An old-growth forest at the Caspian Sea coast is similar in epiphytic lichens to lowland deciduous forests in Central Europe

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We have recorded 138 species (125 of them epiphytic/epixylic) in a single preserved lowland forest in Dagestan (Russia), “Samurski” forest at the west coast of the Caspian Sea. Within its 2,000 hectares, some remnants of old-growth forests persist, dominated by Acer campestre, Carpinus betulus and Quercus robur. This mix of tree species is typical of many lowland deciduous forests in Central Europe, and we found that the lichen flora of Samurski also has much in common with those forests, but less in common with other types of Central European forests. Comparison with geographically closer lowland forests in Azerbaijan, Russia and Iran is impossible due to a lack of data. Using Detrended Correspondence Analysis, we defined a group of species diagnostic for temperate lowland deciduous forests; it includes about 20 species recorded in Samurski, most of which are crustose and usually with Trentepohlia as photobiont. In contrast to Central European lowland deciduous forests, the lichen flora of Samurski includes several species known mainly from the oceanic western Caucasus and Western Europe. To enable comparison with “fixed-area” lichen inventories, we have obtained a separate list of 82 lichen species from a detailed survey of a 1 ha plot in one of the best-preserved forest spots in Samurski.

Fifty-nine species in 17 genera (Arthothelium, Bactrospora, Bryostigma, Catinaria, Coniocarpon, Cresporhaphis, Dendrographa, Enchylium, Enterographa, Inodera, Lecanographa, Lepraria, Peridiothelia, Sclerophora, Xanthoricola, Zwackhia) are new to Dagestan. Agonimia flabelliformis, Arthonia exilis, Bacifidae anderswaldii, Cresporhaphis wienkampii, Caloplaca raesaenenti, C. tominii, Candelariella superdistans and Verrucaria umbrinula are new to the Greater Caucasus. Agonimia borysithenica, Bacidina adastra and Lecanographa lynceae are new to Russia. Candelariella superdistans is new to Asia.


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Introduction

Surveys of various organisms in old-growth forests are important for forest quality assessment and forest protection, and epiphytic lichens are among the most reliable indicators of forest-continuity and forest quality (Johansson & Gustafsson 2001, Paillet et al. 2010). The lack of data about lichen diversity in remnants of lowland deciduous old-growth forests in Russia (Urbanavichus, unpublished) is thus a gap that needs to be filled.

We first provide data on lowland deciduous forest lichen diversity in Russia from a protected area “Samurski” that includes several square kilometres of lowland forest in Dagestan, including old-growth forest remnants. It is situated in the southernmost part of Russia, at the Caspian Sea coast and at the border with Azerbaijan. It is the only well-preserved lowland forest along the Caspian Sea in Russia: more northern territories of Dagestan are drier and covered by cultural steppe or spots of degraded or secondary tree vegetation. Samurski is, however, adjacent to a larger forested area in northern Azerbaijan that may have a similar character (lichen diversity data are absent from this area). Humid Hyrcanian forests (annual rainfall to 2,000 mm) further south in Azerbaijan and those in northern Iran are distinct and have quite different tree species, e.g. Acer velutinum Boiss., Albizia julibrissin Durazz., Gleditsia caspica Desf., Parrotia persica (DC.) C.A. Mey., Pterocarya pterocarpa (Michx.) Kunth ex I.Iljinsk., Quercus castaneifolia C.A. Mey., and Zelkova carpinifolia (Pall.) K.Koch (Akhani et al., 2010). Although relevant lichen inventories are missing for Hyrcanian forests, their lichen flora has definitely a more oceanic character in comparison with the much dryer Samurski: it contains some epiphyllous lichens (Novruzov & Alverdieva 2014, Barkhalov 1975) which are absent from Samurski forest. In this context, Samurski and woodlands in its Azerbaijan vicinity represent a remote group of forests dominated by Acer campestre, Carpinus betulus and Quercus robur (more information in “locality description”). We have not been able to locate the nearest lowland old-growth forests of similar tree species composition, but they are probably hundreds of kilometers distant. Some lowland forest types in Central Europe have very similar tree species composition with identical tree dominants (e.g. Vondrák et al. 2016). Those forests are more than 2,000 km distant from Samurski.

Our primary aim was to perform a lichen inventory of the Samurski forest. As a secondary aim, we compare epiphytic lichen composition of Samurski with various Central European forest types to assess whether, and to what extent, the forest type and tree species composition may determine lichen diversity; i.e. we consider whether those Central European forests dominated by Acer campestre, Carpinus betulus and Quercus robur have a lichen flora similar to Samurski.

Study area

The surveyed forest “Samurski” is located in the south-east of Dagestan, at the border with Azerbaijan, in the delta of the Samur river; it covers an area of c. 2,000 ha and it is part of