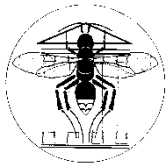


Potential impacts of climate change in larval development and oviposition choice of an aphidophagous hoverfly species *Episyrphus balteatus* (Diptera : Syrphidae)

Grégoire Noël*, Jessica Caetano, Solène Blanchard & Frédéric Francis

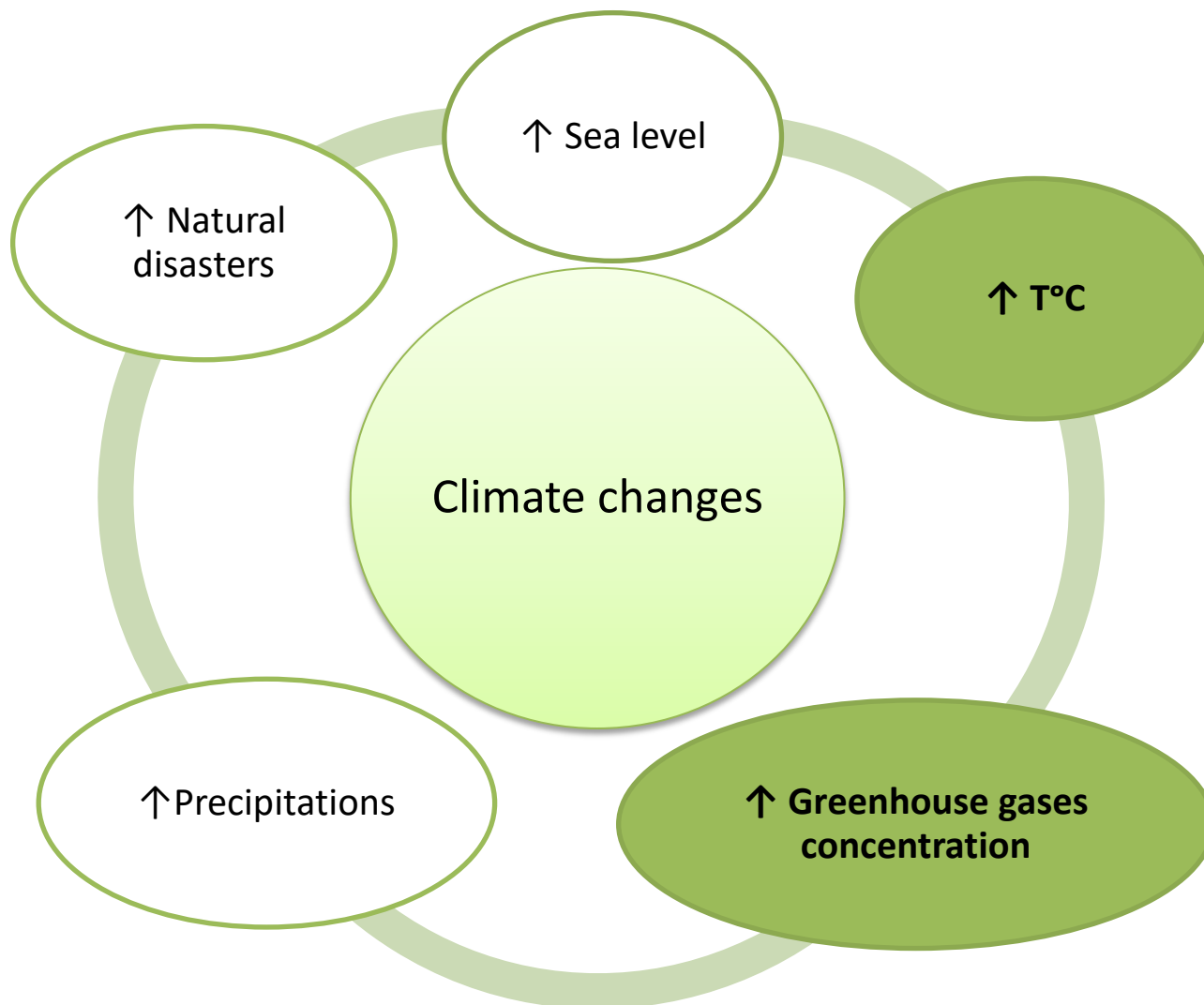


25th National Symposium for Applied Biological Sciences - 31st
January 2020 at Gembloux Agro-Bio Tech (Belgium)



