1st Research Meeting on Biochemistry

NUTRITIONAL AND CHEMICAL ANALYSIS AND BIOACTIVE POTENTIAL OF AROMATIC AND MEDICINAL PLANTS TRADITIONALLY USED AS CONDIMENTS

UEM Universidade Estadual de Maringá

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Introduction

Aromatic and medicinal plants are highly appreciated and used worldwide as condiments, dyes, and preservatives. Given their nutritional value and chemical composition, related to health beneficial properties, their inclusion in the Human diet has gain an increasing expression [1]. Certain mixtures of plants demonstrate greater potential when compared to isolated plants, due to synergistic effects, and these properties make them of great interest in food, pharmaceutical, and cosmetic industries. They have been consumed through direct use in prepared dishes, but also by incorporation into foodstuff, making them bioactive and functional [2].

Materials and methods

Four mixtures of aromatic plants used to season poultry, meat, fish, and salads were characterized in terms of nutritional value (AOAC), chemical composition: free sugars (HPLC-RI), organic acids (UFLC-PDA), tocopherols (HPLC-fluorescence), fatty acids (GC-FID), and phenolic compounds (HPLC-DAD-ESI/MS); and bioactive properties (antioxidant, antimicrobial, anti-inflammatory, and antitumour).

Mixtures have in their constitution:

Results

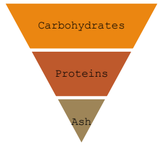


Fig. 1 Ratio of macronutrient quantities.

Macronutrients found in the mixtures of condiments.

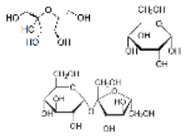


Fig. 2 Chemical structure of fructose, glucose and sucrose.

Fructose, glucose, and sucrose were detected in all samples.

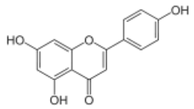


Fig. 3 Chemical structure of Apigenin.

25 phenolic compounds were identified, with apigenin-*O*-malonyl-pentoside-hexoside as the most abundant compound in all extracts.

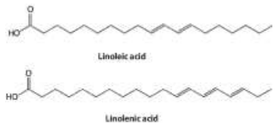


Fig. 4. Chemical structure of linoleic and linolenic acid.

23 different fatty acids were detected, with high percentages of linoleic acid and linolenic acid.

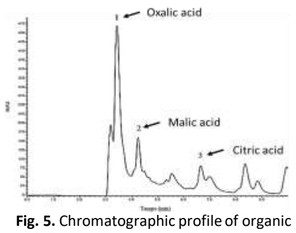


Fig. 5. Chromatographic profile of organic acids from extracts of condiment mixtures.

Oxalic, malic, and citric acids were detected in all the samples.

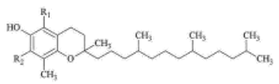


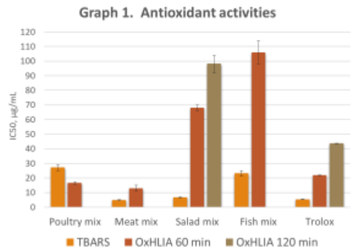
Fig. 6. Chemical structure of vitamin E isomers.

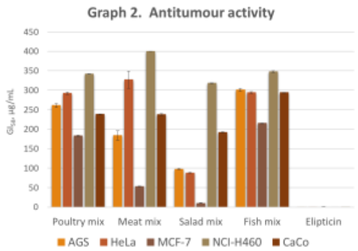
The mixtures revealed the four isoforms of tocopherols.

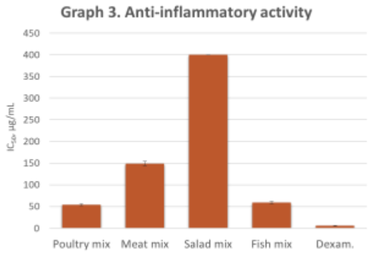
Table 4. Antibacterial activity (minimal inhibitory concentration (MIC) and minimal bactericidal concentration ((MBC); mg/mL).

	Poultry mixture		Meat Mixture		Salad mixture		Fish mixture	
	MIC	MBC	MIC	MBC	MIC	MBC	MIC	MBC
E. coli	5	>20	10	>20	5	>20	5	>20
K. pneumoniae	>20	>20	>20	>20	>20	>20	>20	>20
M. morganii	5	>20	2.5	>20	5	>20	10	>20
P. mirabilis	10	>20	10	>20	10	>20	20	>20
P. aeruginosa	>20	>20	>20	>20	>20	>20	>20	>20
E. faecalis	5	>20	2.5	>20	2.5	>20	5	>20
L. monocytogenes	20	>20	10	>20	10	>20	10	>20
MRSA	5	>20	2.5	>20	5	>20	10	>20

The mixtures for meat and salad revealed the highest antimicrobial activity







For antioxidant activity, the extracts of the mixtures for meat and salads revealed the best results in the TBARS assay, whereas those from mixtures for meat and poultry stood out in the OxHLIA assay (**Graph 1**).

The mixture for salad showed the best antitumour properties (**Graph 2**), and the mixtures for poultry and fish showed the highest anti-inflammatory activity (**Graph 3**).

Conclusion

These seasoning mixtures demonstrated valuable bioactive properties, conferred by their chemical composition and cumulative and synergistic effects observed in the mixtures, which corroborates the importance of their inclusion in the Human diet, either through their consumption as a garnish, or by incorporation into less common foods, and in the conservation and maintenance of food quality.

Recommendations

1C. Pereira, L. Barros, I. Ferreira, Plantas aromáticas usadas como condimentos: prevalência de ácidos gordos polinsaturados. Rev. de Ciências Agrárias, 40 (2017) 155. https://doi.org/10.19084/RCA16227

2C. Pereira, J. Barreira, R. Calhelha, M. Queiroz, L. Barros, I. Ferreira, New insights into the effects of formulation type and compositional mixtures on the antioxidant and cytotoxic activities of dietary supplements based-on hepatoprotective plants. Food Funct, 5 (2014) 2052. https://pubs.rsc.org/en/content/articlehtml/2014/fo/c4fo00387j

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