



anses

# Moustiques vecteurs : comment répondre aux enjeux actuels ?

## Journée thématique

jeudi 25 avril 2024

Espace Van Gogh - Paris 12

En collaboration scientifique avec  
le Muséum national d'Histoire naturelle.



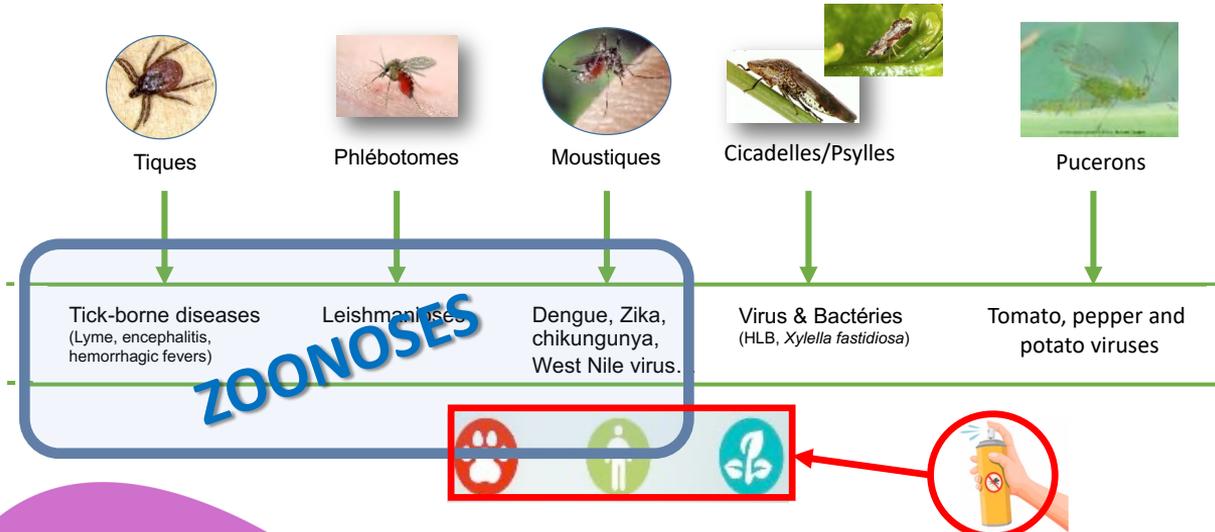
# Enjeux liés au développement d'approches intégrées et d'outils innovants pour lutter contre les vecteurs

Frédéric SIMARD, IRD, MIVEGEC, Montpellier

# L.A.V. intégrée – Quels enjeux?

**One Health** is an integrated, unifying approach that aims to sustainably balance and optimize the **health of people, animals and ecosystems**. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent.

The approach mobilizes **multiple sectors, disciplines** and communities at varying levels of society to work together to foster **well-being** and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.



One Health High Level Expert Panel (OHHLEP)  
from FAO, OIE, UNEP, WHO

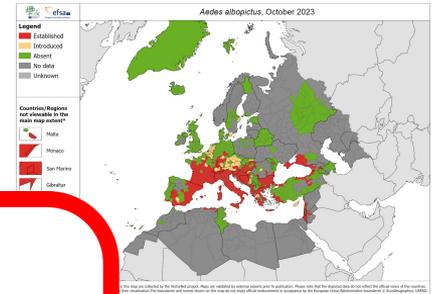
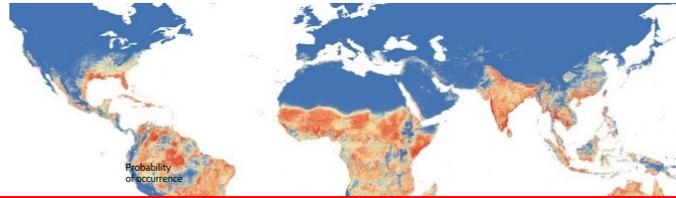
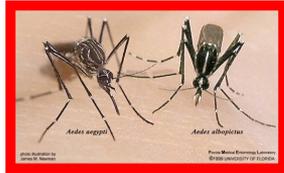


