Genetic patterns of *Vespa velutina* in Spain

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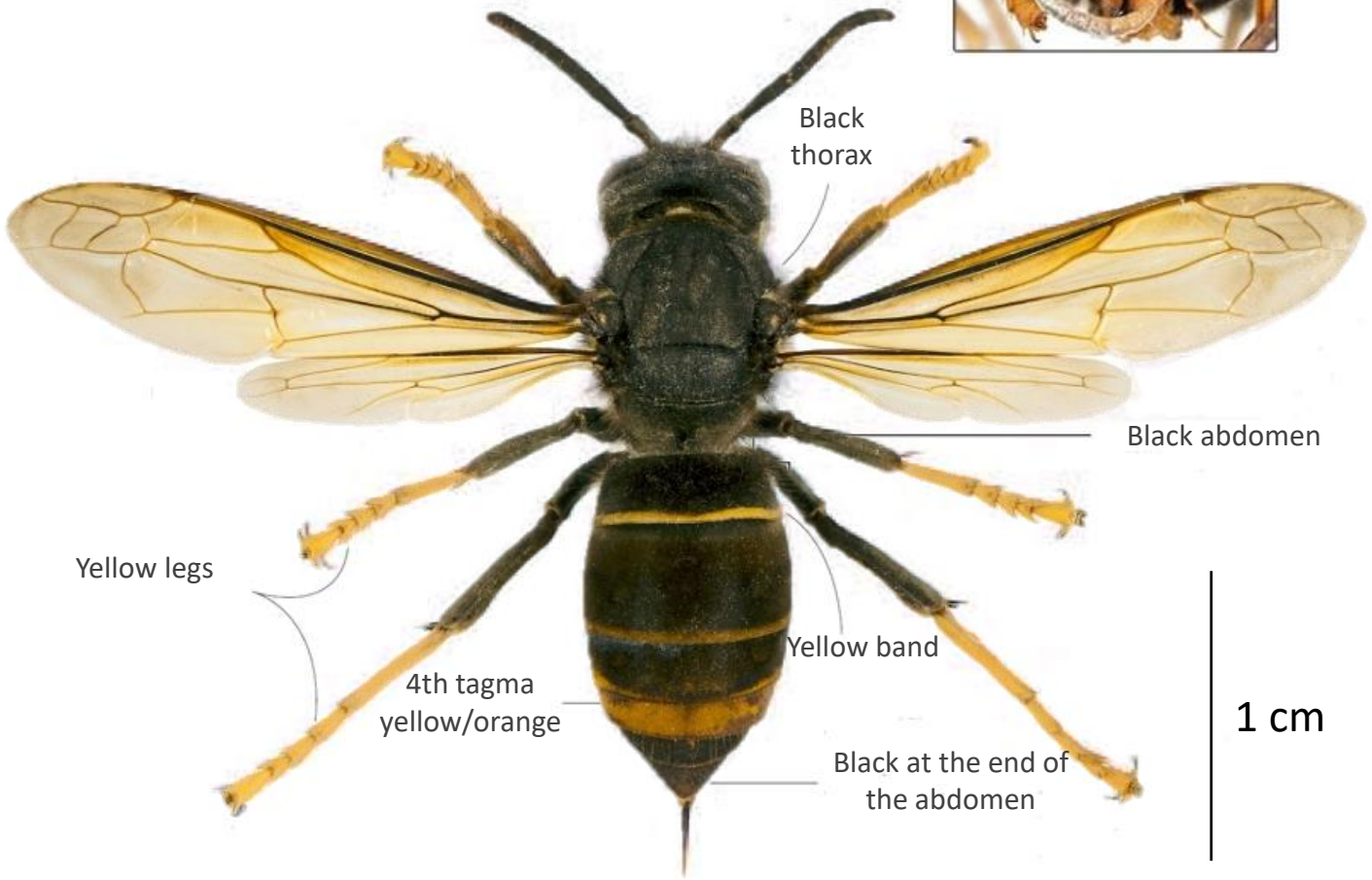
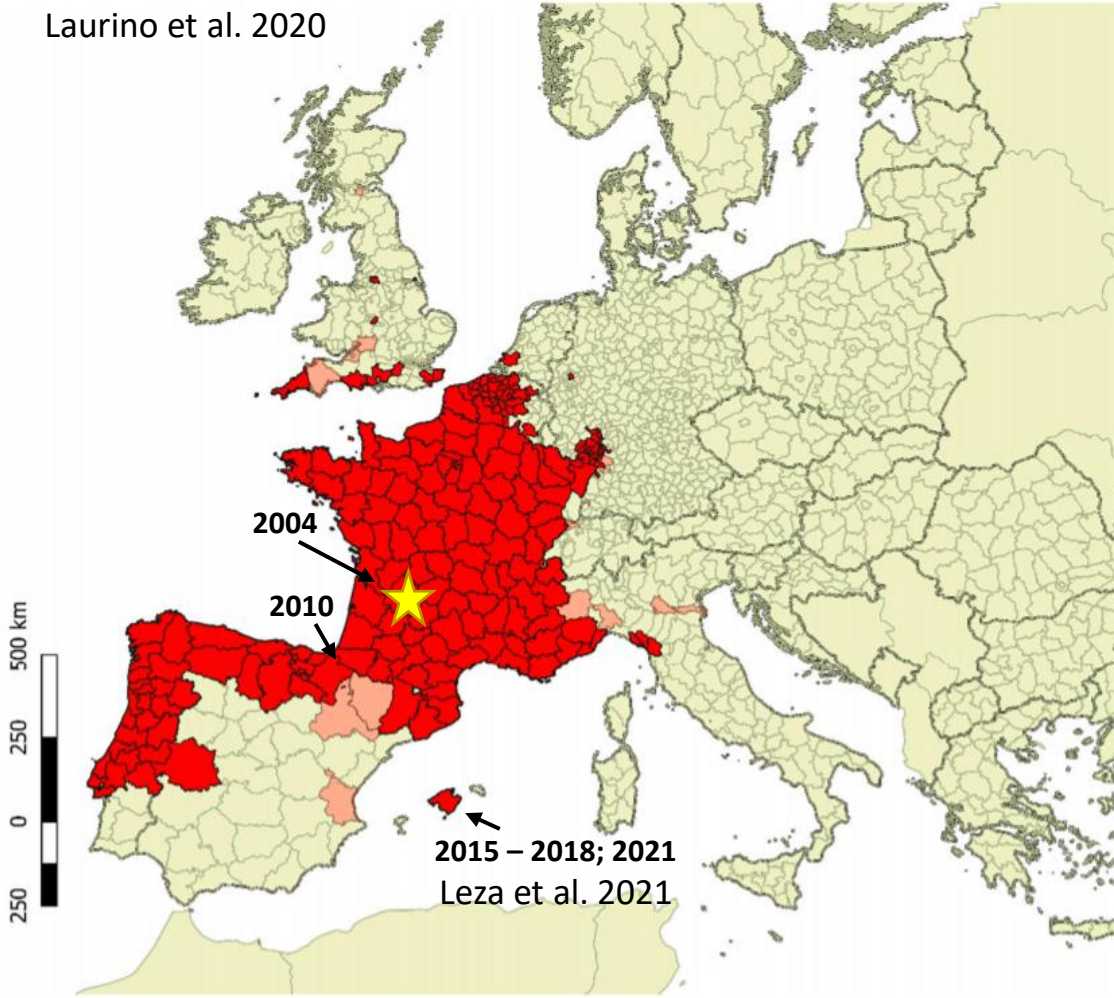
ICUP 2022 BARCELONA ES
10th INTERNATIONAL CONFERENCE ON URBAN PESTS
JUNE 27-29

