



On the occurrence of exotic species in Belgium: the tip of the iceberg?



Veerle Versteirt
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Mosquitoes: introduction



M~~X~~DIRISK

- **Taxonomy:**

- Diptera

- Nematocera

- » Culicidae

- Anophelinae*

- 2 genera

- Culicinae*

- 38 genera (taxonomic confusion)

- Toxorhynchitinae*

- 1 genus

- Worldwide = >3500 species



- **Medical importance:** vectors of parasites, viruses, bacteria, protozoan and nematodes

- Malaria, Dengue, Yellow Fever, Chikungunya, Encephalitis, Filariasis, ...



- **Knowledge of taxonomic and functional biodiversity of mosquitoes (Culicidae) is essential to understand the current risk of disease transmission**
 - Taxonomic biodiversity:
 - Which species?
 - Functional biodiversity:
 - Interaction between species (endemic versus invasive)
- **In Belgium: basic knowledge on mosquito is missing**
- **Ongoing climatic changes + increasing worldwide transport = creation of suitable conditions**
- **Start MODiRISK project in 2007**





- **Institute of Tropical Medicine**



- **Royal Belgian Institute of Natural Sciences**



- **Université Catholique de Louvain**



- **Avia-GIS**



- **Wageningen University**



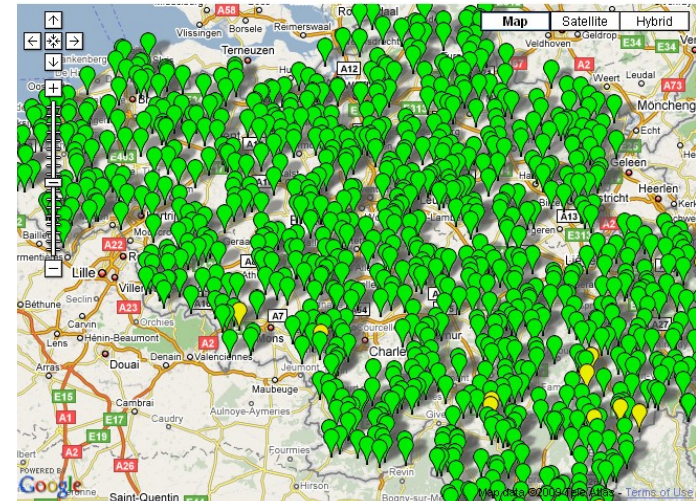
- **Belgian Science Policy**



Sampling strategy



- **Sampling of >900 sites**
 - Random selection (based on Corine dataset)
 - Urban
 - Agriculture
 - Nature
 - **Manual selection**
 - Import risk areas (ca. 60 sites):
 - Harbours, airports
 - Zoo, nature reserves
 - Specific companies (activities)
 - ...
- **2007 & 2008: May-October**





Sampling strategy



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- Importation pathways exotic mosquitoes
 - International trade
 - Tyres
 - *Aedes albopictus* (USA, Italy)
 - *Aedes aegypti* (USA)
 - *Ochlerotatus j. japonicus* (USA)
 - ...
 - Lucky bamboo
 - *Aedes albopictus* (the Netherlands)
 - Why? Desiccation eggs (biology)

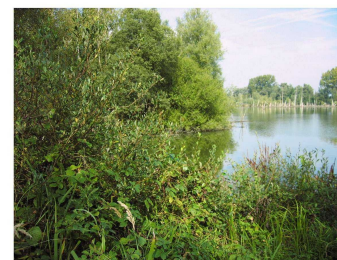
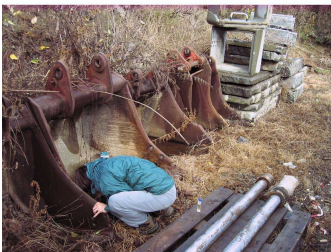




Sampling strategy



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- Species found in 'Import Risk Areas'
 - 20 species
 - 7887 individuals
 - 1 exotic species
 - *Ochlerotatus j. japonicus*

