P1.003 Nutritive and anti-nutritive compounds of green leafy vegetables

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Abstract

Carotenoids, tocopherols and phylloquinone are highly valued in vegetables due to their potential health benefits. Moreover, increased vegetable consumption is one of the recommended dietary interventions for the prevention of kidney stone formation, but documentation on the oxalates and phytic acid content of Southeast Asian green leafy vegetables (GLV) are still lacking. In this study, the profile of eight carotenoids, four tocopherols, and phylloquinone in 26 GLV were analysed by using high-performance liquid chromatography with atmospheric pressure chemical ionisation and tandem mass spectrometry (HPLC-APCI-MS/MS). Lutein, β-carotene and α-tocopherol were the predominant carotenoids and tocopherol in the GLV. Among 26 GLV, sweet leaf bush contained the highest amount of total carotenoids (494 ± 22 µg/g fresh weight (FW)), tocopherols (214 ± 60 µg/ g FW) and phylloquinone (18 ± 2 µg/g FW). Other underutilised GLV, including wolfberry leaves, cassava leaves and moringa leaves, are also a rich source of fat-soluble micronutrients. Similarly, the anti-nutritional contents among the GLV were diverse, with total oxalates and phytic acid ranging from 6 to 557 mg/100 g FW and 6 to 111 mg/100 g FW, respectively. Total oxalates were highest in spinach (557 ± 47 mg/100 g FW) and turmeric leaves (539 ± 33 mg/100 g FW), while phytic acid contents were highest in moringa leaves (111 ± 16 mg/100 g FW) and sweet leaf bush (90 ± 15 mg/100 g FW). Overall, this study enhanced the understanding of micronutrient and anti-nutrient composition in underutilised GLV in Southeast Asia. Data will be important for diet recommendations to promote the nutritional status of the population in the region and enable consumers to make informed choices on how best these GLV can contribute to the optimal health.

Keywords

Micronutrients
anti-nutrients
green leafy vegetables
LC-MS/MS

P1.004 Modern analytical methods for the determination of synthetic dyes in food

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Abstract

Synthetic dyes can cause many health problems, and their use as food additives is rigorously regulated worldwide. Two methods for the determination of synthetic dyes in food were developed. The visual qualitative expression method was based on the extraction of synthetic dyes using a liquid anion exchanger (0.01 M solution of trioctylmethylammonium chloride in chloroform). Using this reagent, an optimal transition of 15 anionic synthetic dyes from the aqueous to the organic phase was achieved (R>99.8%). It was applicable for testing food that must not contain synthetic dyes (wines, juices, etc.) in a very short time (5-10 min). In the case of colouring of the organic phase, identification and quantification was carried out using the HPLC-DAD method described. The rapid and simple method allows for simultaneous determination of 16 synthetic dyes (i.e. E 102, E 104, E 110, E 121, E 122, E 123, E 124, E 127, E 128, E 129, E 131, E 132, E 133, E 142, E 143, E 151) from all food types. The LOD and LOQ ranged from 0.026 to 0.086 µg mL-1 and from 0.077 to 0.262 µg mL-1 respectively, and recovery was 83.7-107.5%.

Keywords

Synthetic dyes
HPLC-DAD
Determination
Food

P1.005 Application of NMR spectroscopy for identification of metabolites in horticultural products

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Traditionally, chromatographic, and spectroscopic techniques were applied to the analysis of horticultural products and in the recent years Nuclear Magnetic Resonance (NMR) spectroscopic methods, specifically those with resonance on hydrogen nucleus (so-called proton NMR) have been successfully used for analyzing plant material such as carrot, cabbages, leek, radishes, apples and so on.

In the scope of the present work we have directed our attention to a selection of fruits and vegetables belonging to *Brassicaceae*, *Solanaceae*, *Amaryllidaceae* and *Rosaceae* families, which were organically grown in two separate areas of Trentino region of Italy. Simple proton NMR spectra of aqueous extracts prepared from lyophilized plant material provided data about contents of various metabolites, for example, amino acids, carbohydrates, organic acids, and aromatic compounds depending on the type of the sample. Various possible health benefits of identified components are discussed.

Keywords

Fruits
Vegetables
NMR Spectroscopy
QNMR

P1.006 Elucidating the prevalence of antibiotic residues throughout a raw milk cheese production chain by LC-MS/MS and commercial testing: a farm-to-fork study.

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Abstract

Antibiotics are natural or synthetic compounds used to treat bacterial infections in livestock. Although a large part of the administered compound is metabolized and excreted via urine and faeces, part may persist and be present in derived products, such as milk. These are harmful to human health, causing toxic effects like hepatotoxicity or carcinogenicity; and lead to antimicrobial resistances [1]. Therefore, this work aimed, for the first time, to (1) analyse the natural prevalence of antibiotic residues in sheep herds, (2) determine to what extent antimicrobials are transferred to raw milk, and (3) study the effect of cheese-making process. Thus, faeces, raw milk, whey, fresh cheese and 60-day-ripened cheese samples were collected from 4 Idiazabal PDO artisanal dairies. Antibiotic residues were extracted by SPE, and detected and quantified by LC-MS/MS [2]. Results were compared with Eclipse FARM test (Zeulab, Spain).

Results revealed 16.3% of samples in which any antibiotic was detected, which were chlortetracycline, enrofloxacin, oxytetracycline, sulfadiazine, sulfamethazine and tylosin. Within positive samples, chlortetracycline (27.5 ± 24.5 µg/kg), tylosin (18.2 ± 5.00 µg/kg) and sulfamethazine (16.5 ± 20.2 µg/kg) were the most abundant compounds. Most antibiotics were detected in faeces, despite samples were obtained from healthy animals. In raw milk, only tylosin was detected, which was below maximum residual limits and was eliminated through whey during cheese-making. The commercial testing was only partially consistent with these results. This study confirms the elimination of antibiotics through faeces, although some persist and appear in raw milk. During cheese-making, residues are eliminated through the whey, allowing cheese innocuousness. However, treatments to eliminate these compounds from raw milk or whey should be investigated, since heat treatments do not completely eliminate them [3].

Ref.:

[1] *Dairy*, 3, 541-564 (2022)

[2] *J. Dairy Sci.*, 102, 2941-2953 (2019)

[3] *J. Food Prot.*, 82, 1553–1559 (2019)

Keywords

dairy products
raw milk cheese
antibiotic residues
LC-MS/MS

P1.007 Techno-economic analysis of subcritical water hydrolysis process for amino acids recovery from brewer’s spent grains

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