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Mercury Contamination in Honey from Different Bee Species in Ecuador: Health Risks and Environmental Quality

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BACKGROUND: Honey quality is influenced by various factors, including botanical origin, bee species, and environmental contaminants such as heavy metals. Mercury contamination, a major environmental concern, can affect the quality and safety of honey, posing potential health risks. This study aims to assess the mercury content in honey produced by different bee species in Ecuador and to evaluate the potential health risks associated with its consumption.

Problem Description: Despite the global concerns regarding heavy metals in food products, little research has been conducted on the presence of mercury in honey, particularly in the diverse ecosystems of Ecuador. This study addresses the knowledge gap by evaluating honey samples from the coastal, highland, and Amazonian regions of Ecuador, with a focus on mercury contamination as a marker of environmental quality.

METHODOLOGY: A total of 50 honey samples were collected from different regions of continental Ecuador in 2024. The samples, representing honey produced by Apis mellifera L., Geotrigona, and Melipona mimetica, were analyzed using Flame Atomic Absorption Spectrometry (FAAS) to determine the mercury content. The botanical origin of the honey was identified, and the sampling locations were recorded with precise geographic coordinates. The study also investigated the potential relationship between the presence of mercury in honey and the environmental conditions around the beehives, including the floristic sources used by bees.

RESULTS: The results revealed varying levels of mercury contamination in honey samples from different regions. Additionally, differences in the floral sources and bee species were observed to influence the mercury uptake in honey. The study also determined the percentage of provisional tolerable intake (%PTWI) and target hazard quotient (THQ) for the honey samples, providing an indication of the potential health risks associated with their consumption.

CONCLUSIONS: This study emphasizes the importance of monitoring heavy metals in honey as a bioindicator of environmental health and food safety. It highlights the need for ongoing research into the safety of honey produced in Ecuador, as well as products containing honey as an ingredient. Furthermore, it suggests that implementing strategies to reduce mercury contamination is crucial to ensure honey is safe for human consumption.