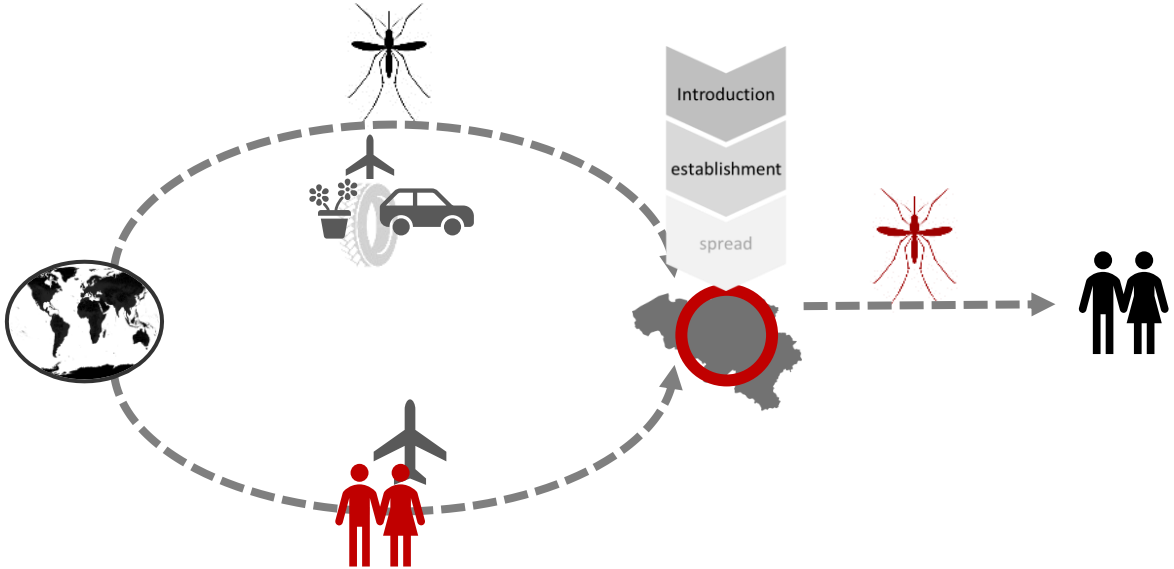
Approaches for integrated management of tiger mosquitoes and challenges related to nuisance and public health

Workshop: How to tackle challenges related to the emerging tiger mosquitoes and related arboviruses?

