

Impact of climate change on tea quality

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Climate change is reportedly affecting the cultivation of tea in China, with changes in temperatures and rainfall altering not only the taste, aroma, and potential health benefits of the popular beverage but also the lives of farmers who grow tea for a living.

A research team headed by Tufts University biologist Colin Orians will study this development in a four-year project funded by a \$931,000 grant from the National Science Foundation.

The study will first examine how climate change affects the concentration of chemical compounds that are responsible for tea's stimulant, sensory and healthful properties. Their work will build on preliminary research conducted in southwestern China's Yunnan Province by co-principal investigator and tea expert Selena Ahmed while she was a graduate student and later Training in Education and Critical Research Skills Program (TEACRS) postdoctoral fellow at Tufts.

Green tea, Orians notes, is widely known to contain high concentrations of antioxidants that are believed to help prevent or moderate a range of health problems associated with the heart, blood sugar and digestion.

"Since the quality of tea is determined by a range of secondary chemicals that depend on climatic conditions, climate change can have significant consequences for tea markets," says Orians, a professor in the Department of Biology in the School of Arts and Sciences at Tufts.

"People buy and drink tea for certain qualities. If those qualities are not there, then they may not buy the tea."

The study findings may also help scientists and growers better understand climate change's effects on other agricultural products such as grapes and cherries. "What we see happening to tea could be a harbinger of what could happen to agriculture in general," Orians says.

Tea is among the world's most widely consumed beverages. One of the biggest markets for tea is the United States where Americans drink 3.6 billion gallons annually and supermarket sales top \$2 billion, according to the Tea Association of the USA. Leading tea-producing countries are Argentina, China, India and Indonesia.

The Tufts-led researchers will focus on three major tea-producing provinces in China: Yunnan, Zhejiang and Fujian. Ahmed has written a doctoral dissertation and scientific articles on the subject and, based on her research, co-authored "Tea Horse Road: China's Ancient Trade Road to Tibet" (River Books Press, 2011) about tea production and trade in southwestern China.

Now an assistant professor in sustainable food systems at Montana State University, Ahmed surveyed Yunnan tea growers who described warmer temperatures in the winter and longer, more intense rainy seasons than in the past. Her co-principal investigator for that work was Rick Stepp, associate professor of anthropology at the University of Florida and a member of the NSF grant team.

"Farmers value both the bitter sweetness and a lingering sweet aftertaste of tea," says Ahmed. "In our research, we learned that farmers perceived diminished quality in tea which they associated with the onset of monsoons. We have seen a decrease in some key chemical compounds that are responsible for producing this flavor. These are also responsible for tea's health properties."

In addition to studying the concentrations of tea's key chemicals, the

researchers will survey consumers to determine how [tea drinkers](#) respond to teas of diminished quality. "Diminished quality could hamper demand for tea, which is critical to farmers whose livelihoods depend on the market," says Ahmed. The researchers will also look at ways in which tea growers can adjust farming methods to mitigate the effects of weather changes.

"After gaining a picture of how [climate change](#) is adversely affecting tea production and gauging consumer response, we hope to be able to develop new possibilities for adapting [tea](#) production to a changing climate," says Orians.

Provided by Tufts University

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