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CAMo: from molecules to modeling

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ABSTRACT COLLECTION

FA COST Action FA1405 Using three-way interactions between plants, microbes and arthropods to enhance crop protection and production

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that enable successful transmission of the pathogen and disease. Understanding the very basis of these mechanisms can allow us to think of and generate new approaches to be added to the very limited toolbox of management of insect-vectored diseases. More specifically, we work on yellows disease of grapevines, carrots and sesame and also on citrus greening and olive quick decline.

Role of endophytes and epiphytes microorganisms in the mediation of olive tree resistance to plant pathogens

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Olive (*Olea europaea* L.) is one of the most important crops in the Mediterranean region, where 95% of the world's olive production is located. Several insect pests and diseases attack the olive crop, reducing its production by 30%. Among diseases, anthracnose (caused mostly by the airborne fungi *Colletotrichum acutatum*), olive knot (caused by the bacterium *Pseudomonas savastanoi* pv. savastanoi), *Verticillium wilt* (caused by the fungus *Verticillium dahliae*) and olive leaf spot (caused by the fungus *Spilocaea oleaginea*), are considered to be the major cause of olive-crop damage worldwide. No effective biological or cultural controls are available against these diseases; therefore, protection relies on chemical control. However, many of the chemical products currently used cause a variety of health problems and environmental impacts. During the last three years we have been carried out studies aiming to explore plant-associated microorganisms, in an integrative perspective, in order to designed new strategies for the control of these diseases. Specifically, we intend to disclose the role of microorganisms (both endophytes and epiphytes) inhabiting olive trees in the mediation of plant defense against the aforementioned diseases, under field conditions, and select the strains with the greatest biocontrol potential. For this, both epi- and endophyte bacteria and fungi inhabiting olive trees from five cultivars (Cobrançosa, Madural, Verdeal Transmontana, Picual and Galega) with different susceptibilities to the aforementioned diseases have been isolated, and further identified by sequencing the 16S (for bacteria) and the ITS region (for fungi) of rRNA genes. Since this approach only detects cultivable microorganisms (uncultured ones will not be represented) the diversity will be additionally assessed recurring to next generation sequencing approaches that allow metabarcoding (in an illumina platform). Disease incidence and severity as well as several chemical and physical factors of the phyllosphere will be evaluated for each olive tree cultivar, and the results obtained will be related with their microbial composition. These results are expected to clarify microbiome mediated beneficial effects on plant protection and also to identified the isolates that appear to be most correlated with disease biological control. The real capability of those isolates to reduce disease symptoms and proliferation of plant pathogens will be studied for selecting the most efficient BCA, by using "in vitro" and "in planta" assays. The results from this study will form the basis for the identification of olive tree microorganisms for the biological control of these four diseases. Results will also uncover previously unrecorded mechanisms of microorganism-olive tree

and microorganism-microorganism relationships, which may be of relevance for plant health and for designing a new strategy for the biological control of these diseases.

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Arbuscular mycorrizal fungi influence plant-insect interactions

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In our group we research the influence of arbuscular mycorrhizal (AM) fungi on plant-insect interactions above and belowground. AM fungi are plant mutualists that uptake nutrients (predominantly P) in return for carbon, and prime the salicyclic acid pathway in plants potentially leading to greater and faster responses by plants to antagonists. We study a wide variety of herbivores and pollinators visiting different plant hosts, and apply our results to both natural and managed systems. We are particularly interested in replicating actual systems and assessing the generality of the influence of AM fungi on insects.

Effects of soil biota on aboveground plant-insect interactions

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The Department of Terrestrial Ecology of the Netherlands Institute of Ecology (Wageningen, NL) broadly studies biotic interactions in terrestrial ecosystems. In particular we study how plants mediate multi-trophic interactions between above- and belowground organisms and how these interactions are affected by (human induced) changes in climate, land use and species invasions.
One of the topics that we focus on is so-called "plant soil feedback". During plant growth, plants change the composition of the community of soil biota in their rhizosphere. These changes ("soil