

OP 2.6

Determination of Se species in Se enriched and drought exposed potatoes by HPLC-ICP-MS and HPLC-UV-HG-AFS

Petra Cuderman¹, Ivan Kreft², Mateja Germ³, Vekoslava Stibilj¹

¹Jožef Stefan Institute, Jamova 39, SI-1000 Ljubljana, Slovenia

²Biotechnical Faculty, University of Ljubljana, Jamnikarjeva 101, SI-1111 Ljubljana, Slovenia

³National Institute of Biology, Večna pot 111, SI-1111 Ljubljana, Slovenia

Selenium (Se) is an important microelement for humans and is toxic for humans at high doses. It plays a role in the prevention of atherosclerosis, specific cancers, arthritis, and altered immunological functions. Cultivation of plants enriched with Se could be an effective way of producing Se rich foodstuffs, with benefits to health. The beneficial effects of Se are dependent on the chemical form, selenomethionine (SeMet) being the most readily assimilated form. The aim of this work was to study Se accumulation and to identify the Se species in potato (*Solanum tuberosum* L.) cultivar Desiree in Ljubljana, Slovenia, enriched in Se by foliar fertilisation. Four combinations of treatments were conducted: well-watered plants with and without Se foliar spraying, and drought exposed plants with and without Se foliar spraying. Potato was foliar spraying with aqua solution containing 10 mg Se per L in the form of sodium selenate. The Se content was found to be less than 117 ng/g in non treated and in the range 300-1000 ng/g in Se treated potato. Beside the total content of Se, the chemical form in which Se is present is almost most important due to the differences in bioavailability and toxicity. Water-soluble Se compounds were extracted from samples by water, than by enzymatic hydrolysis with enzyme protease XIV, amylase and combination of protease XIV and amylase. Separation of Se species (SeCys₂, SeMet, SeMeSeCys, selenite and selenate) was made by anion exchange column (Hamilton PRP-X100) and a cation exchange column (Zorbax 300-SCX). Detection was performed by two techniques, HPLC-ICP-MS and HPLC-UV-HG-AFS. SeMet and selenate were the main species in potato, regardless of the growth conditions. Concentration of selenate was independent, while concentration of SeMet changed using different extraction techniques. The greatest amount of SeMet (40 %) was defined in extracts obtained with enzymatic hydrolysis, using combination of protease XIV and amylase. In water extracts we obtained about 60 % and in enzymatic extracts about 80 % of identified Se compounds. For major compounds comparable results were obtained by both techniques, while some unknown compounds in trace level were observed using HPLC-ICP-MS.