ABSTRACT

Various vegetables (zucchini, eggplant, tomato, red pepper, mangold, spinach, lettuce, white-colored radicchio di Castelfranco, raddichio Leonardo, white cabbage, red cabbage and Savoy cabbage) are shown to be potential sources of common plant triterpenoids (triterpenols: lupeol, α-amyrin, β-amyrin and cycloartenol; ketones: lupenone and friedelin; acetates: lupeol acetate and cycloartenol acetate; and acids: ursolic, oleanolic and betulinic acids) and phytosterols (β-sitosterol, stigmasterol) by a preliminary TLC screening. TLC–MS^2 and HPLC–(UV)–MS^3 methods were developed for the analysis of the triterpenic acids. Another TLC–MS^2 method was developed for the simultaneous analysis of 8 neutral triterpenoids and 2 phytosterols, while an (U)HPLC–UV–MS^2 method was developed for the simultaneous analysis of 11 triterpenoids (including triterpenic acids) and 2 phytosterols. By using APCI in positive ion mode, some characteristic fragment ions were proposed for discrimination among isomeric compounds, that aided their identification. Additionally, a custom-built mass spectral library along with a "head to tail" mode of spectral comparison enabled clearer assignation of the compounds. An orthogonal method to the (U)HPLC–UV–MS^2, based on HPLC–UV was also developed for identification of δ-amyrin in the samples with high certainty. The developed simple and simultaneous methods enabled assignation of many triterpenoids and phytosterols in the vegetable waxes for the first time. The results obtained by different methods were comparable to each other. In addition, semi-quantitative determination of triterpenols was performed for different vegetable extracts. The obtained data allows estimation of their likely daily intake through the diet. δ-Amyrin standard which was used in the studies was isolated by a preparative TLC and semi-preparative HPLC and was chemically characterized by NMR and MS.