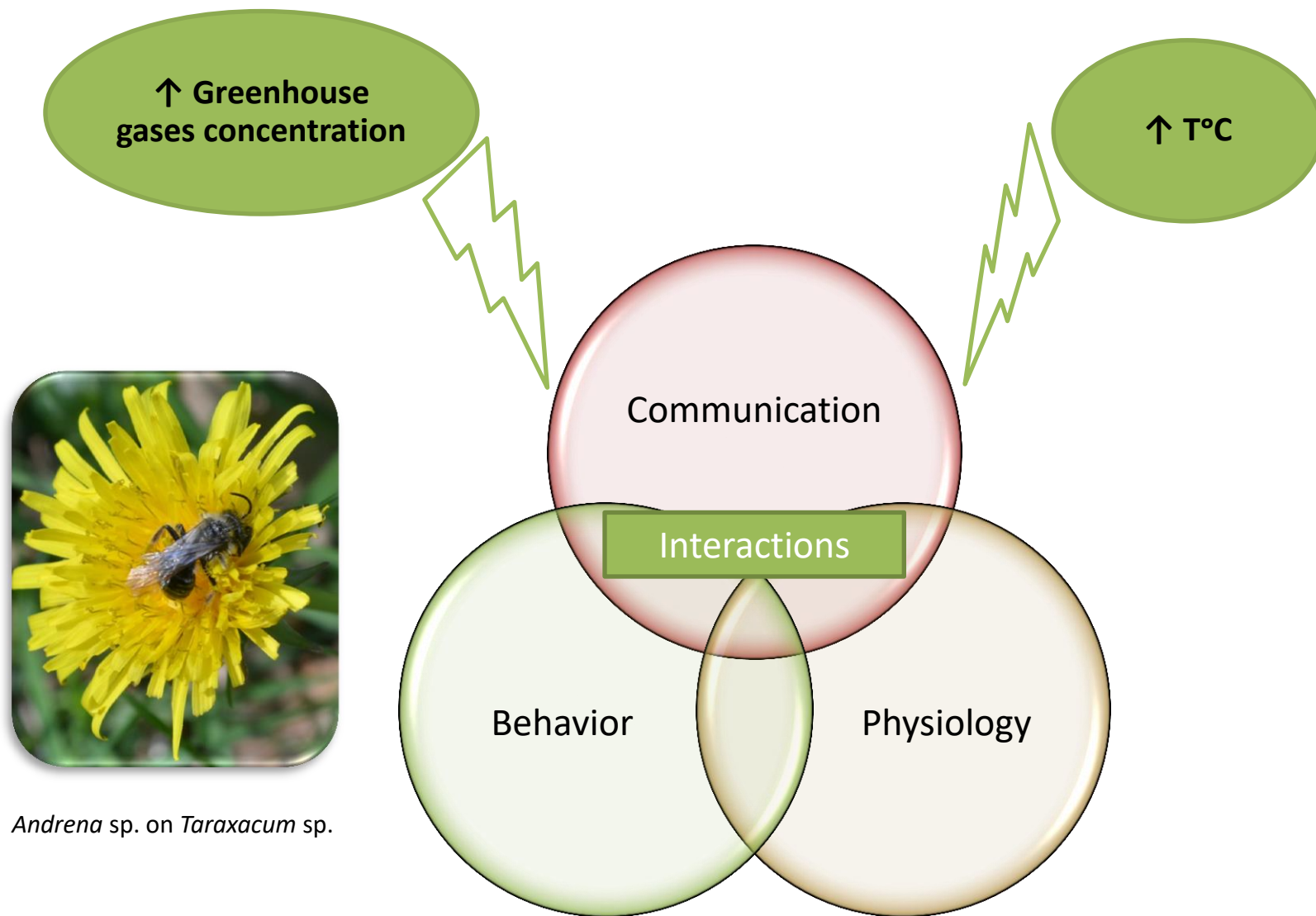


INTRODUCTION



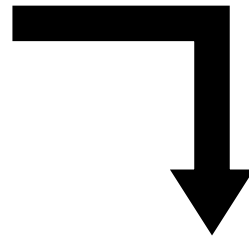


CLIMATE CHANGES IMPACT



TRITROPHIC INTERACTION

Episyrphus balteatus



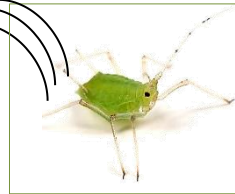
Acyrtosiphon pisum



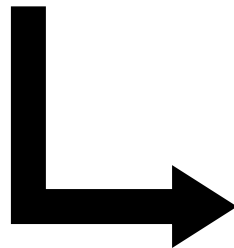
Alarm pheromone emitted by pea aphids *Acyrtosiphon pisum*