genusname	speciesname	NBR
<i>Aedes</i>	<i>cinereus/geminus</i>	639
<i>Aedes</i>	<i>vexans</i>	13
<i>Anopheles</i>	<i>claviger</i>	365
<i>Anopheles</i>	<i>maculipennis s.l.</i>	16
<i>Anopheles</i>	<i>plumbeus</i>	49
<i>Coquillettidia</i>	<i>richiardii</i>	4019
<i>Culex</i>	<i>pipiens</i>	2352
<i>Culex</i>	<i>territans</i>	4
<i>Culex</i>	<i>torrentium</i>	11
<i>Culiseta</i>	<i>annulata</i>	112
<i>Culiseta</i>	<i>morsitans</i>	31
<i>Ochlerotatus</i>	<i>annulipes</i>	32
<i>Ochlerotatus</i>	<i>cantans</i>	91
<i>Ochlerotatus</i>	<i>caspius</i>	8
<i>Ochlerotatus</i>	<i>communis</i>	50
<i>Ochlerotatus</i>	<i>detritus s.s.</i>	41
<i>Ochlerotatus</i>	<i>geniculatus</i>	24
<i>Ochlerotatus</i>	<i>japonicus</i>	3
<i>Ochlerotatus</i>	<i>punctor</i>	11
<i>Ochlerotatus</i>	<i>sticticus</i>	16



Ochlerotatus j. japonicus



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- Found in 2 sites in Walloon province
 - Importing tyre companies
- Sites
 - “Isolated” location
 - Different adult and larvae collections
 - Mosquito magnet
 - Human landing
 - Larvae dipping & sieving





Ochlerotatus j. japonicus



MODIRISK

- Settled species
 - Found as adult in 2007
 - Larvae collected in tyres
 - September-October 2007
 - beginning of April 2008 (hibernation!)
 - Also data 2002-2004
 - French intercorrelated tyre trade
- No indications on dispersal
 - But: need confirmation
- Interaction with endemic fauna = not known
 - ca. 5 accompanying endemic species found
- Multiple introductions?



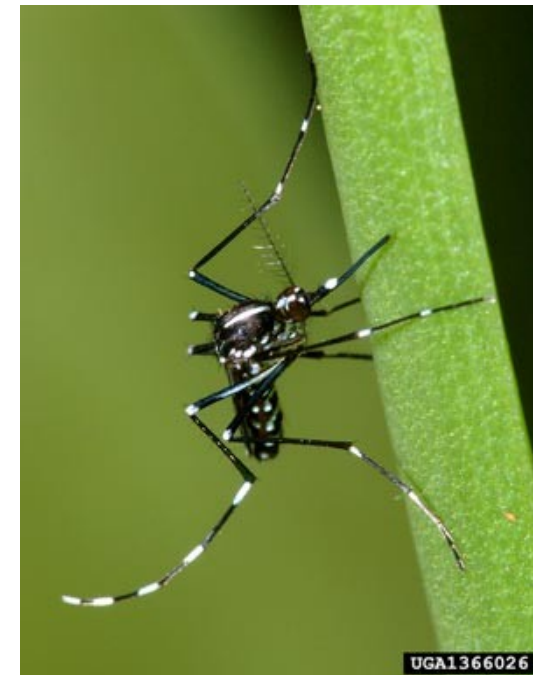


Aedes albopictus



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- The Asian tiger mosquito *Ae. albopictus*
 - Successful invader in many countries
 - Risk on human health (nuisance & vector)
- Found in Eastern Flanders in 2000
 - French intercorrelated tyre trade
- 2nd hand tyre company
- Visits in 2007 and 2008 (MODIRISK)
 - Not found
- Reason of inability to establish?



Paper: Schaffner et al. 2004. **First record of *Aedes (Stegomyia) albopictus* in Belgium**



- 2 important invasive species found in Belgium
 - ancient record of *Aedes albopictus*
 - 2 positive sites of *Ochlerotatus j. japonicus*
- Human mediated invasions
- International trade seems import pathway (global village)
 - Countries depending on trade = vulnerable
 - Correlated to import products
 - Lucky Bamboo in The Netherlands
 - Tyres in USA, Italy, Belgium
- Establishment?
 - origin,
 - biology (egg diapause),
 - climatic conditions,
 - founder populations



- Epidemiological
 - Competent vectors of numerous arboviruses
 - WNV-positive field collections in USA
- Ecological
 - Container-breeding mosquitoes
 - Interactions with native species
 - Shared resources
 - Interspecific larval competition

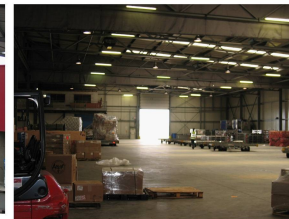


- Monitoring (medical importance)
- Increased knowledge on biology and ecology of exotic species
 - Survey of artificial and natural habitats
 - Understand ecological niche
 - Competitive predictions
 - Resources
 - Accompanying species
- Knowledge on functional biodiversity



- Improved development of Risk Assessment

THANK YOU FOR YOUR ATTENTION



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