



# Modulation of oilseed rape direct and indirect defenses by the rhizospheric microbiota against the cabbage root fly: a holobiont vision

Morgane Ourry



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Direction

Christophe Mougél  
Anne-Marie Cortesero

Partners

Région Bretagne



Keywords

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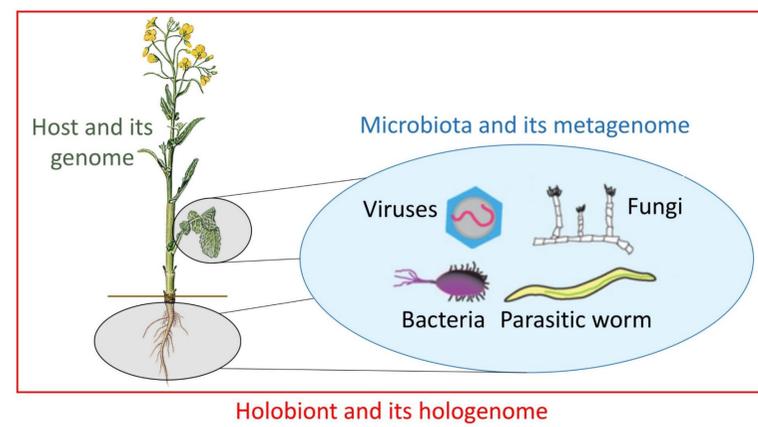
## Social-economic context

Oilseed rape (*Brassica napus*) is worldwide grown as both human and livestock food. After several decades of using chemicals in fields against insect pests, many studies have highlighted the detrimental effects of these pesticides on the environment, including the fauna and flora, but also on human health. Moreover, laws have been voted in order to reduce the use of pesticides or to suppress some of them. It is now essential to develop new alternatives to control pests and their consequences.

## Scientific context

It is common knowledge that insect herbivory activates the plant defence system. Indirect defences include emission of volatile organic compounds which attract parasitoids or predators while direct defences correspond to secondary metabolites with either repulsive or toxic effect.

Several studies have also shown that the interaction between plants and soil microorganisms bring benefits to the plant and generated a new concept called “holobiont”. This characterizes an eucaryota host and its microbial communities as being a new entity which is influenced by its hologenome, corresponding to the host genome and the metagenome of the microbial communities.



Schematic illustration of the concept of holobiont.

## Objectives

Little is known about interactions between soil microorganisms, plants and insects, the influence of pest on soil microbiota and vice versa, as well as the impact on plant defences and insect life history traits. My PhD work will be focused on *B. napus* and a belowground herbivore: the cabbage root fly (*Delia radicum*). Several experiments will take place in order to answer the following questions:

- How infestation by *D. radicum* influence the spatio-temporal dynamics of plant microbial communities in the rhizosphere?
- Does infestation by *D. radicum* impact colonization by wild aboveground insect populations? What is the relation with plant microbial communities?
- Can specific soil entomopathogenic species affect *D. radicum* oviposition, development and survival? Is the effect direct or indirect (i.e. through modification of plant defences)?
- Is there a link between taxonomic and functional diversities of soil and root microbial communities that could explain life history traits of plants and insects?

## Perspectives

This PhD would be a preamble to researches focusing on the plant capacity to select microbial genes to promote its defences, hence resistance against insect pests.

