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Genetic diversity of wild *Rhodiola rosea* populations in Central-Europe revealed with ssr markers

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Rhodiola rosea L. (*Crassulaceae*), commonly known as golden root or roseroot is a traditional adaptogen plant of the cool climates in the northern hemisphere. This species is highly variable both in morphological and phytochemical traits. Genetic structure and relationships of 16 populations from the high mountains of Europe have been characterized with the use of microsatellite markers.

Altogether 266 individuals from sixteen populations located in the Pyrenees, Alps, Carpathians and from North-Scandinavia were studied. Out of the 13 markers only 6 turned out to be informative in this study. The primer pairs for these six SSR loci produced 68 fragments. The number of alleles per locus ranged from 9 to 17. Mean expected heterozygosity (He) was 0.73, ranging from 0.51 to 0.74 in the populations.

A dendrogram of the genetic relationships revealed that populations from different mountains clustered together without any correlation with the geographic distribution of the populations. Principal co-ordinate analysis showed that all individuals are grouped together, which confirmed that diversity within and among the populations were almost equivalent. Interestingly, a population from the Italian Dolomites is even more distant within this group than the Norwegian samples. AMOVA showed that the vast majority of the molecular variance is attributed to within population variability (85%) while only 11% was among populations variation, and 4% among regions variation. This much less differentiation observed between the Eastern Alpine and Carpathian populations supports the existence of a former common glacial refugia and a historical relationship between the two regions.

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Development of Industrial Scale Centrifugal Partition Chromatography

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Centrifugal Partition Chromatography (CPC) is a special chromatographic technique where both stationary and mobile phase are liquid, and the stationary phase is immobilized by a strong centrifugal force. The main advantage is the cost-effectiveness, since it does not need any expensive and bulky solid stationary phase, and both quantity and quality requirements for solvents are less decreased contrast to standard liquid chromatographic techniques. CPC consists of series connected network of extraction cells, which operates as elemental extractors, and the efficiency is guaranteed by the cascade [1]. CPC instruments vary on scale from 50 ml to 25 liter, however all advantages are realized on bigger scale use in industry. Up