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INTRODUCTION

Release of greenhouse gases in the atmosphere has increased since the mid 1800's. Today, concentrations of carbon dioxide (CO₂) and ozone (O₃) have reached respectively 400 ppm and 40-60 ppb in Europe. According to forecasting models, these concentrations are expected to hit between 550 and 1000 ppm for CO₂ and between 60 and 100 ppb for O₃.

Will these increases in greenhouse gas concentration affect interactions between insect herbivores and their natural enemies ?



PROJECT

1/ Evaluate the impact of increased greenhouse gas emissions on intraspecific and interspecific communication in pea aphid *Acyrtosiphon pisum* (Harris) populations.

Quantification of the production of aphid semiochemicals used as kairomones by natural enemies

- Alarm pheromone (E)-β-Farnesene
- Honeydew semiochemicals



Acyrtosiphon pisum (Harris)

2/ What impact on the prey searching behavior of natural enemies.



Harmonia axyridis (Pallas)



Episyrphus balteatus (De Geer)

METHODS

Rearing aphids, hoverflies and ladybirds under ambient and elevated CO₂ and O₃ concentrations.

AND/OR

Crushing aphid(s), collection of volatiles released

Pheromone emission under predation

D-HS

GC-MS analysis

(E)-β-Farnesene

D-HS

zNose™ Real-time analysis

Collection of honeydew produced by aphids

Micro-organism rearing

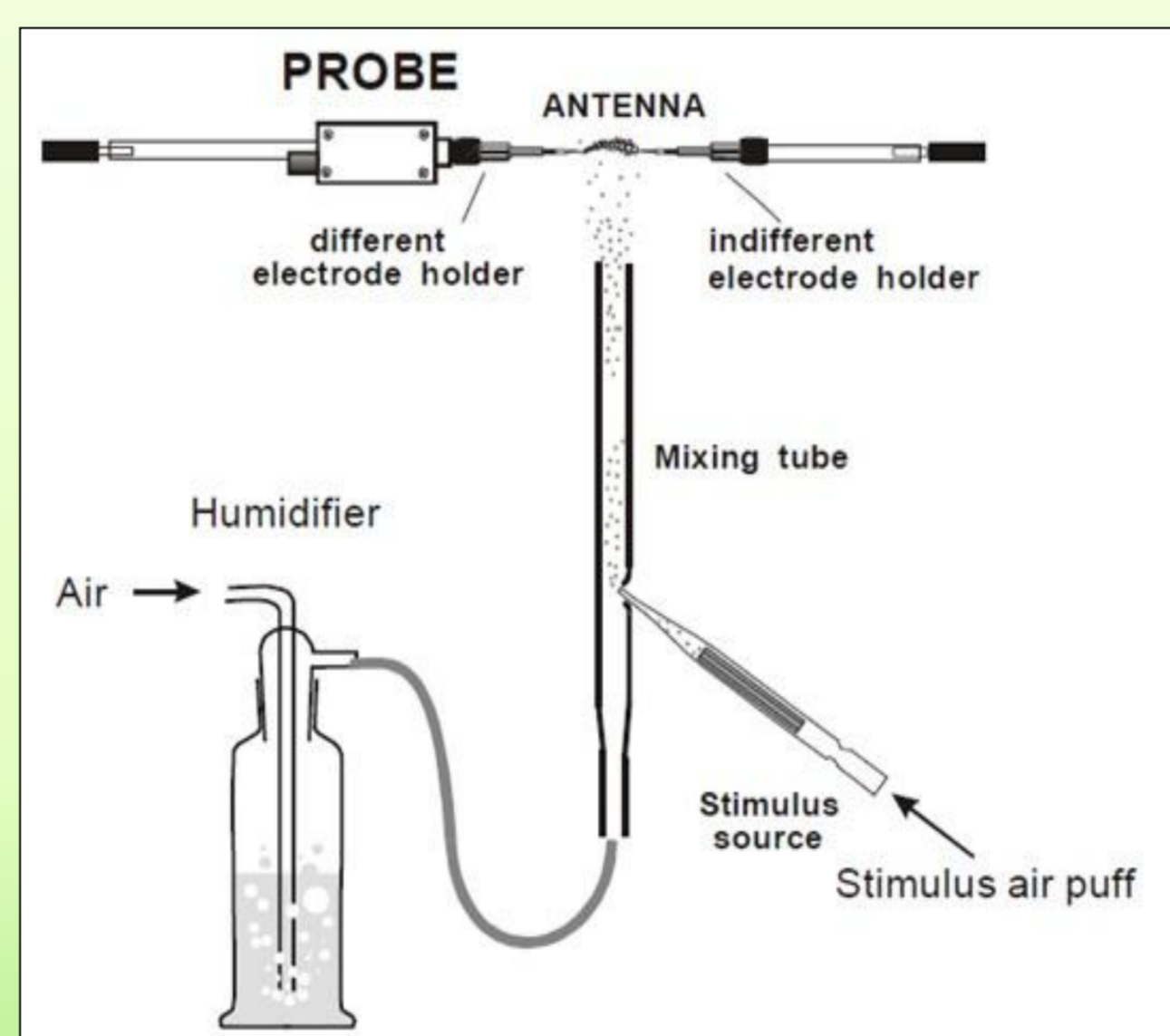
SPME

SPME

GC-MS analysis

Honeydew semiochemicals

Neuronal Perception



Electroantennography

Behavioral response

Four-Arm Olfactometer



Wind Tunnel

EXPECTED RESULTS

- ✓ Modifications in plant secondary metabolites induce perturbations in aphid semiochemical production
- ✓ Less production of (E)-β-Farnesene and honeydew semiochemicals
- ✓ Worse efficiency of natural enemies
- ✓ Could lead to perturbations in ecosystem equilibrium

Acknowledgments :

Fond National de la Recherche Scientifique (FNRS) for funding this project (FRIA).