Wim Van Bortel
15—17 SEPTEMBER 2025

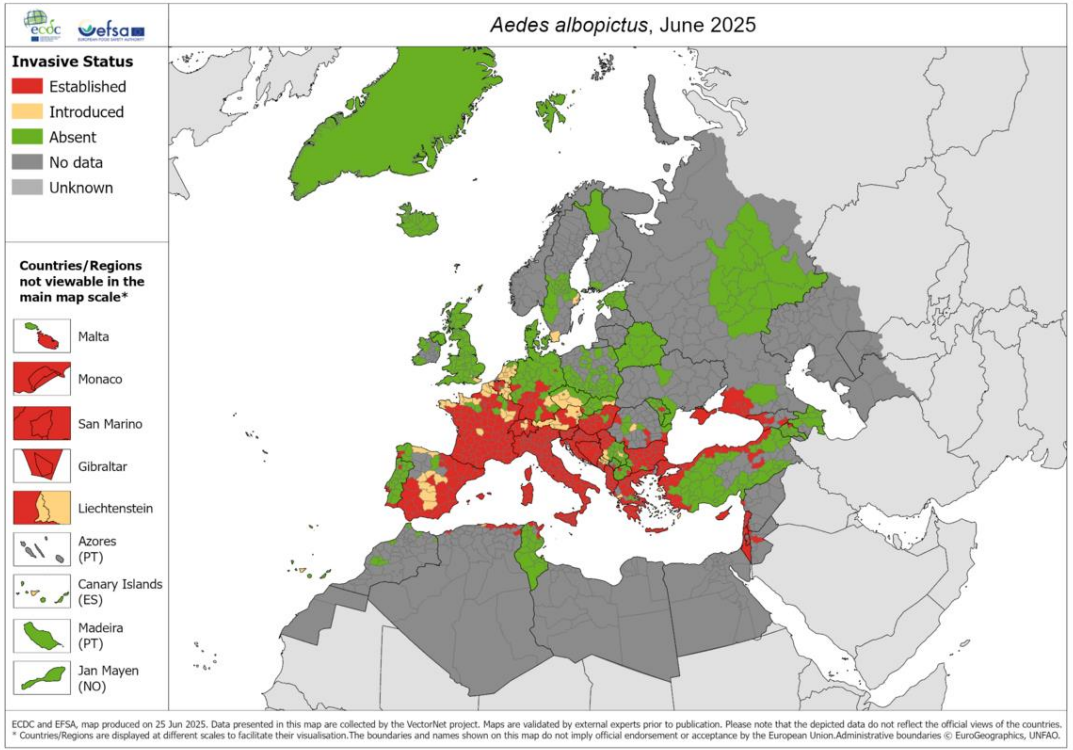
INTRODUCTION

Aedes albopictus & arboviruses | prerequisites



Aedes albopictus | spread in Europe [animation]

- **Originates from Southeast Asia**
- **Notifications in Europe**
  - Albania in late 1970s
  - 1990-2018 mainly around Mediterranean
  - Spreading northwards



Arboviruses | local transmission in Europe

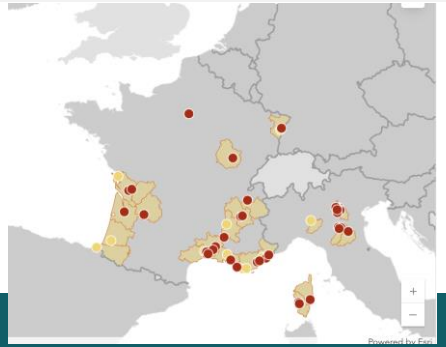
Local transmission of chikungunya virus in mainland EU/EEA, 2007–2024

Local transmission of dengue virus in mainland EU/EEA, 2010–2024

Arboviruses | local transmission in Europe

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CHIV	IT: ~330			FR: 2				FR:12			FR:17 IT: 270 + 219							FR: 1	FR: 301 IT: 107
DENV				FR: 2 CR: 10		PT: ~2100	FR: 1	FR: 4	FR:8			FR: 8 ES:6	FR: 9 ES: 1 + 1	FR: 13 IT: 10	FR: 2	FR: 65 ES:6	FR: 45 ES: 3 IT: 82	FR:83 ES:8 IT:213	
ZIKV													FR: 3						

Local transmission of chikungunya virus in mainland EU/EEA, 2025 (until 3/9/2025) LINK