Introduction



Vespa velutina nigrithorax



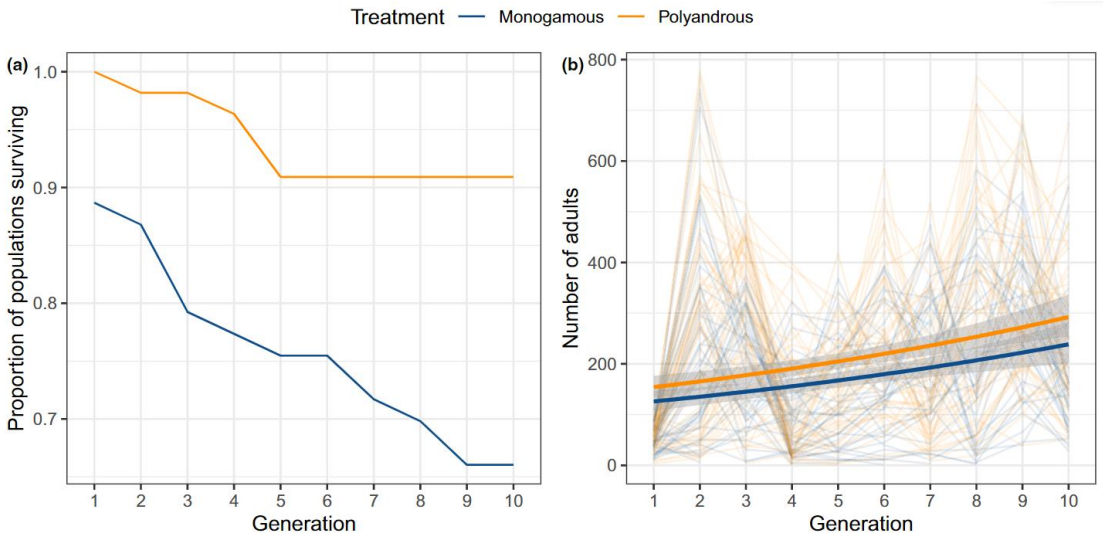
Economic cost

Barbet-Massin et al. 2020; Monceau et al. 2014

Ecological impact

Leza et al. 2019; Rojas-Nossa et al. 2020; Rome et al. 2011

Successful establishment and subsequent spread



Lewis et al. 2020.

- ✓ Polyandry. Arca et al. 2015
- ✓ Exceptional dispersal abilities (82 km). Robinet et al. 2017; Sauvard et al. 2018
- ✓ High reproductive efficiency. Arca et al. 2015
- ✓ Broad diets and habitat ranges. Rome et al. 2021
- ✓ Effective predator defenses. Choi et al. 2021
- ✓ Ability of buffering against environmental changes. Verdasca et al. 2022

Genetic aspects of the invasion

Biol Invasions (2015) 17:2357–2371
DOI 10.1007/s10530-015-0880-9

ORIGINAL PAPER

Reconstructing the invasion and the demographic history of the yellow-legged hornet, *Vespa velutina*, in Europe

M. Arca · F. Mougel · T. Guillemaud · S. Dupas · Q. Rome · A. Perrard · F. Muller · A. Fossoud · C. Capdevielle-Dulac · M. Torres-Leguizamon · X. X. Chen · J. L. Tan · C. Jung · C. Villemant · G. Arnold · J.-F. Silvain

Biol Invasions (2019) 21:2811–2817
https://doi.org/10.1007/s10530-019-02051-4

INVASION NOTE

Recent confirmation of a single haplotype in the Italian population of *Vespa velutina*

Anna Granato · Enrico Negrisolo · Jessica Bonomi · Laura Zulian · Federico Cappa · Laura Bortolotti · Franco Mutinelli

RESEARCH ARTICLE

The invasion, provenance and diversity of *Vespa velutina* Lepeletier (Hymenoptera: Vespidae) in Great Britain

Giles E. Budge[1,2]*, Jennifer Hodgetts[1], Eleanor P. Jones[1], Jozef C. Ostojá-Starzewski[1], Jayne Hall[1], Victoria Tomkies[1], Nigel Semmence[3], Mike Brown[3], Maureen Wakefield[1], Kirsty Stainton[1]

scientific reports

OPEN

Managing incursions of *Vespa velutina nigrithorax* in the UK: an emerging threat to apiculture

Eleanor P. Jones[1], Chris Conyers[1], Victoria Tomkies[1], Nigel Semmence[2], David Fouracre[2], Maureen Wakefield[1] & Kirsty Stainton[1,3]

Biol Invasions
https://doi.org/10.1007/s10530-022-02730-9

ORIGINAL PAPER

Invasion genetics of the Asian hornet *Vespa velutina nigrithorax* in Southern Europe

Andreia Quaresma · Dora Henriques · Joana Godinho · Xulio Gmaside · Laura Bortolotti · M. Alice Pinto

JHR 79: 111–115 (2020)
doi: 10.3897/jhr.79.57048
http://jhr.pensoft.net

SHORT COMMUNICATION

JOURNAL OF Hymenoptera RESEARCH

Vespa velutina nigrithorax Lepeltier, 1836 from Hamburg (Northern Germany) shares the same COI haplotype with other European populations

Martin Husemann[1], Lara-Sophie Dey[1], Oliver Hawlitschek[1]

Objective

In this study, we expanded current knowledge on the invasion genetics of *V. velutina* in Europe by reporting on the results of a mitochondrial and nuclear DNA screening of the invading populations in Mallorca and mainland Spain.

Material and Methods

Sampling and DNA extraction → **Mitochondrial DNA sequencing and data analysis**

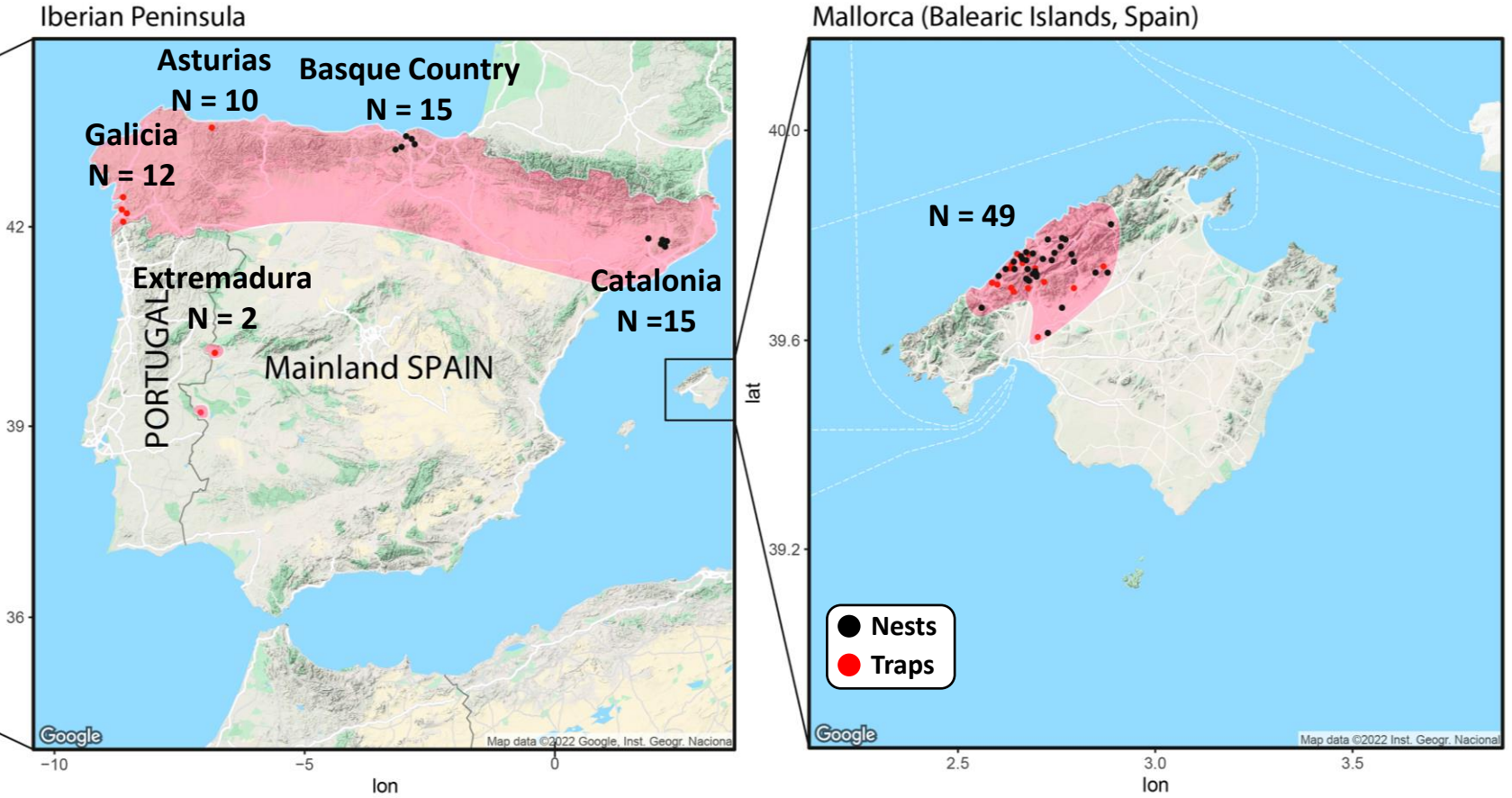
Qiagen DNeasy Blood & Tissue kit
+
60 µg of RNAse A (Promega)

