QUALI-QUANTITATIVE ANALYSIS OF SAND FLIES SPECIES DISTRIBUTION IN THE PLAIN AREA OF EMILIA-ROMAGNA REGION (ITALY) FROM 2012 TO 2016

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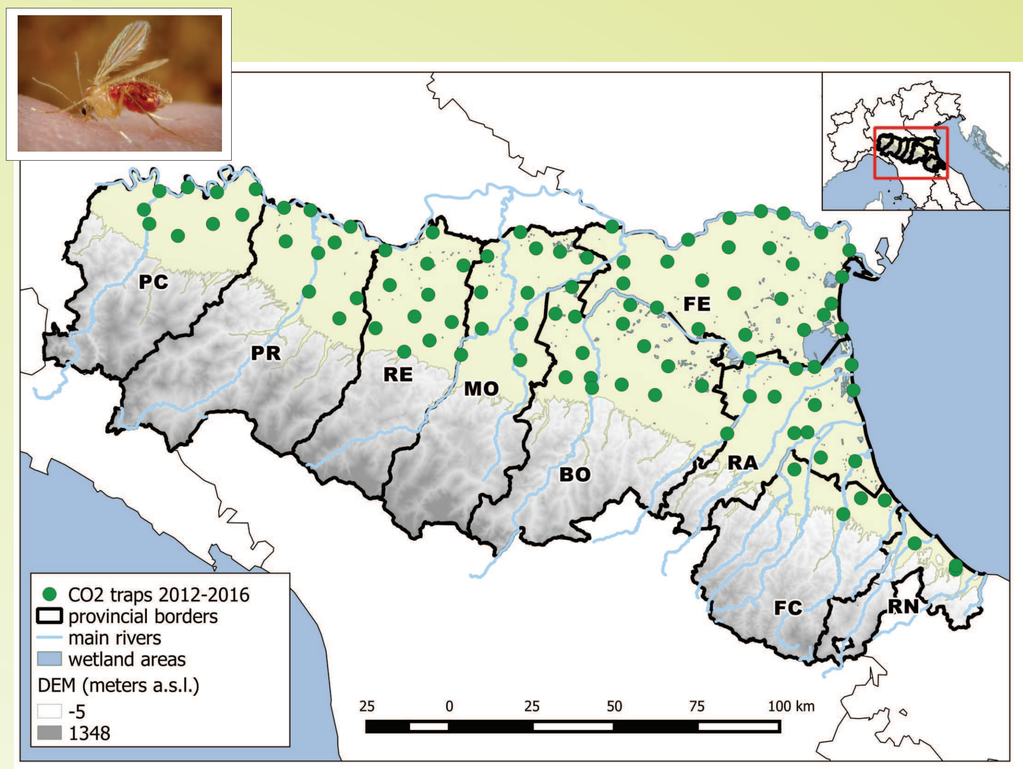
Introduction

Sand flies surveillance is essential for the risk evaluation of emerging infections caused by protozoa of the Leishmania genus and from viruses belonging to the Phlebovirus genus (family Bunyaviridae) – the most significant group of viruses transmitted by sand flies. Information on distribution, abundance and population dynamics of sand flies in the Emilia-Romagna region plain area (around 12,000 km^2) have been collected in the frame of the Regional Vector-borne diseases surveillance program, from 2012 to 2016.



Materials and Methods

The data presented document the collections of adult sand flies by the standardized use of CO_2 traps in the plain area of the nine provinces of the region. About 2,600 adult sand flies belonging to six species were collected by CO_2 traps positioned on a grid with square cells of about 120 km^2 each, ranging between 69 to 88 and sampled every two weeks from the end of May to the beginning of October at an altitude range from -3 to 128 meters a.s.l.