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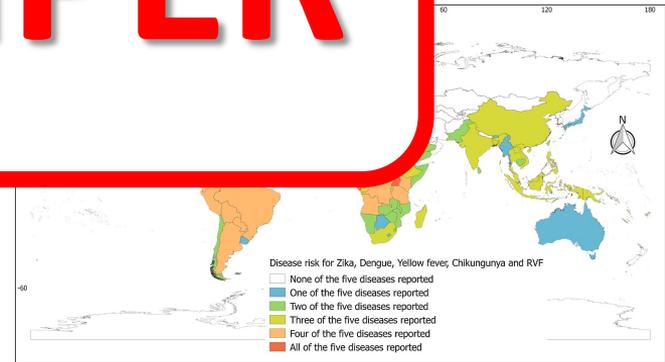


# L.A.V. intégrée – Quels enjeux?



# ANTICIPER

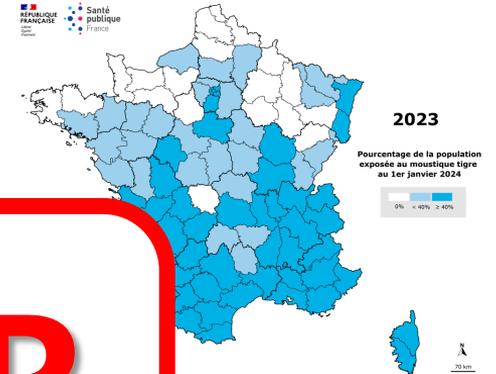
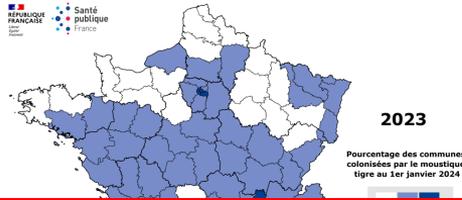
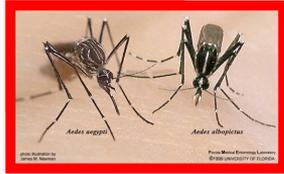
amer 2015& 2019)



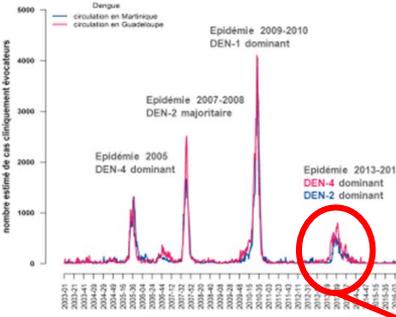
Mondialisation, changement climatique, urbanisation, usage des terres,...

60% de la population à risque pour au moins 1 ABDs (Leta et al. 2018)

# L.A.V. intégrée – Quels enjeux?



Source: réseau des médecins sentinelles



**PROTEGER**



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Courtesy C. Calba, M-C. Paty 2024 Jeudi 25 avril Espace Van Gogh



# L.A.V. intégrée – Quels enjeux?



Manque de bases scientifiques pour évaluer l'efficacité et l'efficacité des outils et stratégies de lutte (Cochran reviews, Roiz et al 2019, Fite et al., in prep)

