University of Applied Sciences and Arts of Southern Switzerland
Department of Environment Constructions and Design

SUPSI

Inventory of Culicidae in and around the nature reserve “Grande Cariçaie” (Lake Neuchâtel) 2019

Sylvie Flämig[1], Eleonora Flacio[1], Antoine Gander [2]

[1] Vector ecology sector, Institute of microbiology – SUPSI, Via Flora Ruchat-Roncati 15, CH-6850 Mendrisio
[2] Association de la Grande Cariçaie, chemin de la Cariçaie 3, CH-1400 Cheseaux-Noréaz

Background

For the first time an extensive study on mosquitoes (Diptera: Culicidae) was carried out in the area of the “Grande Cariçaie”. The goals of the study were to monitor diversity of mosquitoes in the area, secondly to investigate if the mosquito fauna from the nature reserve can induce nuisance on surrounding settlements and thirdly to enlarge data about wetland mosquitoes in Switzerland.

Material & Methods

Mosquitoes were sampled monthly between April and September 2019. Centers for Disease Control (CDC) miniature light traps were used to collect adults. Larval stages were sampled using a standard pint dipper. Larvae and adult stages were collected at 15 different sampling sites, both within the protected areas as well as in adjacent (peri-)urban areas. Mosquitoes were identified to the species level using morphological keys.

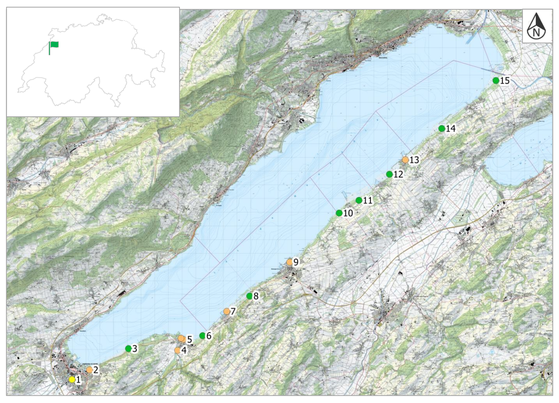


Fig.1 Map of study sites in the nature reserve “Grande Cariçaie” (~ 3.000 ha, Ramsar site) and in surroundings (yellow = urban, orange = peri-urban, green = nature).

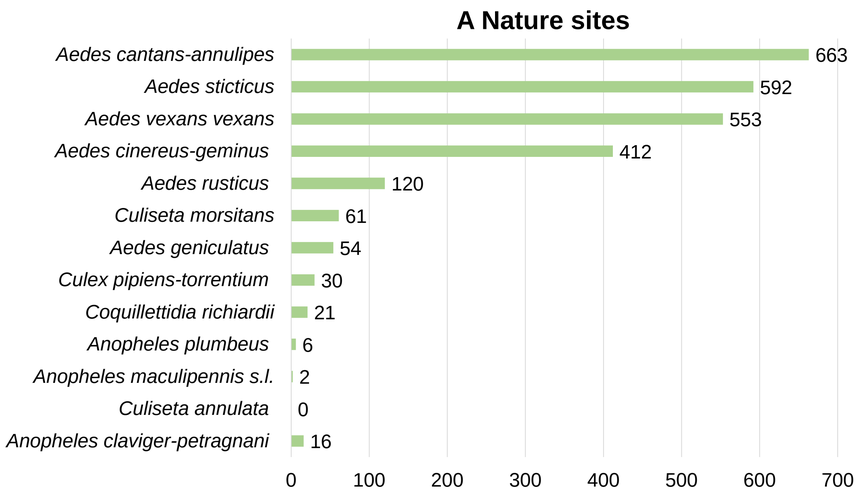
Fig.2 CDC trap used with dry ice as attractant (in blue container).

Results

- A total of 3,422 adult female mosquitoes and 252 larvae were collected in 6 sampling rounds.
- 17 different species were detected (as adult, larvae or both).
- No invasive mosquito species were caught.
- Average adult catches per site were higher in nature sites than in peri-urban sites but fluctuated greatly (327.25 ± 163.00 vs. 114.86 ± 34.94). Catch numbers per site ranged from 11 to 1,306 individuals.

Tab.1 List of mosquito species found as larvae or adult at the Grande Cariçaie in 2019.

