Insecticide resistance modulates densovirus effect in Aedes albopictus

Haoues Alout, Alice Namias, Pierrick Labbé, Célestine Atyame Nten, Pablo Tortosa, Mylène Weill

Insecticide resistance modulates densovirus effect in *Aedes albopictus*

Namias[1] A, Labbe[1] P, Atyame[2] C, Tortosa[2] P, Weill[1] M, Alout[3] H

[1] Institut des Sciences de l'Evolution de Montpellier (ISEM), UMR5554 CNRS/IRD/Université Montpellier, France
[2] Processus Infectieux en Milieu Insulaire Tropical (PIMIT), UMR249 CNRS/INSERM/IRD/Université de La Réunion, île de La Réunion, France
[3] Animal, Santé, Territoires, Risques, Ecosystèmes (ASTRE), UMR117 INRA/CIRAD, Montpellier, France

Presenter: Haoues Alout, haoues.alout@inra.fr

Abstract:

Insecticide resistance is an adaptation to vector control but it can also modulate physiological and behavioural traits potentially impacting many aspects of mosquito ecology [1]. To understand *Aedes albopictus* dynamics and find new control alternatives, it is crucial to understand how resistance impacts life history traits and the interaction with microorganisms. To this aim, we compared the performances of mosquito lineages sharing a common genetic background but homozygous susceptible or resistant to dieldrin (*rdl*). We compared larval development in absence of insecticide and we challenged the two lineages with the densovirus *AalDV2*, a potential alternative control tool [2], to compare their susceptibility to infection in two distinct larval environments. Homozygous resistant mosquitoes developed more slowly than the homozygous susceptible[A], but displayed similar larval mortalities[B]. Insecticide resistance increased densovirus-associated mortality in distilled water[C] but not in regular tap water, and more generally it was associated with a greater variance of densovirus replication[D].

Results and discussion:

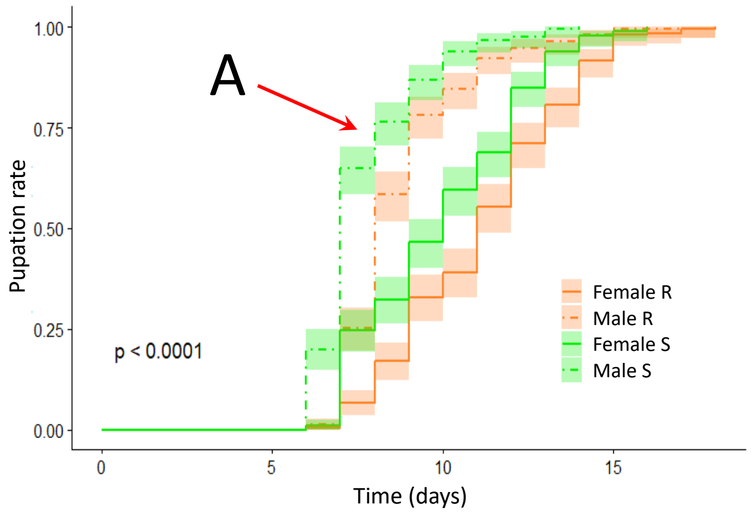

Figure 1. Daily pupation rate of susceptible (S) and resistant (R) *A. albopictus*

- Increased development time associated with insecticide resistance (A) but similar larval mortality (B)

	Genotype	S		R		
	Water type	N	Mortality rate	N	Mortality rate	χ^2 (p-value)
Control	Tap (3 reps)	510	0.150	500	0.157	0.095 (0.757) ← B
Densovirus	Tap (1 rep)	100	0.130	100	0.160	0.161 (0.688)
	Distilled (2 reps)	200	0.105	200	0.210	**7.536 (0.006)** ← C
χ^2 (p-value)			2.4 (0.300)		2.82 (0.244)	

Table 1. Larval mortality rate of susceptible (S) and resistant (R) *A. albopictus* in absence or presence of densovirus infection challenged in tap or distilled water.