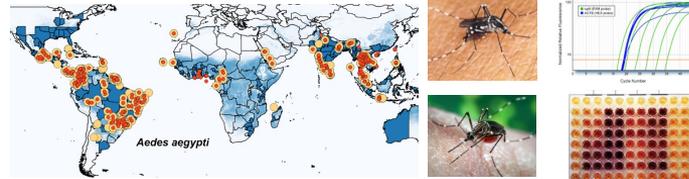
# INNOVER

# EVALUER

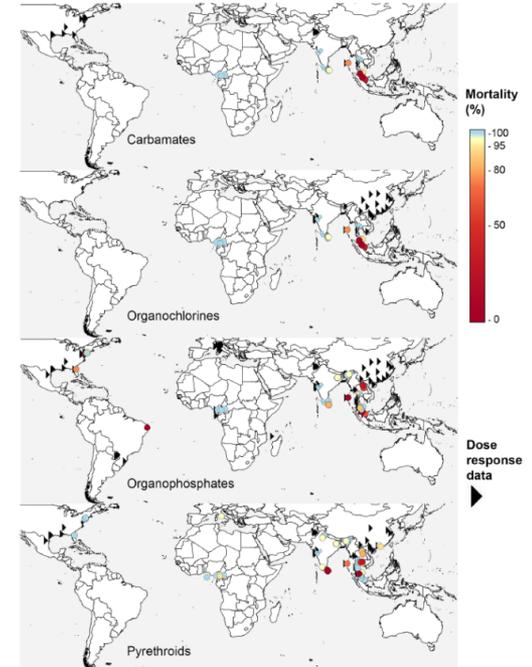
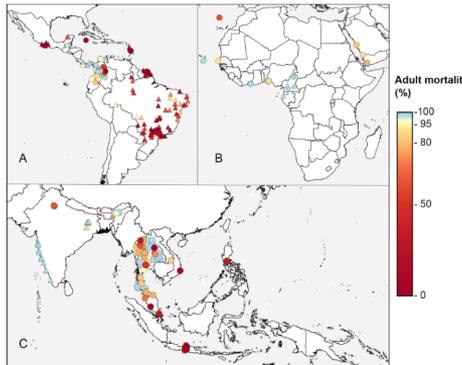
# L.A.V. intégrée – Quels enjeux?



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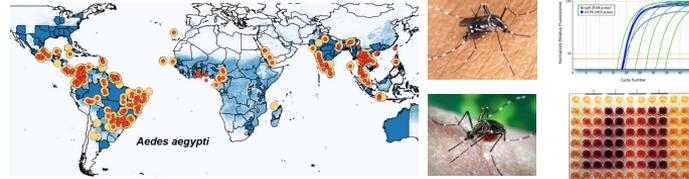
Résistance des *Aedes* aux insecticides décrites dans >57 pays (Moyes et al. 2017)



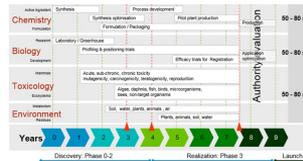
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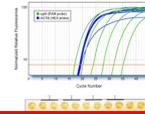
Résistance des *Aedes* aux insecticides décrites dans >57 pays (Moyes et al. 2017)



**ZÉRO PESTICIDE**

Manque général d'investissement,  
Réduction des insecticides/pesticides  
Contexte réglementaire inexistant/inapproprié  
Acceptabilité sociale

# L.A.V. intégrée – Quels enjeux?



# INTEGRER

Manque de bases scientifiques pour évaluer l'efficacité et l'efficience des outils et stratégies de lutte (Cochran reviews, Roiz et al., Fite et al., in prep)

Manque général d'investissement,  
Contexte réglementaire inexistant/inapproprié  
Rejet social des insecticides/pesticides  
Acceptabilité sociale

Actions multisectorielles coordonnées pour une gestion intégrée du risque vectoriel