Species	Found as	
	Larva	Adult
Anopheles (Anopheles) claviger (Meigen 1804) - *Anopheles (Anopheles) petragnani* Del Vecchio 1939	X	x
Anopheles (Anopheles) maculipennis s.l. Meigen 1818	x	x
Anopheles (Anopheles) plumbeus Stephens 1828	x	x
Aedes (Aedes) cinereus Meigen 1818 - *Aedes (Aedes) geminus* Peus 1970	x	x
Aedes (Aedimorphus) vexans vexans (Meigen 1830)	x	x
Aedes (Finlaya) geniculatus (Olivier 1791)	x	x
Aedes (Ochlerotatus) cantans (Meigen 1818) - *Aedes (Ochlerotatus) annulipes* (Meigen 1830)	x	x
Aedes (Ochlerotatus) flavescens Müller 1764	x	
Aedes (Ochlerotatus) sticticus Meigen 1838		x
Aedes (Rusticoidus) rusticus Rossi 1790	x	x
Coquillettidia (Coquillettidia) richiardii (Ficalbi 1889)		x
Culex (Culex) pipiens Linnaeus 1758 / *Culex pipiens pipiens* biotype *molestus* Forskal 1775 - *Culex (Culex) torrentium* Martini 1925	x	x
Culex (Maillotia) hortensis hortensis Ficalbi 1890	x	
Culex (Neoculex) territans Walker 1856	x	
Culiseta (Allotheobaldia) longiareolata (Macquart 1838)	x	
Culiseta (Culicella) morsitans (Theobald 1901)	x	x
Culiseta (Culiseta) annulata Schrank 1776	x	x



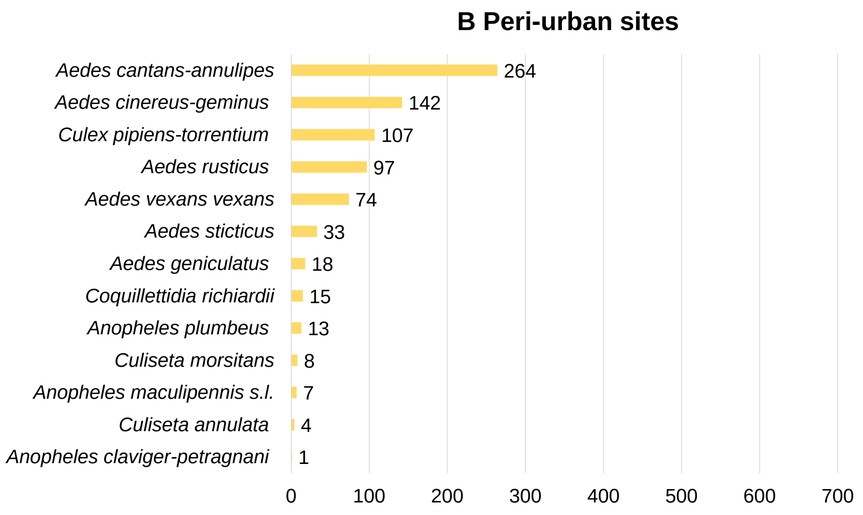


Fig.3 Ranking of adult species according to quantities caught for nature (A) and (peri-)urban sites (B). Note that number of sites was 8 in nature, 6 in peri-urban, 1 in urban area.

Discussion

Species diversity, composition and abundance

- High species diversity in the nature reserve and surroundings: The 17 species detected represent almost half of all Culicidae species recorded for Switzerland (info fauna, 2017).
- The species composition is representative of a wetland area.
- The total number of specimen caught is rather low compared to other studied wetland areas (Flacio et al., 2014; SUPSI, 2020).
- The proportion of floodwater mosquitoes *Ae. vexans* and *Ae. sticticus* in this study is rather low compared to other wetlands (SUPSI, 2020, Flacio et al. 2014). This might be because the Grande Cariçaie does not have such extensive floodplains, where unhatched eggs accumulate in the soil over years. Also, the detailed flooding regime (length, areas and fluctuations of flooding) might not be suitable for mass hatching events.

Mosquitoes in nature and (peri-) urban zones

- The geographical and landscape difference between the nature and non-nature sites was not so distinct, as the whole area is rather rural. Therefore, it is difficult to show an influence of mosquitoes migrating from the nature reserve to the other areas.
- Huge differences in catch numbers per site show that the individual sites vary greatly in their attractiveness for mosquitoes.
- All of the commonly found species in the peri-urban area can be aggressive biters. However, none of these species was caught in quantities that could cause nuisance for residents.

Conclusion

- ✓ Rich diversity of native species in nature reserve
- ✓ Strong connection and exchange of mosquitoes between studied nature and non-nature sites
- ✓ No nuisance detected for residents

References:
Flacio, E., Rossi-Pedruzzi A., Bernasconi-Casati E. & Patocchi N. (2014). Culicidae fauna from Canton Ticino and report of three new species for Switzerland. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 87, 163 – 82.
info fauna (2017). Liste Zweiflügler ganze Schweiz. CSCF& karch/CC=-KOF.
SUPSI (2020). Census of Culicidae at the national natural reserve Bolle di Magadino, final report.

Acknowledgments:
This study was funded by the “Association de la Grande Cariçaie”.

Contact:
Sylvie Flämig sylvie.flaemig@supsi.ch
Eleonora Flacio eleonora.flacio@suspi.ch www.supsi.ch/im
Antoine Gander a.gander@grande-caricaie.ch www.grande-caricaie.ch

SVEG meeting 2021