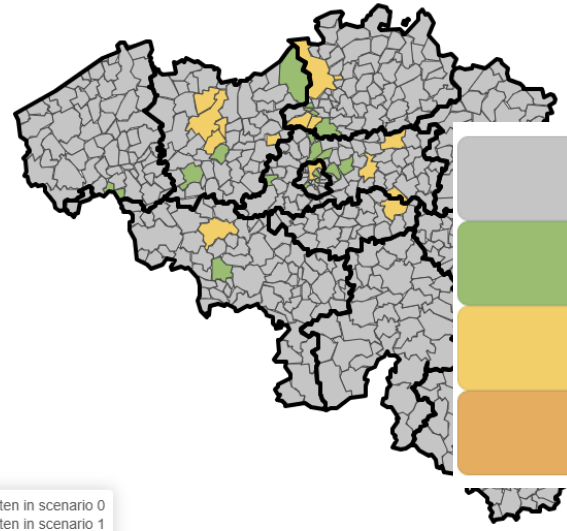


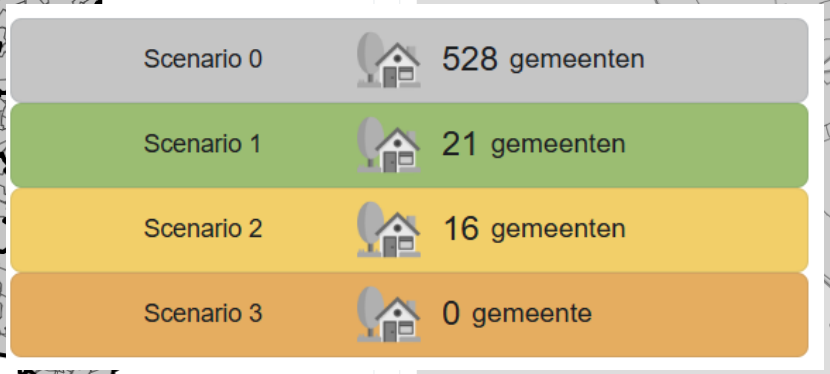
CHIKUNGUNYA
DENGUE
ZIKA
CR = Croatia | FR = France | IT = Italy | PT = Portugal | ES = Spain

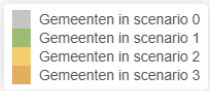
AEDES ALBOPICTUS IN BELGIUM

The tiger mosquito | 2022-2025

https://epidata.sciensano.be/tiger_mosquito_situation/



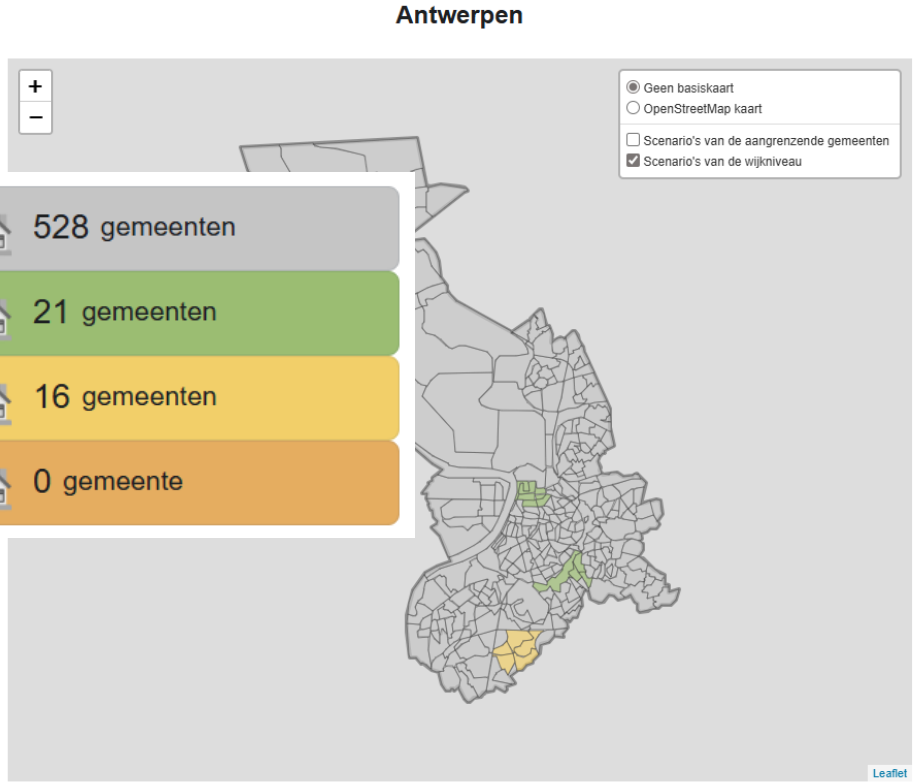




Klik op een gemeente om de details te zien op de volgende kaart

Leaflet

Scenario	Beschrijving
0	Geen melding van de tijgermug maar risico op introductie.
1	Melding van de tijgermug.
2	Vermoedelijke lokale overwintering (populatiedie de winter kan overleven) en lokale vestiging van de tijgermug.
3	De tijgermug is wijd verspreid in het gebied.



