New stable isotope enriched plant compounds for use as internal standards

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IsoLife BV produces plant components, uniformly (U) labelled with stable isotopes like ^{13}C and ^{15}N. They are obtained from food plants and pharmaceutical herbs cultivated in advanced phytotrons, which are specifically designed for high abundance isotope labelling.

These innovative components are applied as internal standards for MS in medicine, nutrition, clinical chemistry, and biotechnology (metabolomics). One example of a new product is the labelled flavonoid U^{13}C-quercetin (Fig. 1).

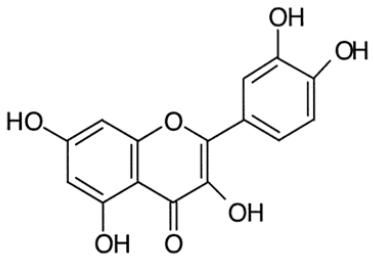

Figure 1. Quercetin

Materials and Methods

Potato (cv. 'Elkana') and tomato (cv. 'Microtom') plants were grown in an Espas labelling chamber (1) on a hydroponics system (2). $^{13}CO_2$ (99 atom %; Isotec) was the only C source. U^{13}C-quercetin was extracted from potato shoots by methanol/ water, acid hydrolysis and CPC fractionation and analyzed by HPLC and MS by Prisna BV. Tomato fruits of different ripening stages were flash-frozen in LN_2.

Results

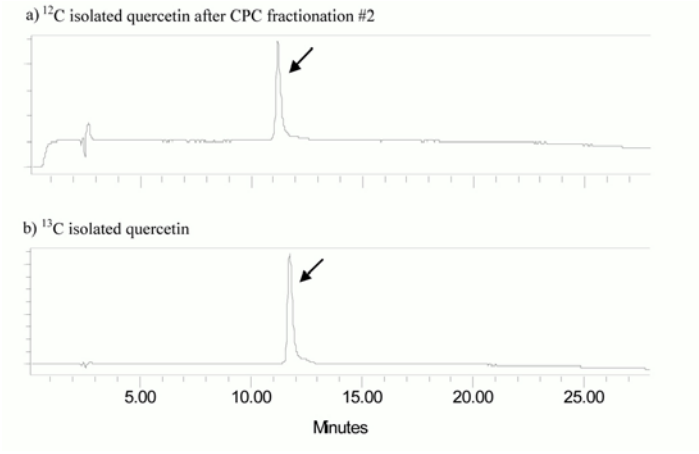

Figure 2.

U^{13}C-quercetin has been purified from U^{13}C-plants by HPLC and CPC as illustrated in Figure 2 and demonstrated by MS analysis (Figure 3). The latter also shows the uniform ^{13}C labelling (> 98.5 atom %; binomial distribution), since molecular mass increased from 303.2 to 318.2 (quercetin has 15 C-atoms).

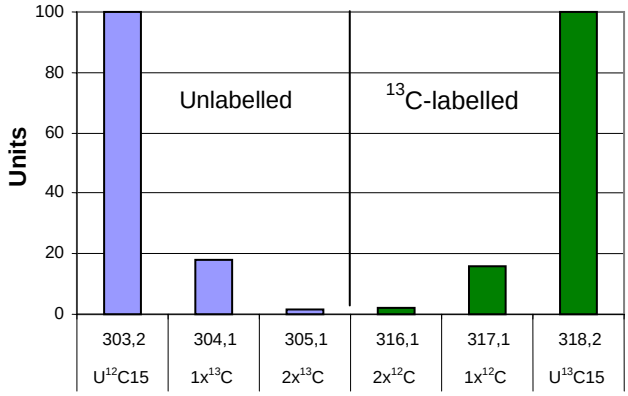

Figure 3. **$[M+H]^+$ Molecular Ion Mass of Quercetin**

Discussion

Two advantages of U^{13}C-standards are:

- they facilitate identification (LC-MS) by indicating the number of carbon atoms
- they improve quantification of multiple metabolites in extracts (GC-MS) by reducing variation by a factor six.

Future products involve U^{13}C-tomato fruit extracts and software for high-throughput analyses. This technique will allow automated and quantitative analyses of complete 'metabolomes' in nutrition, medicine, plant breeding, and pharmaceutics (3,4,5).

IsoLife BV provides powerful stable isotope tracers for a range of applications. We create tailor-made solutions for your specific problems.

References

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