

Summary

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S U M M A R Y

The present paper deals with morphology and ecology of the collective species Scabiosa columbaria L. from the central and western Alps. The following taxa of this group were studied: Scabiosa lucida Vill., S. columbaria L. s.str., S. portae A. Kerner, S. gramuntia L., S. vestita Jordan, S. candicans Jordan and S. dubia Vel. (studied area see fig. 12, p. 73). In addition representatives of S. tomentosa Cav. from Spain, S. uniseta Savi from the Apennins, S. columbaria s.str. and S. ochroleuca L. from northern and western Europe as well as some material from Ethiopia, were investigated (p. 8).

Numerous plants from the studied populations were kept in the experimental field and their characters were scored. Subsequently, 7 quantitative and 2 qualitative characters were chosen for a more detailed analysis (p.32-40).

The chromosome numbers studied in representatives of various taxa of S. columbaria stay in agreement with the data from the literature: all examined plants proved to be diploid with $2n = 16$ (p. 36).

The natural habitats of S. columbaria s.l. were investigated in respect to their ecology; some phytosociological observations were also made (p. 12-31 and 65-68).

The results point to complex relations between ecology and morphology within the group of Scabiosa columbaria. Most of the quantitative morphological characters were correlated with altitude, soil temperature, exposure and degree of the vegetation cover. Clear correlation was observed with: length and breadth of the calyx bristles, relative length of the leaf segments in the uppermost pair of stem leaves, height of the plants and length of their stems. The ecological factors mentioned above were also correlated with the beginning of flowering. On the other hand,

neither the nitrogen supply nor pH values in the topsoil seemed to cause any specific morphological variation within the group of S. columbaria (p. 53-70).

The influence of management on the differentiation within S. columbaria s.l. manifested itself chiefly in some fluctuations of the beginning of flowering: on the average, cultivated meadow populations began to flower about 4 weeks earlier than the control samples from not mown grasslands. In addition to this, in meadow plants the relative length of leaf segments was smaller than in the control samples (p. 63).

As to the relations between the geographical distribution and morphology, the density of the pubescence of the rosette leaves increased clearly along a north-south gradient. It should be noted that this was the only quantitative character which showed only a low degree of correlation with the ecological factors. For the other 6 quantitative characters the pattern was the opposite: there was no or only weak geographical differentiation and, as already mentioned, relatively strong correlation with ecological factors (p. 71-76).

The distribution areas of the studied taxa are partially overlapping. In the regions where some of them come into contact, various intermediate forms were found; they apparently represent products of hybridization and introgression. This concerns mainly Scabiosa lucida and S. columbaria s.str. on the northern side and was also the case with S. portae and S. gramuntia on the southern side of the Alps (p. 77-84).

Numerous experimental crosses between various representatives of the S. columbaria group were performed. There was no indication of incompatibility barriers occurring between the investigated taxa: seed germination as well as fertility of the hybrids proved to be nearly always normal. The hybrids represented mostly an intermediate type between the parents; sometimes, however, a partial dominance of some characters could be seen (p. 87-100).

Within the genus, Scabiosa columbaria s.l. seems to be an isolated group. Despite numerous attempts, no hybrids were obtained from crosses between various representatives of S. columbaria and those of S. canescens Waldst. et Kit. s.l., the group supposed to be the nearest relative of S. columbaria (p. 88).

The close relationship occurring between the taxa of Scabiosa columbaria s.l. is discussed. There is a strong indication that the widely distributed S. columbaria s.str. has originated after the glaciations from crosses between S. lucida and S. gramuntia and could spread mainly after man had cleared the forests: experimental hybrids and natural intermediates between S. lucida and S. gramuntia were sometimes not at all different from S. columbaria; this taxon is mainly restricted to man-made habitats. S. portae seems to have originated in a similar way but with a stronger influence from S. gramuntia. Hybridization, introgression and gene flow were apparently of great importance in the evolution of the whole polymorphic group of S. columbaria (p. 107-111).

A key to the 8 species of S. columbaria s.l. in the studied area is presented (p. 112-113).