

CRACKING THE COFFEE CODE

Understanding the impact of genetics and the environment on coffee quality

THE PROBLEM

There is almost nothing known about the effects of important variables like geography, soil, variety, and climate on the cup quality of *C. arabica* coffee, despite a global value of the coffee industry (~\$250 billion worldwide) and the explosive growth of the specialty coffee market, which seeks to provide 'differentiated and compelling' coffee experiences to millions of consumers the world round. Studies to date have focused on single countries, single farms, and few quality attributes. Indeed, until 2016, the coffee sector did not even have the basic necessary sensory science tools to analyze and evaluate coffee sensory attributes in a repeatable, accurate and statistically discriminatory manner.

THE SOLUTION

In order to fill this enormous gap, WCR is partnering with UC-Davis, the Specialty Coffee Association, and the Coffee Science Foundation to execute the biggest and most comprehensive sensory and chemical evaluation of coffee varieties across multiple environments in history.

In 2015, World Coffee Research began its 'International Multi-location Variety Trial', a one of a kind, global network of farms, each planted with genetically identical coffee varieties. Now, these plants have matured and are ready for sensory, chemical, and quality analysis. Working collaboratively, scientists across multiple disciplines will analyze 12 varieties growing in 16 sites across 12 different countries. The project will result in a database of varieties, environments, flavors and chemistry that allow researchers to begin to decode the mysteries of coffee flavor—the link between genetics, environment, and coffee's sensory attributes.

Using sensory descriptive analysis, chemical analysis, and expert testing, this research consortium will produce scientifically rigorous data to:

1. Determine effects of genotype, environment and genetic/environmental interaction on coffee sensory attributes, quality perception by industry/buyers, and bean chemistry
2. Utilize the results to identify geography and variety combinations with the potential to increase quality, and possibly value addition opportunities at origin
3. Begin to identify cup quality trends over locations and years that are driven by environmental change
4. Determine key volatile organic compounds in bean chemistry driving quality perception and sensory attributes in coffee
5. Identify precursor molecules of relevant volatile organic compounds for use in developing genetic markers that can increase the success and efficiency of coffee breeding programs in targeting quality

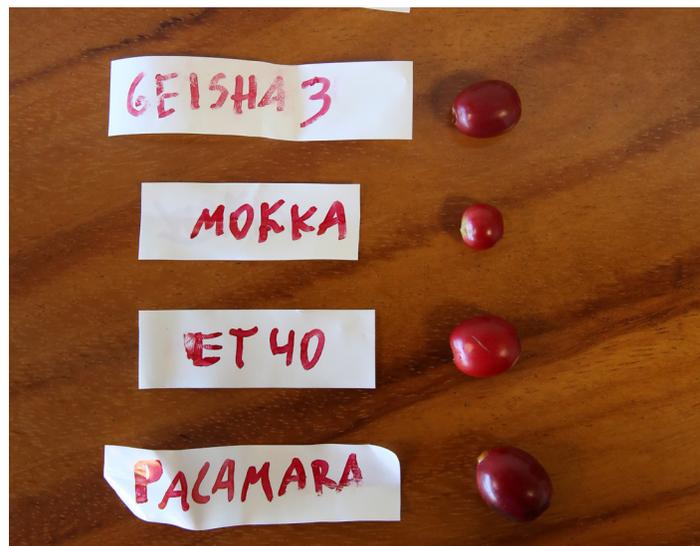


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IMPACT

Because there are the exact same varieties being grown in so many diverse locations, the effects of geography, soil, climate, and agronomic variables on quality attributes of coffee will be discovered and used to drive quality improvements to benefit the farmer and the consumer. Specific expected outcomes include:

- Farmers earn higher prices for formerly unknown differentiated coffees coming from specific variety-locations
- National Coffee Institutes have the opportunity to re-orient programs, projects and farmer outreach based on the country's intrinsic coffee value
- Breeding programs use identified 'cup quality' markers to develop higher quality varieties
- Coffee companies gain tools to strategically and economically source coffees with specific cup quality attributes

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| LOCATION: | Congo, Dominican Republic, Guatemala, Honduras, India, Indonesia, Jamaica, Kenya, Nicaragua, Peru, Zambia |
| TIMELINE: | 2020-2022 |
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