Proteomic approach to investigate aphid - plant interactions

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Plant – insect relations are mainly regulated by the evolution of the defence mechanism's developed by plants and the ways herbivore insects adapt themselves to these defensive systems. Plant defence can be direct or indirect, localised or systemic. A common property of these mechanism's is the broad range of phytophagous agents, including insect pests, which are efficiently controlled by the defensive produced molecules. To cope with the induction of several direct defence molecule productions, herbivores developed several detoxification enzymatic systems such as the gluthathione S-transferases and monooxygenases. Here we studied the chemical ecology of aphid (such as *M. persicae*) – plant relations using a proteomic approach. The aphid switch from a host plant to others from Solanaceae and Brassicaceae family was first investigated to assess the metabolic changes and potential adaptations in aphids according to particular host plant species. Specific association's between aphids and their host plant were previously shown to be related to the presence of particular bacterial symbionts. The respective role of the aphid and their related symbionts in the adaptation to the host plant was also investigated considering the proteome variations of aphids in presence or absence of endosymbionts. Finally, the particular role of aphids in plant defensive responses due to its sucking feeding behaviour was investigated focusing on the protein composition of aphid saliva. The complex protein mixtures related to the different aphid materials was separated by two dimension electrophoresis methods and the related spots of proteins significantly varying were selected and identified by mass spectrometry (ESI-MS-MS and Maldi-Tof-MS-MS) coupled with data bank investigations. The impact of the down regulated or overexpressed aphid proteins involved in different metabolic pathways was discussed. This broad proteomic approach is a very reliable tool to study the biologically involved proteins from aphids in response to several environmental changes, and particularly the insect - host plant interactions.