



HAL
open science

STUDY OF THE IMPACT OF A CHRONIC CO-EXPOSURE OF A PESTICIDE AND A PREBIOTIC ON THE INTESTINAL MICROBIOTA USING TWO IN VITRO MODELS

Marina Requile, Ovidio Gonzalez Alvarez Duban, Stéphane Delanaud, Larbi Rhazi,
Véronique Bach, Flore Depeint, Hafida Khorsi-Cauet

► **To cite this version:**

Marina Requile, Ovidio Gonzalez Alvarez Duban, Stéphane Delanaud, Larbi Rhazi, Véronique Bach, et al..
STUDY OF THE IMPACT OF A CHRONIC CO-EXPOSURE OF A PESTICIDE AND A PREBIOTIC ON THE IN-
TESTINAL MICROBIOTA USING TWO IN VITRO MODELS. 25th United European Gastroenterology Week,
Oct 2017, Barcelone, Spain. <hal-04336188>

HAL Id: hal-04336188

<https://normandie-univ.hal.science/hal-04336188v1>

Submitted on 11 Dec 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

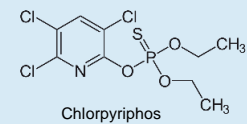
STUDY OF THE IMPACT OF A CHRONIC CO-EXPOSURE OF A PESTICIDE AND A PREBIOTIC ON THE INTESTINAL MICROBIOTA USING TWO *IN VITRO* MODELS

REQUILE Marina^{1,2}, GONZALEZ ALVAREZ Duban Ovidio^{1,2}, DELANAUD Stéphane¹, RHAZI Larbi², BACH Véronique¹, DEPEINT Flore² and KHORSI-CAUET Hafida¹

1. Equipe PERITOX UMR-1101 INERIS; Université Picardie Jules Verne ; Amiens
2. Unité Transformation et Agroressources; Institut Polytechnique UniLaSalle ; Beauvais
Contact: marina.requile@u-picardie.fr

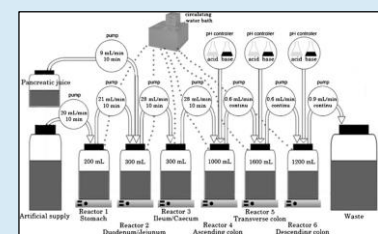
Introduction and goals

The excessive use of pesticides, often found as residues in our diet and as contaminants in drinking water, has become a public health topic. Indeed, preliminary studies have shown that chronic low-dose exposure to **chlorpyrifos** (CPF) (Joly et al. 2013) alone causes an intestinal imbalance (dysbiosis).



Objective: The objective of this study is to evaluate the preventive potential of a prebiotic (inulin) in co-exposition with CPF on intestinal dysbiosis, bacterial translocation and its consequences on the integrity of the intestinal mucosa using two *in vitro* models.

Matérials and Methods

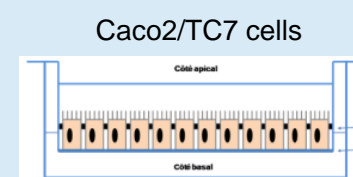


Simulator of the Human Microbial Intestinal Ecosystem: SHIME®



Stabilization of microflora (15 days)

