Plant surfaces as vehicles of *Bacillus cereus* responsible of human food poisoning

- Introduction

A major concern in food safety is the contamination of fresh and stored food with spoiling bacteria that provoke human poisoning. *Bacillus cereus* is a common food-borne pathogen responsible of important poisoning outbreaks and severe bacteraemia and septicaemia. Poisoning caused by *B. cereus* is classified in two main categories: emetic and diarrheic. The emetic poisoning is correlated to the production of cereulide. This toxin is very heat stable, and it can be produced in the food contaminated by *B. cereus* cells. Diarrheic poisoning is provoked by the enterotoxin hemolysin BL, the non-hemolytic enterotoxin and the cytotoxin K.

- Objective

To study the interaction of *B. cereus* with plants as a bacteria reservoir, and in ready-to-eat fruits and vegetables.

- Materials & Methods

A collection of strains implicated in food-borne outbreaks were tested in vitro for a battery of phenotypes related to bacterial multicellular behaviour and thus interaction with host.

1. Solid or liquid media were used to study biofilm formation, motility or adhesion to surfaces.
2. Leaves, fruits and vegetables (melon leaf, cucumber leaf and fruit and endive) were used to study the persistence of *B. cereus* over time and their distribution and organization by electron microscopy.

- Results

All the strains behaved similarly in vitro, only some persisted on plant surfaces. Among them, the emetic strain AH187 was selected because bacterial cells persisted on a concentration of 10^4-10^5 CFU per gram of leaf, vegetable or fruit, with a sporulation rate of 40%. The electron microscopy images showed the organization of bacteria in well-developed biofilms with visible extracellular matrix. Finally, mass spectrometry analysis proved the presence of some isoforms of cereluide on the different surfaces.

- Conclusion

The fact that cells of *B. cereus* persist in leaf surface mainly as vegetative cells are indicative of their ability to adapt to the physico-chemical changeable phyllosphere, and thus to produce the emetic toxin cereulide. The presence of spores, and the formation of biofilms can be indicative of the versatile adhesive properties of this strain to diverse surfaces. Altogether are supportive of the importance of plant surfaces either as reservoir of bacterial cells or as vehicles for further contamination and food poisoning.