Cox1 using primer-pair LCO/HCO

CodonCode Aligner

+ sequences in GenBank (N = 337)

MAFFT 7. Katoh et al. 2018



Median joining haplotype network
Leigh & Bryant 2015

+

ML phylogenetic tree (IQTree)
Nguyen et al. 2015

Bayesian Information Criterion (TN+F+G4)
1000 *bootstrap*

Microsatellite genotyping and data analysis

15 microsatellite loci
Arca et al. 2012; Daly et al. 2002;
Hasegawa and Takahashi 2002

GENEMAPPER 3.7

allele scores harmonized with
Quaresma et al. 2022

Existing dataset containing genotypes:

- Invaded range: France, Portugal, Italy

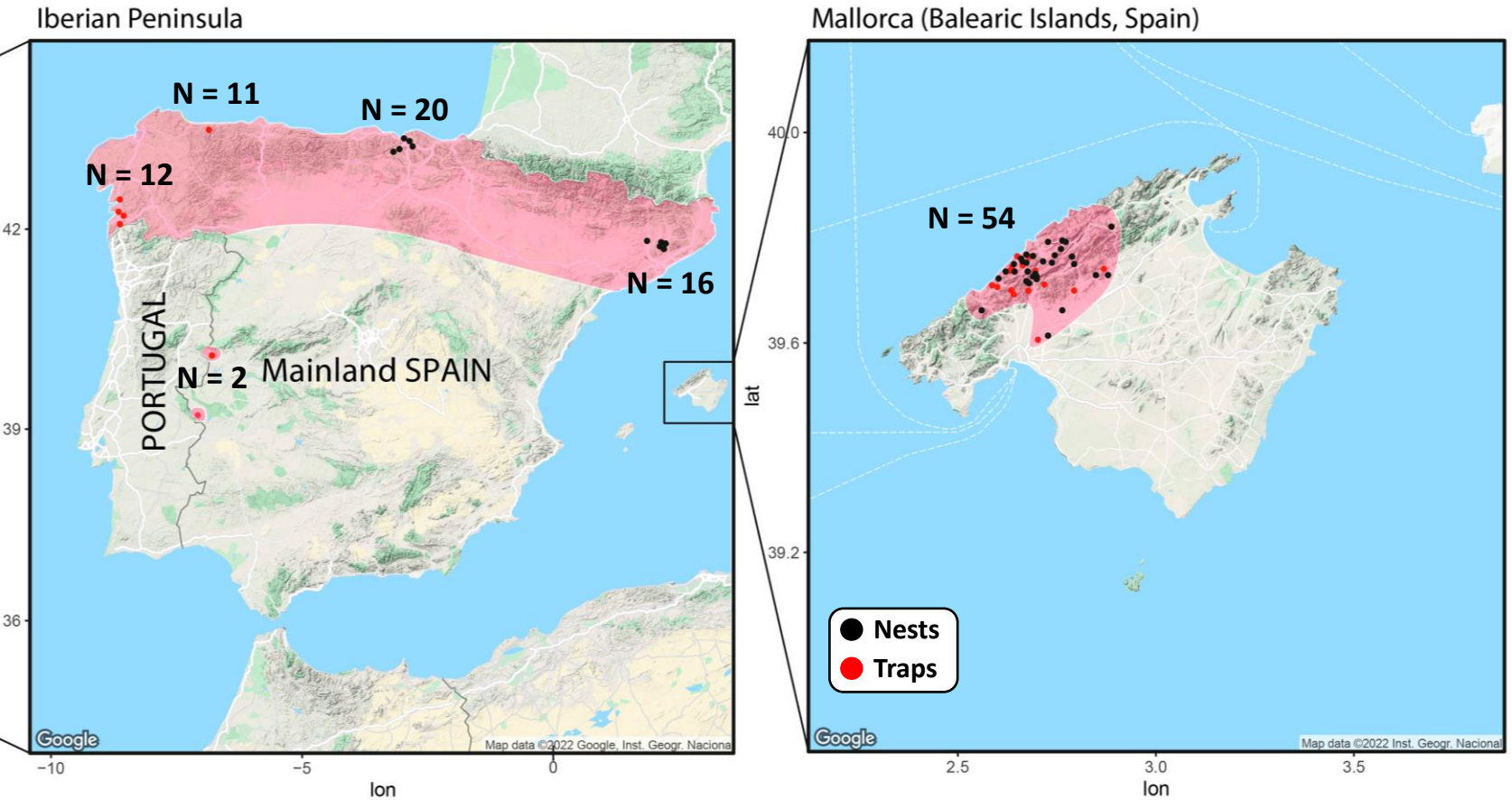
Arca et al. 2015; Quaresma et al. 2022

ARLEQUIN 3.5.2.2. Excoffier et al. 2005

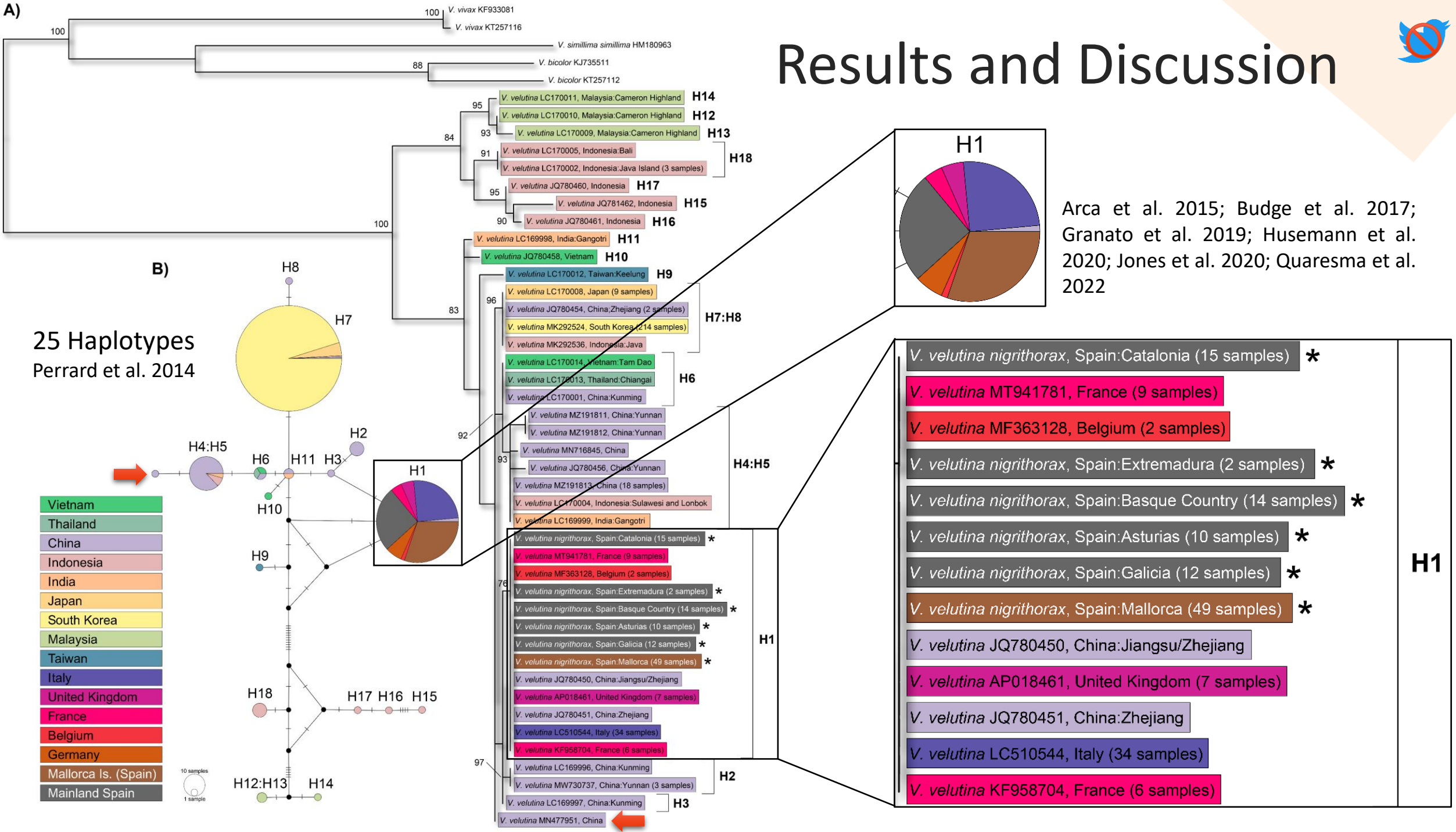
- Na, Ho, He, f
- Genetic distances (FST)

DAPC. a*degenet.* Jombart, 2008

- PCoA
- Genetic clustering



Results and Discussion



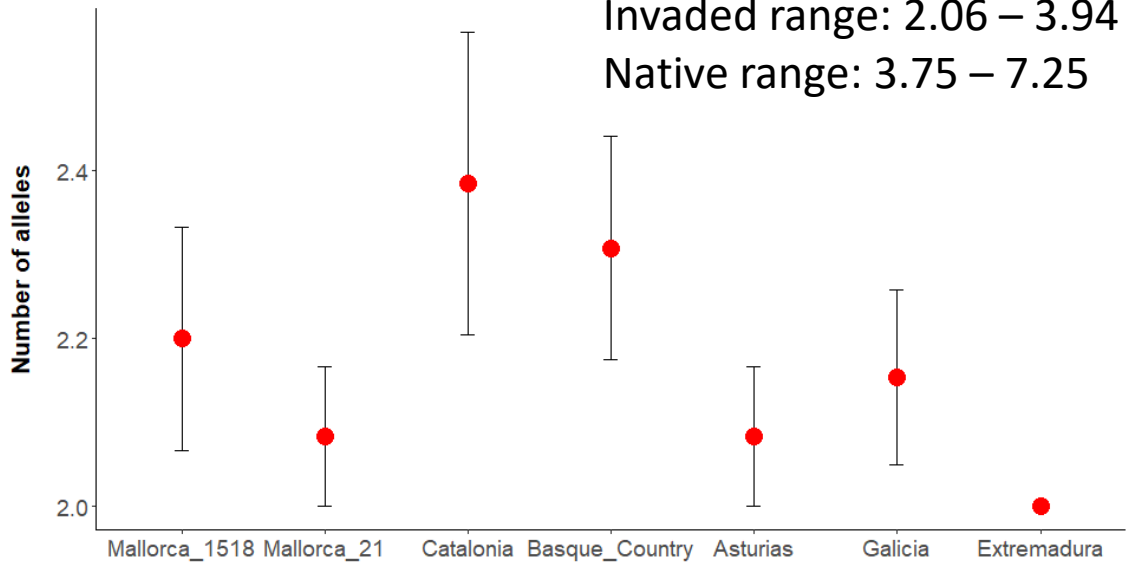
25 Haplotypes

Perrard et al. 2014

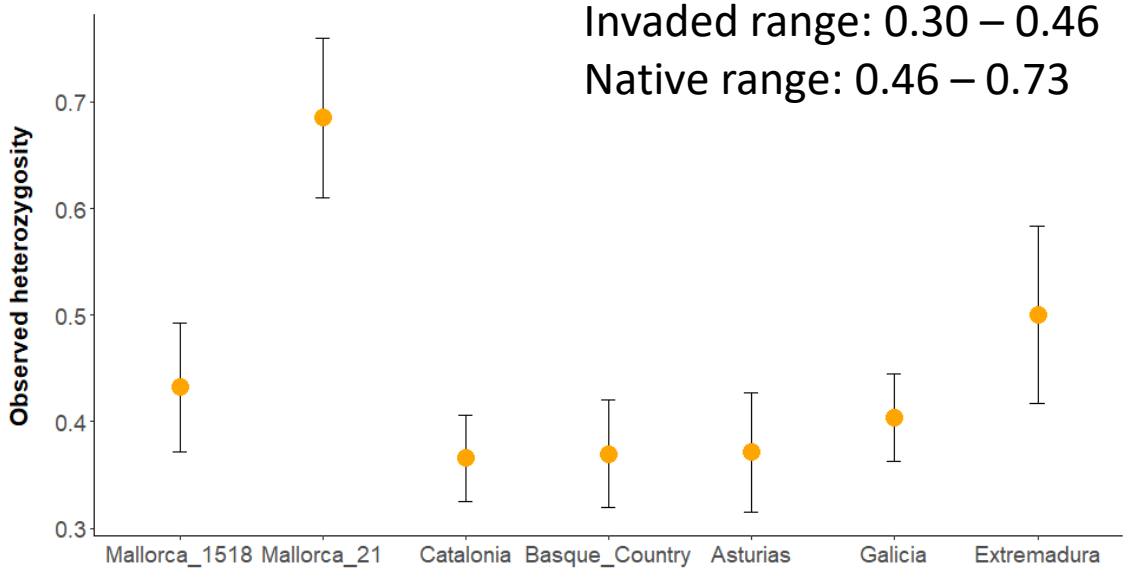
Arca et al. 2015; Budge et al. 2017; Granato et al. 2019; Husemann et al. 2020; Jones et al. 2020; Quaresma et al. 2022