The tiger mosquito | introduction pathways

- **First observation in Belgium**
  - 2000 link to international tyre trade
- **Observations of introduction**
  - 2000-2018: trade in plants and tyres
  - 2018: along motorways
  - 2022: start of citizen science many observations in residential areas

Journal of the American Mosquito Control Association, 20(2):201–203, 2004

SCIENTIFIC NOTE

FIRST RECORD OF *AEDES* (*STEGOMYIA*) *ALBOPICTUS* IN BELGIUM

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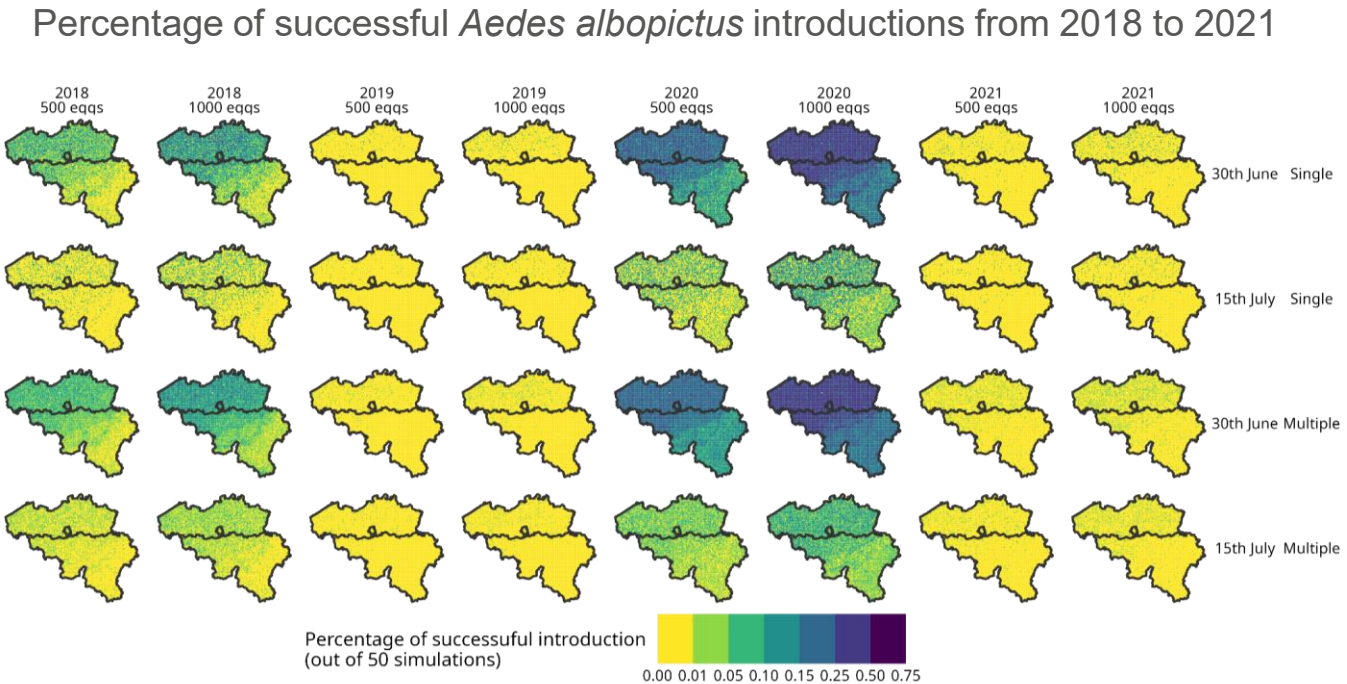
Source: ITM

