Community-wide difference in floral traits between continental and oceanic island coastal plants

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Abstract

Oceanic islands usually exhibit lack of large bees and butterflies with long proboscises and dominance of small-sized bees with proboscises in their pollination networks. Such pollinator compositions are known to promote the floral evolution in some oceanic island plant populations, whose ancestors were originally pollinated by large bees and butterflies in continents and continental islands. We recently reported that long-tongued pollinators were more scarce in coastal communities of Izu (oceanic) islands compared to those of the Honshu (continental) island communities in Japan. This scarcity of long-tongued pollinators caused community-level niche shifts in oceanic-island pollinator communities, such that long-tubed flowers were more frequently visited by short-tongued pollinators. However, how have such community-level pollinator niche shifts influenced floral phenotypes in Izu island plant communities are largely unknown. To examine the issue, we compared lengths of the style, stamen and petal (and corolla tube) of 19 dominant species (8, 4, 3 and 4 species with long-, medium, short-tubed and open flowers, respectively) of coastal vegetation between the Honshu and Izu islands: 3 and 5 sites were investigated in the Honshu and Izu islands, respectively. In most long-tubed species, one or more measured traits were significantly larger in the oceanic island sites than those in continental island sites. Conversely, in most medium- and short-tubed species, any or all of the measured traits were significantly smaller in the oceanic island sites than those in the continetal sites. Meanwhile, we found no differences in floral traits of open flowers between continental and oceanic island sites. Thus, we found community-wide differences in floral traits between the continental and oceanic islands in plant with corolla tubes. In some study species, the lengths of floral traits were significantly correlated with the average tongue length of pollinators, suggesting that the pollinator niche shifts might cause the floral phenotype changes in oceanic islands. In other study species, however, floral trait differences between continental and oceanic sites could not be explained by the community average of tongue length of pollinators. Our results suggest that many coastal plant species have flowers adapting to pollinator communities without long-tongued bees and butterflies in oceanic islands.

Keywords: floral traits, pollinator, plant community, phenotypic variation

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