



## A revision of the *Rhododendron taipaoense* complex (subg. *Tsutsusi* sect. *Tsutsusi*, Ericaceae), based on observations of morphological characters and seed micromorphology

XIAO-FENG JIN<sup>1</sup>, BING-YANG DING<sup>2</sup>, YING-YING ZHOU<sup>1</sup>, SHUI-HU JIN<sup>3</sup> & WANG-WEI YANG<sup>1</sup>

<sup>1</sup>College of Life & Environment Sciences, Hangzhou Normal University, No. 16 Xuelin Street, Xiasha Higher Educational District, Hangzhou Zhejiang, 310036, People's Republic of China. Email: docxfjin@163.com

<sup>2</sup>College of Life & Environment Sciences, Wenzhou University, Chashan Higher Educational District, Wenzhou, Zhejiang, 325027, People's Republic of China. Email: dby@wzu.edu.cn

<sup>3</sup>School of Forestry & Bio-Technology, Zhejiang Agricultural & Forestry University, Huancheng Road, Lin'an, Zhejiang, 311000, People's Republic of China. Email: jsh501@163.com

### Abstract

In this paper, we present a revision of the *Rhododendron taipaoense* complex, including *R. taipaoense* and eight other named species, based on literature survey, field collections and observations, inspection of herbarium specimens, statistical analysis of morphological characters, and SEM observation of seed shape and testa. We evaluated all characters that have previously been used to diagnose these species: indumentum of young shoots and abaxial surfaces of leaves; filament dimensions; style base; leaf color, size, and apex shape; flower number per inflorescence; corolla length; and length of the stamen and pistil. Cluster analysis of 146 individuals showed that individuals from different populations are interdigitated, irrespective of traditional taxonomic limits. Analysis of morphological data using principal coordinate analysis (PCoA) likewise shows a continual gradation between populations, rather than disjunctures between named species. Consequently, only one species is recognized in the present paper, and *R. apricum*, *R. falcinellum* (*R. apricum* var. *falcinellum*), *R. florulentum*, *R. hepticum*, *R. piceum*, *R. rufulum*, *R. spadiceum*, and *R. rufoindumentum* (nom. nud.) are all reduced to synonyms of *R. taipaoense*.

**Key words:** China, morphometric analysis, population, scanning electron microscopy, statistical analysis, taxonomy

### Introduction

The genus *Rhododendron* Linnaeus (1753: 392), with ca. 1000 species worldwide, comprises a well known group of alpine flowering shrubs distributed primarily in eastern and southeastern Asia (Chamberlain *et al.* 1996, He & Chamberlain 2005, Jin *et al.* 2010). Linnaeus originally described nine species that are now placed in *Rhododendron*, although he treated five of them in *Azalea* Linnaeus (1753: 150) (Philipson & Philipson 1973). The Sino-Himalayan region is considered the center of diversity of the genus (Ming & Fang 1979). *Rhododendron* subgenus *Tsutsusi* (Don 1834: 845) Pojarkova (1952: 55) comprises ca. 110 species and is distributed mainly in Sino-Japan, with a minor extension to South Asia (Yamazaki 1993, 1996, He 1994, He & Chamberlain 2005). Sleumer (1949, 1980) classified subg. *Tsutsusi* into three sections: *Tsutsusi* Don (1834: 845), *Brachycalyx* Sweet (1831: 95) and *Tsusiopsis* Sleumer (1949: 552). Section *Tsusiopsis* has more recently been merged into sect. *Brachycalyx* (Yamazaki 1996, Jin *et al.* 2010). China has about 80 species of subg. *Tsutsusi*, with a center of diversity in the mountainous region of South China (He 1994, He & Chamberlain 2005, Jin *et al.* 2007).

*Rhododendron taipaoense* T. C. Wu & P. C. Tam (in Tam *et al.* 1978: 36), which belongs to sect. *Tsutsusi*, was described based on a type specimen collected in eastern Guangdong, South China (Tam *et al.* 1978).