+

Emitted Volatile Organic Compounds (VOCs) from honeydew



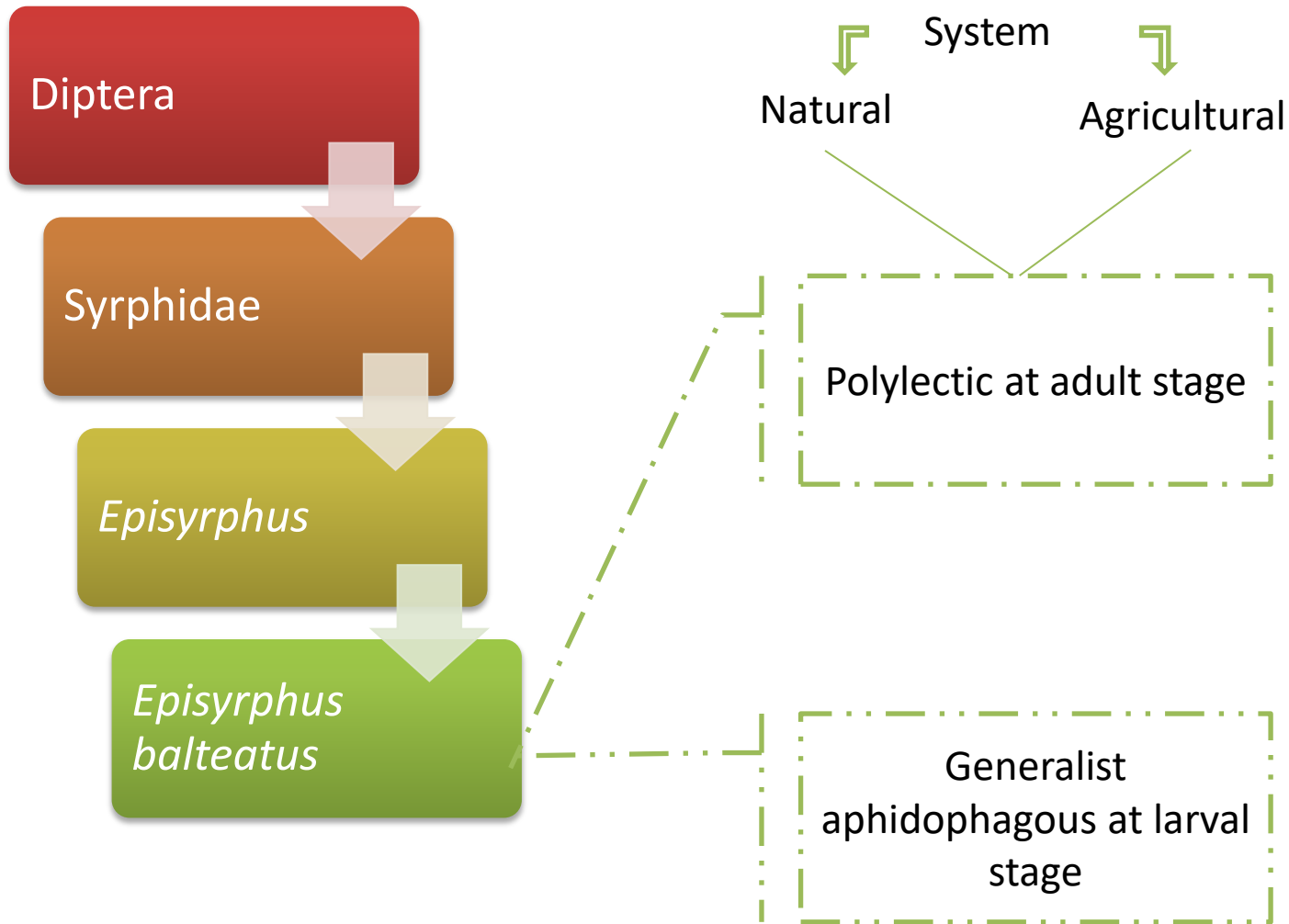
Phytophagous



Defense VOCs

Vicia faba L.

Episyrphus balteatus (De Geer)



© Jéssica Caetano
Episyrphus balteatus adult



© Arthur Van Damme
Acyrtosiphon pisum and larva of *Episyrphus balteatus* on *Vicia faba*



HYPOTHESIS

WHAT ARE THE POTENTIAL IMPACTS OF
CLIMATE CHANGE ($T^{\circ}\text{C}$ AND CO_2) IN
LARVAL DEVELOPMENT AND OVIPOSITION
CHOICE OF *E. BALTEATUS* ?

