

Dragon Trees, Tertiary Relicts in Current Reality

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Few of the about 190 species currently described in the plant genus *Dracaena* [1] (Asparagaceae) reach the arborescent form. Arborescent dracaenas have been classified into the Dragon tree group [2]: *Dracaena cinnabari* Balf.f., *D. tamaranae* A. Marrero, R. S. Almeida et M. González-Martín, *D. draco* L. s.l., *D. ombet* Kotschy & Peyr. s.l. and *D. serrulata* Baker s.l., and *D. ellenbeckiana* Engl. from South Arabia, Macaronesia and North Africa. In addition, several species from Southeast Asia, such as *D. jayniana* Wilkin & Suksathan, *D. cochinchinensis* (Lour.) S. C. Chen, *D. yuccifolia* Ridl., *D. cambodiana* Pierre ex Gagnep. and *D. kaweesakii* Wilkin & Suksathan, can be included due to their tree growth habit [3–5].

Dragon trees are considered Tertiary relict species [6]. These trees have been part of one of the oldest woodland ecosystems in the world [7]. Most species are endemic with limited (often island) distributions [2,5,8,9]. The distribution of Dragon trees is highly fragmented, consisting of small populations with unbalanced age structures. Often young trees are missing because natural regeneration is reduced by the overgrazing of livestock [3,5,10–18]. Dragon trees can be found in areas characterized by a predominantly arid tropical climate with a monsoon seasonality bringing wet air in the form of clouds and fog [19,20]. They are well adapted morphologically and physiologically to capture water in such conditions [21–23]. Several Dragon tree species are endangered (some are even extinct) according to the IUCN Red List, even though most of the species have not been assessed yet.

Dragon trees are an important source of non-timber plant products for indigenous communities [24]. They produce a red resin, called dragon's blood, which has been used for coloring and medical purposes since ancient times [25]. The dragon's blood was an important trade product in Ancient Egypt and in the Greek and Roman empires [26,27]. Therefore, Dragon trees are among the plants that have played a key role in human history. They have, therefore, important natural and cultural values.

Because of their global importance, we assembled a group of researchers and local practitioners engaged in the research and conservation of the vulnerable and often endangered arborescent *Dracaena* species of the world. To this goal, we organized the first World Conference on Dragon Trees, hosted by Mendel University in Brno (Czech Republic), on 5–8 September 2019. The conference hosted about 35 attendants from 12 different countries. The main objective of the event was to present the latest results of scientific research focused on species of the Dragon tree group and to determine the main gaps for future investigation as the basis for their conservation and management. An important output of the conference was the establishment of the first Dragon Tree Consortium, an informal open society that focuses on cooperation in Dragon tree research and conservation.

The Special Issue includes nine studies covering a broad range of research topics related to Dragon trees. Celiński et al. [28] present the complete *D. draco* chloroplast genome, which provides new information and helps to elucidate phylogenetic relationships, particularly within the genus *Dracaena*. A new approach in taxonomy with a potential for



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growth analysis is presented by Vahalík et al. [29], who compared 3D tree models of four Dragon tree species. Germination trials published by Bauerová et al. [30] show the high regeneration potential of *D. cinnabari* seeds, an endemic species on Socotra Island (Yemen). Two studies focus on the Dragon tree resin, one on the traditional way of harvesting resin from *D. cinnabari* described by Al Okaishi [31], while Ding et al. [32] reviewed the progress and achievements from applied history as well as induction techniques that are used for the formation of dragon's blood of *D. cambodiana*, which has taken place in China. Lengálová et al. [33] developed the first model of crown age estimation for *D. ombet* and *D. draco* subsp. *caboverdeana*, species that have an important value for population studies and setting up a framework for conservation measurements. Vahalík et al. [34] present the results of an extensive inventory of *D. serrulata* in Oman and an assessment of its threats. Vasconcelos et al. [35] highlight *D. cinnabari* as an umbrella species providing microhabitats for almost half of the endemic reptile fauna on Socotra. Finally, Maděra et al. [36] review the current knowledge of the taxonomy, evolution, anatomy and morphology, physiology and ontogeny of the arborescent Dragon tree species. Attention was paid to the composition, harvesting, medicinal and ethnobotanical use of the resin (dragon's blood). An evaluation of population structure, distribution, ecology, threats and conservation issues forms the final part of the review.

We hope that the world's first Dragon tree conference and this topical collection will establish a new tradition to stimulate the scientific investigation and improved conservation of this unique and globally endangered tree group.

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