Plant Diversity 38 (2016) 207–208

Contents lists available at ScienceDirect

Plant Diversity

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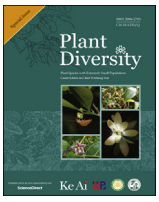


Words from the Guest Editor-in-Chief

PSESP (Plant Species with Extremely Small Populations) is a new concept developed to rescue the most globally threatened plant species. It first appeared in "*Proposal for the Extremely Small Population protection project for the endemic plants and animals of Yunnan*", a report submitted to China's State Forestry Administration (SFA) through the Yunnan Forestry Department (YFD) in 2005. In September 2009, four years after the launch of the project, the "*First National PSESP Seminar and Launching Ceremony of the Reintroduction Program of China*" was hosted by SFA, YFD and the Kunming Institute of Botany (KIB), under the Chinese Academy of Sciences, and held in Kunming, Yunnan, China. Since then, reintroduction and reinforcement of three model PSESP, namely *Manglietiastrum sinicum* (*Huagai mu* in Chinese), *Quercus sichourensis* (Xichou Oak) and *Paphiopedilum armeniacum* (*Xinghuang doulan* in Chinese), has been supported by the SFA and YFD as a demonstration program for the rescue and conservation of PSESP. In March 2010, the Yunnan Government approved the "*Planning Outline (2010–2020) and Emergency Action Plan (2010–2015) for Wild Species with Extremely Small Populations*" submitted by YFD and Yunnan Provincial Science and Technology Department (YPSTD). This Plan designates 62 PSESP for rescue before 2020, of which 20 required urgent action by 2015, and are therefore given the highest priority. In October 2011, the "*Launching Ceremony of Pilot Demonstration for Establishment of PSESP In-Situ Conservation Sites in Yunnan*" was held. March 2012 saw the SFA and National Development and Reform Commission (NDRC) jointly issue and distribute guidelines in the form of the "*Rescuing Conservation Plan for PSESP (2011–2015) of China*". Following these guidelines, some 120 PSESP have been nationally targeted for actions.

PSESP are characterized by small remaining populations (far lower than the Minimum Viable Population, MVP), restricted habitat, extremely high risk of extinction, and exposure to serious human disturbance. Scientifically, there is not an MVP threshold for plant species, and therefore 5000 mature individuals for a species with fewer than 500 mature individuals in each isolated population has been proposed for qualification as a PSESP in China. These figures are based on both a review of literature addressing global MVP and conservation practices in China. For species with an extremely high risk of extinction, emergency protection is critically important, together with comprehensive research on the threats, reproductive biology, genetic diversity, conservation genetics, species recovery and population/habitat restoration of the species. During the past five years (the "12th Five-Year" period of China from 2011 to 2015), with financial support from a special government fund, national and regional-level actions to rescue PSESP (including field surveys, creating *in situ* conservation sites/spots, propagation for both *ex situ* conservation and population restoration, as well as germplasm banking) has made great advances in several parts of China. Training programs run by the central and local governments at both national and provincial levels, as well as education and public awareness campaigns about the concept of PSESP and its importance in the botanical institutions have also been implemented. Over the next five years (the "13th Five-Year" period of China from 2016 to 2020) it is hoped that China's PSESP conservation program can create a high-impact template for direct action and for the focus of financial and human resources on the species most in need of support. Indeed, the Ministry of Science and Technology of China (MSTC) has already announced several national key projects for PSESP rescue programs.

Comprehensive research for guiding and/or evaluating the efficacy of PSESP conservation is another key issue. With support from national and/or international organizations and foundations, particularly from the National Natural Science Foundation of China (NSFC), several PSESP projects have been very successful. Outcomes of some of these projects have already been published in Chinese and English academic journals, or in "*Communication for Conserving Plant Species with Extremely Small Populations (PSESP)*", which is an informal Chinese reference issued by the Kunming Botanical Garden (KBG) to facilitate exchanges between researchers and the relative organizations. My sincere thanks go to the Editors-in-Chief of *Plant Diversity*, Prof. Zhekun Zhou and Prof. Sergei Volis, for their generosity in providing space for this PSESP special issue to present progress on current research on PSESP.

