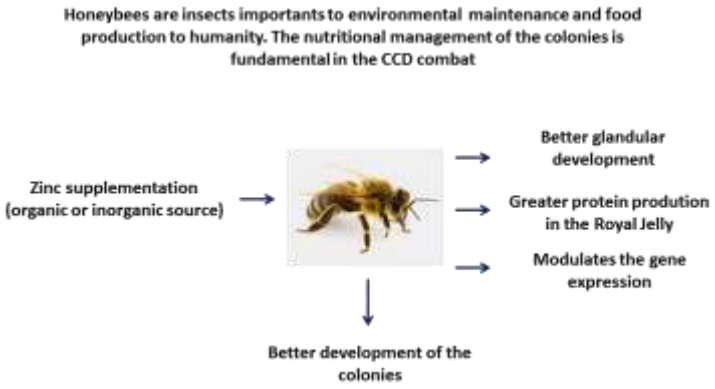
Honeybee Nutrition as mechanism of control to Beekeeping Development and Environmental Sustainable

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Honey bees are important pollinators of crops and native vegetation, promoting the increase of food production estimated to be worth more than $216 billion annually [1]. However, the managed bee colonies have suffered considerable losses in recent years, and reduced diversity of bees has been observed worldwide [2–4], indicating a threat to food safety and ecosystem maintenance. The syndrome called colony collapse disorder (CCD) was described firstly in the United States, characterized by a rapid loss of worker bees, with few or no dead bees in or near the hives, an abandoned brood and stored food, and delayed invasion of hive pests. The potential causes of CCD are habitat destruction, the presence of pathogens and parasites, climate change, and high use of pesticides and adjuvants [2,5,6], as well as the scarcity of floral sources. Thus, the honeybee's nutrition is an important mechanism to help in the development and maintenance of the colonies, being able to assist in the minimizing the CCD effects. The mineral supplementation with zinc (organic or inorganic source) for the colonies was able to modulate positively the glandular development in honeybees with 6-day-old-year, promoting the royal jelly production with better quality, verified by the greater proteins expression (protein spots) by proteomic analysis. The zinc supplementation too modulated the expression of important genes related the antioxidant and immunology system and sensorial perception. This results show that the management nutritional of the honeybees colonies are an important strategies to combat the CCD and to help the environmental and the pollination services that this insects promoting for the humanity.



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