# L.A.V. intégrée – Quelles solutions?



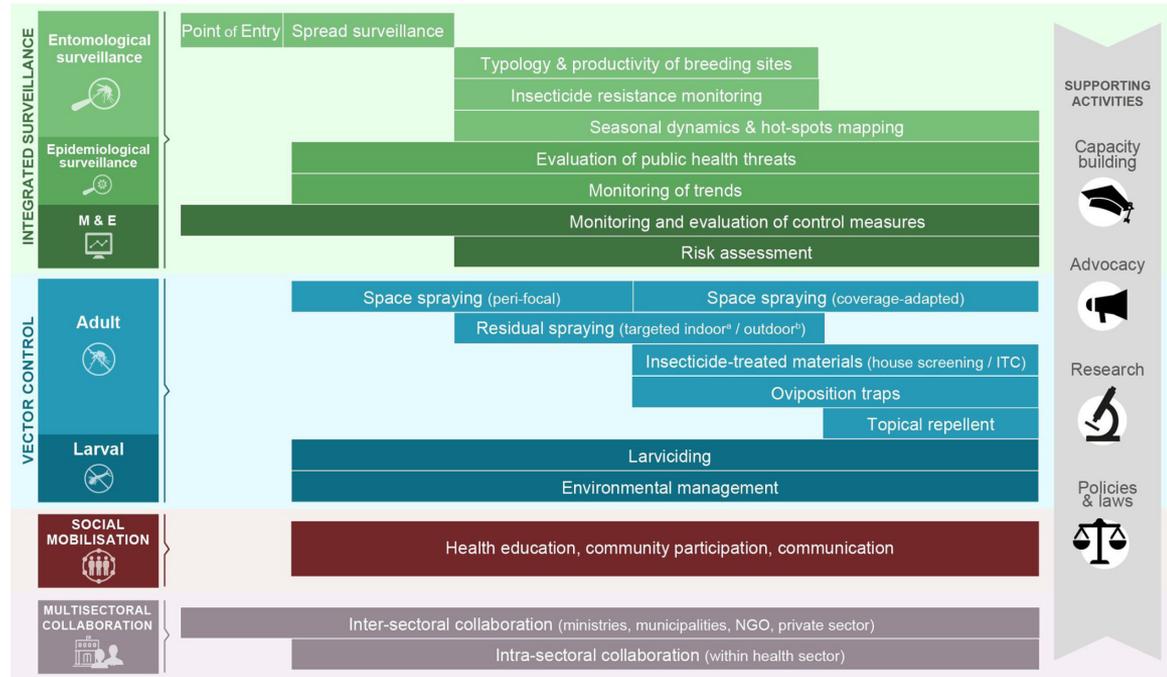
REVIEW

## Integrated *Aedes* management for the control of *Aedes*-borne diseases

David Roiz<sup>1\*</sup>, Anne L. Wilson<sup>2</sup>, Thomas W. Scott<sup>3</sup>, Dina M. Fonseca<sup>4</sup>, Frédéric Jourdain<sup>1</sup>, Pie Müller<sup>5,6</sup>, Raman Velayudhan<sup>7</sup>, Vincent Corbel<sup>1\*</sup>

This review is one of a series being conducted by the Worldwide Insecticide resistance Network (WIN). It describes a framework for implementing Integrated *Aedes* Management (IAM) to improve control of diseases caused by *Aedes*-borne viruses based on available evidence. IAM consists of a portfolio of operational actions and priorities for the control of *Aedes*-borne viruses that are tailored to different epidemiological and entomological risk scenarios. The framework has 4 activity pillars: (i) integrated vector and disease surveillance, (ii) vector control, (iii) community mobilisation, and (iv) intra- and intersectoral collaboration as well as 4 supporting activities: (i) capacity building, (ii) research, (iii) advocacy, and (iv) policies and laws.

PLOS Neglected Tropical Diseases | <https://doi.org/10.1371/journal.pntd.0006845> December 6, 2018



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# L.A.V. intégrée – Quelles solutions?

REVIEW

## Alternative strategies for mosquito-borne arbovirus control

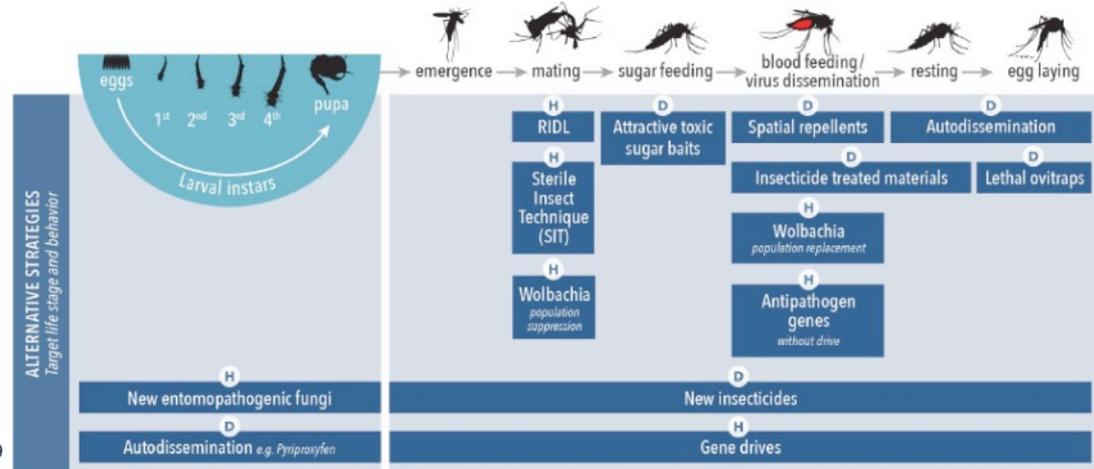
Nicole L. Achee<sup>1\*</sup>, John P. Grieco<sup>1</sup>, Hassan Vatandoost<sup>2</sup>, Gonçalo Seixas<sup>3</sup>, Joao Pinto<sup>3</sup>, Lee Ching-NG<sup>4</sup>, Ademir J. Martins<sup>5</sup>, Waraporn Juntarajumong<sup>6</sup>, Vincent Corbel<sup>7</sup>, Clement Gouagna<sup>7</sup>, Jean-Philippe David<sup>8</sup>, James G. Logan<sup>9,10</sup>, James Orsborne<sup>9</sup>, Eric Marois<sup>11</sup>, Gregor J. Devine<sup>12</sup>, John Vontas<sup>13,14</sup>

