

Acer mazandaranicum

Ecology and conservation of a narrow endemic maple species in northern Iran



THE SPECIES

The Mazandaran maple (*Acer mazandaranicum*) is an impressive tree that can reach a height of up to 35-45 meters, growing preferably on northern slopes in humid and foggy forests at an altitude of 450-1900 m asl in the western part, and of 1150-1700 m asl in the central part of the Hyrcanian forests. Surprisingly, it was only discovered and described as a separate species in 2008 in the province of Mazandaran.

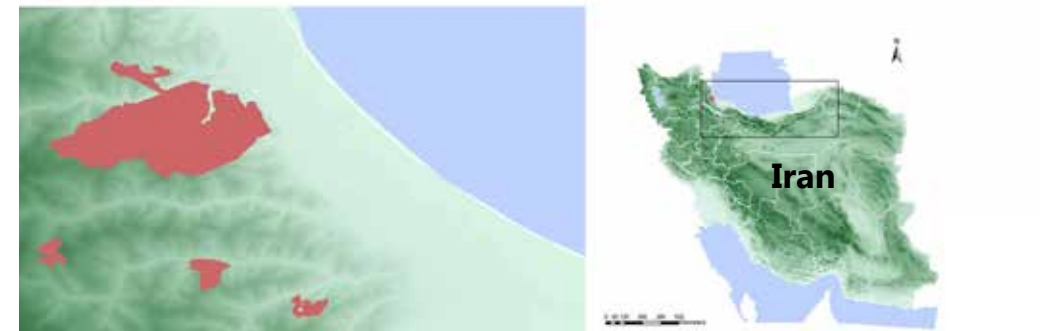
Its most striking features are the pendulous peduncles (stems supporting the whole inflorescence, 6-7 cm) and the very long pedicels (small stalks attaching a flower to the inflorescence, 7-9 cm long!). The two wings of the typical maple-fruit, called samara, tend to overlap at the tip, which is rather unusual and distinguishes this species from other maples species occurring in the region, such as Hyrcanian maple (*A. hyrcanum*) or Velvet maple (*A. velutinum*).

1. Massive Mazandaran maple in its natural habitat in the Hyrcanian forests presents its showy autumn colours. (mp)

2. A twig with leaves and flowers of *Acer mazandaranicum*: note the very long peduncles and pedicels. (mp)

3. The Elburz Mountains stretch along the southern shoreline of the Caspian Sea from Azerbaijan in the west to eastern Iran. Red surfaces: known populations of the Mazandaran maple, including the type locality of Ashek. (hy)

4. The unique feature of the Mazandaran maple: the tips of the samara wings tend to overlap. (mp)



DISTRIBUTION

The Hyrcanian forests along the coasts of the Caspian Sea in Iran and Azerbaijan host a remarkable diversity of both plant and animal species. Therefore, they were declared UNESCO World Heritage site in 2019.

Not only distinctive maple species have been found there, but also many other broad-leaved tree species such as the Persian silk tree (*Albizia julibrissin*), Caucasian zelkova (*Zelkova carpinifolia*) or the rare Sabet's lime tree (*Tilia sabetii*). They form a mostly deciduous, broad-leaved temperate rainforest and are relicts from a formerly much wider distributed vegetation, now extinct in other regions of the world.

The animal diversity is equally impressive: Caucasian leopard, brown bear or Eurasian lynx roam through those lush forests.

1. The pending long inflorescences of *Tilia sabetii* are characteristic for this enigmatic tree species of the Hyrcanian forests. (hz)

2. and **4.** The lush Hyrcanian forests host a rich diversity of broad-leaved tree species. (er)

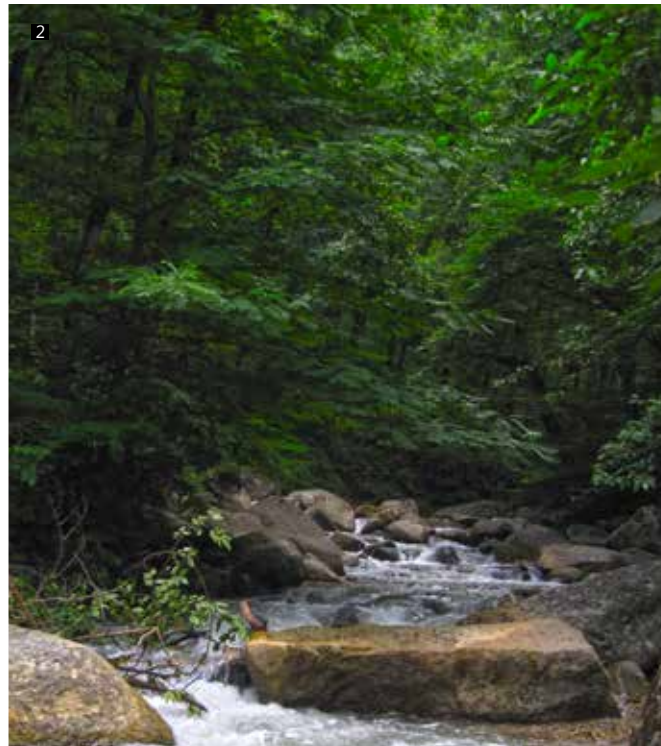
3. The logo of the *Acer mazandaranicum* project has been developed to gain visibility and enhance awareness for this rare tree species.