Source: ITM

Source: Eritja et al. 2017. Sci Rep 7: 14399

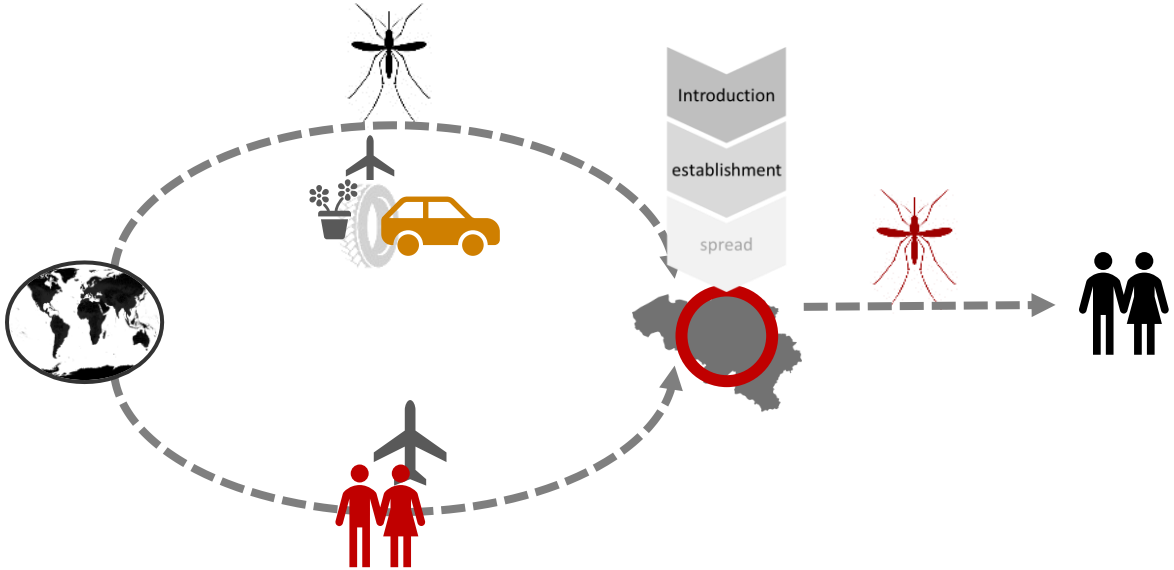
The tiger mosquito | modelling successful introductions



Modelling Framwork. Da Re D, et el. dynamAedes: a unified modelling framework for invasive *Aedes mosquitoes. Parasit Vectors. 2022;15(1):414.*

PREVENTION & CONTROL

Prevention and control | options



- ***Aedes albopictus***
  - Surveillance
  - Control
    - Introduction: ?
    - Establishment : yes
    - Spread: yes

- **Import of virus**
  - Surveillance
  - Information and awareness

- **Local transmission**
  - Awareness
  - Vector control
  - Case management

Prevention and control | ECDC guidance

Public health guidance for assessing and mitigating the risk of locally-acquired Aedes-borne viral diseases in the EU/EEA

Risk Level	Risk area type	Vector established	Autochthonous transmission during the current season	Presence of *Aedes*-borne viruses all over the year
1	Area without established vectors	No	No	No
2	Predisposed area	Yes	No	No
3	Affected area	Yes	Yes	No
4	Endemo-epidemic area	Yes	Yes	Yes

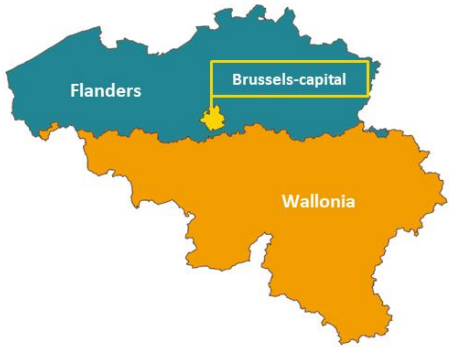
https://www.ecdc.europa.eu/en/publications-data/public-health-guidance-assessing-and-mitigating-risk-locally-acquired-aedes-borne

- Disease surveillance
- Laboratory diagnosis
- Awareness raising and capacity building
- Multi-sectoral collaboration and coordination
- Vector management (entomological surveillance and control activities)

Vector surveillance and control| challenges

Resources	Responsibilities	Coordination	Legal and regulatory issues	Operational topics
▪ Funding (project based) ▪ Entomological expertise in PH	▪ Fragmented and unclear ▪ Roles of different responsible entities	▪ Fragmented across sectors (health, environment, research) and responsible entities	▪ Rigid planning hinder adaptive, surveillance-based responses ▪ EU biocide regulation is complex and often not well known	▪ Fragmented data & insufficient monitoring vector biology & environmental data ▪ Link vector abundance and disease risk poorly understood