Objectives





OBJECTIVES

1 Temperature effect on the larval development of *Episyrphus balteatus*

2 Temperature and CO₂ effect on the choice of oviposition site of *Episyrphus balteatus*

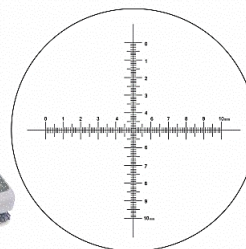
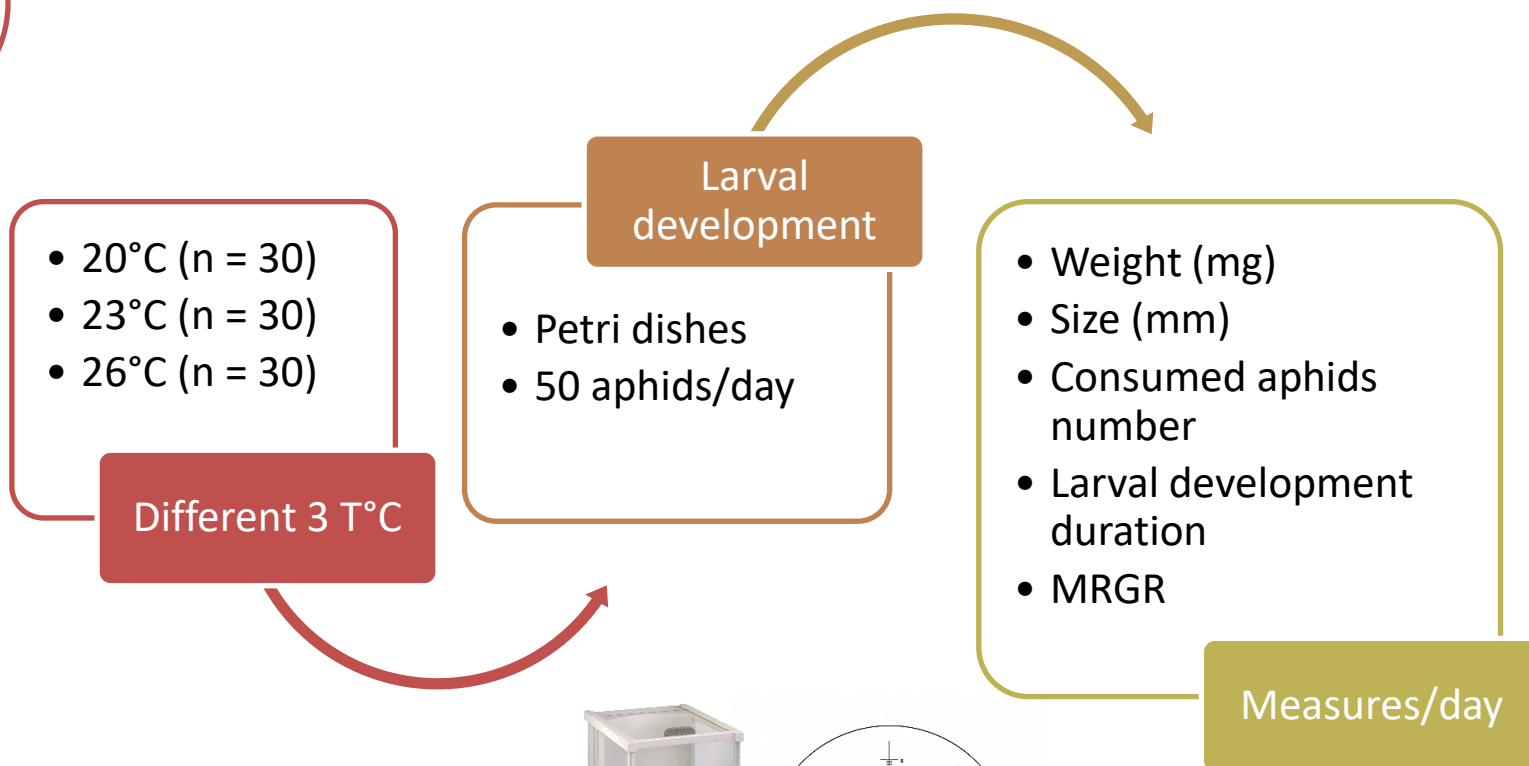
Materials & Methods





