

# OFFICIAL ABSTRACT and CERTIFICATION

## The Effect of Sulfur Dioxide on the Olfactory Learning of Western Honeybees (Apis mellifera)

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Air pollution is a significant problem within our environment as the continuous burning of fossil fuels has resulted in the production of pollutants such as sulfur dioxide (SO<sub>2</sub>). Pollution poses a threat to Western Honeybees (Apis mellifera) as they reduce honeybees' ability to perceive floral volatiles and airborne pheromones, thereby effecting their foraging efficiency. Knowledge of the importance of olfactory learning in young bees is imperative to research as nearly 73% of cultivated crop varieties are pollinated by bees. The objective of our project was to learn about the effects of sulfur dioxide on the olfactory learning of foraging naïve bees and analyze the severity of limonene degradation in New York. Honeybees were classically conditioned to lavender using the Proboscis Extension Reflex (PER) Assays. If the Honeybee extended their proboscis after lavender exposure and before the sugar reward, we considered the assay to be responsive. A total of 0.03 moles of sulfur dioxide was produced, which the experimental group was exposed to for approximately 3 seconds before conditioning. Our results showed that the control group responded by extending their proboscis an average of 67.92% of the trials while the experimental group responded for 18.33% of the trials. This data supports the conclusion that sulfur dioxide increases the time of olfactory learning in foraging naïve honeybees. A choropleth map of New York was created with computational analysis where each county was shown in one of five colors, the darkest color being the greatest level of degradation of limonene by diesel exhaust, a common floral volatile and a major source of sulfur dioxide.

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