

P1488.

The evolution of reproductive systems and sexdetermining mechanisms within *Rumex* (Polygonaceae) inferred from nuclear and chloroplastial sequence data

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We compare nuclear ITS and chloroplast intergenic sequences of 31 species of *Rumex*. Our phylogenetic analysis supports a systematic classification of the genus, which differs from that currently accepted. This new phylogeny suggests a common origin for all Eurasian and American dioecious species of *Rumex*, with gynodioecy as an intermediate state on the way to dioecy. Our results support the contention that sex determination based on the balance between the number of X chromosomes and the number of autosomes (X/A balance) has evolved secondarily from maledetermining Y mechanisms and that multiple sex chromosome systems, XX/XY1Y2, were derived twice from an XX/XY system. The resulting phylogeny is consistent with a classification of *Rumex* species according to their basic chromosome number, implying that the evolution of *Rumex* species might have followed a process of chromosomal reduction from $x=10$ toward $x=7$ through intermediate stages ($x=9$ and $x=8$).