Exploring Flavors of Edible Ants: A Path to Sustainable Gastronomy and Consumer Acceptance

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Introduction

Edible insects are gaining popularity as a sustainable solution for the rising global demand for proteins, owing to their low environmental impact and high nutritional value. However, solely emphasizing the environmental and health advantages of consuming insects might not be sufficient to encourage widespread acceptance. Investigating the flavor profiles of edible insects holds the potential to shift marketing strategies towards hedonic-focused campaigns that will be more successful in boosting consumer acceptance. Certain insects are already considered delicacies. For instance, Formicine ants are utilized as a sour flavoring agent in some cultures, and the leaf-cutting chicatana ants are highly favored in Mexican cuisine.

Objective

Our study aims at understanding the flavor profiles of different ant species which are essential for creating appealing insect-based products that can overcome disgust-based aversions associated with insect consumption.

Methodology

To explore the flavor profiles of these edible ants, the volatiles of leaf cutting ants (*Atta mexicana*), common black ants (*Lasius niger*), spiny ant pupae and adults *(Polyrhachis sp.*), and weaver ant workers and queens (*Oecophylla smaragdina*) were analyzed using headspace solid-phase microextraction and gas chromatography-olfactometry-mass spectrometry.

Conclusion

Our study revealed distinctive odor profiles for different ant species. *L. niger* were characterized by a pungent, acidic, and vinegary smell primarily due to their high formic acid content, a secretion from their venom glands. Additionally, numerous Dufour gland alkanes such as tridecane, undecane, and pentadecane, known to act as alarm pheromones, were detected in *L. niger* . In contrast, *A. mexicana* ants exhibited nutty, roasty, woody, and fatty notes. Unlike *L. niger*, *A. mexicana* ants did not contain formic acid. Instead, they had alarm pheromone 4-methyl-3-heptanone and trail pheromone 2,5-dimethylpyrazine. The fatty aroma of chicatana ants was probably attributed to their abundant presence of aldehydes such as hexanal, octanal, and nonanal.

Acknowledgement

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Results

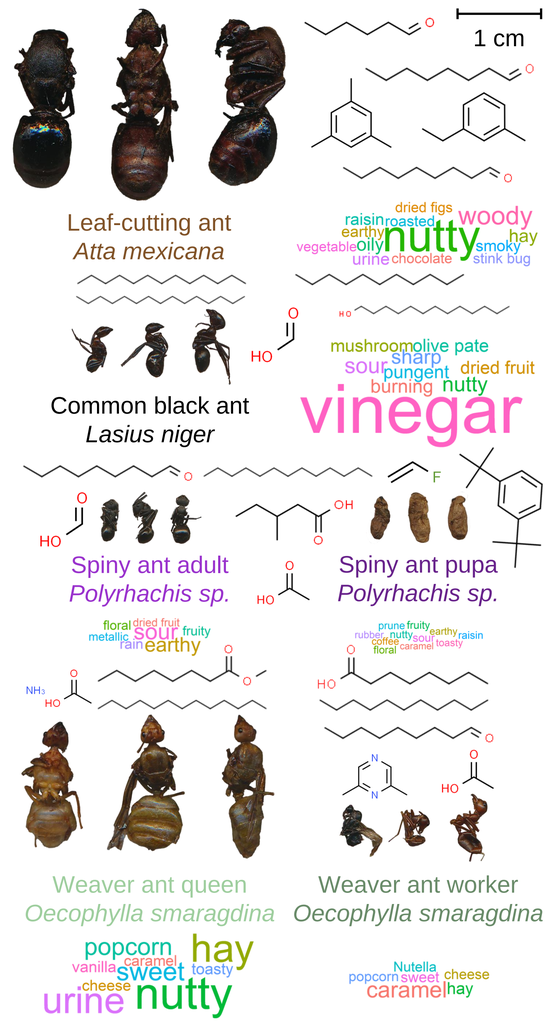

Figure 1. Tested ant species and their major volatiles and flavor descriptors.

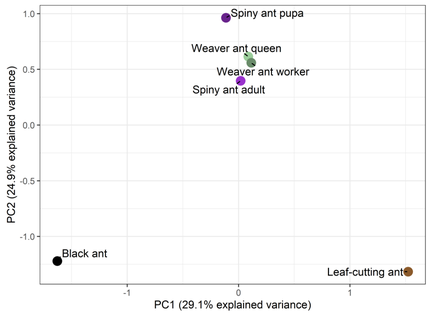

Figure 2. Principal component analysis of volatile compounds in ant samples.

