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THE SCIENCE OF REFINEMENT: UNVEILING THE CHEMICAL AND SENSORY SIGNATURES OF MATCHA AND GYOKURO TEAS

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Abstract: The study evaluates the composition and potential risks of heavy metals in Japanese green teas **Matcha** and **Gyokuro**, highlighting cultivation, chemical structure, and protective factors. Through analytical methods (FAAS, HPLC, UV-VIS), differences in bioactive content and contamination levels were assessed to support food safety and health benefits.

• Introduction

Matcha and Gyokuro are premium shaded teas from Japan, rich in **amino acids, catechins, and chlorophyll**. Their cultivation and processing methods enhance antioxidant and relaxing properties. However, environmental and technological factors can lead to **heavy metal accumulation**, requiring monitoring for consumer safety.

• Material and method

Samples of **Matcha (ceremonial and industrial)** and **Gyokuro** were analyzed using **FAAS** for heavy metals, **HPLC** for catechins and caffeine, and **UV-VIS** for antioxidant activity. Standardized reagents and ISO procedures ensured accuracy and reproducibility.

• Results and discussions

Both teas showed **high antioxidant capacity** and **beneficial amino acid profiles** (notably L-theanine). Matcha, had higher total catechins and chlorophyll, while Gyokuro had a softer, sweeter umami taste and slightly lower heavy metal content. Detected metals (Pb, Cd, Cu) were below safety limits, confirming minimal toxicological risk and supporting controlled cultivation as a key preventive factor.

• Conclusions

Matcha and Gyokuro offer **nutritional and therapeutic value** with **low contamination risk** when sourced responsibly. Sustainable cultivation and periodic analytical control are essential to ensure product quality, safety, and consumer health.