INTERSPECIFIC LARVAL COMPETITION:

One further point to explain the expansion of *Aedes albopictus*

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Introduction

▪Invasive species are frequently good colonizers of unsaturated sites (r-selected traits) **but** invaders often have to colonize areas already occupied ➔they should have higher competitive abilities than resident or previously introduced species.

▪*Aedes albopictus* (Diptera:Culicidae) is among the 100 of the World's Worst Invasive Alien Species and has replaced *Ae. aegypti* in many countries.

▪In Reunion Island *Ae. albopictus* is the most common mosquito and *Ae. aegypti* is rarer and coexists at larval stages with this invasive species (Bagny et al, 2009). A comparative study on life history traits realised there on both species revealed several differences but was not sufficient to explain the pattern of distribution observed. (Bagny et al, in prep)

Could competitive interactions contribute to the expansion of *Ae. albopictus* in areas already occupied by *Ae. aegypti*?

Materials et methods

Several factors were studied with four replicates for each treatment:
- Effect of **abiotic factor**: ambient temperature (20°, 25°, 30°C) on mean **survivorship** and median **pupation time** (P50) of both species (density: 20*Ae. albopictus* / 20*Ae. aegypti*)
- Effect of **biotic factors**: larval densities of conspecifics and heterospecifics (20, 40, 60 individuals for 200 mL of water) / food availability (limited and optimal diet: leaf litter+additional food) on **individual performance** (mean **survivorship** and mean **fecundity**) of both species

Results

Fig.1a **Mean survivorship (±SE) at different temperatures**

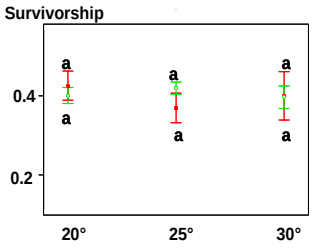
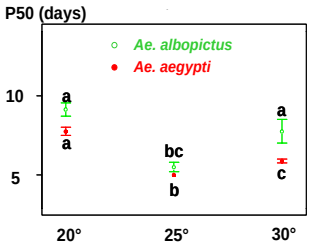


Fig.1b **P50 (in days) (±SE) at different temperatures**



Different letters indicate significant differences (P<0.05) using Wilcoxon pairwise test with "Benjamini & Hochberg (BH)" correction

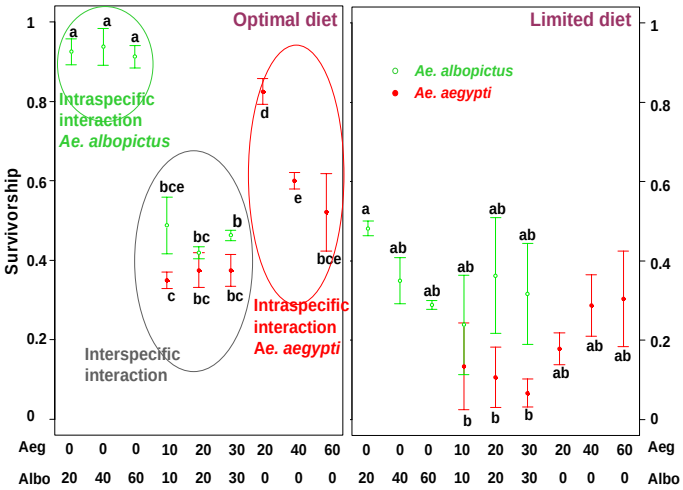
❖ No significant differences in survivorship of both species between 20°C and 30°C

❖ *Ae. aegypti* develops faster than *Ae. albopictus*

❖ Minimun developement time is observed at 25°C

Fig.2 **Mean survivorship (±SE) of both species at 25°C**

Different letters indicate significant differences (P<0.05) using Wilcoxon pairwise test with "Benjamini & Hochberg (BH)" correction

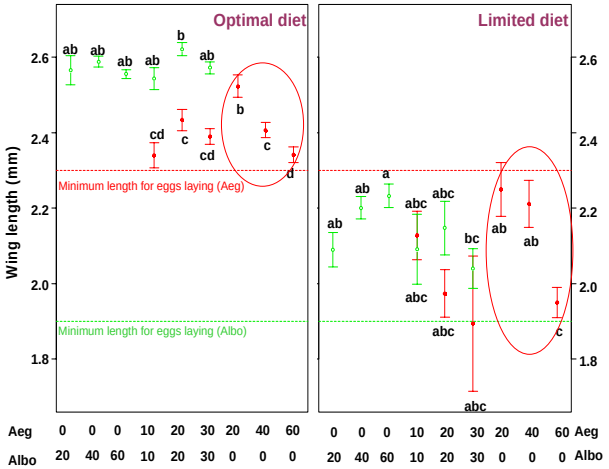


❖ **On optimal diet**: - Decrease of survivorship of *Ae. albopictus* only due to presence of *Ae. aegypti* (no density effects)
- Decrease of survivorship of *Ae. aegypti* linked with increase of conspecifics density (intraspecific interaction) and linked with presence of *Ae. albopictus* (whatever the density)

❖ **On limited diet**: significantly lower survivorship than under optimal diet at all density for both species

Fig.3 **Mean wings length (±SE) (mm) for both species at 25°C**

Different letters indicate significant differences (P<0.05) using Wilcoxon pairwise test with "Benjamini & Hochberg (BH)" correction



❖ Significant decrease of wing length of *Ae. albopictus* only under limited diet but the species is still able to lay eggs

❖ Significant decrease of wing length of *Ae. aegypti* when species density increases under optimal treatment. (Limited diet ➔ No eggs laying)

Discussion

➢ In the range20-30°C, temperature does not affect the outcome of competitive interactions between both species
➢ *Ae. aegypti* is more affected by intraspecific interaction than is *Ae. albopictus*

➔ The high ability to outcompete *Ae. aegypti* under all treatments of density and diet could partly explain the worldwide expansion of *Ae. albopictus*

Bagny, L., Delatte, H., Fontenille, D., Quilici, S. Progressive decrease in *Ae. aegypti* distribution in Reunion Island since the 1900's. J. Med. Entomol. (In press)

Bagny, L., Delatte, H., David, P., Fontenille, D., Quilici, S. Could life history traits explain the displacement and reduction of *Ae. aegypti* populations in La Réunion? (In prep)

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