THE PROJECT

This project focuses on long-term conservation and scientific exploration of one of the most endangered tree species of the Hyrcanian forests, the Mazandaran maple. As many other tree species in this region, it grows in a very specific and relict habitat, it has a restricted distribution and is therefore sensitive to habitat alteration and reduction.

Specifically, the project aimed to answer the following questions: What is the distribution of *A. mazandaranicum* and how large are the existing populations? How will global warming affect the distribution of this species? What is the genetic diversity of this species? What role does *A. mazandaranicum* play for other organisms in the Hyrcanian forests? All of this information will be used to create a detailed action plan. Finally, the knowledge gained will help to realize very practical goals of the project and implement the conservation measures: Collecting seeds, setting up a tree nursery (ex situ culture), reinforcement of existing populations and/or reforestation in new sites.



OUTPUT

Several new populations of *A. mazandaranicum* have been discovered during this project. The species is known today from five isolated regions in the Hyrcanian forests. Particularly interesting is the finding of the new subpopulations at higher altitudes, indicating a possible adaptation to future climate changes. Our recent publication (Yousefzadeh et al. 2024, see References) demonstrated that the potential habitat of the species will be drastically diminished in suitability in the future. At the same time, it indicated that the species may possess the capability to shift its altitudinal distribution and potentially migrate to higher elevations in response to increasing temperatures and decreasing rainfall.

In order to mitigate the threats facing this endangered species and reduce the risk of extinction, ex situ conservation measures as well as in situ protection activities within its habitat are necessary to ensure long-term survival. Hundreds of seedlings were raised in a nursery and used for afforestation in a suitable habitat next to existing stands.

1. Young seedlings in the nursery waiting to be planted in a suitable habitat. (mp)

2. An afforestation in the vicinity of the nursery in order to test the viability of the young plantlets. (bn)

3. Collection seeds requires intensive manual labour and is therefore very time-consuming. (hp)

4. Splendid autumn colours of Mazandaran maple tree leaves bring a golden touch into the Hyrcanian forests. (mp)

FURTHER DEVELOPMENTS

From an ecological and silvicultural point of view, *A. mazandaranicum* needs small gap areas in the forest for successful regeneration. Therefore, in habitats with the presence of both beech and *A. mazandaranicum*, the dense forest cover must be opened. More seed collections and nurseries will be necessary in the future, especially because the species does not show mass fruit production every year. As for all long living trees, maple seedlings grow slowly.

Thus, a longer engagement and regular monitoring is necessary to document the success of this project. Additionally, in order to preserve the seeds on an even longer time scale a cryopreservation in the Iranian Biological Resource Centre (IBRC) must be undertaken. Furthermore, research on genetic diversity of *A. mazandaranicum*, but also on bryophyte and animal diversity linked to Mazandaran maple will be presented in scientific articles. Due to our activities, the attention of the Iranian research and administration institutions was attracted to this species and its habitat. Therefore, several additional research topics will be defined to continue the exploration and conservation of *A. mazandaranicum* launched with the present project.



INTERNATIONAL COLLABORATION

The rich experience of the team of the Botanical Garden of the University of Fribourg (Switzerland) about rare and relict woody species around the world and the highly developed skills of the Iranian partners from Tarbiat Modares University in Noor (Iran) led to this collaboration. This project is generously supported by the **Fondation Franklinia** (Switzerland).

Project partners:

Prof. Gregor Kozlowski is director of the Botanical Garden of the University of Fribourg (Switzerland), an important centre for the study of relict woody plant species. His work focuses on the ecology, distribution and conservation of trees as well as of alpine and aquatic plants.

Prof. Hamed Yousefzadeh works as an associated professor at the Faculty of Natural Resources and Marine Sciences of Tarbiat Modares University in Noor (Iran). His research interests lay in the genetics of rare and endangered woody plants.

ACKNOWLEDGMENTS

Special thanks to **Mansour Pouramin**, who found several new locations of this species in western Hyrcanian forests. We wish to express our gratitude to **Dr. Bahram Naseri** and **Shirvan Sartare** for helping in producing seedlings in the nursery, as well as to **Dr. Nicolas Küffer** and **Dr. Laurence Fazan** from the Botanical Garden of the University of Fribourg, for the international coordination and supervision of the project.

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IMAGE CREDITS

bn – Bahram Naseri; mp – Mansour Pouramin; hp – Hadi Pourmousa; er – Ehsan Rajaei; hy – Hamed Yousefzadeh; hz – Habib Zare

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