



(RESEARCH ARTICLE)



Overview of *Paeonia mlokosewitschii* L

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Abstract

The study involves the monitoring *Paeonia mlokosewitschii* L. - one of the rare endemic, critically endangered species of narrow local distribution both, in natural, i.e. *in situ* conditions of Lagodekhi Nature Reserve and in *ex situ* conditions at the National Botanic Garden of Georgia. Due to the influence of anthropogenic and other negative environmental factors, this important species of Georgian plant diversity, which is included in the Red List and the Red Book of Georgia, have significantly decreased in the area of its distribution.

Keywords: Caucasus; Georgian Flora; Diversity; Endemic; Florocomplex; Reserve; *in-situ*, *ex-situ* Conservation.

1. Introduction

Lagodekhi State Reserve with its size, diversity of flora and fauna is one of the most interesting and distinctive natural landscapes of Kakheti Caucasus among the other reserves of Georgia. It consists of about 1,500 species of plants, with off 30 species survived the last glaciation. About 120 species are Caucasian endemic and 10 species are of Georgian origin. One can find the vegetation and florocomplexes of the Tertiary Period here. Lagodekhi Protected Area is known to be unimpaired not only in Georgia but throughout Europe. Lagodekhi Nature Reserve is located in the Caucasus, in particular, on the southern slopes towards the Alazani River valley in the eastern part of Kakheti Caucasus. Its northern border runs along the watershed ridge and represents the border between Georgia and the Autonomous Republic of Dagestan. The reserve is adjoined by the Matsimi River on the east, bordering the Republic of Azerbaijan, by Mskhalgori ridge to the west, and in the south by some villages of Lagodekhi district like Shroma, Tsodna, Rachisubani and Lagodekhi regional center. The total area of Lagodekhi Reserve within the mentioned borders is 20400 hectares. The reserve is rich in rivers, deep ravines and lakes of glacial origin.

The floristic composition in the forests of the lower mountain belt is especially interesting. A considerable number of relict species are preserved here.

Lagodekhi Nature Reserve is one of the excellent refuges, where the relict plants of the Tertiary flora, Colchis and Talish (Hyrceanian) are the best preserved such as *Acer campestre* L., *A. laetum* C.A.Mey., *A. trautvetteri* Medw., *Juniperus hemisphaerica* C.Presl., *J.oblonga* Bieb., *J.sabina* L., *Pinus sosnowskyi* Nakai., *Taxus baccata* L., *Betula litwinowii* Doluch., *B. pendula* Roth., *Lonicera caucasica* Pall., *Celtis caucasica* Willd., *Corylus iberica* Wittm. ex Kem.-Nath., *C. Kachetica* Kem.-Nath., *Rhododendron caucasicum* Pall., *Rh.luteum* Sweet., *Castanea sativa* Mill., *Fagus orientalis* Lipsky., *Quercus iberica* Stev., *Q. macranthera* Fisch. & C.A. Mey.ex Hohen., *Q. Pedunculiflora* C. Koch., *Juglans regia* L., *Pterocarya pterocarpa* (Michx.) Kunthex I.Iljinsk., *Padus avium* Mill., *Pyrus caucasica* Fed., *Staphylea pinnata* L., *Tillia begoniifolia* Stev., etc. The reserve is also rich in rare herbaceous and endemic plants.

Paeonia mlokosewitschii is a rare and endangered endemic specie in Georgia spread in Lagodekhi Reserve. It was discovered and described as early as in 1897 by Polish naturalist Ludwik Młokosiewicz. Later, in the early twentieth

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century, the famous botanist Kesselring obtained the species from Lagodekhi Nature Reserve. Afterwards the plant was disseminated throughout European and American botanical gardens.

Quite interesting information and materials on *Paeonia* was found in the works by Dioscorides, a Roman scholar and writer in the 1st century BC, as well as in Theophrastus's writings. At that period, China was considered the homeland of *Paeonia*. It is an *Arcto-Tertiary* plant or according to some researchers, it is a mesophyllous forest element of the *Tertiary* period. The oldest species were found in Southeast Asia and the Caucasus.

The further evolution of the plants was carried out through xerophytization that caused the formation of down on the fruit, indumentum on the leaves and other morphological changes. If considering the peculiarities of the species, their morphological and ecological conditions, we may conclude that the species of Caucasian peony are ancient and today they are widespread in the *tertiary* deciduous forests of the Caucasus. Thus, it can be assumed that *Paeonia mlokosewitschii* L., an endemic species of Georgian flora of narrow local distribution is a rare relict endemic plant of eastern Caucasus.