Vector surveillance and control| some feedback from the field



- Active and passive surveillance (national)
- Prevention and control (regional)
  - Regional authorities for health and environment
- Communication with citizens (local)
  - Municipalities

Door-to-door treatments

Vector surveillance and control| some feedback from the field

- Involvement & knowledge of citizens
- Data sharing and data flows
- What is an appropriate surveillance plan?
- What is a good mosquito control approach and who has the expertise?
- Impact of the control operations
- Coordination and tasks between entities

Vector surveillance and control| other challenges

PERSPECTIVE

Green cities and vector-borne diseases: emerging concerns and opportunities

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Summary

- Major challenges that burden your work on this topic
  - Surveillance framework but not flexible to adapt to new situation
  - Expertise at different levels
- Topics that need follow-up and community building across regions
  - Common view for a cross-border problem (sectors, regions, countries)
  - Green-Blue cities and *Aedes albopictus*
- Success factors
  - Official notification mechanism
  - Coordination increasing
- Measurable objectives (indicators) of success


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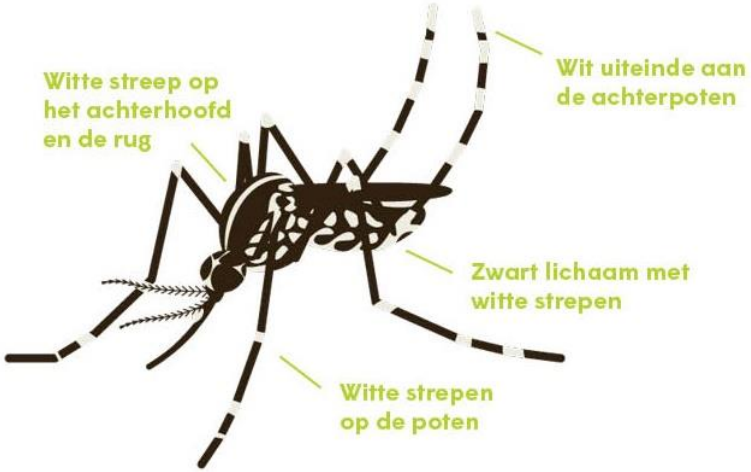
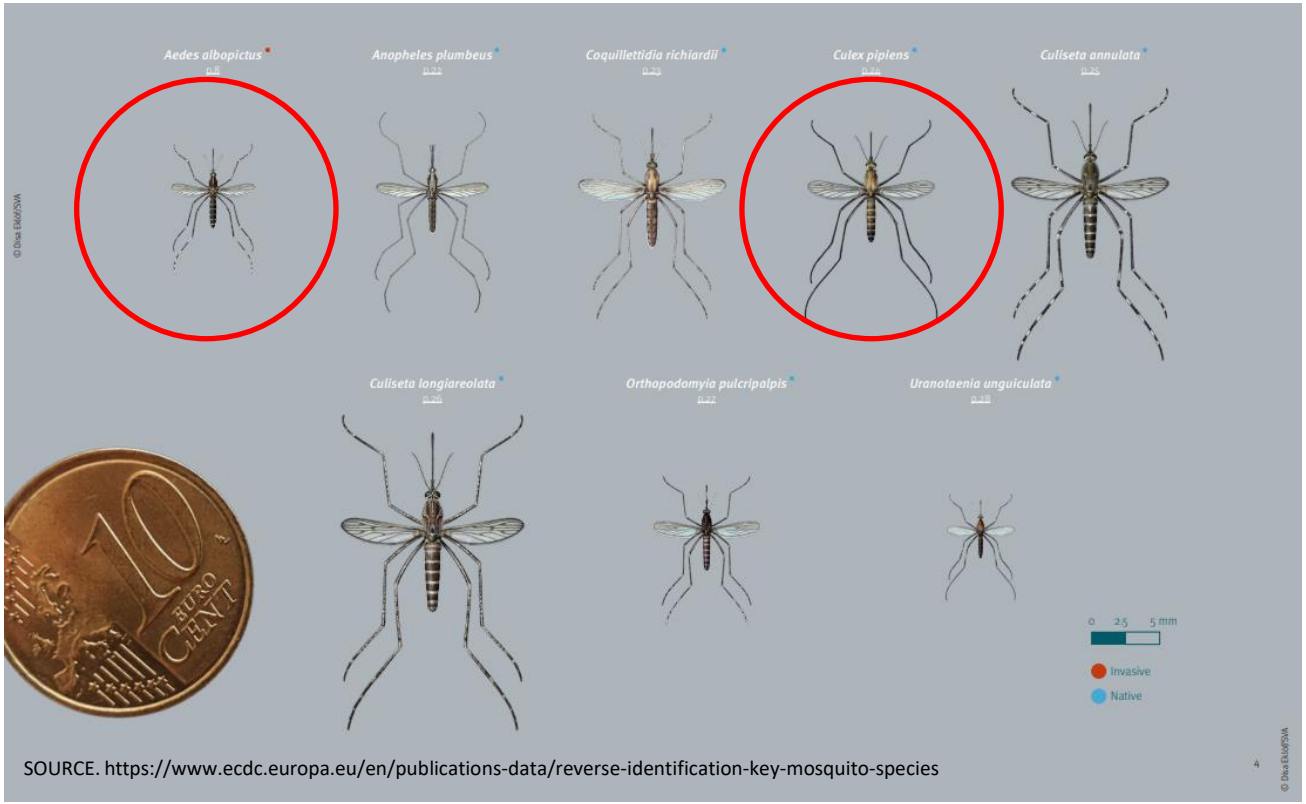
BASIC FACTS

