Effect of foliar application of selenium on its uptake and speciation in carrot

Carrot (Daucus carota) shoots were enriched by selenium using foliar application. Solutions of sodium selenite or sodium selenate at 10 and 100 μg Se ml⁻¹, were sprayed on the carrot leaves and the selenium content and uptake rate of selenium were estimated by ICP-MS analysis. Anion and cation exchange HPLC were tailored to and applied for the separation of selenium species in proteolytic extracts of the biological tissues using detection by ICP-MS or ESI-MS/MS. Foliar application of solutions of selenite or selenate at 100 μg Se ml⁻¹ resulted in a selenium concentration of up to 2 μg Se g⁻¹ (dry mass) in the carrot root whereas the selenium concentration in the controls was below the limit of detection at 0.045 μg Se g⁻¹ (dry mass). Selenate-enriched carrot leaves accumulated as much as 80 μg Se g⁻¹ (dry mass), while the selenite-enriched leaves contained approximately 50 μg Se g⁻¹ (dry mass). The speciation analyses showed that inorganic selenium was present in both roots and leaves. The predominant metabolised organic forms of selenium in the roots were selenomethionine and gamma-glutamyl-selenomethyl-selenocysteine, regardless of which of the inorganic species were used for foliar application. Only selenomethionine was detected in the carrot leaves.

The identity of selenomethionine contained in carrot roots and leaves was successfully confirmed by HPLC-ESI-MS/MS.
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 4.17 SJR 1.911 SNIP 2.383
Web of Science (2011): Impact factor 3.655
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.981 SNIP 2.253
Web of Science (2010): Impact factor 3.458
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.789 SNIP 2.023
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.47 SNIP 1.706
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.475 SNIP 2.087
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.028 SNIP 1.526
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.077 SNIP 1.438
Scopus rating (2003): SJR 0.876 SNIP 1.248
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.966 SNIP 1.235
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.785 SNIP 0.975
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.588 SNIP 0.961
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.654 SNIP 0.921
Original language: English
Keywords: gamma-glu-Mesecys, HPLC-ESI-MS/MS, HPLC-ICP-MS, Carrot, Foliar application, SeMet, Selenium speciation
DOIs: 10.1016/j.foodchem.2009.01.054
Source: orbit
Source-ID: 243682
Research output: Research - peer-review › Journal article – Annual report year: 2009