



Cluster analysis of *Pinus taiwanensis* for its *ex situ* conservation in China

X. Gao¹, L. Shi² and Z. Wu³

¹College of Life Science, Anhui Normal University, Wuhu, China

²International Center for Bamboo and Rattan, Beijing, China

³School of Forestry and Landscape Architecture,
Anhui Agricultural University, Hefei, China

Corresponding author: L. Shi

E-mail: leishi@icbr.ac.cn

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ABSTRACT. *Pinus taiwanensis* Hayata is one of the most famous sights in the Huangshan Scenic Resort, China, because of its strong adaptability and ability to survive; however, this endemic species is currently under threat in China. Relationships between different *P. taiwanensis* populations have been well-documented; however, few studies have been conducted on how to protect this rare pine. In the present study, we propose the *ex situ* conservation of this species using geographical information system (GIS) cluster and genetic diversity analyses. The GIS cluster method was conducted as a preliminary analysis for establishing a sampling site category based on climatic factors. Genetic diversity was analyzed using morphological and genetic traits. By combining geographical information with genetic data, we demonstrate that growing conditions, morphological traits, and the genetic make-up of the population in the Huangshan Scenic Resort were most similar to conditions on Tianmu Mountain. Therefore, we suggest that Tianmu Mountain is the best choice for the *ex situ* conservation of *P. taiwanensis*. Our results provide

a molecular basis for the sustainable management, utilization, and conservation of this species in Huangshan Scenic Resort.

Key words: Climatic factor; Custer analysis; Genetic marker; Morphological trait; *Pinus taiwanensis*