

Cycad plant depends on insect for multiple services

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Professor Thomas Marler measures the dimensions of a male cone on a cycad plant in the University of Guam's research plots. Marler has shown how a tiny moth interacts with the cone of this endemic cycad species to provide multiple services to the plant. Credit: UOG file photograph

When a plant endemic to several islands in the Western Pacific Ocean taps the services of a helpful insect, a double-dose of benefits comes its way.

The plant is a member of a unique group of plants known as cycads, which produce their seeds in cones rather than within fruits. The insect is a tiny moth currently known to exist only on the islands of Guam and Rota. The insect's primary role is to ensure [seed production](#) occurs by pollinating the plants. "But what we have learned is the behavior of the

moth also triggers the plants into increased frequency of reproduction," said UOG Professor Thomas Marler.

The research conducted in the Western Pacific Tropical Research Center at the University of Guam breaks new ground because the findings reverse how biologists have viewed one component of the plant-insect partnership, and the results appear in the May issue of the [American Journal of Botany](#). "When each organism in a relationship obtains benefits from the other member of the relationship, the partnership is called a mutualism," said Marler. In mutualisms where an insect provides the service of transporting pollen from plant to plant to facilitate seed production, the plant gives back something that benefits the insect.

With many cycad species, the plant offers their male cones as an insect nursery where eggs are laid and [larvae](#) eat the cone tissue. "This service has been portrayed for many cycad species as something the plant sacrifices in order to receive the pollination services from the insect," said Marler. The Guam-based research followed many years of plant behavior to show that when the [insects](#) were allowed to use the male cones as nursery facilities, those particular [plants](#) produced new cones more quickly in the subsequent months or years. So what was once believed to be a sacrifice by the plant to ensure receipt of a separate benefit from the insect turns out to be a second direct benefit received from the insect.

This particular mutualism has drawn the attention of administrators and researchers at the Research Center because this is the first documented moth or butterfly pollinator for any of the roughly 300 described cycad species. Moreover, the ongoing cycad research is in a race with time as two alien insect pests have recently invaded Guam and Rota and have placed the endemic cycad species under acute threat. "So these findings that alter how scientists view mutualisms are timely as we try to learn as much as we can from this species before the population declines

even more," said Lee Yudin, Dean of UOG's College of Natural and Applied Sciences.

Provided by University of Guam

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