



NJF Seminar 399

Beneficial health substances from berries and minor crops –

- How to increase their concentration in cultivated species, eliminate losses in processing and enhance dietary use

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Morphological features and phenylpropanoid contents of natural and cultivated *Rhodiola rosea* roots in Finland

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Endemic *Rhodiola rosea* L. populations are found in the North-East parts of Finnish Lapland in Kilpisjärvi and Utsjoki areas (69°N). Root samples were collected from three places during June 2006 and the morphological and chemical features were compared to cultivated accessions. The cultivated plants originated from a northern Finnish nursery, collected in Norway. They were 5 years old in age, grown in Mikkeli (61°N). Root size, root formation and their phenylpropanoid contents were studied.

The fresh root weights of natural old plants ranged between 118-398 g per plant in Kilpisjärvi, 150-1286 g in Utsjoki and 269-1004 g per plant in cultivation in Mikkeli. The root morphology of the old natural and cultivated plants was different. The cultivated plants consisted of big, strong rootstocks, 5-15 cm in diameter and 0.5-2 cm thick and 10-25 cm long fibrous roots. The ratio of the rhizome and roots was 70:30. All parts were alive.

The rootstocks in the nature were generally smaller, 1-5 cm in diameter, and they had one or two 10-25 cm long, pale brown roots and several fibrous roots. The horizontal thick crown part had 5-25 cm lower shoots, 1-3 cm in diameter. Significant part of the rhizome and lower woody shoots were died. The proportion of died parts ranged between 33-68%. The bigger and older the plants were, the higher was the proportion of the dead parts. However, the both the dead and light brown root parts have the typical rose-like scent as well.

The average content of rosavins in the alive roots of the three North-Lapland populations was 2.03%, of which rosavin being the highest (1.37%, followed by rosarin ($x = 0.43\%$) and by rosin ($x = 0.22\%$). The average cinnamicalcohol content was 0.15% and the salidroside content was 1.95%. The rosavin and salidroside contents were at their highest in the Kilpisjärvi I. population, being 1.55% and 2.06%, respectively. Compared to the alive roots the contents of phenylpropanoids in the

dead parts were 42-45% lower.

The chemical profile of the roots of the cultivated strain was nearly similar to the natural populations, but the contents of the phenylpropanoids were lower. The total rosavins content was 30% lower (1.41%) and the salidroside content was only 0.75%.

From the collection aspect, the natural roots have unpractical morphological characteristics and significant dead parts, containing fewer quantities of active compounds. Otherwise the studied North-Lapland natural populations are small and from economical and environmental points they don't seem to be realistic for raw material sourcing. From production aspect the cultivation is the only real alternative in Finland. Due to the highest rosavins and salidroside contents, the Kilpisjärvi I. population is the better accession for further cultivation.