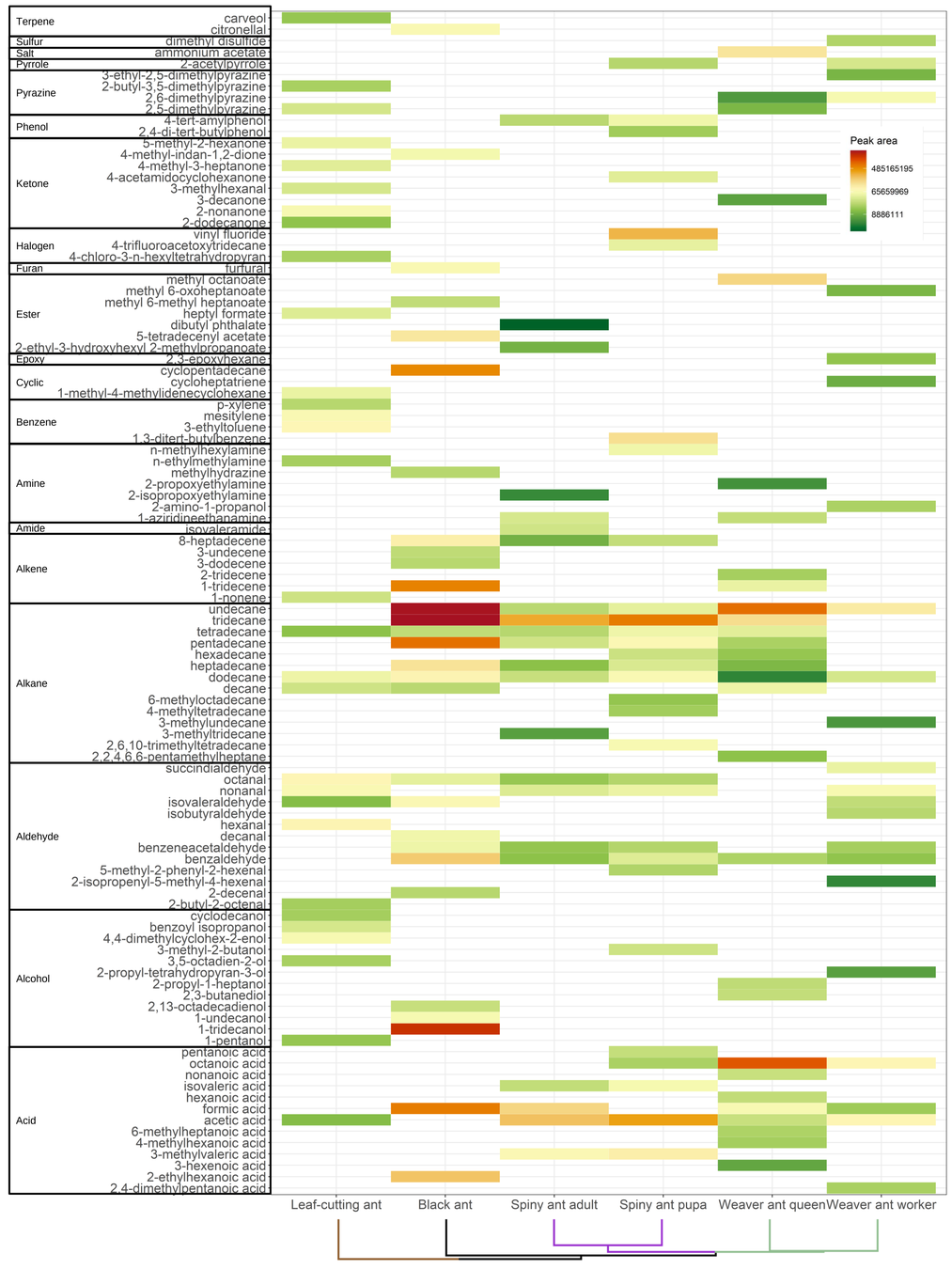

Figure 3. Heatmap and dendrogram of major volatiles in tested ant samples.