

Coffee and the effects of climate change

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Whether you prefer notes of berry and citrus or chocolate and nuts, dark roast or light, a good cup of coffee can be a simple pleasure. You probably would notice if some of your morning brew's brightness disappeared, or if the familiar fruity aroma dulled a little. Changes like these might not stem from when the beans were roasted or ground, but from growing conditions.

Coffee is grown on more than 27 million acres across 12.5 million largely smallholder farms in more than 50 countries. Many coffee-producing regions are increasingly experiencing changing [climate conditions](#), whose impact on coffee's taste, aroma, and even [dietary quality](#) is as much a concern as yields and sustainability.

A new research review says that coffee quality is vulnerable to shifts in [environmental factors](#) associated with climate change. The review, led by researchers from the Friedman School of Nutrition Science and Policy at Tufts and Montana State University, also finds that some current adaptation strategies to combat these effects provide hope for positive outcomes.

"A subpar cup of coffee has economic implications as well as sensory. Factors that influence coffee production have great impacts on buyers' interest, the price of coffee, and ultimately the livelihoods of the farmers who grow it," says Sean Cash, an economist and the Bergstrom Foundation Professor in Global Nutrition at the Friedman School and senior author on the study, published in *Frontiers in Plant Science*.

"Climate change impacts on crops are already causing economic and political disruption in many parts of the world," he says. "If we can understand the science of these changes, we might help farmers and other stakeholders better manage coffee production in the face of this and future challenges."

In their analysis, the researchers looked at the effects of 10 prevalent environmental factors and management conditions associated with climate change and climate adaptation, respectively, across 73 published articles.

The most consistent trends the team found were that farms at higher altitudes were associated with better coffee flavor and aroma, while too

much light exposure was associated with a decrease in coffee quality. A synthesis of the evidence found that coffee quality is also susceptible to changes due to water stress and increased temperatures and [carbon dioxide](#), although more research on these specific factors is needed.

Some current efforts to mitigate the effects of [climate change](#), including shade management to control light exposure, selection and maintenance of [climate](#)-resilient wild coffee plants, and pest management, show promise and feasibility, but innovative solutions to support bean growth at all elevations need to be devised, the team says.

"These strategies are giving some hope that coffee quality can be maintained or improved and will ultimately help farmers consider how to design evidence-based interventions to support their farms," says Selena Ahmed, an ethnobotanist in the Food and Health Lab at Montana State University, who earlier was a postdoctoral scholar in the Tufts IRACDA program. "These impacts on crops are important to study in general, not just for [coffee](#). Our food systems support our food security, nutrition and health."

More information: Selena Ahmed et al, Climate Change and Coffee Quality: Systematic Review on the Effects of Environmental and Management Variation on Secondary Metabolites and Sensory Attributes of *Coffea arabica* and *Coffea canephora*, *Frontiers in Plant Science* (2021). [DOI: 10.3389/fpls.2021.708013](https://doi.org/10.3389/fpls.2021.708013)

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