



Research News

Thicker-leaved tropical plants may flourish under climate change

How plants will fare as carbon dioxide levels continue to rise is a tricky question



Rainforest on Panama's Barro Colorado Island; researchers there study tropical ecosystems.

[Credit and Larger Version \(/discoveries/disc_images.jsp?cntn_id=302485&org=NSF\)](#)

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How plants will fare as carbon dioxide levels continue to rise is a tricky question and, researchers say, especially vexing in the tropics. Some aspects of plants' survival may get easier, some parts will get harder, and there will be winners and losers. The resulting shifts in vegetation will help determine the future direction of climate change.

To explore the question, a [U.S. National Science Foundation](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1553715&HistoricalAwards=false) -funded study led by [University of Washington](https://www.washington.edu/news/2021/03/31/thicker-leaved-tropical-plants-may-flourish-under-climate-change-which-could-be-good-news-for-climate/) scientists looked at how tropical forests, which absorb large amounts of carbon dioxide (CO₂) might adjust as CO₂ continues to climb. The results show that multiple changes occurring in plants' leaves and competition between species could preserve these ecosystems' ability to absorb CO₂ from the atmosphere. A [paper](https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020GB006807) reporting the findings was published in the journal *Global Biogeochemical Cycles*.

"Our findings suggest that plants with some types of responses, like making their leaves thicker, will ultimately grow better in tropical forests than their competitors," said senior author Abigail Swann. "If these better-growing plants become more common in the forest, the total rates of water and carbon exchange could stay closer to what they are now."

Higher CO₂ in the atmosphere makes it a bit easier for plants to photosynthesize. But if nitrogen can't keep up, the plants become less efficient at producing energy.

"The verdict is still out on why plants grow thicker leaves under high CO₂," Swann said. The new modeling study suggests an explanation: "Thicker leaves can concentrate the nitrogen so that photosynthesis rates per area of leaf are high."

Trees that have more carbon relative to nitrogen in their leaves become less efficient at photosynthesis, which helps them grow and emit less water vapor -- which helps trees stay cool. But tree species whose leaves also thicken are better at absorbing carbon and producing water vapor, helping them to grow tall, stay cool, and outcompete their neighbors.

"Plants have always been a central part of our climate system," said Varavut Limpasuvan, a program director in NSF's Division of Atmospheric and Geospace Sciences. "Their characteristics invariably change with the climate, but their roles are difficult to assess and model. This study addresses these difficulties and helps to reduce uncertainties in future climate projections."

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