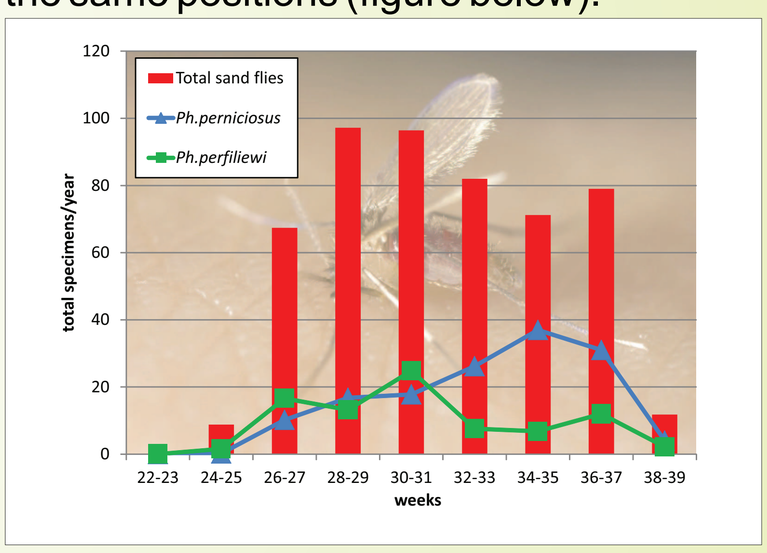
Species Distribution Model (MaxEnt 3.3.3k) applied to some environmental variables at 250m resolution (CLC, NDVI, BIOCLIM, DEM) and graduated symbols (QGIS 2.18 - http://www.qgis.org) were used to evaluate the distribution and abundance in the plain area.

