#4833 INSECT PLASTICITY TO CLIMATE CHANGE: EFFECT OF GUT SYMBIONT ON STARVATION RESISTANCE AND THERMAL TOLERANCE OF TEPHRITID FRUIT FLIES (DIPTERA, TEPHRITIDAE)

PO-07

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❑ Introduction

- Thermal stress resistance, allowing insects to adapt to novel or variable climatic conditions, is one of the most important factors that contributes to niche partitioning and biogeographic patterns.
- The ability of an insect to withstand periods of food deprivation or limitation is also considered as a key driver of invasion success.
- Synergies between the insect host and its gut microbiome could affect the capability of providing plastic responses to environmental changes.

Role of gut symbionts in tephritid plasticity under starvation and thermal stress ?

❑ Material and Methods

▪Using laboratory colonies of ***Bactrocera dorsalis*** and ***Zeugodacus cucurbitae*** (6 rep/treatment; 70 adults/rep).

▪**Starvation resistance**: **three adult diet treatments**: sucrose solution only (20%), yeast hydrolysate solution only (20%), or sucrose and yeast hydrolysate at 3:1 ratio.

▪**Thermal tolerance: 10°C, 25°C, 35°C**

▪**Symbionts effect:** <u>axenic</u> (diet with antibiotics) and <u>non-axenic</u> (diet without antibiotics) adult tephritid fruit flies (Fig.1).

Measuring adults **performance** (mean **survival** mean **fecundity**) of fruit fly species.

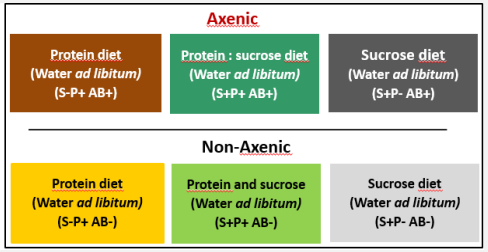

Fig.1 Experimental design

❑ Results

- Gut symbionts and feeding status significantly (GLM, P<0.001) affected cold and heat survival of *B. dorsalis* and *Z. cucurbitae*.
- Non-axenic flies showed a significantly higher survival than axenic ones at different tested temperature (Fig.2).

Gut microbial symbionts and food quality can play critical roles in the heat and cold tolerance of *B. dorsalis* and *Z. cucurbitae*.

- Fecundity of fruit flies was significantly affected by diet (with higher values for protein:sucrose diets), temperature (higher fecundity with 25°C), and gut symbionts (higher fecundity in non-axenic flies) (Fig.3).

Complete diet (protein:sucrose) is essential for fecundity, while protein is of less importance for survival (except at high temperature).

Decrease in host performance was coupled with, and potentially mediated by gut symbiont loss in axenic flies and by adult food quality.

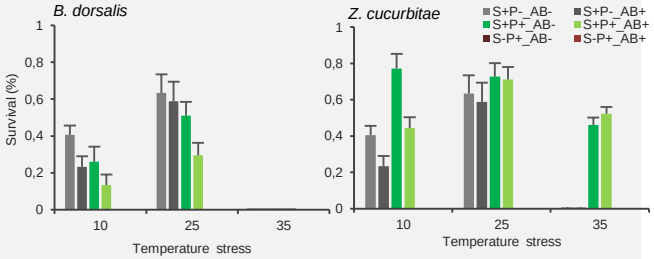

Fig.2 Females fruit fly survival after 30 days of diet, temperature treatments (legend fig.1)

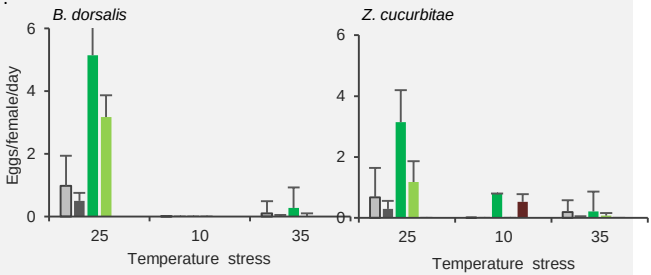

Fig.3 Fruit fly fecundity (±SE) during 30 days at different diet and temperature treatments (legend fig.1)

❑ Discussion

Gut symbionts can facilitate the persistence of fruit fly populations (survival and fecundity) under stressful conditions (thermic and starvation stress), enhancing thus their capacity to colonize new area.