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The content of biologically active compounds in extruded crisps with the addition of bear's garlic

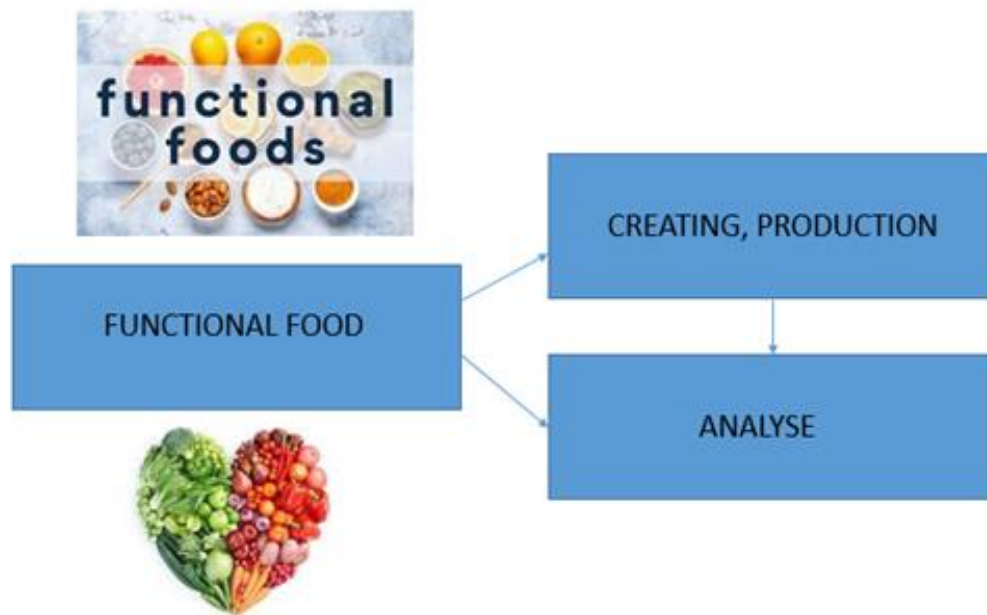
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The content of biologically active compounds in extruded crisps with the addition of bear's garlic



One of the methods of preventing chronic civilization and metabolic diseases is the use of a properly balanced diet rich in phytochemicals with proven effectiveness.

The experiment consisted in designing, producing and testing for the antioxidant potential and content of polyphenolic compounds (phenolic acids, flavonoids) of extruded crisps with a quantitatively variable content of wild garlic (*Allium ursinum* L.) added, amounting to 0, 1, 2, 3, 4%. The parameters used during the extrusion process differed in the rotational speed of the extruder screw (80, 100 and 120 revolutions per minute). Effective ultrasonically assisted extraction of polyphenols (UAE) contained in the finished products was carried out, then the total content of polyphenols, flavonoids and the antioxidant potential. For the qualitative and quantitative determination of phenolic acids, UHPLC-MS Chromatography was used. The total content of polyphenols and flavonoids increased.

Chromatographic analysis of the samples showed a large variety of phenolic acids. 9 acids were detected in all samples. The content of individual phenolic acids and the sum of phenolic acids increased in the samples along with the increase in the content of wild garlic. The designed food was characterized by a relatively high potential for scavenging the DPPH free radical.

The experiment showed that the extrusion method used for production did not cause the degradation of the thermolabile biologically active polyphenolic compounds. The tested crisps may constitute a new range of functional foods

Keywords: *Allium ursinum* L.; antioxidant potential; functional food



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Introduction



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Functional food

- Functional foods are foods that have a potentially **positive effect on health** beyond basic nutrition
- Functional food- definition
 - a) Functional foods may be designed to have **physiological benefits and/or reduce the risk of chronic disease**
 - b) Must be consumed as part of a normal diet
 - c) In conventional formula
 - d) Positively laboratory tested is absolutely required

Historical view

- 1984- The concept of functional foods was born in Japan
- 1991- Food for Specified Health Uses
- Situation in Europe

Functional food production methods

- addition of active substances
- innovative chemical composition
- limiting energy value
- New technologies, for example microencapsulation or vacuum impregnation.



- extruded crisps with a quantitatively variable content of wild garlic 0, 1, 2, 3, 4%.
- extrusion parameters: rotational speed of the extruder screw (80, 100 and 120 rpm)
- the total content of polyphenols, flavonoids and the antioxidant potential
- UPLC MS Waters ACQUITY UPLC System chromatograph

Results and discussion



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The content of free phenolic acids ($\mu\text{g} / \text{ml}$ of extract) after hydrolysis in samples of crisps with the addition of wild garlic produced at 80 rpm.

% addition	The content of free phenolic acids ($\mu\text{g} / \text{ml}$ of extract)									
	protocatechuic	p-OH benzoic	vanilic	caffeic	syringic	p-coumaric	ferulic	synapic	salicylic	sum
0%	0,406	4,012	0,121	30,358	8,817	64,058	665,751	63,950	0,657	838,130
1%	0,574	3,915	0,873	49,192	11,398	165,700	1159,250	82,192	0,877	1473,971
2%	0,509	4,961	5,083	63,217	11,191	184,117	1216,350	93,850	0,909	1580,187
3%	0,624	5,026	21,868	66,137	11,253	196,575	1260,917	93,700	1,065	1657,165
4%	0,442	5,824	52,142	77,700	12,065	212,340	1322,666	105,342	1,155	1789,675



The content of free phenolic acids ($\mu\text{g} / \text{ml}$ of extract) after hydrolysis in samples of crisps with the addition of wild garlic produced at 120 rpm.

% addition	The content of free phenolic acids ($\mu\text{g} / \text{ml}$ of extract)									
	protocatechiuc	p-OH benzoestic	vanilic	caffeic	siringic	p-coumaric	ferulic	synapic	salicylic	sum
0%	0,443	4,928	0,123	32,083	9,521	66,875	516,583	62,108	0,635	693,299
1%	0,666	4,955	2,609	58,508	11,098	173,200	1161,750	83,883	0,779	1497,448
2%	0,656	5,050	10,038	66,479	11,266	187,716	1225,083	91,633	0,944	1598,865
3%	0,714	4,895	25,296	67,554	10,694	200,208	1265,333	89,525	1,053	1665,275
4%	0,751	5,365	96,375	78,383	11,413	216,650	1323,583	102,700	1,190	1836,410

Conclusions

The results presented above are very important from a practical point of view. They mean that both wild garlic and food products enriched with it are an important source of biologically active flavonoids that are not deactivated during the production process, which is the high-temperature and high-pressure extrusion process.

The tested crisps may constitute a new range of functional foods.

Acknowledgments



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