CHROMOSOME NUMBERS WITHIN THE ACHILLEA MILLEFOLIUM AND THE A. DISTANS GROUPS IN THE CZECH REPUBLIC AND SLOVAKIA

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Abstract: The Achillea millefolium group is represented in the Czech Republic and Slovakia by six species. Achillea setacea and A. asplenifolia are diploid; A. collina and A. pratensis are tetraploid; A. millefolium is hexaploid; and A. pannonica is octoploid. The populations from Slovakia of the A. distans group, distributed mainly in Central and south-eastern Europe, were all hexaploid. The presence of these taxa in the area studied was documented by means of chromosome counts in 285 plants originating from 110 mainly natural populations. Results of the chromosome counts are discussed against a background of literature data from Europe. For the species studied, brief descriptions as well as comments on their distribution and ecology are provided.

INTRODUCTION

The Achillea millefolium group seems to be one of the best-studied plant taxa of Central-European flora with regard to chromosome counts. Probably the earliest chromosome counts of this group of yarrows from Central Europe were those of FELFÖLDY (1947; probably of A. asplenifolia VENT.) and of POLY (1948, 1949, 1950) of A. collina BECKER ex RCHB., A. asplenifolia, and A. setacea WALDST. et KIT. EHRENDORFER (1953, 1959a) clearly separated the Achillea millefolium group from other yarrows and established relationships between its taxonomy and four ploidy levels known within the group. According to his concept, the group under study is a polyploid complex (n=9) consisting of six taxa in Central Europe: two of them at the diploid level (A. asplenifolia and A. setacea), one at the diploid and tetraploid level (A. roseoalba EHREND.), one at the tetraploid level only (A. collina), another one a hexaploid (A. millefolium L.), and the sixth one being an octoploid (A. pannonica SCHEELE), all occurring in Austria. The closely-related A. distans group, comprising A. distans WALDST. et KIT. ex WIL. and probably other poorly-defined taxa, all hexaploid, is distributed in Central and south-eastern Europe. Ehrendorfer’s student SCHNEIDER (1958) devoted her studies mostly to the hybridization among particular members of the group at the same and across different ploidy levels. EHRENDORFER (1959b) used yarrows together with Galium L. as a model group when postulating his theory of hybridization-differentiation cycles. In order to explain evolutionary processes within the group at a cytological level, he turned his attention to some cytological aspects more complex than the ploidy level itself (EHRENDORFER 1957, 1960a,b).
During the boom of chromosome counts which started in the sixties, yarrows became a popular subject of these studies. Single chromosome counts (see Appendix 1) as well as cytogeographic studies, sometimes accompanied by more- or less-detailed morphological analyses, were published from almost all countries neighbouring the present area of study: Poland (OŚWIECIMSKA \\& GAWŁOWSKA 1967, DĄBROWSKA 1977), Germany (DERSCH 1974, BISTE 1978, LIPPERT \\& HEUBL 1988), and the Ukraine (ANDROSHCHUK 1978, ANDROSHCHUK et al. 1978, 1979). Since *A. millefolium* is an important drug used both in folk and official medicine (*Herba millefolii*; ANONYMUS 1997, CHANDLER et al. 1982) with spasmylytic and anti-inflammatory effects due to its content of proazulenes, some papers were aimed either at the analysis of the content of proazulenes only or at the correlation of proazulene content with the ploidy level. Studies of this kind were made, for instance, in Poland (OŚWIECIMSKA \\& GAWŁOWSKA 1967, OŚWIECIMSKA 1968) and Germany (BISTE 1978, BUGGE 1991). MICHLER \\& ARNOLD (1999) analyzed relations among the ploidy level, content of proazulenes, and the environment in order to predict the occurrence of plants rich in proazulenes on the basis of surrounding vegetation. The results reported in some of these studies suffer from the facts that (1) the exact taxonomic identity of plants investigated either remained unknown or (2) plants were identified exclusively by means of chromosome counts.

Recently, important studies were published by a team based mainly at the Institute of Pharmacognosy, University of Vienna (SAUKEL \\& LANGER 1992a,b, VETTER 1995, VETTER et al. 1996). The authors were able to clarify links among the ploidy levels, morphological characters, ability to form secondary compounds (among them proazulenes) and its inheritance, ecological conditions, distribution as well as the taxonomic scheme. Their results confirm with slight modifications (recognition of another taxon at the tetraploid level, which was formerly regarded as a tetraploid cytotype of *A. roseoalba*, described as *A. pratensis* SAUKEL et LANGER) Ehrendorfer’s concept and also make possible a better interpretation of some earlier studies.

According to the present state of knowledge, the *A. millefolium* group includes seven species in Central Europe. Based upon our own observations and literature data, they can be briefly described as follows:

1. **Achillea setacea**: Small to middle-sized, densely hairy. Rosette leaves narrow, their segments very finely divided, those ultimate almost filiform, conspicuously three-dimensionally arranged (leaves thus terete). Stem leaves narrowly triangular to linear, with a broad, stem-clasping (auriculate) base. Rachis of stem leaves narrow. Corymbs dense, capitula with white ligules. Diploid. Confined to dry (relict) habitats. So far known from Central, south-eastern and eastern Europe, Asia Minor and Middle East. In Central Europe flowering mainly in May and June.


3. **Achillea roseoalba**: Small and slender, subglabrous to slightly hairy. Leaves more finely divided than in the former, those in the lower part of the stem mostly sessile. Corymbs small, with pale to dark pink or, rarely, white ligules. Confined to meadows and poor fens of the central, southern and eastern Alps. Diploid, believed to have originated by the introgression of *A. setacea* into *A. asplenifolia* (EHRENDORFER 1959a,b).