A Coalition of Invasive Species Attacks Guam's Endemic Cycad, *Cycas micronesica*

Aubrey Moore, Ross H. Miller, Thomas E. Marler and Lee S. Yudin

Western Pacific Tropical Research Center, University of Guam, Mangilao, Guam 96923, USA

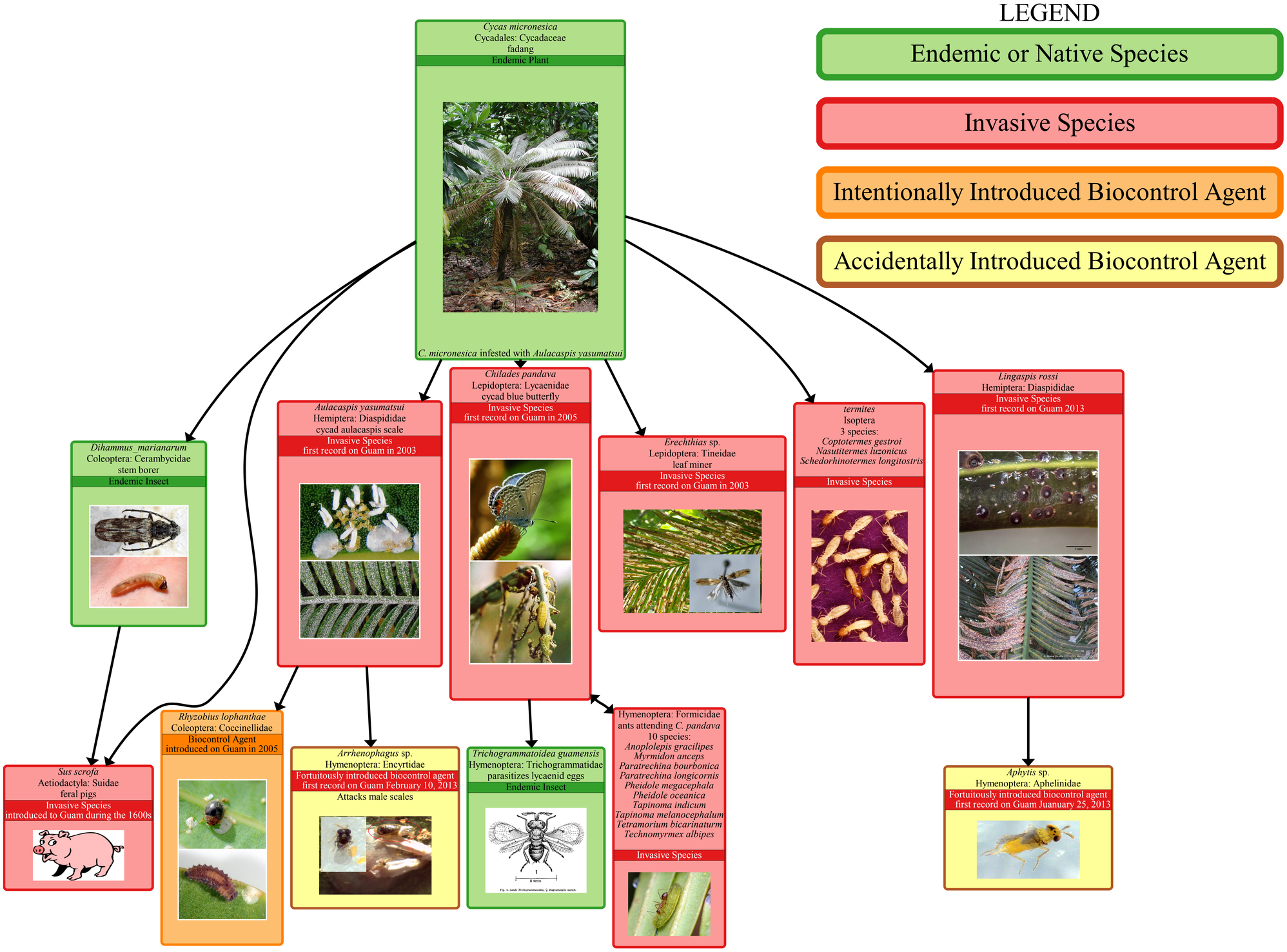

Figure 1: Summary of ecological relationships between *C. micronesica* and invasive species which threaten its existence. Arrows indicate which species benefit from relationships.

A 2002 forest survey listed *Cycas micronesica*, locally known as "fadang", as the most numerous tree-sized plant in Guam's forests. In 2006 *C. micronesica* was placed on the IUCN Red List of Threatened Species in response to high mortality from simultaneous attack by recently introduced invasive species including the cycad aulacaspis scale (CAS), *Aulacaspis yasumatsui*, the cycad blue butterfly, *Chilades pandava*, and a lepidopteran leafminer, *Erechthias* sp. The coccinellid, *Rhyzobius lophanthae* was established as an effective biological control agent for CAS. However, the cycads continue to decline due to damage from CAS and other herbivores. In some areas of Guam, 90% of *C. micronesica* have been killed and the plant could be extirpated from the wild by 2019 if current trends persist.

References

Moore, A., T. Marler, R.H. Miller and R. Muniappan. 2005. Biological control of cycad aulacaspis scale on Guam. The Cycad Newsletter 28(5):6-8.

Marler, T.E. and R. Muniappan. 2006. Pests of *Cycas micronesica* leaf, stem, and male reproductive tissues with notes on current threat status. Micronesica 39: 1-9.

Marler, T. E. and A. Moore 2010. Cryptic scale infestations on *Cycas revoluta* facilitate scale invasions. HortScience 45(5): 837839.

Marler, T. E., L. S. Yudin and A. Moore 2011. *Schedorhinotermes longirostris* (Isoptera: Rhinotermitidae) on Guam adds to assault on the endemic *Cycas micronesica*. Florida Entomologist 94(3): 702-703.

Marler, T.E. and J.H. Lawrence 2012. Demography of *Cycas micronesica* on Guam following introduction of the armoured scale *Aulacaspis yasumatsui*. J. Trop. Ecol. 28:233242.

Marler, T. E. 2013. Temporal variations in leaf miner, butterfly, and stem borer infestations of *Cycas micronesica* in relation to *Aulacaspis yasumatsui* incidence. HortScience 48(10):13341338.

Marler, T. E. & J. H. Lawrence 2013. Phytophagous insects reduce cycad resistance to tropical cyclone winds and impair storm recovery. HortScience 48(10):12241226.

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