Aedes albopictus | why we don't want them?

- Biting nuisance during the day
- Carrier (vector) of tropical viruses such as dengue, chikungunya and Zika

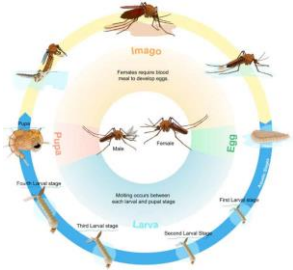


Mosquitoes | they are all different



SOURCE. https://www.ecdc.europa.eu/en/publications-data/reverse-identification-key-mosquito-species

Aedes albopictus | breeding sites



- **Larval ecology**
  - Natural containers such as tree holes, bamboo pots, and leaf axils
  - Any artificial containers: tires, flowerpots, cemetery urns/vases, buckets, tin cans, rain gutters, ornamental ponds, drums
- **Overwintering:** eggs stage

Prevention and control | options

	Vector established	Autochthonous transmission during the current season	Presence of Aedes-borne viruses all over the year	Context	actions
RISK 1. Areas without established vector	**NO**	**NO**	**NO**		▪ Public health actions focus on surveillance of imported cases and mosquito vectors.
RISK 2a. Predisposed area with low receptivity	**YES**	**NO**	**NO**	▪ Vector density **low** ▪ The climatic conditions **unfavourable** for transmission	▪ Public health actions focus on surveillance of imported cases and mosquito vectors, prevention and preparedness.
RISK 2b. Predisposed area with high receptivity and vulnerability	**YES**	**NO**	**NO**	▪ Vector density **high** ▪ The environmental and climatic conditions **favourable** transmission ▪ High number of **travellers** (importation of viruses)	▪ Public health actions focus on surveillance of imported cases, possible autochthonous cases and mosquito vectors, and prevention and preparedness.
RISK 3a Affected area with low number of cases	**YES**	**YES**	**NO**	▪ Number of autochthonous cases/clusters **low** ▪ Transmission chains **traceable**	▪ Public health actions and interventions focus on surveillance, prevention, response and control.
RISK 3b Affected area with high number of cases	**YES**	**YES**	**NO**	▪ Number of autochthonous cases/clusters is **high**, **beyond** tracing capacity and targeted vector control interventions	▪ Public health actions and interventions are focusing on response and control.
RISK 4 Endemo-epidemic area	**YES**	**YES**	**YES**	▪ Autochthonous transmission in subsequent years, **independent** from the importation of new viruses	▪ Public health actions and interventions are focusing on surveillance, response and control.