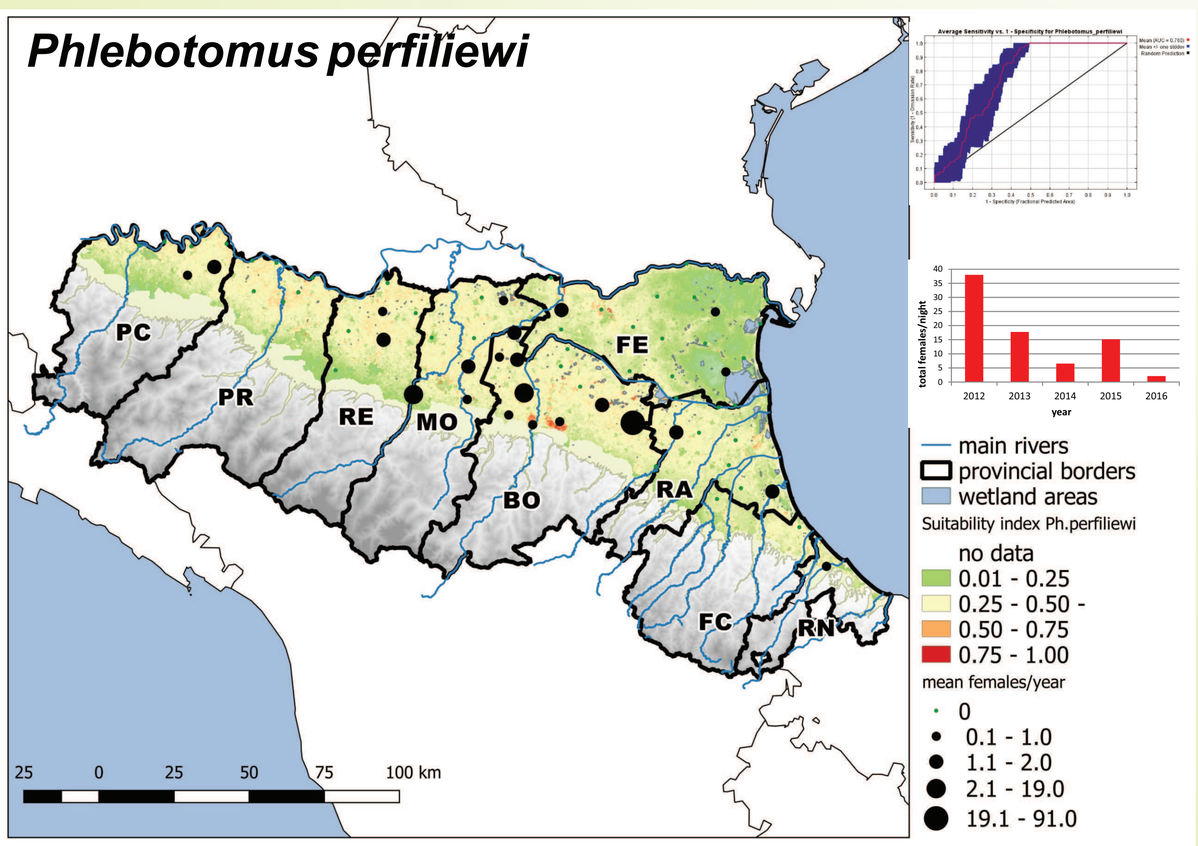
Results and Discussion

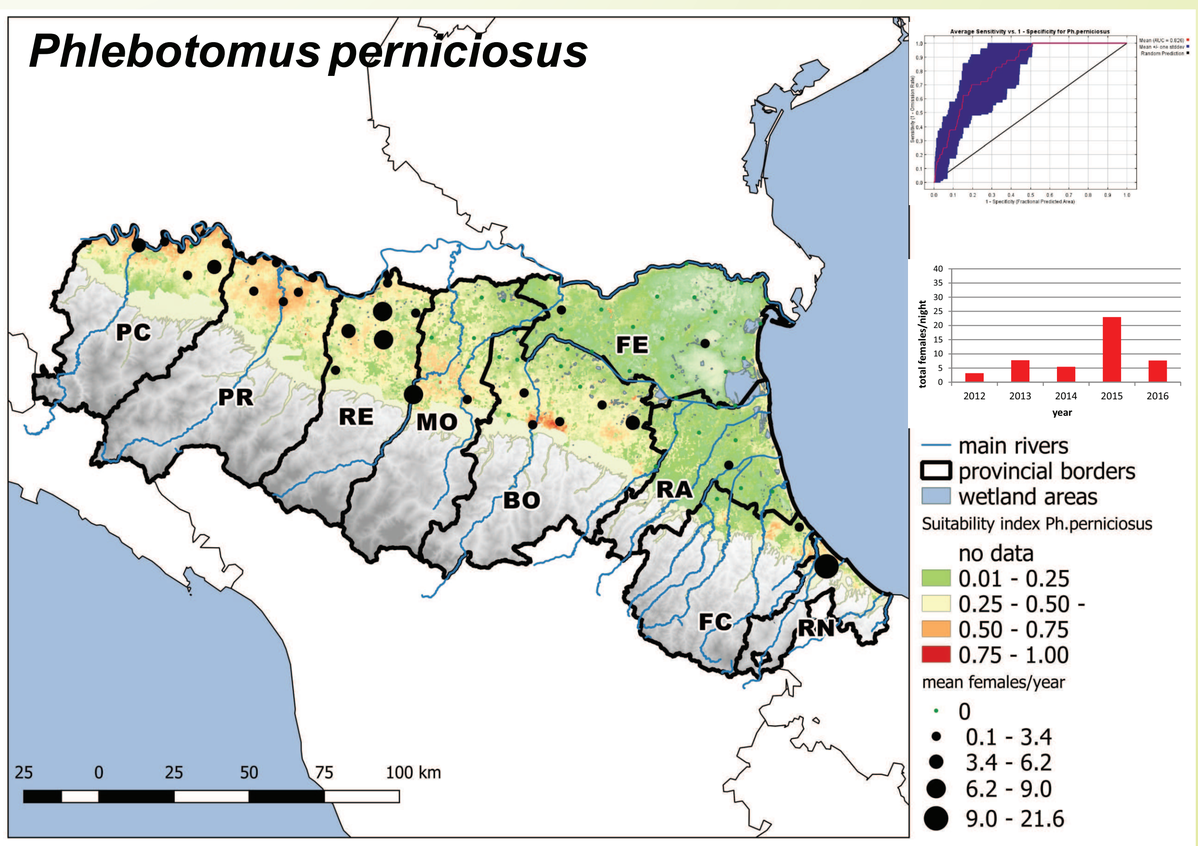
Year	N.CO_2 Traps	Specie	Total	Province								
				BO	FC	FE	MO	PC	PR	RA	RE	RN
2016	69	*Ph. perfiliewi*	206	170	0	0	17	***	0	0	19	0
		Ph. perniciosus	113	8	1	0	16	***	26	0	41	21
		Ph. papatasi	1	0	0	0	0	***	1	0	0	0
		Ph. spp.	26	24	0	0	0	***	0	0	1	1
		S. minuta	2	0	0	0	2	***	0	0	0	0
2015	72	*Ph. perfiliewi*	197	113	1	15	46	1	0	4	17	0
		Ph. perniciosus	384	23	1	2	30	36	39	2	161	90
		Ph. papatasi	4	0	0	0	0	0	0	0	0	4
		Ph. spp.	36	6	0	0	4	4	0	0	15	7
2014	72	*Ph. perfiliewi*	79	42	3	1	23	1	0	0	8	1
		Ph. perniciosus	87	11	2	0	8	17	20	0	18	11
		Ph. papatasi	1	0	0	0	0	0	0	0	0	1
		Ph. spp.	8	1	0	0	4	1	1	0	1	0
		Ph. mascittii	6	0	0	0	2	1	2	0	1	0
2013	76	*Ph. perfiliewi*	309	105	89	4	75	7	1	24	2	2
		Ph. perniciosus	115	7	3	0	10	16	11	1	26	41
		Ph. spp.	43	11	8	0	10	3	1	1	7	2
2012	88	*Ph. perfiliewi*	736	707	0	1	22	2	0	0	4	0
		Ph. perniciosus	117	49	0	0	6	39	6	0	17	0
		Ph. spp.	139	94	0	0	23	4	12	0	6	0
Total			**2,609**	**1,371**	**108**	**23**	**298**	**132**	**120**	**32**	**344**	**181**

