X. fastidiosa* shows a global clustered pattern and directional distribution, and barriers and corridors condition the spread in regional geography context **Fig.5**.

Figure 5: Spatial patterns and distribution of *Xylella fastidiosa* in Alicante province



Overall, the outbreaks show a clustered pattern.

Spreading distribution is also directional.

Hotspots are detected in the distribution centre.

Barriers and corridors influence the foci distribution.

- Physical and human geography drives the spread of *X. fastidiosa*.
- The buffer zones seem to control (but not stop) the outbreaks.