

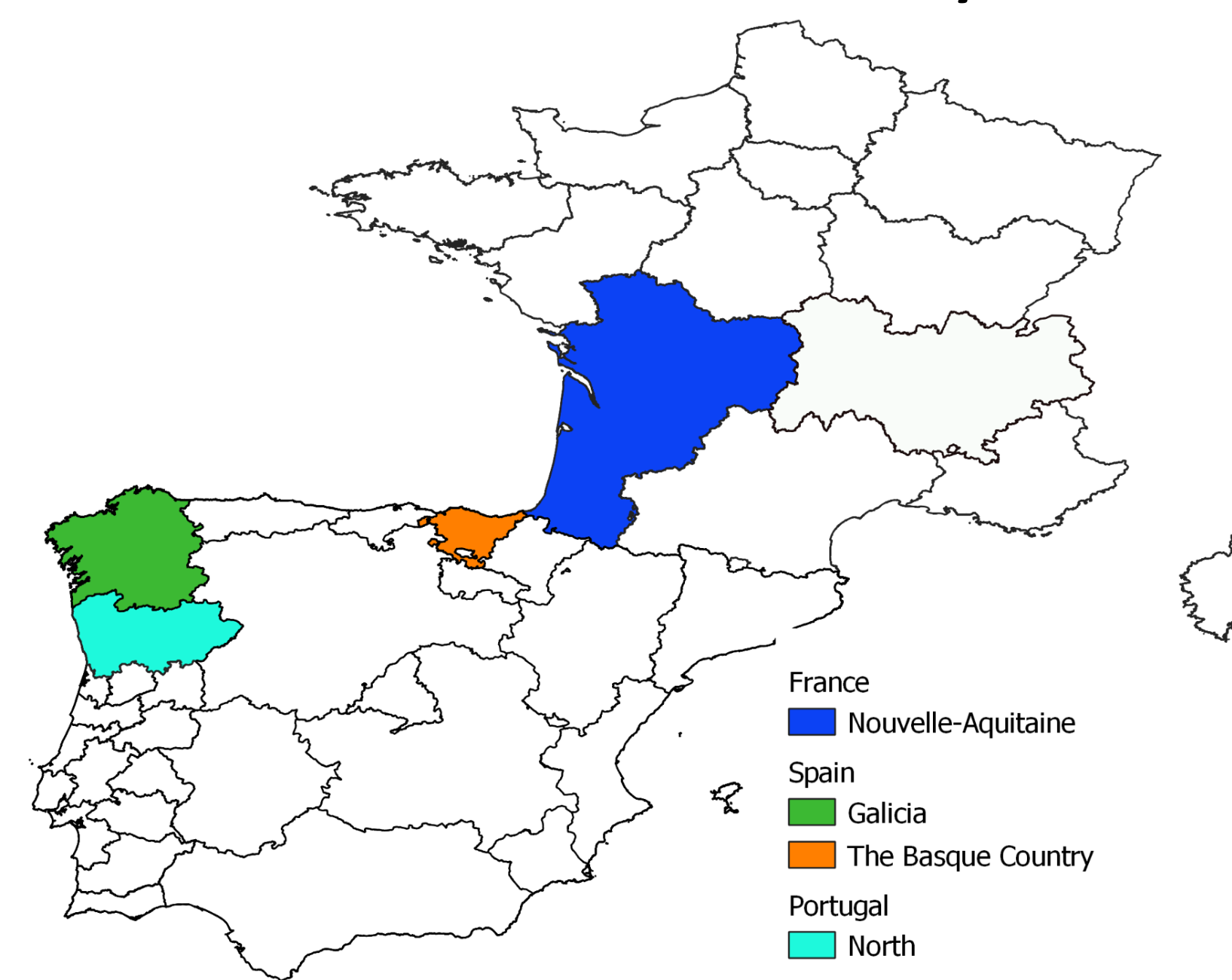
Economic costs and practices to control *Vespa velutina nigrithorax* in beekeeping: a survey in four regions in Europe

García-Arias, AI; Ferreira-Golpe, MA; Vázquez-González, I; Nave, A; García-Pérez, AL; Thiéry, D and Godinho, J.

