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SYMBIONT RESOURCE MANAGEMENT IN HONEYBEE HEALTH PROTECTION

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Abstract

Less explored in terms of biodiversity and functionality than conventional habitats, non-conventional ones represent indeed a great source of compounds and microbes with powerful biological and biotechnological potential. Among these environments, expanding attention has been recently directed toward the invertebrate gut and, in general, to the insect body intended as a niche in which microorganisms survive and flourish. In their evolution insects have been adapted to feed on such a variety of substrates and matrices, ranging from wood to blood and phloem sap. These unbalanced diets are indeed exploited by insects thought their microbiota. For example psyllids and leafhoppers feed on phloem sap which rich in carbohydrates and poor in nitrogen compounds. Insects-associated microorganisms provide them with the lacking compounds. On the other hand blood-feeding insects, such as tsetse flies, have a vitamin-deficient diet which is complemented by compounds furnished by their microbial symbionts.

Insect symbionts are a promising tool for the development of biocontrol strategy in which the manipulation of insect microbiota outcome in the control of insect pests for agriculture and vector-borne pathogens or in order to protect beneficial insects from diseases and stresses. In this work the preservation of honeybee health by the exploitation and the management of their bacterial symbionts has been taken into account.

In the last years honeybees are facing severe economic losses worldwide due to their exposition to many infective diseases. One of the most threating disease is the "American Foulbrood disease" (AFB), caused by *Paenibacillus larvae*. In the present work, following culture-dependent and -independent characterization of the insect microbiome, several honeybee symbionts have been selected and tested *in vitro* and *in vivo* for their capability to induce an antagonistic activity toward the pathogen. Spore-Forming Bacteria (SFB), Lactic Acid Bacteria (LAB) and Acetic Acid Bacteria (AAB) showed the most interesting and promising capabilities in the preservation of the host health. The results underline that the management of the microbial resource associated to honeybees could be exploited in order to prevent an unbalanced microbiome or, in other words, an intestinal dysbiosis, contributing to the protection of the insect health.