

Even small changes within an ecosystem can have detrimental effects

February 1 2018



Ants tending scales. Credit: Kirsten Prior

A mutualistic relationship between species in an ecosystem allows for the ecosystem to thrive, but the lack of this relationship could lead to the collapse of the entire system. New research from Binghamton University, State University of New York reveals that interactions between relatively small organisms are crucial to mutualistic relationships in an ecosystem dominated by much larger organisms, including trees and elephants.

Binghamton University Assistant Professor of Biological Sciences Kirsten Prior, along with Todd Palmer from the University of Florida, studied the symbiotic interaction between the whistling thorn acacia tree (the dominant tree in the East African savanna) and the [ants](#) that inhabit them. The ants benefit from the tree by getting housing and sugar-rich nectar, and the tree benefits because the ants protect it from [large herbivores](#) such as elephants. Using observational studies and experiments, the researchers discovered that a third partner, scale insects, are the most important resource affecting ant colony size and activity, as well as their effective defense against predators. The honeydew produced by the insects is a consistent source of sugar for the ants, providing them with a source of nutrients during prolonged dry seasons when nectar from the tree is scarce.

"While this ant-plant mutualistic interaction has been well-studied, our research showed that this keystone interaction is even more intricate than previously thought," said Prior. "We learned that the mutualism involves a third player: a species of scale insect that feeds on the tree sap and produces an excrement called honeydew, on which the ants also feed, and makes the ants a stronger mutualist."

Mutualism provides vital interactions between organisms in shaping the [ecosystems](#), said Prior. "The acacia tree provides both food and housing for ants, whereas the ants deter large herbivores, primarily elephants, by delivering painful bites. This mutualism is a keystone interaction, since

removing the ants that ward off elephants from the tree causes a shift in the ecosystem. Removing the scale insects also has a negative impact, as the tree is unable to produce as much food that the ants need."

Prior plans to continue her research further into how complex interactions between symbiotic species shape ecosystems and how global change can also have a significant impact on altering these important interactions.

The paper, "Economy of Scale: Third Partner Strengthens a Keystone Ant-plant Mutualism," was published in *Ecology*.

More information: Kirsten M. Prior et al, Economy of scale: third partner strengthens a keystone ant-plant mutualism, *Ecology* (2018).
[DOI: 10.1002/ecy.2104](https://doi.org/10.1002/ecy.2104)

Provided by Binghamton University

Citation: Even small changes within an ecosystem can have detrimental effects (2018, February 1) retrieved 25 April 2024 from
<https://phys.org/news/2018-02-small-ecosystem-detrimental-effects.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.