Introduction

V. velutina was introduced into Europe in 2004 via a single queen (Haxaire et al., 2006) and spread rapidly. Several impacts related to the invasion have been reported (Monceau et al., 2014): ecological, health and economic.

This study provides an estimate of the costs incurred by beekeepers (total population) in controlling *V. velutina*. Beekeepers were interviewed to identify control practices and to obtain information on costs for the year 2020.



This is the first large-scale study of the practices and costs incurred by beekeepers in the fight against *V. velutina*.

Material and methods

Sample: 378 beekeepers: 107 Nouvelle-Aquitaine (NA), 151 Galicia (GZ), 50 the Basque Country (BC) and 70 North Portugal (PO). Descriptive statistics were obtained for the total population, using a complex sample module that considered the sampling plan (IBM complex sample 21).

Results

- Control methods, use and cost

Control method	% use	% cost
Trapping (queens and workers) (TR)	90.9	47.9
Reducing the size of the hive entrance (HE)	54.8	10.7
Artificial feeding (AF)	44.9	14.5
Training (TRA)	40.6	8.3
Nest removal & others (beekeeper) (NR)	29.1	2.9
Electric harp (EH)	15.9	4.9
Hive muzzles (HM)	12.7	2.7
Trojan horse approach (TH)	10.4	4.8
Relocating hives (RH)	8.1	1.3
Protective mesh in apiaries (PM)	2.8	1.9

Results

- Estimated cost values and 95% confident interval (€)

	Value	Lower limit	Upper limit
TR	3,808,665.4	3,129,704.8	4,487,626.0
HE	853,515.9	683,907.3	1,023,124.6
AF	1,154,771.3	825,644.1	1,483,898.6
TRA	663,422.4	507,214.3	819,630.6
NR	232,073.9	78,893.1	385,254.8
EH	388,209.8	175,566.3	600,853.2
HM	218,066.4	121,207.6	314,925.2
TH	378,662.9	169,675.8	587,650.0
RH	103,901.7	53,571.1	154,232.2
PM	148,084.8	-15,507.0	311,676.5
Total	7,949,374.5	6,889,170.8	9,009,578.2

- Production value: €7,7131,957.8 (€64,259,761.9 – €90,004,153.7)

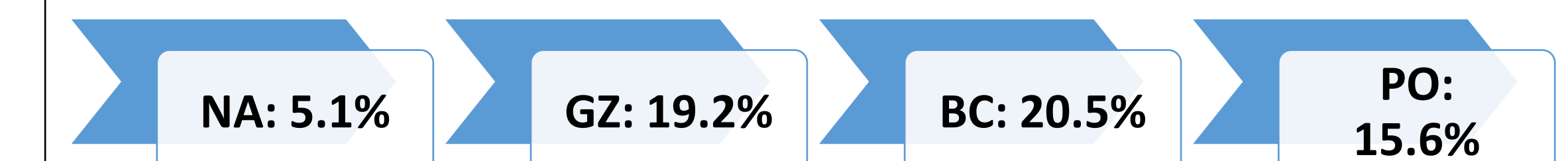
References

- Haxaire J., Bouget J-P. and Tamisier J-P. (2006) *Vespa velutina* Lepeletier, 1836, une redoutable nouveauté pour la faune de France (*Hym., Vespidae*). Bulletin de la Société entomologique de France 111:194
- Monceau K., Bonnard O. and Thiéry D. (2014) *Vespa velutina*: a new invasive predator of honeybees in Europe. Journal of Pest Science 87, 1-16.

Conclusions

Total costs represented **10.3%** of the estimated production value.

% cost/production for each area:



Despite the widespread use of traps in the four study regions, beekeepers reported some differences in the use of methods of controlling *V. velutina*, which affected the distribution of costs.

Lower costs in NA: French beekeepers, with more experience with the invasion, used lower cost control methods; higher production value.

This work was supported by Atlantic POSitive, Conservation of Atlantic pollination services and control of the invasive species *Vespa velutina*, project funded by the Interreg Atlantic Area Programme through the European Regional Development Fund (ERDF).

