

Ploidy profiling of *Centaureum erythraea* germplasm representing the diversity of the central Balkans: *in vitro* screening for highly productive diploid and tetraploid genotypes

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Centaureum erythraea Rafn (common centaur) is an important medicinal plant species whose various health effects have been ascribed to its key specialized bioactive metabolites (mostly to secoiridoids and xanthenes). Assessment of species diversity through the analysis of ploidy level and genetic variation is important for the selection of high-yielding genotypes for sustainable production of pharmacologically important specialized metabolites. In this work, we scored ploidy level of *C. erythraea* germplasm stored in *ex situ* seed collection containing seeds of more than 40 populations originating at locations across the central Balkan Peninsula. Furthermore, we selected two neighboring populations, one of the diploid and one of the tetraploid genome background, and compared growth parameters and productivity among and within diploid and tetraploid genotypes. Plants belonging to the diploid population showed different growth patterns as compared to tetraploid plants after one month of growth under *in vitro* conditions. To evaluate the content of iridoids (loganin and loganic acid), secoiridoids (secologanin, sweroside, gentiopicrin, and swertiamarin), and xanthenes (demethyleustomin, methylbellidifolin, eustomin, and decussatin) in diploid and tetraploid genotypes, a targeted UHPLC/DAD/(±)HESI-MS² analysis was performed for methanol extracts of shoots and roots, separately. One-month-old shoots of all diploid genotypes contained significantly higher amounts of total iridoids and xanthenes than tetraploids, primarily due to high amounts of sweroside, decussatin, and methylbellidifolin. The observed variation both among and within diploid and tetraploid genotypes should be taken into consideration when estimating strategies for biotechnological improvement and for unraveling molecular background of specialized metabolites biosynthesis.

Keywords: *Centaureum erythraea*, diploid, tetraploid, iridoids, xanthenes

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