Exposure of Rosmarinic Acid Prior to Thiamethoxam and Its Effect on the Survival and Circadian Rhythm of Honeybees (Apis mellifera) in Puerto Rico

Gruber, Alejandra (School: University Gardens High School)

Honeybees rely heavily on their circadian clock to achieve the orientation based on the solar compass and the "time memory", which allows them to locate food resources and return to the hive. Currently, the continuous losses of honeybees (Apis mellifera) raise concern about their significant effect on agricultural productivity. One of the main causes of losses is the exposure to neonicotinoid pesticides that deteriorate bees' foraging capacity and compromise their central nervous system, causing death. In this study, forager bees were used to evaluate if prior exposition to Rosmarinic acid increases survival and rhythmicity of honeybees later exposed to the neonicotinoid pesticide Thiamethoxam. One trial was carried out by using eight monitors to examine the locomotor activity for eight days. Different concentrations of Rosmarinic acid were used (40ug/g and 80µg/g) that were administered directly in the food (honey/sugar) during the first 3 days. In the remaining days, the honeybees were exposed to the pesticide Thiamethoxam (70ng/g). The results obtained indicated that the high dose (80ug/g) of the antioxidant ensured survival compared to the control group, pesticide and even the median dose of the antioxidant. However, in terms of rhythmicity the results did not show any improvement so future studies should be held upon this antioxidant to ensure its effect both in the survival and circadian rhythm of honeybees. Nevertheless, these results can be used as a baseline for future studies to assess the effect of Rosmarinic acid in honeybees.

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