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IMPACT OF THERMAL PREPARATION ON SENSORY AND PHYSICO-CHEMICAL PROPERTIES OF POTATOES

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Abstract: *Potatoes are one of the most consumed vegetables in the world due to their rich nutrient content. The goal of the study was to evaluate the impact of different thermal methods preparation on the sensorial and physicochemical characteristics of four varieties of potatoes: white, red, sweet and purple. Immediately after preparation, the sensory attributes (appearance, colour, taste odour, texture, chewing and swallowing sensation) of the samples were evaluated. After 48 hours of storage at 2-4ºC the moisture, pH, reducing sugar, salt content, antioxidant activity expressed by ferric reducing antioxidant power (FRAP) value, polyphenol and flavonoid content of cooked potatoes were determined using as reference samples the same varieties of raw potatoes. The results of the sensory analysis showed that the most appreciated samples were those prepared by frying followed by those obtained by baking and boiling. All assessed physicochemical properties of samples were affected by the heat treatments applied.*

• Introduction

Potatoes (*Solanum tuberosum*) are one of the most widely consumed and versatile crops globally, playing a significant role in various aspects of health, nutrition, and food security. Their impact ranges from addressing undernutrition and enhancing food security to contributing to overnutrition and associated health issues like obesity, diabetes, and heart disease.

Potatoes are rich in essential nutrients such as vitamin C, potassium, and dietary fiber. They also provide a good source of carbohydrates, which are crucial for energy. Also, potatoes contain antioxidants such as flavonoids, carotenoids, and phenolic acids, which help neutralize harmful free radicals in the body and may reduce the risk of chronic diseases.

Potatoes can be prepared in numerous ways, each offering a distinct set of sensory properties such as flavor, texture, aroma, and appearance. Each method of preparation brings out unique sensory properties in potatoes, making them a versatile ingredient that can be adapted to various culinary preferences and nutritional needs. The common preparation methods of potatoes include: boiling, steaming, baking, roasting, frying, mashing, grilling, microwaving and sautéing. Each method of preparation brings out unique sensory properties in potatoes, making them a versatile ingredient that can be adapted to various culinary preferences and nutritional needs.

Thermal cooking also induces changes in the nutritional profile and antioxidant properties of potatoes.

The goals of our reserch were to assessed which cooking method induces the most differences in sensory and physico-chemical properties of 4 potato varieties.

• Material and method

White, red, sweet and purple popatoes samples were purchased from a local supermarket and were cooked by frying, boiling, baking, and grilling. Imediately after preparation, the sensory attributes as: of the samples were evaluated (appearance, colour, taste odour, texture, chewing and aftertase, ISO 4121:2002). In order to carriesd out the physico-chemical characteristics the methods ISO Methods were used: moisture (SR 91/2007 pct.10), pH (TS 1728 ISO 1842), reducing sugar (STAS 90-2007, pct. 20), salt content (ISO 1841-2). The antioxidant activity expressed by ferric reducing antioxidant power (FRAP) value, total polyphenol content (Folin-Ciocâlteu method) and flavonoid content the cooked potatoes were assessed using the Specord 205 spectrophotometer (Analytik Jena AG, Jena, Germany). Until the analysis the samples were storage 48 hours of at 2-4ºC . The antioxidant properties of potatoes were performed on an extract prepared by: to 1 g of each sample, 10 ml of 70% ethanol was added, followed by shaken for 30 min and and filtering of extracts.