Microsatellite diversity

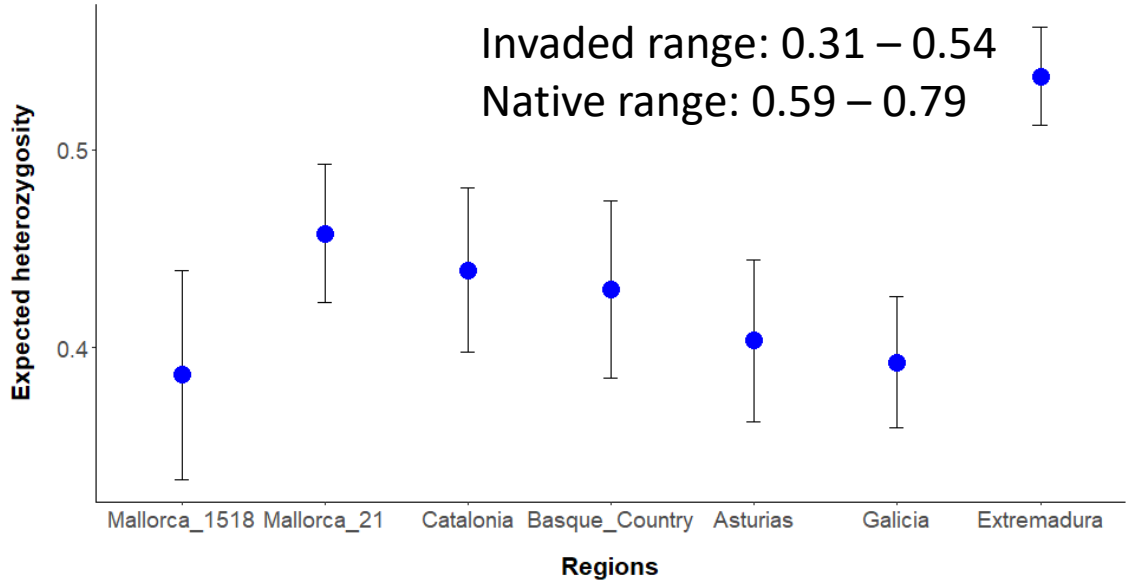
Invaded range: 2.06 – 3.94
Native range: 3.75 – 7.25

