NJF Report • Vol 3 • Nr 1 • Year 2007

Nordic Association of Agricultural Scientists

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

Piikkiö, Finland, 14-15 March 2007

NJF
Nordic Association of Agricultural Scientists

Production of bioactive phenolic compounds by berry cell cultures

Riitta Puupponen-Pimiä, Olivier Biedermann, Liisa Nohynek, Kirsi-Marja Oksman-Caldentey. VTT Technical Research Centre of Finland, P.O. Box 1000 (Tietotie 2), FI-02044 VTT, Finland. Tel. +358 20 7224457, gsm +358 40 7428916, riitta.puupponen-pimia@vtt.fi

Berries are rich in bioactive phenolic compounds. Flavonoids, ellagic acids and ellagitannins are typical for strawberries. An alternative to use berry plants as a source of bioactive phenolic compounds, plant cell cultures are interesting choice for production of already known compounds, as well as novel compounds with potential pharmaceutical value. As far as we know, the biosynthetic capacity of strawberry cell cultures has not been explored earlier. In addition, the cell cultures can be induced by elicitation to synthesise secondary metabolites, such as phenolic compounds.
The production of phenolic compounds by berry cell cultures of strawberry (Fragaria x ananassa) was studied and the biosynthesis of phenolic compounds was stimulated by elicitation. Strawberry suspension cell cultures were successfully cultivated on Murashige and Skoog medium containing NAA (α-Naphthalene acetic acid, 5.4 μM l−1) and Kinetin (0.5 μM l−1). The inoculum concentration for an optimal growth and the time point for an elicitation were determinated by analysing the growth parameters of the cell cultures. The cell cultures were elicitated with 40 μM l−1 and 80 μM l−1 methyl jasmonate after a growth period of 12 days and it could be observed that the growth of the elicitated cultures was stronger than the one of the unelicitated cultures. The cell cultures were analysed by HPLC using photodiode array detector. Nine reference substances and the samples of the strawberry fruits were analysed by the same method for comparison. It could be shown that the elicitation of the strawberry cell cultures with 40 μM methyl jasmonate was more effective than with 80 μM methyl jasmonate. The maximum levels of eight out of ten analysed substances which were elicitated with 40 μM methyl jasmonate were reached after 24 hours but decreased in the next 72 hours. Hydroxycinnamic- and flavonoid-type compounds could be identificated in the samples of the strawberry cell cultures by comparing the retention times and spectra with the ones of the standards.