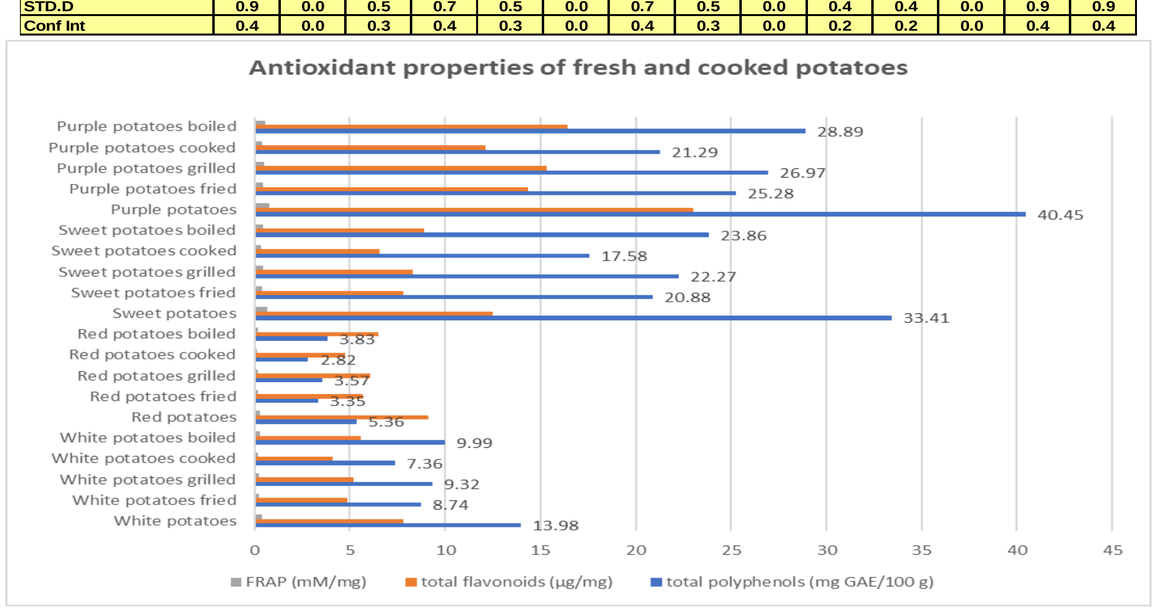
• Results and discussions

Physico-chemical properties (w/w) of the potatoes before and after cooking

Sample	Moisture (g/100g)		pH		Sugar (g/100g)		Salt (g/100g)	
	After	Before	After	Before	After	Before	After	Before
White potatoes fried	47,1	75,7	6,1	5,7	32,2	21,5	0,037	0,025
White potatoes grilled	25,8		6,8		34,8		0,029	
White potatoes cooked	28,9		6,8		34,5		0,029	
White potatoes boiled	70,4		6,0		29,2		0,035	
Red potatoes fried	46,2	73,8	5,9	5,5	25,7	19,6	0,040	0,030
Red potatoes grilled	42,8		6,0		29,4		0,032	
Red potatoes cooked	43,1		6,0		28,2		0,033	
Red potatoes boiled	69,5		5,7		23,4		0,032	
Sweet potatoes fried	27,6	44,2	5,8	5,4	68,8	40,7	0,15	0,090
Sweet potatoes grilled	25,3		5,9		67,9		0,12	
Sweet potatoes cooked	26,8		5,8		67,2		0,13	
Sweet potatoes boiled	38,7		5,7		70,5		0,12	
Purple potatoes fried	35,5	56,7	6	5,6	21,8	14,5	0,095	0,080
Purple potatoes grilled	33,2		6,1		20,7		0,092	
Purple potatoes cooked	34,8		5,9		20,4		0,094	
Purple potatoes boiled	42,1		5,8		24,3		0,092	

The sensorial characteristics of potaoes according to the preparation method

Sample	Appearance	Section aspect	Colour	Overall taste	Specific aroma	Others (off aroma)	Overall odours	Specific odours	Others (off odours)	Hardness	Tenderness	Chewing behaviour	Persistency	Aftertaste
White potatoes fried	5	4	5	5	5	0	5	5	0	4	4	4	5	5
White potatoes grilled	5	4	5	4	5	0	4	4	0	4	4	4	5	5
White potatoes cooked	5	4	4	4	4	0	4	5	0	4	4	4	4	4
White potatoes boiled	3	4	4	3	4	0	3	4	0	5	5	4	3	3
Red potatoes fried	5	4	5	5	5	0	5	5	0	4	4	4	5	5
Red potatoes grilled	5	4	5	4	5	0	4	4	0	4	4	4	5	5
Red potatoes cooked	5	4	4	4	4	0	4	5	0	4	4	4	4	4
Red potatoes boiled	3	4	4	3	4	0	3	4	0	5	5	4	3	3
Sweet potatoes fried	5	4	5	5	5	0	5	5	0	4	4	4	5	5
Sweet potatoes grilled	5	4	5	4	5	0	4	4	0	4	4	4	5	5
Sweet potatoes cooked	5	4	4	4	4	0	4	5	0	4	4	4	4	4
Sweet potatoes boiled	3	4	4	3	4	0	3	4	0	5	5	4	3	3
Purple potatoes fried	5	4	5	5	5	0	5	5	0	4	4	4	5	5
Purple potatoes grilled	5	4	5	4	5	0	4	4	0	4	4	4	5	5
Purple potatoes cooked	5	4	4	4	4	0	4	5	0	4	4	4	4	4
Purple potatoes boiled	3	4	4	3	4	0	3	4	0	5	5	4	3	3
		95%												
AVG.	4.5	4.0	4.5	4.0	4.5	0.0	4.0	4.5	0.0	4.3	4.3	4.0	4.3	4.3
STD.D	0.9	0.0	0.5	0.7	0.5	0.0	0.7	0.5	0.0	0.4	0.4	0.0	0.9	0.9
Conf Int	0.4	0.0	0.3	0.4	0.3	0.0	0.4	0.3	0.0	0.2	0.2	0.0	0.4	0.4



• Conclusions

All the preparation methods used influenced the sensory, physicochemical properties and antioxidant activity applied to the four potato varieties. In terms of senzorial characteristics, the most appreciated samples were those prepared by fried, followed by grilling, baking and boiling. The thermal treatment led to the decreasing of moister and at the increasing content of sugar, salt and pH respectively of all samples. All prepared potato samples showed decreases in antioxidant properties compared to raw samples.