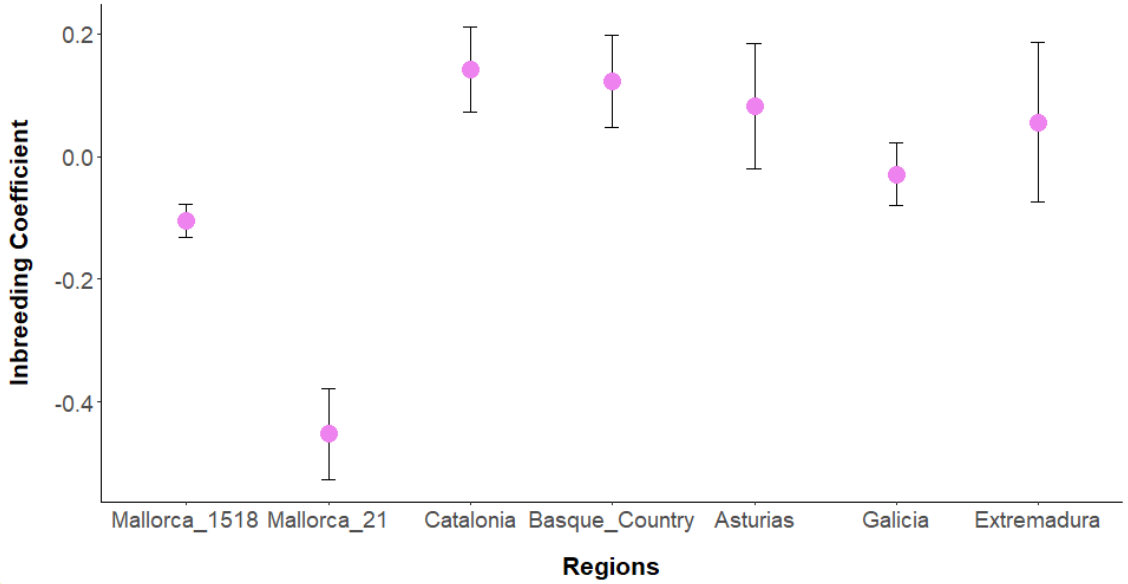


Invaded range: 0.30 – 0.46
Native range: 0.46 – 0.73



Invaded range: 0.31 – 0.54
Native range: 0.59 – 0.79

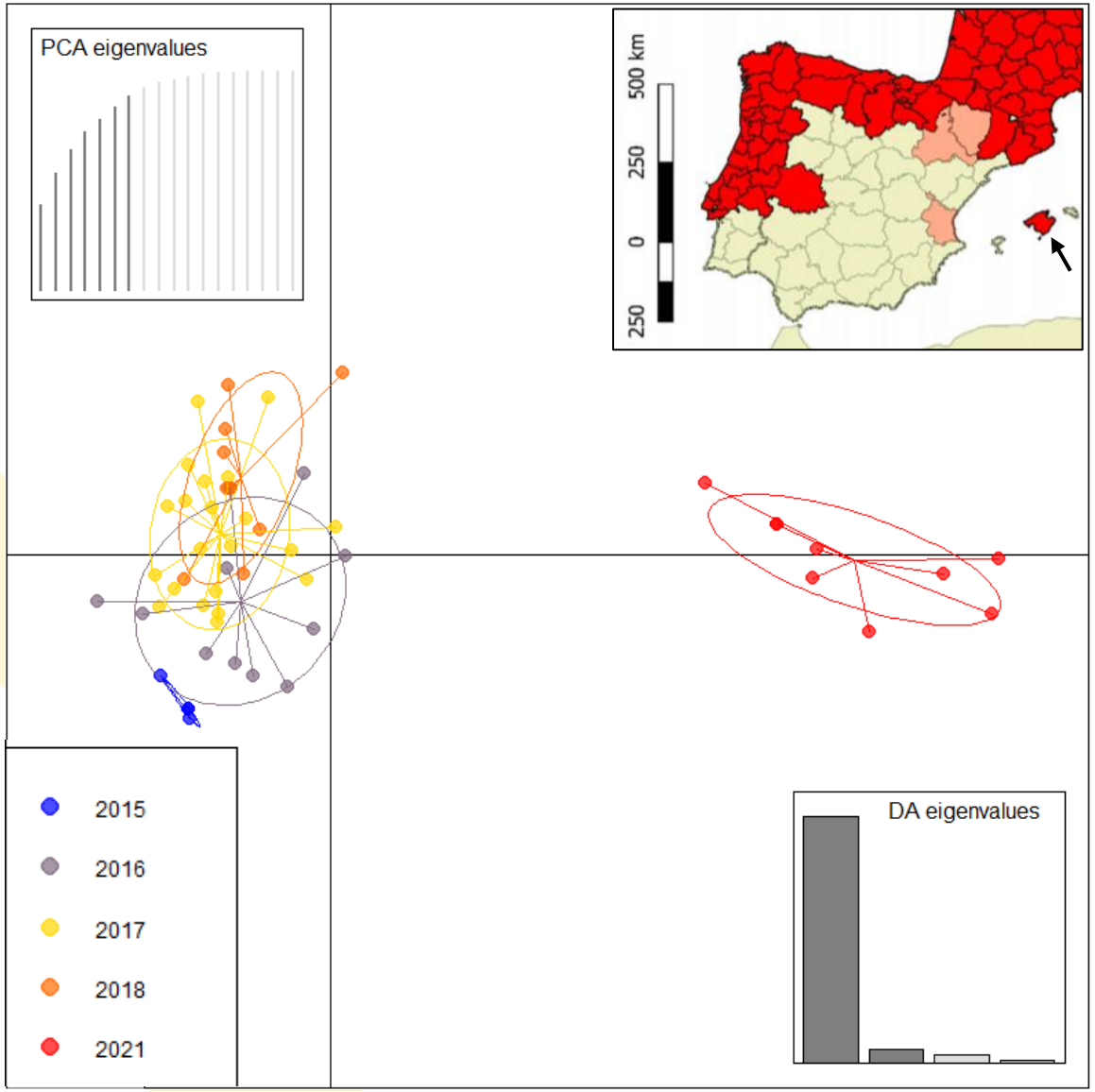