- *AalDV2* densovirus showed greater mortality in resistant mosquitoes compared to susceptible ones only in distilled water (C)

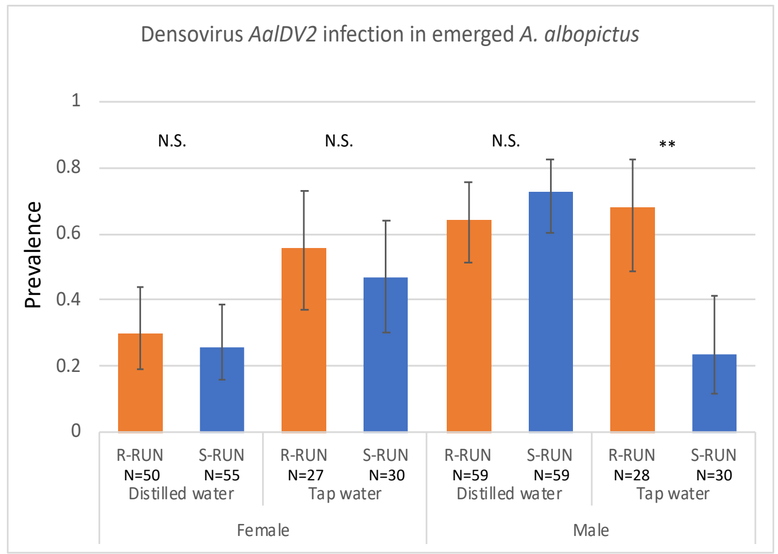

Figure 2. Prevalence of densovirus infection in newly emerged *A. albopictus*

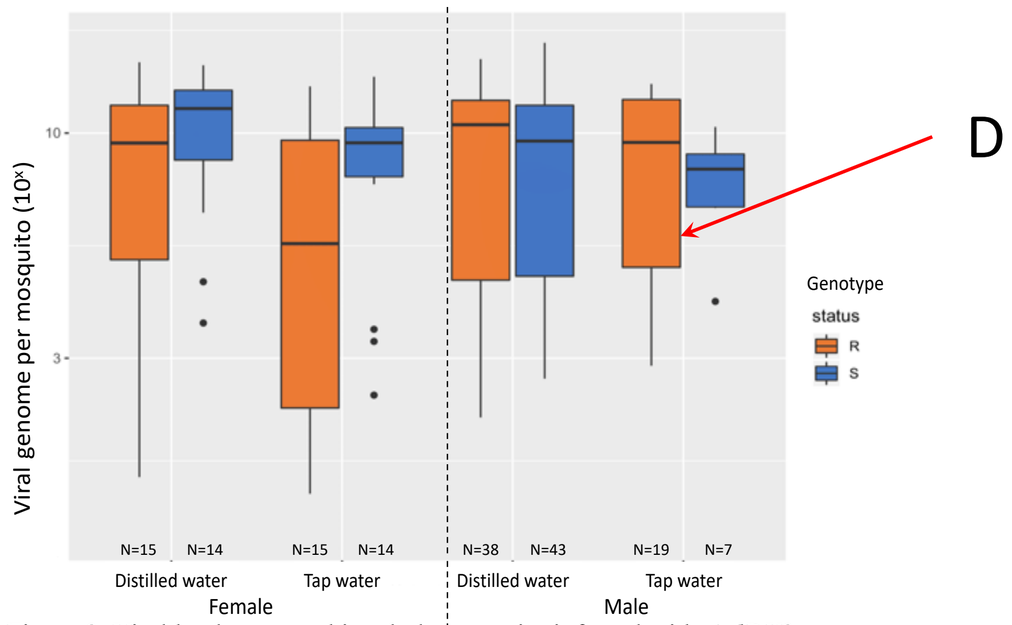

Figure 3. Viral load measured in whole mosquito infected with *AalDV2*

- Insecticide resistance modulates *AalDV2* densovirus prevalence depending on sex and type of water

- *AalDV2* viral load showed greater variance in resistant mosquitoes than in susceptible ones (D)

References

[1] Alout et al. 2017 PLoS Path. 13: 3–7.
[2] Carlson et al. 2006 Adv Virus Res. 2006;68: 361–392

Contact info

Download poster