The diversity of pistillate flowers and its taxonomic value to the classification of Daphniphyllum (Daphniphyllaceae)

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ABSTRACT. Daphniphyllum is the sole genus of the family Daphniphyllaceae consisting of dioecious species with inconspicuous reduced unisexual mostly caducous flowers. The paucity of helpful taxonomic characters from vegetative and reduced reproductive organs has led to difficulties in intrageneric classification and species identification. The pistillate flowers have characters of higher taxonomic value than those of the vegetative organs, staminate flowers and fruits, but pistillate flower information is rarely reported. Here pistillate flowers of 19 taxa were studied to reveal pistillate floral diversity and major developmental features with a view to intrageneric classification. Four types of stigma shape were recognized: punctiform, reniform, linear and oblong. Daphniphyllum stigmas, except for the punctiform type, elongate variously after an early stage of anthesis. The pistillate flowers of three taxa are asepalus. The calyces of other taxa were categorized into three types, free, cleft and parted, which are consistent within taxa. The existence and persistence of staminodes are diagnostic characters. This study shows that the characteristics of pistillate flowers provide helpful information for identification at the species and even the variety level. Our results do not support the currently accepted two sections, Daphniphyllum and Lunata. Instead, Huang’s original intrageneric classification into three sections, Daphniphyllum, Lunata and Staminodia, is supported, but with two species previously in Daphniphyllum reassigned to Staminodia.

Keywords: Caducous; Calyx; Daphniphyllum; Lunata; Staminode; Staminodia; Stigma; Taxonomic value.

INTRODUCTION

Daphniphyllum is the sole genus of the family Daphniphyllaceae distributed from tropical to subtropical Asia. The genus Daphniphyllum was established by Blume (1826), based on the type species, D. glaucescens. Monographic studies on Daphniphyllum have been made by Müller (1869), Rosenthal (1916, 1919) and Huang (1965, 1966). Currently, this genus comprises about 30 species of evergreen trees or shrubs with a distributional range from tropical to subtropical Asia (East Asia, Southeast Asia, and Indian subcontinent), generally between 46°N to 10°S and 75°E to 150°E (Huang, 1965; Kubitzki, 2007).

Intrageneric classification was first proposed by Hurusawa (Hurusawa, 1942a, b) who divided Daphniphyllum into two sections, Staminodia and Calycifera, based on four species in Japan (including Taiwan). He distinguished these two sections based on pistillate flower features: section Staminodia with obvious staminodes; section Calycifera with very obscure or trace of staminodes and persistent or deciduous sepalas. Huang (1966) described nine species in his monograph of Daphniphyllum, and divided this genus into three sections, namely Daphniphyllum, Lunata and Staminodia. More recently, 16 species of Daphniphyllum were described in the Flora of Malesiana by the same author (Huang, 1997). However, he revised his treatment of this genus by dividing it into two sections (Lunata and Daphniphyllum), and relegated the previous section Staminodia to a subsection of section Daphniphyllum (Huang, 1996).

The flowers of Daphniphyllum are unisexual (Heywood et al., 2007), wind-pollinated (Fishbein and Soltis, 2004) and inconspicuous. The flowers of all species are arranged into a racemose inflorescence and are often clustered near...