



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 36th cycle

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Stress, immunity and honeybee health: new strategies to limit colony losses

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The honey bee colony loss is a multifactorial syndrome induced by interacting stress factors, which reduce the immune competence and allow an uncontrolled proliferation of parasites and pathogens. A central role in this syndrome is played by the symbiotic association between the viral pathogen Deformed Wing Virus (DWV) and its vector mite *Varroa destructor*, the two major stress agents that severely impact honey bee immunity and health. Their synergistic interaction can be boosted by any other immunosuppressive stressor which further exacerbates their negative impact on the host, which has an additional level of fine regulation mediated by the honey bee gut microbiota. Indeed, any effect on immunity has an impact on and is modulated by the complex microbial community harboured in the honey bee gut.

In this complex framework of interactions, the present PhD project aims to unravel the mechanisms underlying the immunomodulating effects of the stress agents which are among the major threats for honey bees: DWV, pesticides and poor nutrition. The study of their impact will be carried out at metaorganism level, given the key-role that gut symbionts have in modulating the immune system and metabolism. The expected results will shed light on the functional basis of health decline of honey bee colonies, and will pave the way towards the development of molecular tools (1) for pesticide risk assessment, taking into account their subtle effects on immunocompetence, and (2) for alleviating the negative effects of stressors on immunity, by developing nutritional plans and probiotic supplements enhancing defence barriers against parasites and pathogens.