THE EXPERIMENT & VARIABLES

1





OVIPOSITION SITE CHOICE

2

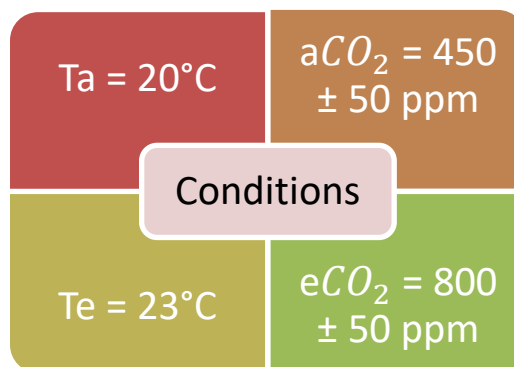
Aphids rearing and plants cultivation in 4 conditions

$T_a \times aCO_2$

$T_e \times aCO_2$

$T_a \times eCO_2$

$T_e \times eCO_2$



Dual-choice bioassays (n = 9/combo): combination of both conditions

$T_a \times aCO_2$ | $T_a \times eCO_2$

$T_a \times aCO_2$ | $T_e \times aCO_2$

$T_a \times aCO_2$ | $T_e \times eCO_2$

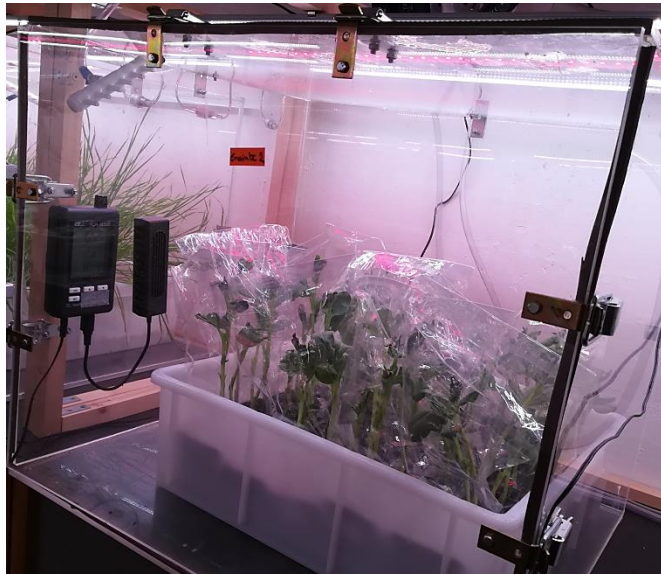
$T_a \times eCO_2$ | $T_e \times aCO_2$

$T_a \times eCO_2$ | $T_e \times eCO_2$

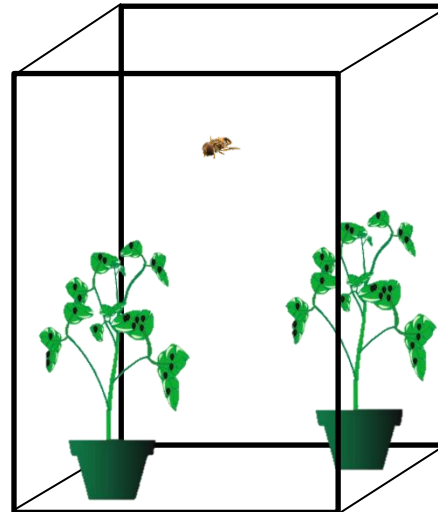
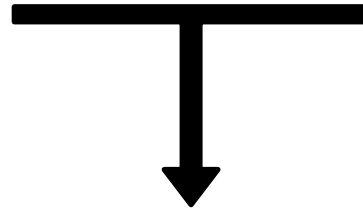
$T_e \times aCO_2$ | $T_e \times aCO_2$

$T_e \times eCO_2$ | $T_a \times eCO_2$

BIOASSAYS SET-UP



Cultivation of *Vicia faba* and rearing of *Aphis fabae* (Scopoli 1763) in different conditions of CO_2 and $T^\circ C$.



Dual-choice at ambient conditions
(CO_2 et $T^\circ C$)



Adult rearing of *Episyrrhus balteatus* at ambient conditions (CO_2 et $T^\circ C$).

