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Summary

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The Quercus pubescens forests in Valais (Swiss Central Alps) and their ecological limits

On the background of the general problem of the limits between deciduous (and mediterranean type) and coniferous forests, ecological investigations were made from 1970 to 1974 in the Quercus pubescens and Pinus silvestris forests in Valais, a region with continental climate where these two species are the only important forest trees in the lower parts. The aim was the determination of the factors producing the forest pattern. The factors investigated were the human influence on the stands, the climate (especially the irradiation), the soil factors and the distribution of the two trees. Besides, a phytosociological investigation of the oak woods was carried out after the method of Braun-Blanquet.

Results

On the base of a model, it has been shown that the distribution is mainly determined by irradiation and altitude. The oaks are restricted to the sites with strong irradiation: the minimum irradiation required increases with increasing altitude. The oaks further avoid the depressions where late spring frosts occur. The pines grow on all sites where the oaks cannot exist (Chapter 3.15).

Parent rock conditions do not play an important role in the distribution of the two species, which are both equally drought resistant. The nutrient supply in the soils is never low (3.13).

As far as they are not destroyed, the forests suffered the influence of human activities (fire, pasture, coppice selection system) for centuries. Some oak woods were transformed into pine stands or into composite forests with oaks in the scrub layer and pines in the tree layer. Today, as every

human activity has stopped in these forests, they are regenerating towards a more natural composition (3.11).

Other mountain regions exist with relatively continental climate and where, during the growth period, there is intense irradiation, but also sufficient quantities of precipitations. The comparison shows that there, too, the distribution of oaks and conifers is determined by the same factors as in Valais. These regions are: the other inner valleys of the central and western Alps (with the same species as in Valais), the mountains of the south-western United States (Quercus and Pinus), the inner valleys of the north-western Himalayas (Quercus, Abies, Pinus) and some Caucasus valleys (Quercus, Conifers). This model, therefore, seems to fit as well to deciduous as to other oak species (3.23, 3.24).

From the phytosociological point of view, the Valais oak woods can be divided into two associations according to climate and parent rock conditions: into the Campanulo trachelii-Quercetum pubescentis prov. under less continental climate at the limit towards the outer Alps, on silicate soils, and into the Saponario-Quercetum pubescentis prov. in the centre of Valais. The subdivisions also follow a complex water gradient influenced by climate and soils (4.1). The comparison of these associations with other existing units is made difficult by the present development of the stands and by the different dates of the relevés and must therefore be considered only provisional (4.2.).

In the last chapter, the conservation of the most outstanding places with oak woods is suggested.