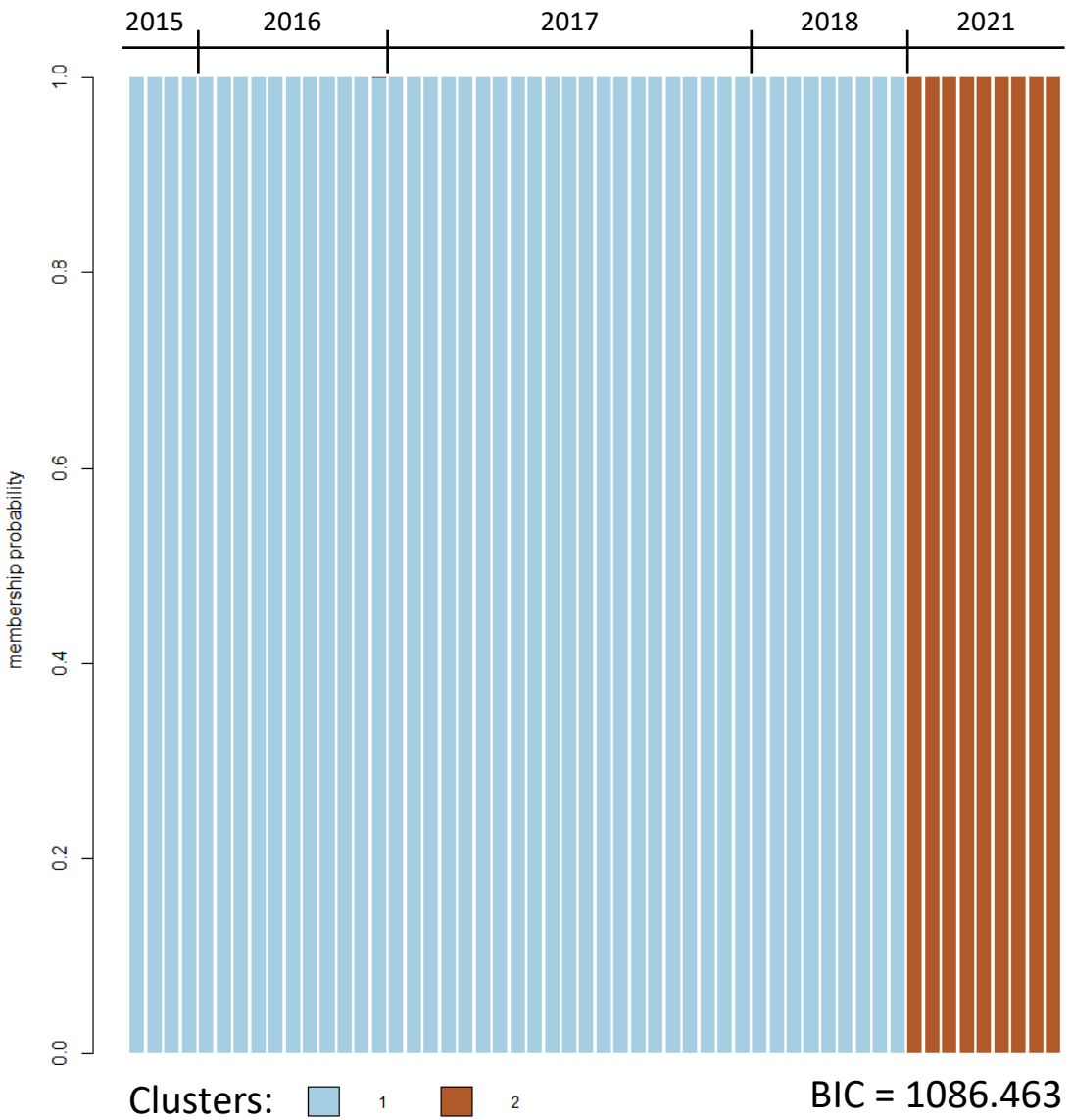


Arca et al. 2015; Quaresma et al. 2022

Mallorca

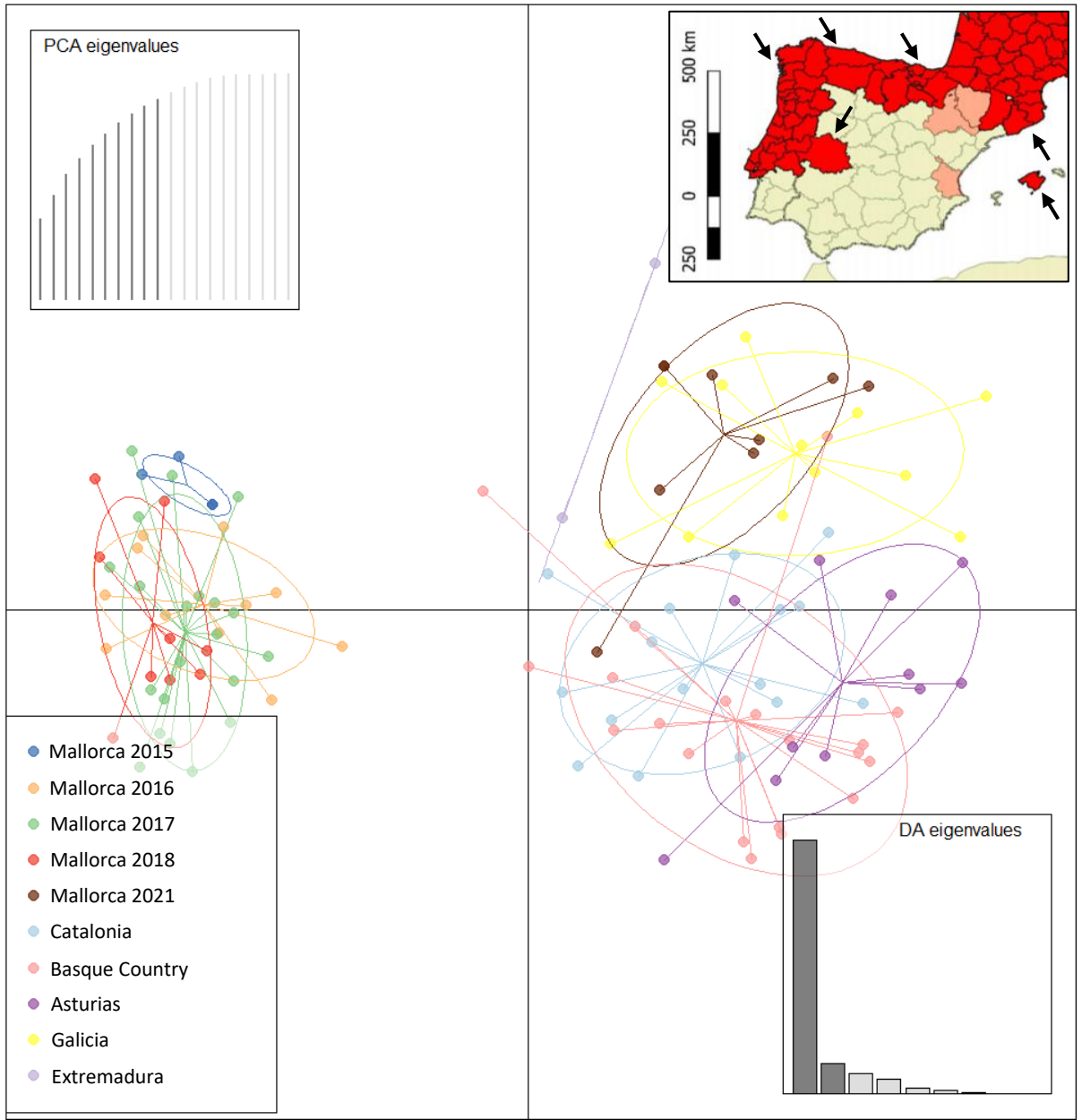
Discriminant analysis of principal components (DAPC)