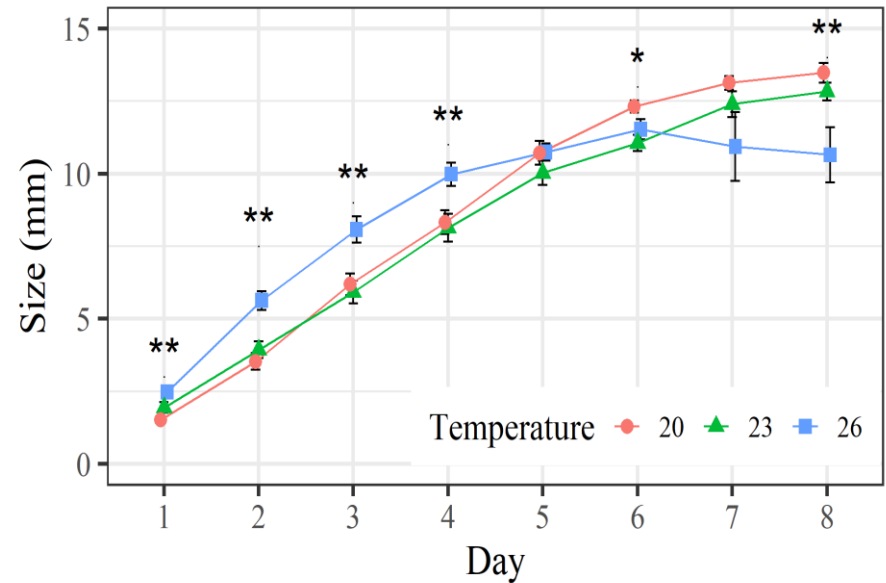
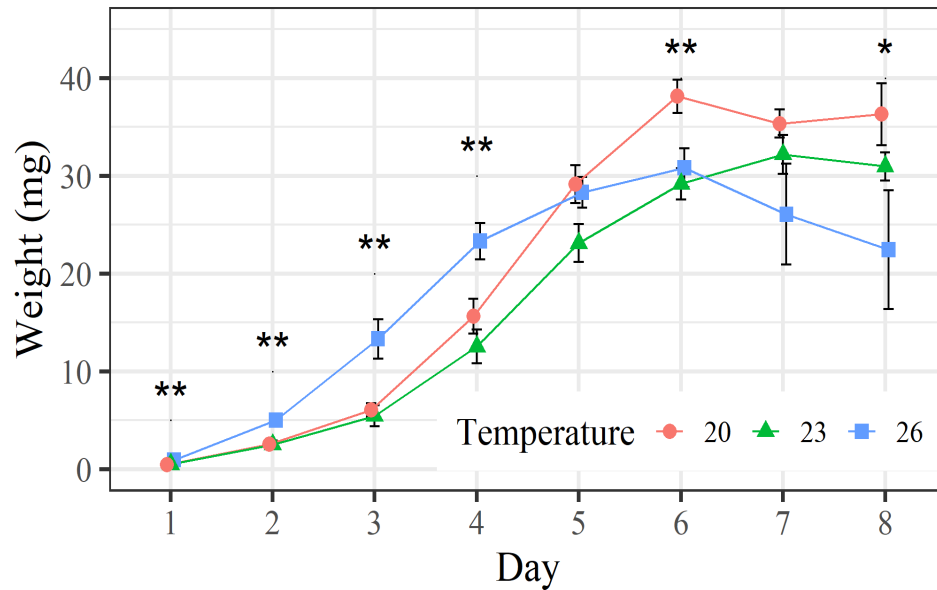
Results & Discussion



