

Ploidy level distribution in the white-rayed complex of *Melampodium* (Heliantheae, Asteraceae)

Ploidiestufen-Verteilung im White-rayed complex von
Melampodium (Heliantheae, Asteraceae)

**Renate OBERMAYER, Dieter REICH,
Carolyn Anna REBERNIG, Hanna WEISS-SCHNEEWEISS &
Tod F. STUESSY**

The genus *Melampodium* comprises 39 recognized species distributed throughout Mexico, Central America and the southwestern US. All species have yellow rays except for three shrubby, xerophytic taxa, *M. leucanthum*, *M. cinereum* and *M. argophyllum*, which form the so-called white-rayed complex and mark the northern limits of the genus range. These species are clearly separated by their distributions and ecology and are well supported in molecular analyses (AFLPs and haplotype analyses).

Previous studies revealed the presence of three different ploidy levels within the white-rayed complex: diploids and tetraploids (plus occasional triploids) in *M. cinereum* and *M. leucanthum*, and exclusively hexaploids in *M. argophyllum*. In both *M. cinereum* and *M. leucanthum* diploid cytotypes prevail in the western part of their distribution area, while tetraploids are dominating in the east. *M. argophyllum* was hypothesised to be of allopolyploid origin, involving *M. leucanthum* and *M. cinereum* as parents.

The current study presents the data on the ploidy levels estimations for 148 populations (2094 individuals) of *M. leucanthum*, for 30 populations (450 individuals) of *M. cinereum* and for 2 populations (36 individuals) of *M. argophyllum*. For ploidy determination, flow cytometry of DAPI stained silica gel-dried material has been applied, using *Glycine max* 'Merlin' as the internal standard.

119 populations of *M. leucanthum* are diploid (1 and 8 contain sporadically 4x and 3x individuals, respectively) and 29 populations are tetraploid (1 contains a 3x individual, 1 contains a 6x individual). 17 populations of *M. cinereum* are diploid (one contains a 3x individual) and 13 populations are tetraploid

(three contain sporadically 5x individuals, and one contains a 6x individual). Both populations of *M. argophyllum* are hexaploid. The data obtained in this study agree well with the reports on ploidy level distribution (on the smaller scale) in the white rayed complex performed 40 years ago, suggesting that the polyploid establishment and maintenance is connected to ecological and perhaps historical biogeographical factors.

The correlation of ploidy level distribution in the three taxa with the molecular, cytogenetic and ecological data will allow us to address the questions of the origin (single vs. recurrent), maintenance and the evolution of tetraploid cytotypes in *M. leucanthum* and *M. cinereum*, as well as on the origin of hexaploid *M. argophyllum*.

address:

Renate OBERMAYER, Dieter REICH, Carolin Anna REBERNIG,
Hanna WEISS-SCHNEEWEISS & Tod F. STUESSY
Faculty Center of Botany
Department of Systematic and Evolutionary Botany
University of Vienna
Rennweg 14
A-1030 Wien

email:

renate.obermayer@univie.ac.at

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Autor(en)/Author(s): Reich Dieter, Weiss-Schneeweiss Hanna, Stuessy Tod F., Rebernig Carolin Anna, Obermayer Renate

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