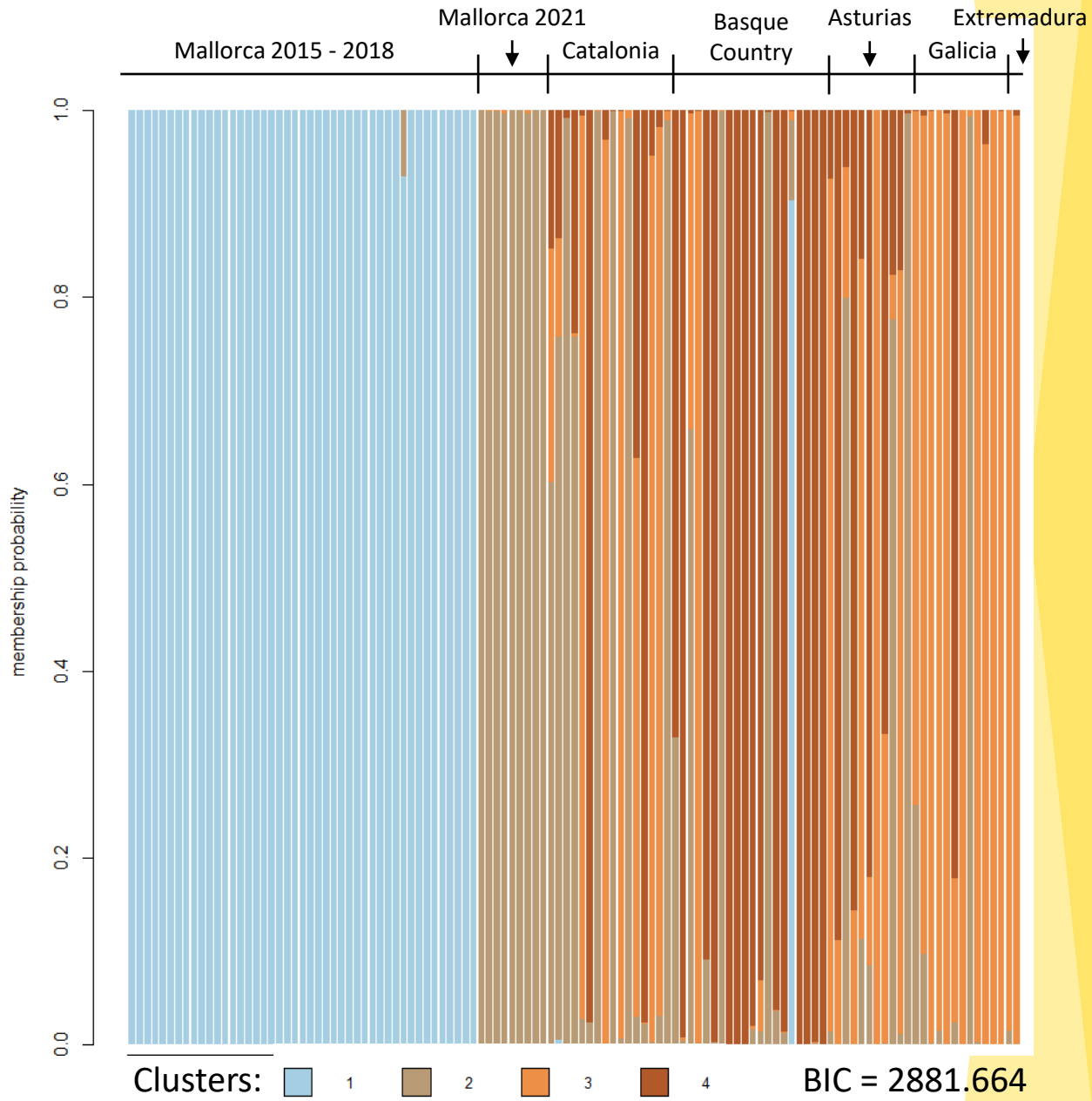




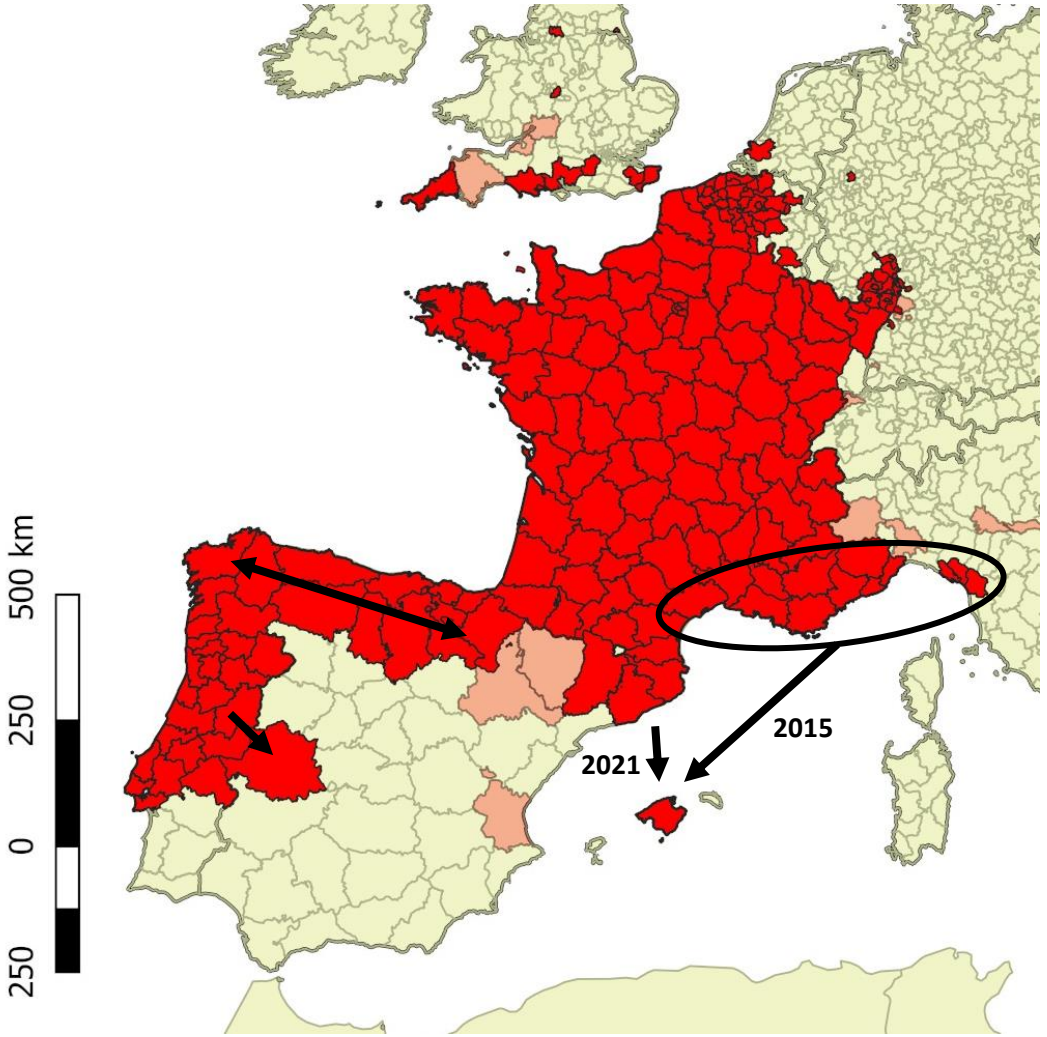
Spain

Discriminant analysis of principal components (DAPC)