LARVAL WEIGHT & SIZE EVOLUTION

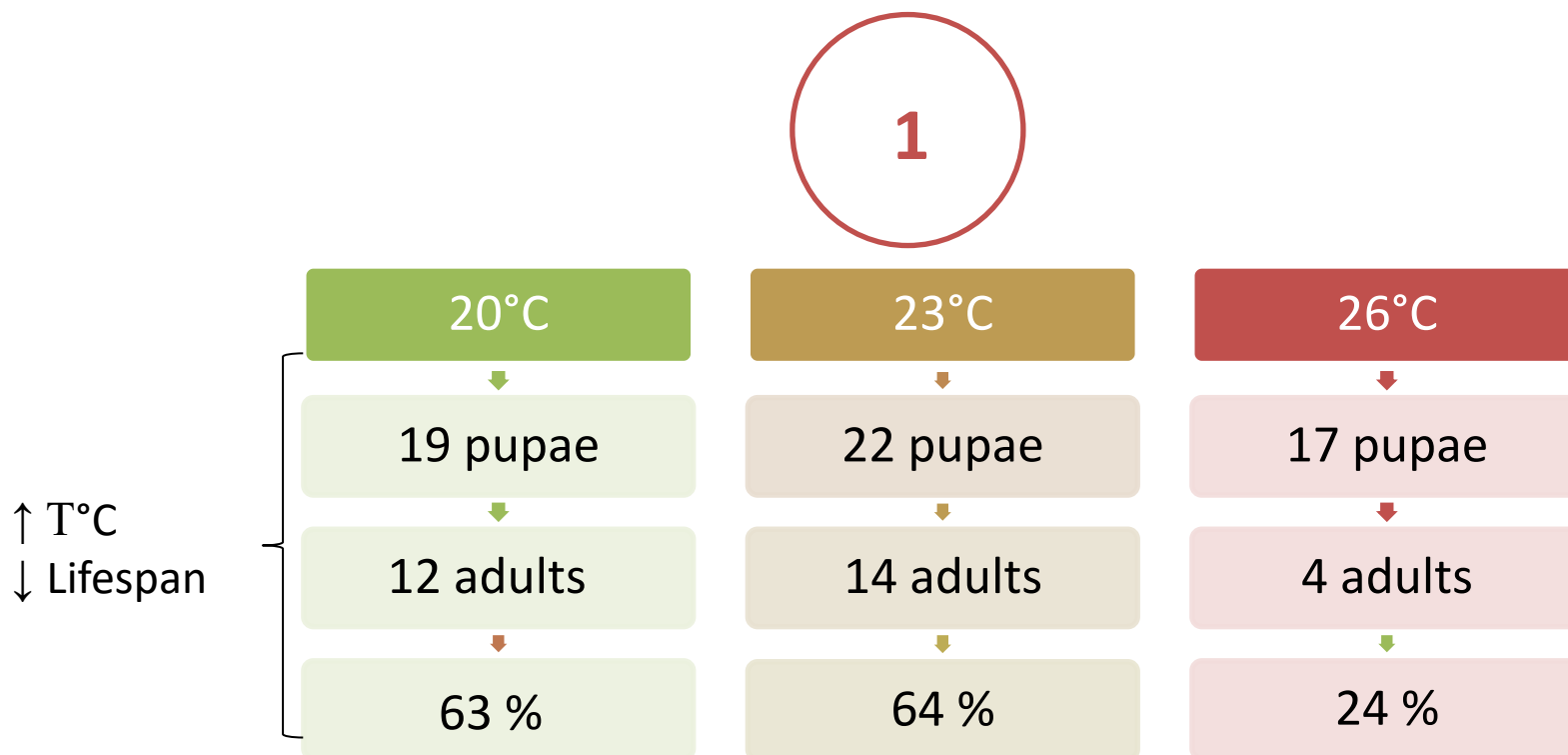
1

- Highly correlated variables
- Last larval weight and size are lower for 26°C than 20°C
- Larval development is faster at 26°C than for 20°C and 23°C





