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ENTOMOLOGICAL SURVEILLANCE ON MOSQUITOES IN PIEDMONT REGION (NORTH-WESTERN ITALY), 2011-2013

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INTRODUCTION:
Mosquito borne diseases (MBDs) are a group of infections representing an emerging threat worldwide for both humans and animals. Originally endemic in tropical regions, in recent years they expanded their geographical range, mainly due to globalization, climatic and environmental changes.
These factors facilitate the introduction and establishment of exotic mosquitoes species and pathogens in new areas (Scholte et al., 2008, Med Vet Entomol, 22:352–358; Medlock et al., 2011, Vector Borne Zoonotic Dis., 2:435-47).
Piedmont region is located in North-western Italy. It is a MBDs free area bordering infected regions (South-eastern of France and the Italian Emilia Romagna region), and shows habitat and climatic features suitable to the introduction of exotic mosquitoes and MBDs that they can transmit, as already evidenced in several European countries (Schaffner et al., 2009, Med Vet Entomol., 23:448-51; Seixas et al., 2013, Mem Inst Oswaldo Cruz., 108 Suppl 1:3-10).
In this work we describe the entomological surveillance carried out from 2011 to 2013 in Piedmont in order to gain a better knowledge on mosquitoes distribution and to early detect the introduction of exotic invasive species.

MATERIALS AND METHODS:
The whole Piedmont territory was divided into 73 equal squares 20x20km. For each square sited under 600 meters a.s.l. at least one trap was located in fixed sampling sites. They were selected according to risk factors that can affect MBDs epidemiological cycle: proximity to wetland areas, presence of hosts and habitat features (according to the Corine Land Cover classification).
Entomological surveillance was performed during the mosquito season of each year with weekly or fortnightly samplings. Mosquitoes were trapped using CO2 CDC dry ice-baited traps. Furthermore in 2013, 8 BG sentinel traps with the BG-Lure were placed into national and international trade areas, in order to monitor the introduction of exotic invasive mosquitoes. Mosquitoes were identified to species level by morphological standard classification keys (Stojanovic and Scott, 1997, USA: Ed.Stojanovich CJ & Scott HG). Mosquito species were grouped according to their vector competence (EFSA, 2009).

RESULTS:
During the surveillance period, a total of 99271 mosquitoes were collected with CO2 CDC traps. They belong to 14 different species. According to their vector competence, four species were classified with high level of competence, three species with moderate and seven species with low (Table 1).
A total of 3084 mosquitoes were collected in 2013 with BG sentinel traps. They belong to 6 different species. According to their vector competence, 3 species were classified with high level of competence and 3 species with moderate (Table 2). No exotic mosquito species were found.

Mosquito species	N	%	Vector competence
Culex pipiens	47996	48,35%	High
Ochlerotatus caspius	33958	34,21%	Moderate
Culex modestus	7262	7,32%	High
Anopheles maculipennis s.l.	5528	5,57%	Moderate
Aedes vexans	1950	1,96%	Moderate
Aedes albopictus	1191	1,20%	High
Culex theileri	20	0,02%	High
Other	1366	1,39%	
Total	99271		

Tab 1: Mosquito species collected in Piedmont (from 2011 to 2013) with CO_2 CDC traps and their vector competence. Other species include: *Ochlerotatus geniculatus, Culex* sp., *Aedes cinereus, Ochlerotatus caspius, Anopheles plumbeus, Culiseta subochrea, Aedes* sp., *Culiseta longiareolata, Culiseta* sp., *Culiseta annulata*

Mosquito species	N	%	Vector competence
Cx. pipiens	1192	38,65	High
Ae. albopictus	680	22,05	High
Oc. caspius	894	28,99	Moderate
An. maculipennis s.l.	246	7,98	Moderate
Ae. vexans	69	2,24	Moderate
Cx. modestus	3	0,1	High
Total	3084		

Tab 2: Mosquito species collected in Piedmont with BG sentinel traps in 2013 and their vector competence

CONCLUSIONS:
The entomological surveillance enforced in Piedmont, was designed in order to know the real vector distribution even in absence of clinical cases of MBDs. The results showed that most mosquitoes trapped had moderate-high vector competence and might be able to acquire and transmit the most common MBDs. The availability of continuous data on mosquito population, its spatial distribution and abundance in the study area, where no autochthonous cases of MBDs in humans or animals have so far been reported, provides important information to be used in case of an epidemic emergency, to set up focused anti-vectorial plan and to draw risk maps useful for public authorities.

Keywords:
mosquito borne diseases, invasive species, surveillance