Exposure of SHIME® to CPF (3,5 mg) ± Inulin (10g) per day



Collection of samples at D0, D15 et D30

• Integrity and epithelial function
• Bacterial translocation

• Bacterial profile
• Fermentative activity

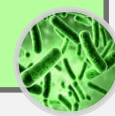
Results

Bacterial profile and fermentative activity

- ↓ with CPF 3.5 mg
- ↑ with Inulin

- ↓ with Inulin
- ↑ with CPG 3.5 mg

Beneficial flora

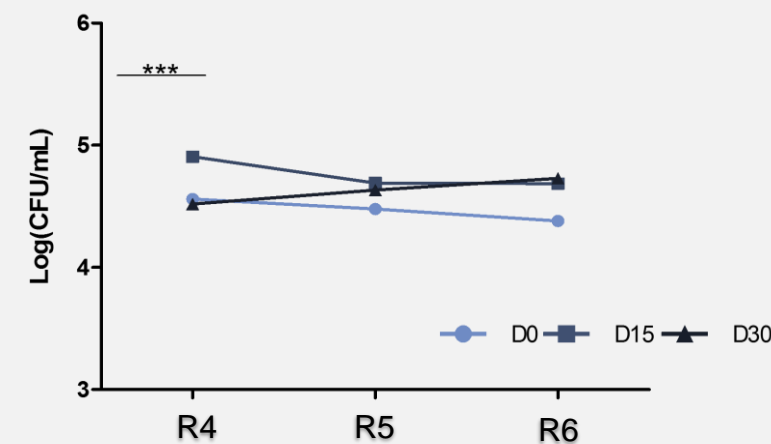


Potentially pathogenic flora

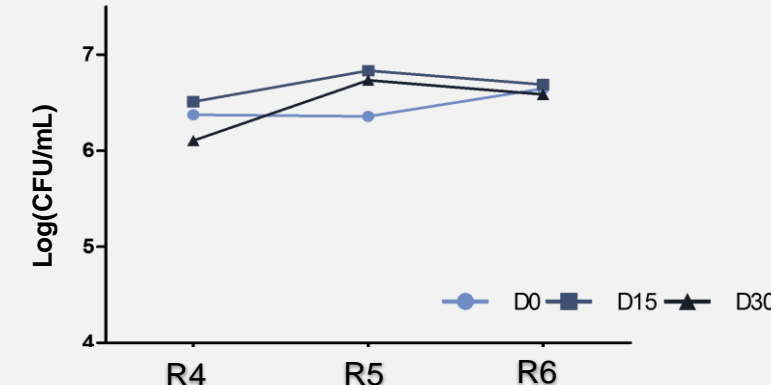


Co-exposition CPF 3,5 mg / Inulin

Potentially pathogenic flora (*Staphylococcus*)



Beneficial flora (*Bifidobacterium*)



→ Prebiotic helps to restore intestinal dysbiosis induced by CPF.

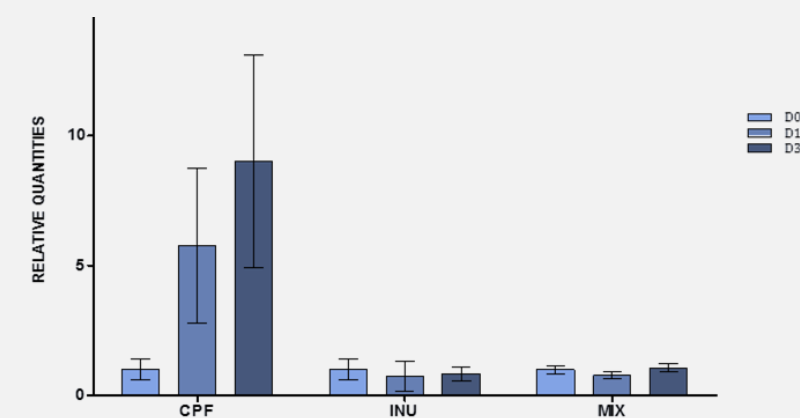
→ Inulin beneficially influenced the fermentative profile, with higher production of VFA (Volatile Fatty Acids), especially propionic acid and butyric acid.

Impact on the functional epithelium

Trans-epithelial resistance (TEER)

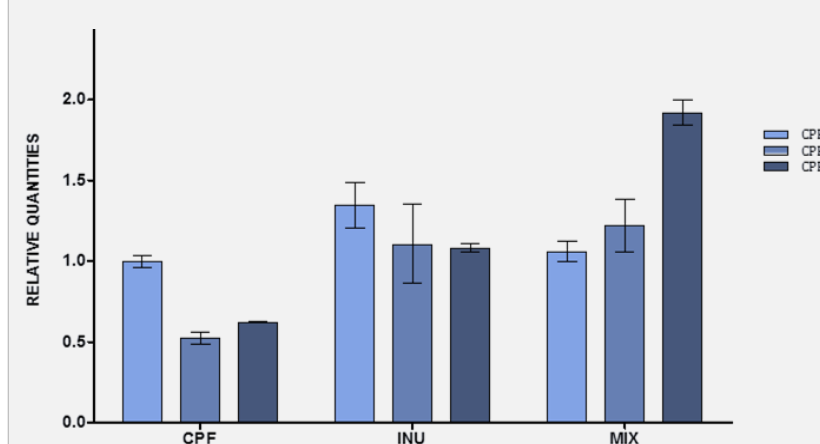
→ Reduced TEER suggest perturbation of the epithelial layer in all conditions.

Inflammation: production of IL8



→ Prebiotic prevents the pro-inflammatory response.

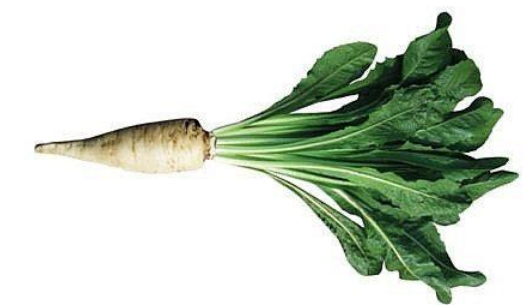
Expression of the Villin gene



→ Increase of the villin gene expression to restore the perturbation caused by the CPF.

Conclusion

CPF / inulin co-exposure has an impact on both the bacterial profile and metabolism, suggesting that prebiotic supplementation could decrease the damages caused by CPF exposure. The combination of two *in vitro* models seems to be an ethical and relevant alternative to animal or human experiments.



Perspective

Preliminary results showed toxicity of SHIME® samples on intestinal epithelial cells. Therefore, an optimization phase is necessary. In order to have a better representation of the complexity of the mucosal tissue, the model could be developed further by the inclusion of mucus-producing cells.