



Magnolia sinostellata and relatives (Magnoliaceae)

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Abstract

Magnolia sinostellata has been considered a synonym of *Magnolia stellata* by several taxonomists due to many shared morphological characters. With similar leaves and twigs, *Magnolia amoena* is distributed in areas near *M. sinostellata*. These three species were studied by comparing morphological, cytological and palynological characters, creating a maximum parsimony phylogenetic tree based on plastid DNA sequences and studying these taxa in the field. The results are as follows: *M. sinostellata* is a diploid, $2n=2x=38$, and there are heterozygotes with paracentric inversion chromosomes in wild populations. *Magnolia stellata* is also a diploid, and there are heterozygotes with pericentric inversion chromosomes in wild populations. The abnormal chromosome behaviour in meiosis has serious effects on survival of the two species. *Magnolia amoena* is diploid with more or less normal meiosis except for a few lagging chromosomes in anaphase I and II. *Magnolia stellata* has a more complicated exine sculpture than the other two; exine structure is different in all three species. Separate species status for *M. sinostellata* is also supported by results of the plastid DNA phylogenetic study. Distributions, population descriptions and observations are provided, and based on all the evidence presented we conclude that *M. sinostellata* is a distinct species in *M.* subgenus *Yulania*.

Key words: exine sculpture, *Magnolia amoena*, *Magnolia stellata*, *Magnolia* sect. *Yulania*, paracentric inversion, plastid DNA phylogenetics

Introduction

Magnolia sinostellata Chiu & Chen (1989: 79) was first found at Caoyutang Forest Farm in Jingning County, Zhejiang Province (China). The plants were growing in open secondary forest as shrubs and small trees at an elevation of 950–1200 m in a swamp of about 25 hectares (Si *et al.* 2001). Similar to *M. sinostellata*, *M. stellata* Maximowicz (1872: 419) is a shrub or tree with flowers composed of many tepals. *Magnolia stellata* is endemic to the area around Ise Bay in Japan, growing at an elevation of 10–550 m in lowland hills, terraces and riverbeds in open swampy places, mostly in hilly regions. *Magnolia amoena* Cheng in Chien & Cheng (1934: 280) is native to southeastern China and occurs in an area adjoining that of *M. sinostellata*.

The taxonomic validity of *M. sinostellata* has long been controversial owing to its morphological similarities to *M. stellata*. As pointed out by Chiu & Chen (1989), it resembles *M. stellata* of Japan in the unique chrysanthemum-like flower but differs in the color of the twigs and the shape of leaves and tepals. It is also similar to *M. amoena* in features of twigs and leaves, but with a more conspicuous difference in its habit and the shape of tepals (Chiu & Chen 1989). *Magnolia sinostellata* is listed as a species in doubt in *Flora Reipublicae Popularis Sinicae* (Liu *et al.* 1996), but was acknowledged valid status later (Liu *et al.* 2004). Frodin & Govaerts (1996) treated it as a synonym of *M. stellata*, which was the same in Xia, Liu and Nootboom (Xia *et al.* 2008).

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