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Terrestrial Biodiversity and Ecosystems

Deer Predation and Ant/Gravity-Mediated Seed Dispersal Maintain Year-to-Year Fidelity of Patch-Based Distribution of an Annual Parasitic Plant: Conservation and Evolutionary Implications

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跨領域科技研究大樓1樓C102交誼廳
Host: Dr. Chien-Hsiang Lin 林千翔副研究員

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Abstract

Parasitic plants comprise a phylogenetically diverse cohort of ecologically important plants, accounting for >1% of known flowering plant species. The evolution of parasitism – i.e., the evolution of an organ (haustorium) enabling vascular connection to a host plant – has led to morphological and genetic reductions, with a subset of obligate parasites (holoparasites) fully heterotrophic and reliant on their hosts. This host reliance has many evolutionary and conservation implications that are currently poorly understood, including important influences on spatial patterns and population continuity. The spatial pattern and range of the local host(s) defines the potential pattern and range of the parasite, with the parasite only able to occur where a host is already established; however, despite prolific seed production and diverse reported pollination and dispersal vectors, holoparasites often occur in population sizes and patterns much smaller than that of their hosts. Across six geographically isolated sites within Taiwan (Hengchun, Orchid Island) the annual holoparasite *Balanophora fungosa ssp. fungosa* maintains a static patchy distribution pattern, with significantly fluctuating year-to-year population sizes driven by patch size rather than range expansion or contraction via changes in number of patches. With the aim of better understanding the conservation status and ecological role of this species in Taiwan, from 2021 to 2026 we investigated biotic and abiotic drivers of this spatial pattern. We found no evidence for host limitation or pollination failure, and only a minor edaphic influence on germination potential. However, seed predation (Cervus nippon) significantly limited the number and pattern of plants able to reach seed-bearing phase, and short-distance ant (Carebara diversa) and gravity dominated seed dispersal maintained spatial fidelity of patch locations. Our results present the first evidence of predation and dispersal limitation in parasitic plants and provides distinct evidence of ecological damage of released deer on cryptic plants and Taiwan's forest ecosystems.

Keywords: holoparasite, recruitment, gene flow,
animal interaction, conservation