### Key learning points

- Arboviruses such as dengue, Zika, and chikungunya are reemerging worldwide with increasing prevalence and/or severity.
- Decades of efforts have failed to consistently control *Aedes* spp. mosquito populations and/or to curtail the cycle of arbovirus epidemics. Reasons are complex and include inadequate program implementation; lack of human, financial, and infrastructural capacity; IR; and inability to scale up existing interventions.
- Several alternative *Aedes* spp. arbovirus vector-control strategies are in the development pipeline and under evaluation, including biological and chemical approaches, but lack evidence with regards to when and where such strategies and/or products could offer greatest public health value and contribute to managing IR.
- Alternative strategies will need to be introduced using an approach of integrated vector management to include optimization of current methods, such as innovative delivery of existing products.
- An alternative vector-control strategy may be more useful via its role in integrated resistance management, even if it is of a similar efficacy to existing interventions.

### Interventions Challenged by Resistance

1 target site 2 cuticular impermeability 3 metabolic detoxification 4 behavioral



### Anticipated Impact of Intervention on Resistance Mitigation

H High D Dependent on Active Ingredient

PLOS Neglected Tropical Diseases | <https://doi.org/10.1371/journal.pntd.0006822> January 3, 2019

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# L.A.V. intégrée – Quelles solutions?



*This project has received funding from the European Union HORIZON-MSCA-2021-SE-01, under the grant No 101086257 [Jan 23 - Dec 26]*

17 pays  
20 académiques  
5 privés  
1 Organisation Intl.



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# L.A.V. intégrée – Quelles solutions?



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ino**VEC**



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**Objectif:** Promouvoir les **collaborations internationales, multidisciplinaires et trans-sectorielles** pour renforcer les **connaissances scientifiques et techniques** sur la surveillance et la lutte contre les moustiques vecteurs et les arbovirus émergents

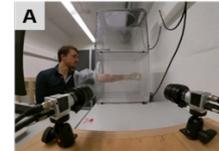
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# L.A.V. intégrée – Quelles solutions?

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# L.A.V. intégrée – Des opportunités!

- ❑ Programmes et cursus d'enseignement
- ❑ Encadrement et supervision Docs et Posdocs



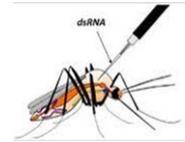
- ❑ Renforcement des capacités et transfert de technologies
- ❑ Organisation d'ateliers techniques et conférences (Resistance Workshop, FIOCRUZ, Sept 23).



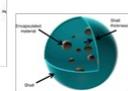
inoV<sup>EC</sup>



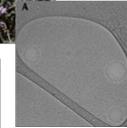
- ❑ Développer et évaluer l'efficacité d'outils et technologies innovantes pour le contrôle des moustiques vecteurs