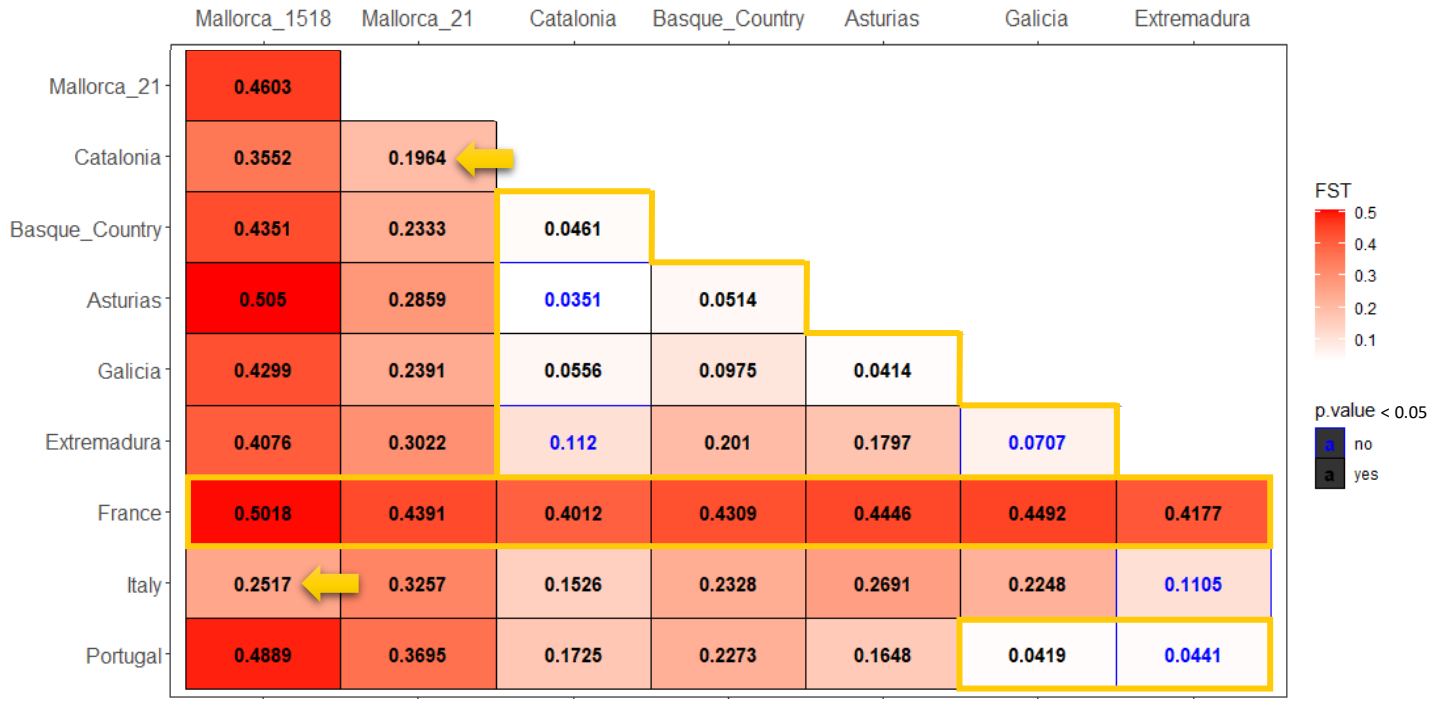




Genetic differentiation between populations using FSTs



Arca et al. 2015; Quaresma et al. 2022

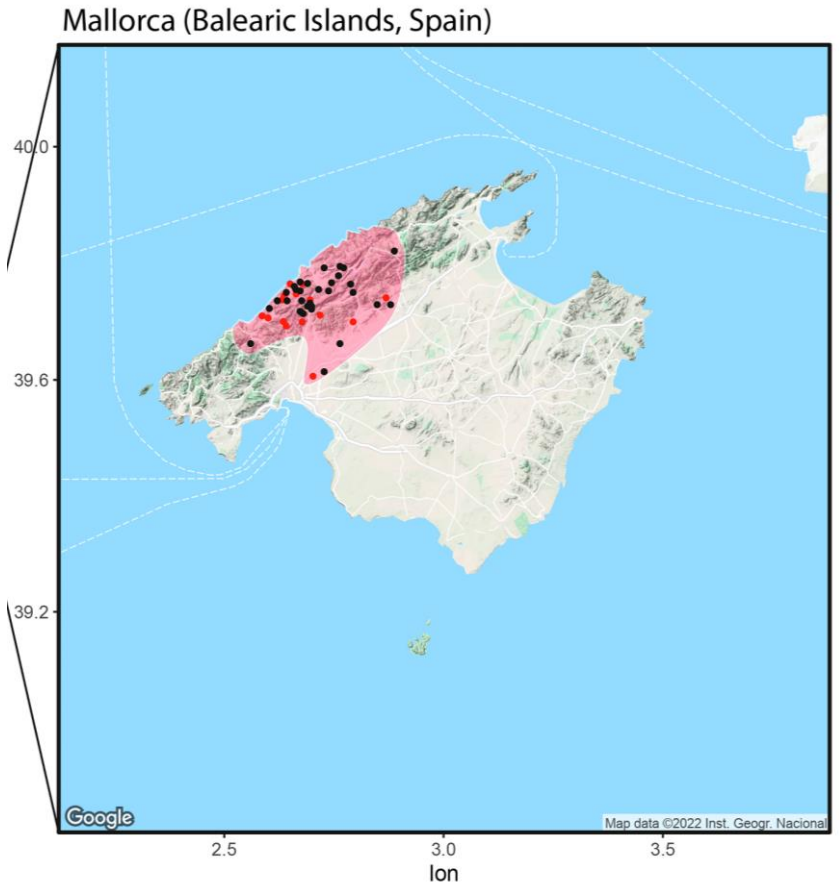


Allelic richness loss

Italy	→	Mallorca (2015 – 2018)	=	17,76%
France	→	Mallorca (2015 – 2018)	=	25,76%
Catalonia	→	Mallorca 2021	=	3,40%

What now?

Increasing sample size



Research Article Pest Management Science

Received: 7 August 2020 Revised: 23 December 2020 Accepted article published: 10 January 2021 Published online in Wiley Online Library: 1 February 2021

(wileyonlinelibrary.com) DOI 10.1002/ps.6264

Six years of controlling the invasive species *Vespa velutina* in a Mediterranean island: The promising results of an eradication plan

Mar Leza,[a*] Cayetano Herrera,[a] Gabriela Picó,[b] Toni Morro[b] and Victor Colomar[b]

- ✓ Mating statistics.
- ✓ Number of foundress.
- ✓ Putative scenarios of invasión.
- ✓ Directional genetic differentiation and relative migration.

Thank you for your attention

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This work has been possible thanks to a FPI grant (FPI_014_2020) from the *Conselleria d'Educació, Universitat i Recerca del Govern de les Illes Balears*.

This study has been done with the support of the Biodiversity Foundation of the Ministry for the Ecological Transition and the Demographic Challenge.

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