

# Scientists: As rainfall changes, tropical plants may acclimate

May 7 2007

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Tropical plants may be more adaptable than commonly thought to changing rainfall patterns expected to accompany a warming climate, new research shows.

A University of Florida scientist and other researchers have found that plants in Hawaii have the ability to acclimate to big changes in rainfall in at least one important respect – how they get nutrients. The plants largely rely on one form of the vital nutrient nitrogen in moist areas. But in the still wetter terrain that characterizes some rainforests, they switch to another form of nitrogen that becomes more available in those conditions.

The findings, reported in paper set to appear this week in the online edition of the *Proceedings of the National Academy of Sciences*, present a notable exception to the commonly held idea that tropical plants are highly specialized in their own little environmental niches – and thus very sensitive to disturbances of those niches.

That could be good for the plants because climate change is expected to radically alter rainfall patterns in the tropics. But it comes with a caveat: Nutrient uptake is only one of many ingredients in plant life. Other unrelated changes that accompany a warming climate could still affect plant distribution and growth, such as those that hold sway over pollinators, insect predators or invasive plants.

"These plants should be able to do OK in terms of their nitrogen

nutrition, even with the climate changing," said Ted Schuur, a UF assistant professor of ecology and one of four authors of the paper. "But of course, we only studied one group of organisms and one mechanism in this study" and plants depend on many different mechanisms to coexist, some of which may also change with changing rainfall.

The scientists researched plant growth at six sites on the slopes of Mount Haleakala, a volcano on the island of Maui. The sites were ideal because they share the same species, elevations and soils but have vastly different rainfall. The wettest rainforest sites receive an astonishing 196 inches of rain annually, while the driest sites in this study get about 79 inches.

"That's the range of rainfall you might find across the entire tropics, but that would usually be over hundreds or thousands of kilometers," Schuur said. "I can visit all of these forest sites in a single day."

The scientists analyzed nitrogen isotopes in the soil and leaf samples of four plant species at each site. They learned that drier soils contained more nitrogen in the form of nitrate, while wetter soils contained more nitrogen in the form of ammonia. Isotopic analysis of the plants revealed that they switched from nitrate to ammonia "abruptly, and in unison" once the rainfall reached a certain level.

"There's an abrupt change halfway through the rainfall gradient, and they all switch to this other form for their nutrition," Schuur said.

That's a surprise partly because of the uniformity of response, he said. Such uniformity sharply contrasts the conventional notion that tropical plant species coexist by adopting widely different strategies to getting what they need. At least with regard to nitrogen uptake, all the Hawaiian plants acted the same -- and at the same time.

" ... This does not support the idea that natural selection has caused

species to diverge into highly specialized niches for nitrogen consumption," the PNAS paper says.

That's a positive sign considering that as the Earth warms, some areas of the tropics are widely expected to be wetter, some drier. So, at least one of dozens of variables that will change with precipitation changes – nutrient uptake – might not affect tropical plants. That said, plenty of others could, Schuur said.

Source: University of Florida

Citation: Scientists: As rainfall changes, tropical plants may acclimate (2007, May 7) retrieved 19 April 2024 from <https://phys.org/news/2007-05-scientists-rainfall-tropical-acclimate.html>

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