
Speciation of the sect. *Camellia* based on pollinator shift in Japanese islands

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Abstract

The genus *Camellia* (Theaceae) is particularly prevalent in East and Southeast Asia (82-280 species). According to the Flora of China, there are 13 species in the sect. *Camellia*, of which 12 are found in China (11 being endemic), and only two species, *C. japonica* and *C. rusticana*, are found in the Japanese islands. Most species of *Camellia* have the separated filaments, but the sect. *Camellia* species except for *C. rusticana* and *C. chekiangoleosa* have the connected filaments, which indicates the bird-pollinated flower characteristics to keep large amount of nectar. *C. japonica* occurs in the end of the range of *Camellia* distribution. This species blooms in the winter when insects are absent and have to depend on bird pollination whereas other *Camellias* depend on both pollination, insects and birds. Therefore *C. japonica* might be the most adaptable species to the bird pollination. On the other hand, *C. rusticana* has ancestral traits with not-connected filaments in sect. *Camellia*. We hypothesized that pollinator shift occurred and speciated to sect. *Camellia* from ancestral genus *Camellia*. But *C. rusticana* might to get back to the insect pollination to fit to the snowy environment in Japan. Hence, this study aims to examine the speciation of Japanese *Camellias* based on pollinator shift by comparing the floral morphologies and the genetic differentiations of genus *Camellia*. We compared their morphologies of leaf hypodermis, flower form, petal color, filament color and filament color in the twenty populations and estimate quantitatively the differentiation. The floral traits of *C. japonica* such as filament connection rates, nectar and sugar contents are one of most adapted characteristics for bird-pollination. Genetically, *C. japonica* is newly differentiated species based on MIG-seq and cpSSR, relatively. *C. rusticana* with few common SNPs could not be taxonomically positioned, but it might be an older position in the sect. *Camellia*. In other words, *C. rusticana* didn't return to the insect pollination, but is the ancestral species in the sect. *Camellia*. As for the speciation of genus *Camellia*, the species with bird-pollination traits are not rapidly speciated from their common ancestors but occurred from different phythesis depending on environmental conditions.

Keywords: bird pollination, floral traits, MIG seq, SNPs, cpSSR

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