This special issue of *Plant Diversity* presents seven peer-reviewed articles. The articles cover a range of topics, including analysis of gaps in the knowledge of the seed/spore biology of China's 120 PSESP for germplasm banking (seed and spore), genetic diversity and conservation genetics, reproductive biology, pollination biology, seed dispersal and seed germination in the natural habitat, as well as population restoration by augmentation or reinforcement. It is important to realize that germination information and necessary storage conditions are only available for 28 species (23%) and 10 species (8%), respectively, of the 120 Chinese PSESP proposed by the SFA and NDRC in 2012. Furthermore, about 60% of PSESP species may require cryopreservation for long-term storage in germplasm banks.

Craigia yunnanensis, one of two relict species in the genus *Craigia*, has an isolated distribution in the Wenshan and Dehong regions of Yunnan, and has experienced significant genetic

Peer review under responsibility of Editorial Office of Plant Diversity.

http://dx.doi.org/10.1016/j.pld.2016.10.004

differentiation between its different populations. *Ex situ* conservation of this species should sample individuals from representative populations, and breeding should avoid crosses between individuals from the two regions due to a high risk of outbreeding depression.

Research into *Q. sichourensis*, one of the 20 PSESP prioritized and approved for urgent rescue by the Yunann Government, confirmed the existence of a total of five individuals in three localities. Acorns from this species were found to be viable and germinate fast, but also lose viability quickly in drought. We can be certain that the successful restoration of *Q. sichourensis* in its natural habitat will involve consideration of the high desiccation sensitivity of the acorns, and also the degradation of habitat.

Understanding the reproductive biology of *M. sinicum* (also called *Magnolia sinica*), one of most notable PSESP in China, has long been a difficult issue because it is a very tall tree growing in remote mountain areas. However, understanding its reproductive characteristics is essential if we are to save this particular species. At this point I would also like to remember my friend, Prof. Qingwen Zeng, who passed away in September, 2012 as a result of an accident while observing fruiting on *M. sinicum* in southeast Yunnan.

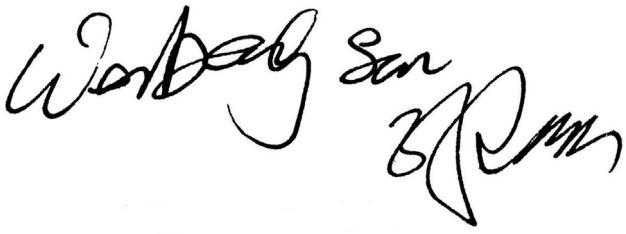
Aquilaria sinensis is a species that is highly valuable economically, and its over-exploitation has resulted in the rapid decline of wild populations. Indeed, in Yunnan province it may even be extinct in the wild. The results of pollination and seed dispersal studies indicated that noctuids and pyralids are the most effective pollinators of pollinator-dependent *A. sinensis*, and that hornets are its effective seed dispersers.

Cinnamomum chago, another economically valuable tree for timber and as an oil source, is not well known in China. The biology and conservation genetics were investigated thouroughly, and have confirmed that this species should be ranked as a PSESP and should receive special attention and protection.

Ziziphus celata, is a clonal shrub limited to extremely small populations and is narrowly endemic to pyrogenic central Florida sandhills. This species was used as a case study in this issue to address the question of adaptive introduction for species/population recovery in the wild, and I believe the conclusions from this case can be borrowed and adapted for some of China's PSESP.

I encourage readers to explore their interests and I gratefully welcome corrections.

What's next? I have reason to believe that the integrated conservation system for PSESP, combined with achievements in theoretical and technological research, will continue to mature, and more articles and/or special issues on PSESP will appear in *Plant Diversity*.



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Available online 26 October 2016