Rnai-based  
biopesticides



Nanotechnology  
based repellents



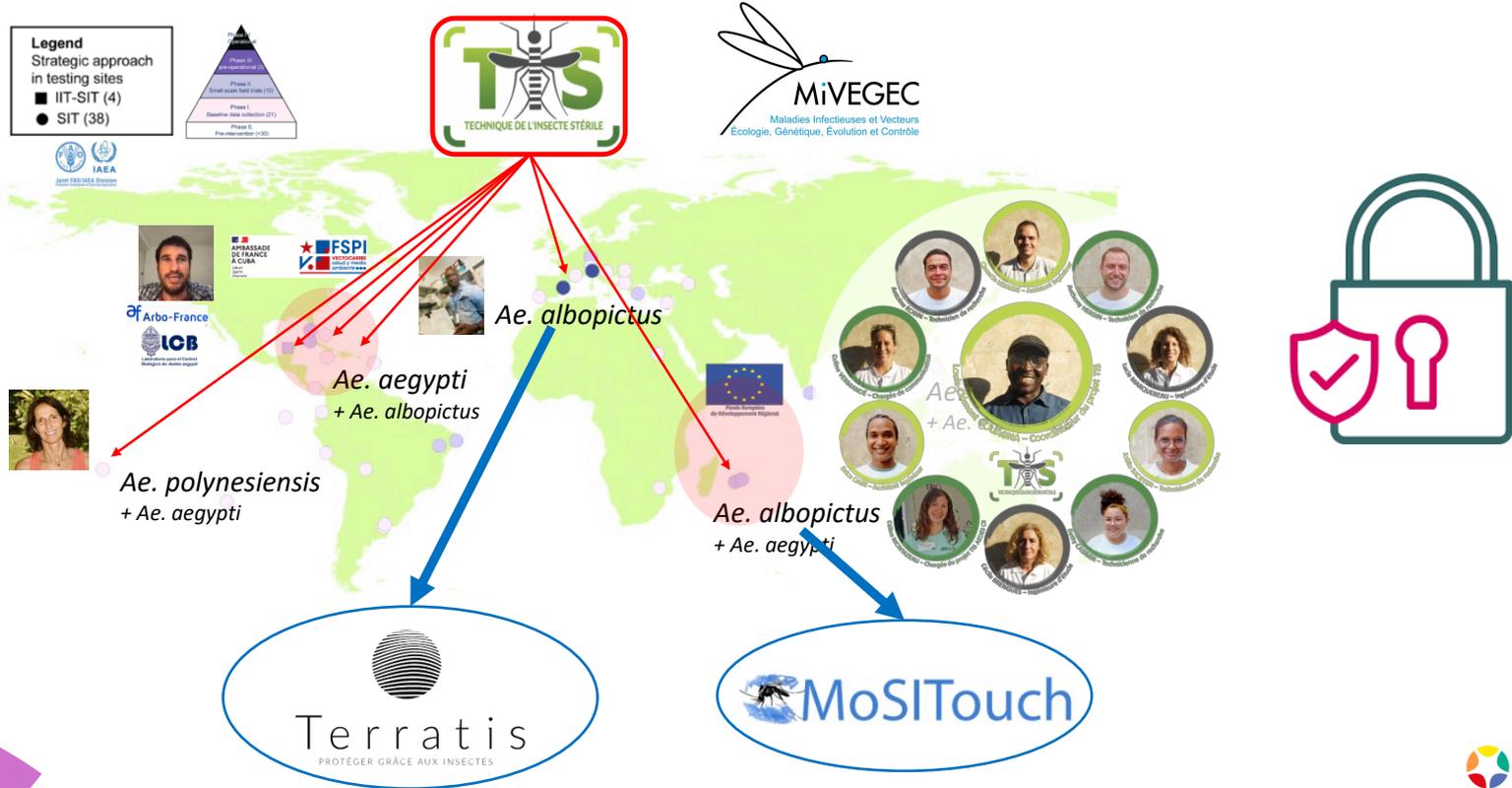
Mass-trapping  
technologies

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# L.A.V. intégrée – Des opportunités!



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# L.A.V. intégrée – Des opportunités!



International Conference

“Advances in surveillance and control methods for *Aedes*-borne diseases and urban vectors”

August 26-28, 2024

White Sands Resort & Conference Center  
Jangwani, Africana Road  
Dar es Salaam, Tanzania



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Merci de votre attention

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**ESOVE**  
2024

The XXIII<sup>rd</sup> European Society for Vector Ecology Conference

**ONE HEALTH IN ACTION:**  
supporting and accelerating  
the bridging of the vertebrate  
and plant health communities

14-17<sup>th</sup> Oct. 2024  
Montpellier, France

<https://www.alphavisa.com/e-sove/2024/index.php>