ADULT EMERGENCE

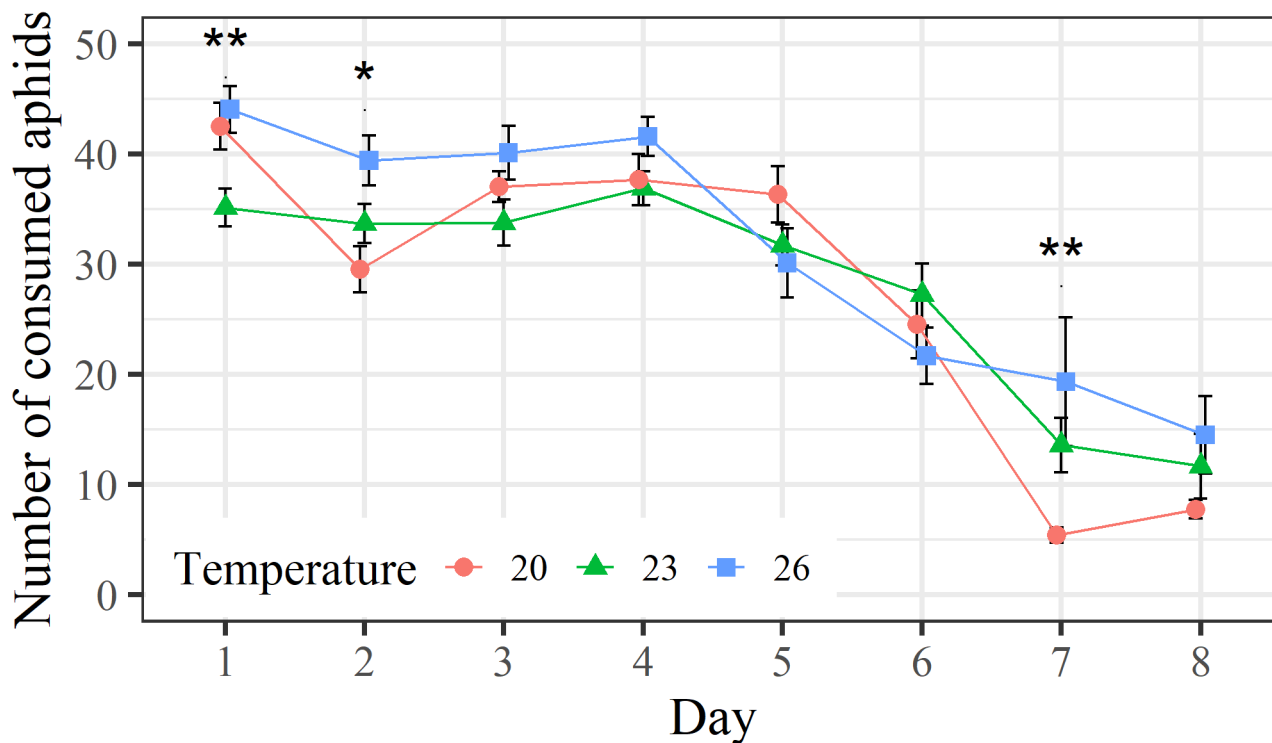




APHID CONSUMPTION

1

- Total number of consumed aphids/larva is equivalent according to the three T°C
- MRGR also equivalent

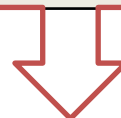




OVIPOSITION SITE CHOICE EXPERIMENT

2

Ta x aCO ₂	Ta x aCO ₂	Ta x aCO ₂	Ta x eCO ₂	Ta x eCO ₂	Te x aCO ₂
Ta x eCO ₂	Te x eCO ₂	Te x aCO ₂	Te x aCO ₂	Te x eCO ₂	Te x eCO ₂

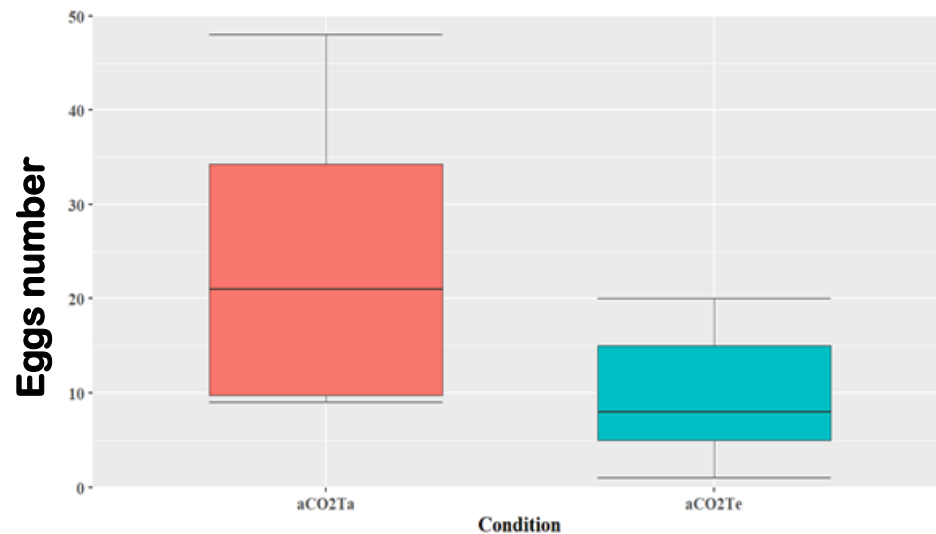


Ta = Ambient temperature

Te = Elevated temperature

aCO₂ = Ambient CO₂

eCO₂ = Elevated CO₂



Take-Home Message



TAKE-HOME MESSAGE

1

↑T°C



Larval development

- ↓ Last larval weight & size → fitness
- ↓ Larval development duration
- = aphidophagous potential

2

↑T°C



Oviposition site choice

- ↓ Attraction of aphid-plant system

Perspectives

- Transcriptomic

Perspectives

- Keep all the trophic systems cultivation and rearing at same climate conditions

Thank to the team !



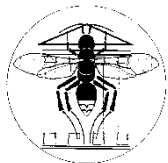
Jessica Caetano



Solène Blanchard



Frédéric Francis





Thank you for your
attention !

