



Application of vibrational and fluorescence spectroscopy to the compositional analysis of colored-flesh potatoes

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Rok wydania

2024

Czasopismo

Journal of the Science of
Food and Agriculture

Numer woluminu

104

Strony

1399-1407

DOI

10.1002/jsfa.13021

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Determination of composition and physicochemical parameters of natural products requires dedicated, often laborious and expensive, analytical protocols. Different spectroscopic techniques, in conjunction with chemometrics, seem to have a considerable potential in direct analysis of raw plant material and foods, without any chemical treatment. Fluorescence spectroscopy and three vibrational spectroscopy techniques were applied to determine total polyphenol content, antioxidant activity and macronutrient levels in red- and purple-fleshed potato varieties. Excitation–emission matrix fluorescence, Fourier transform Raman, attenuated total reflection Fourier transform infrared and near-infrared spectra were recorded for the freeze-dried samples. Combining spectral data and the results of reference analyses, partial least squares regression models were constructed for each parameter studied. For polyphenols and antioxidant activity, quantification errors found for validation samples amounted to 3.74–5.04% and 4.75–6.35%, respectively, whereas macronutrient analysis gave errors in the 3.45–4.55%, 3.09–5.30% and 5.10–8.58% ranges for starch, protein and sugar determinations, respectively. The obtained results demonstrate that different spectroscopic techniques in combination with multivariate modeling allow simultaneous determination of various parameters of plant samples based on a single sample spectrum. They can effectively replace commonly used protocols of food product analysis requiring sample dissolving and extraction of the compounds of interest.

Słowa kluczowe

colored-flesh potatoes, polyphenols, antioxidant activity, Nutrients, Vibrational spectroscopy, Fluorescence spectroscopy, Quantitative analysis, multivariate analysis

Adres publiczny

<http://dx.doi.org/10.1002/jsfa.13021>

Strona internetowa wydawcy

<https://onlinelibrary.wiley.com/>

Plik został wygenerowany dnia 2026-08-21 03:25:37

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