The family Paeoniaceae is represented by 1 genus and 45 species that are distributed in the Caucasus, Asia, Europe and the mountainous countries of North America. There are 10 species of peony in Georgia: *Paeonia macrophylla* (Albov) Lomak., *P.steveniana* Kem.-Nath., *P.wittmanniana* Hartwiss ex Lindl., *P.mlokosewitschii* Lomak., *P.ruprechtiana* Kem.-Nath., *P.caucasica* (Schipcz.) Schipcz., *P.lagodechiana* Kem.-Nath., *P.majko* Ketzch., *P.carthalinica* Ketzch., *P.tenuifolia* L. Nine of them are endemic species of narrow distribution of the Georgian flora and *Paeonia tenuifolia* is a cosmopolitan plant, the area of which extends to the Crimea. [1].

Paeonia mlokosewitschii L. is one of the target species introduced in the National Botanic Garden of Georgia and *in situ* and *ex situ* conservation of the plant has been monitored for years.

2. Material and methods

The object of the research is *Paeonia mlokosewitschii* L. a rare relict endemic of Eastern Caucasus. Nowadays it occurs only in Shida (Inner) Kakheti, Shiraki (Kashebi) and Dagestan (headstream of the Andis-Koisu River) [2].

The young growth of *Paeonia mlokosewitschii* L. was obtained on the experimental collection plot of the rare and endangered plants of the Caucasus at the National Botanical Garden of Georgia.

3. Results and discussion

Our observations showed that *Paeonia mlokosewitschii* L., introduced in the experimental collection plot of rare and endangered plants of the Caucasus at the National Botanical Garden of Georgia, is distinguished with different ecological features from the other species of this genus. It has different period of development of vegetation dynamics (from early spring to autumn), golden-yellow flowers and shiny leathery leaves, bluish black fruit, glossy seeds. As observed, vegetation occurs in fall of the last year. It developed some renewal buds above the ground in September. Its differentiation and further development appears to be directly proportional to the increase in temperature. The plant began active growth in the spring of the following year, the adult individuals began blooming in April, developed 20-40 flowering stems and large flowers 12-14 cm in diameter. Under the cultural conditions it produces double flowers, the corolla petals are 8-12, instead of 5-6 that makes the whole plant high ornamental in the flowering phase. Hence, the name "yellow wonder" of the Caucasus emerged. During the flowering period, the plant reaches 50-60 cm in height [3]. The seeds ripen in July-August. The plant is propagated by seeds or vegetatively and produces self-seeding. The plant showed high adaptability and plasticity in the subarid zone of Tbilisi.

Having studied *Paeonia mlokosewitschii* L. under the *in situ* natural conditions, we estimated the number and density of the plant. Due to the intensified anthropogenic impact for many years and various negative environmental factors, the quantity of the plant has considerably reduced.

The plant has been used in medicine for many years to treat various ailments, particularly tincture, from root runners was used for curing tuberculosis, bronchitis, pneumonia, kidneys, stomachache, infectious hepatitis, convulsion, central nervous system, etc. As a highly decorative plant, it is successfully used in landscape architecture, for planting in gardens and parks. The plant is also a good material for making flower bunches. *Paeonia mlokosewitschii* L. is frequently used for selective purposes, both in Georgia and abroad. For this reason, the quantity of this precious plant has reduced in the area of its natural distribution.

Based on the observations, the aim of our study was to propagate this species under the conditions of ex situ conservation and then reintroduce it to the classical "Locus classicus" habitats.

Reintroduction and repatriation of 85 individuals of *Paeonia mlokosewitschii* have been performed in Lagodekhi Nature Reserve, particularly on the rocky slopes, in the semi-shaded areas of the tertiary mesophilic deciduous forests, in the vicinity of Kudigori. (Figure 1)



Figure 1 *Paeonia mlokosewitschii* L.

Paeonia mlokosewitschii L. is assessed by the CR criteria of the IUCN category. This species deserves a lot of attention and we believe that the further scientific research will be conducted with the purpose to continue protection and maintenance of the plant through *in situ* and *ex situ* conservation.

The results obtained after the joint scientific research are very important. Lagodekhi Nature Reserve is distinguished by variety of florocomplexes, rich floristic composition, plant diversity and rich vital forms of rare plants that will still arise great interest for our joint scientific research in the future.

We assume that *Paeonia mlokosewitschii* L. is an important plant of high conservation value and economic importance.

4. Conclusion

Paeonia mlokosewitschii L. is important specie as the plant with high conservation value. Hence, we argue for its introduction, dissemination and transplantation in its natural spread areas.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no conflicts of interest.

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