Hybrid Coffee: A Sustainable Flavour-First Approach to Coffee Innovation

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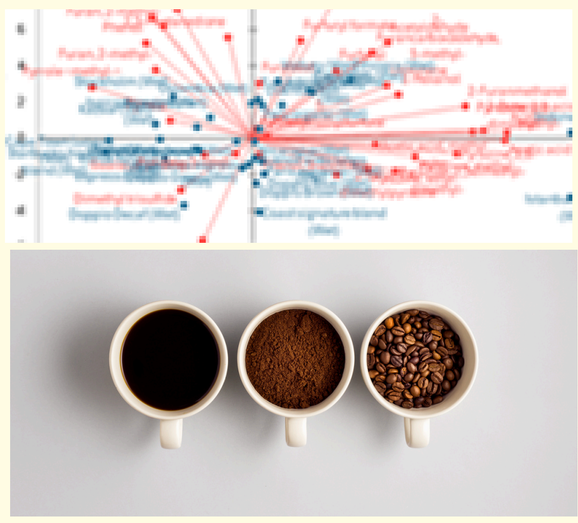
Background

Up to 50% of coffee-growing land is projected to become unsuitable by 2050 due to climate change, and volatile supply chains. This directly threatens the global coffee industry.
Simultaneously, consumer demand for sustainable coffee products is rising.
Hence there is an opportunity to extend coffee using plant derived hybrids that lessen threats and support future-proofing the coffee supply chain.

Approach

We have developed a hybrid beverage, derived from low-impact plant materials combined with real coffee beans.
This product replicates coffee's aroma and flavour while reducing its environmental impact and enhancing supply chain resilience.
Our unique approach combines flavour chemistry and fermentation with machine learning approaches to create a sustainable production extension for coffee.

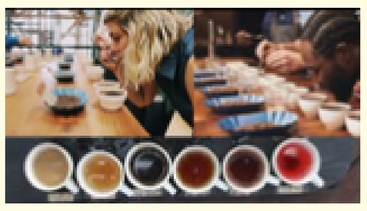
Digitised flavours of entire coffee category



Screen sustainable prototype ingredients

Complex ML enabled flavour models

Skilled flavourists and coffee blenders



Key Findings

We applied a multi-step biotransformation process to over 140 ingredient variants, including malting, fermentation with proprietary microflora, and bespoke roasting approaches.

GC-MS identified a new matrix of key aroma compounds in coffee. The bio-transformed ingredients were mapped using machine learning models, and generated a series of predictive digital formulation tools that led to the generation of a subset of flavour "blocks". These were combined with R&G coffee. Sensory bench testing validated the resulting prototypes against key coffee flavour profiles.

Our machine learning models successfully predicted flavour outcomes and optimised ingredient blends by flavour, cost, and sustainability metrics.

Conclusions

The resulting prototypes achieved significantly higher sensory parity with traditional coffee than leading coffee alternative competitors in blind taste evaluations.

Hybrid coffee offers a scientifically grounded and commercially viable route to mitigating coffee's environmental and supply chain risks.