

Plant communities with *Pinus mugo* (alliance *Pinion mugo*) in the subalpine belt of the Western Carpathians

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A syntaxonomical revision of plant communities with dominant *Pinus mugo* in the Western Carpathians is presented. The data set of 341 phytocoenological relevés was examined and analysed using the detrended correspondence analysis and the cluster analysis.

The author suggests distinguishing the dwarf pine stands of the supramontaneous and subalpine belts of the Western Carpathians referred to the alliance *Pinion mugo* Pawłowski in Pawłowski et al. 1928 of the order *Junipero-Pinetalia mugo* Boşcaiu 1971 and the class *Roso pendulinae-Pinetea mugo* Theurillat in Theurillat et al. 1995, into three separate associations: the *Cetrario islandicae-Pinetum mugo* Hadač 1956, the *Homogyno alpinae-Pinetum mugo* (Sillinger 1933) Šibík et al. 2005, and the *Adenostylo alliariae-Pinetum mugo* (Sillinger 1933) Šoltésová 1974.

The first one (the *Cetrario-Pinetum mugo*) is species-poor community, where apart from the extremely dwarf *Pinus mugo* scrubs (a few decimetres in height), some hemikryptophytes (*Festuca supina*, *Oreochloa disticha*, *Juncus trifidus*) and dwarf shrubs (*Vaccinium myrtillus*, *V. vitis-idaea*) are distributed markedly sticking out. In the layer of bryophytes and lichens *Cetraria islandica*, *Pleurozium schreberi* and *Polytrichum strictum* with numerous *Cladonia* species dominate.

These phytocoenoses are occurring on extremely severe sites, in the interface of the subalpine and alpine belts (alt. 1680–1970 m and upper). They occupy windswept stands with inclination 10–40°, where the snow, water, and wind erosions are profound, developing on podzolized soils with a thick layer of undecomposed remains of dwarf pine on surface.

The *Homogyno alpinae-Pinetum mugo* is a species very poor and floristically monotonous community, which habitus define the dominant 1,5–3 m tall *Pinus mugo* scrubs. From other wood species, *Salix silesiaca*, *Sorbus aucuparia*, *Picea abies* and some other form a shrub layer. The dominant bilberry, *Vaccinium myrtillus*, with several other species, such as *Avenella flexuosa*, *Homogyne alpina* and *Calamagrostis villosa* determine the physiognomy of the herb layer. The moss layer is usually well developed, with most frequently present *Dicranum scoparium* and *Hylocomium splendens*.

Plant communities of this association are commonly concentrated in the supramontaneous and subalpine belts (alt. 1250–1850 m) of the central part of the Western Carpathians, spreading on the slopes with different inclination and orientation, mainly on siliceous bedrocks. The extreme climatic and edaphic conditions induce the occurrence of moderately acid-oligotrophic species in the herb and moss layers.

The author highlights the unauthorized names of the association *Vaccinio myrtilli-Pinetum mugo* Hadač 1956 or *Vaccinio myrtilli-Pinetum mugo* (Sillinger 1933) Šoltésová 1974, which are only a younger homonyms of the valid name of the association *Vaccinio myrtilli-Pinetum montanae* Morton 1927 that characterises the acidophilous, species rich dwarf pine stands on calcareous bedrocks in the Alps. He suggests the new name – *Homogyno alpinae-Pinetum mugo*.

The *Adenostylo alliariae-Pinetum mugo* is a more-layered, species rich and floriferous shrubby community, which physiognomy is determined by *Pinus mugo*. The tree layer, more commonly formed by *Sorbus aucuparia*, develops rarely and with very limited cover. The herb-layer is composed of the tall-herb taxa (*Aconitum firmum*, *Adenostyles alliariae*, *Cicerbita alpina*, *Doronicum austriacum*, *Luzula sylvatica*, *Rubus idaeus*, *Veratrum *lobelianum*, etc.), forming more or less continuous layer. The medium or low herb layer consists of *Festuca carpatica*, *Geranium sylvaticum*, *Hypericum maculatum*, *Leucanthemum rotundifolium*, *Polygonatum verticillatum*, *Primula elatior*, *Valeriana tripteris* and some other species. Mosses are occurred relatively frequently, the most common species is *Dicranum scoparium*.

The community is well developed on the sites with favourable edaphic conditions (with sufficient nutrition supply during all the vegetation period) and with good decomposition of humus, at the altitude 1400–1750 m. The stands occupy slopes with 25–45° inclination harbouring calcareous and siliceous bedrocks, where the snow layer is thick and prolonged.

The *Pinus mugo* scrubs create a distinctive vegetation belt above the timberline, in a zone, where the forest cannot naturally exist. Moreover, the physiognomy of stands is very different. The pure floristic approach clearly reaches the limits and consideration of physiognomic and habitat characteristics are indispensable. This is the reason, why we classify dwarf pine stands to the class *Roso pendulinae-Pinetea mugo*, which includes all mountain dwarf pine stands both on basic and acid substrata.