***In 2016 sand flies were not collected in province of Piacenza (PC)

From 2012 to 2016, the commonest and most abundant species identified were *Phlebotomus perfiliewi* (1,527 specimens and presence in 56% of total traps activated from 2012 to 2016) and *Phlebotomus perniciosus* (816 specimens and presence in 41% of total traps).
The temporal comparison of identified species was performed on 63 traps activated in the 5 years of surveillance in the same positions (figure below).







The quali-quantitative analysis of data shows that the total sand flies population of the Emilia-Romagna region plain area (red histogram in the figure) is more abundant from week 26 to 37 and the composition of the sand flies populations varied between geographical locations, seasonal period and surveillance year, in particular for the two most abundant species: *Ph. perfiliewi* has a seasonal not regular trend with a peak in weeks 30-31 (first half of the surveillance season), it was most abundant in 2012 and it has medium suitability index (presence probability) in all provinces of the plain area, in particular Bologna (BO) and south Modena (MO) provinces with highest females number collected; *Ph. perniciosus* density was higher in 2015, has seasonal regular mean trend with a peak in weeks 34-35 (second half of the surveillance season), and it has a medium suitability index and highest abundance in the west provinces of the plain area (Piacenza (PC), Parma (PR), Reggio-Emilia (RE)) and some restricted areas in the provinces of Forlì-Cesena (FC) and Rimini (RN). The quali-quantitave analysis conducted and the preliminary species distribution maps created for *Ph. perfiliewi* and *Ph. perniciosus* can be useful for future surveillance campaigns and for evaluating risk trasmission of fleboviruses and leishmania in the plain area of the region.

REFERENCES

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