COMPARATIVE STUDIES REGARDING SOME BIOACTIVE COMPOUNDS IN DIFFERENT SPROUTS

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Abstract

Sprouts are living food and an important element in processes of an intense detoxification and rejuvenation of human bodies. Sprouts therapeutic action is different in many cases from what we know from the adult plant parts (of traditional herbal medicine). Each plant is a biological equilibrium with its own ecosystem, which has an affinity for the human biological system and various diseases. Embryonic plant tissues help the human body fight inflammatory diseases.

For this study 3 types of sprouts were taken: red onion, fenugreek and alfalfa and it was realised a comparative study regarding some bioactive compounds from the selected samples, like total polyphenol content, flavonoids, Vitamine C, peroxidase activity, protein content.

Key words: sprouts, fenugreek, red onion, alfalfa, bioactive compounds.

INTRODUCTION

Overcooked, processed and „dead" foods play a significant role in causing our poor health and lack of energy. Living foods are those foods that due to its numerous enzymes and bioactive compounds ensure the health of the human body.

One of the new functional foods are sprouts. Sprouts are forming from seeds during sprouting. The sprouts are outstanding sources of protein, vitamins and minerals and they contain health-maintaining important nutrients like glucosinolates, phenolic compounds and selenium-containing components in the Brassica plants or isonflavons in the soybean. Because the sprouts are consumed at the beginning of the growing phase, their nutrient concentration remains very high (Marton et al 2010).

Germination is an inexpensive and simple method of improving nutritive value, and several studies have reported higher levels of nutrients and lower values of antinutrients in germinated food seeds and grains compared to the ungerminated originals (Raman, 1984; King and Perwastien,1987; Honke et al., 1998).

Sprouts are becoming more and more popular in western countries as healthy foods, for their positive effects on the prevention of cardiovascular diseases and cancer (Ma et al., 2014).

Fenugreek *(Trigonela foenum-graecum)* is a plant in the family Fabaceae. Fenugreek is used both as a herb (the leaves) and as a spice. The leaves and sprouts are also eaten as vegetables. The plant is cultivated worldwide as a

semi-arid crop and is a common ingredient in many curries. (Wikipedia, Mathava Naidu et al, 2011) . The seeds are rich in leucine, valine, lysine and phenylalanine. Manganese, magnesium, zinc and copper contents are reported for the first time in Sudan by (Nour and Magboul) 2013. Sprouting also removes some anti-nutrients such as enzyme inhibitors in the seed that make sprouts safe for the diet. Sprouting in fenugreek is known to improve its soluble protein and fibre content and reduce the phytic, tannic acid and trypsin inhibitors (Mansur and El Adawy, 1994).

Red onion sprouts **-** Red onions, belongs to the Amaryllidaceae family, *Allium* genus, and are cultivars of the onion with purplish red skin and white flesh tinged with red. Red onions principal componenets like quercetin, allicin and chromium — can protect against cancer, fight fungi and bacteria, promote cardiovascular health, reduce high blood pressure and insulin resistance, and aid in weight loss (www.healwithfood.org). Red onions are mainly made of carbohydrates and water and provide significant amounts of vitamin C and vitamin B6. They are also one of the best food sources of chromium. Red onion sprouts are perfect substitutes for proper onions because they have a higher content of vitamins, minerals and enzymes. Red onion seeds have a strong and fresh taste and flavor.

Onion plants synthesize flavonoids as protection against damage by UV radiation and by intracellular hydrogen peroxide (Lee SU et al., 2008).

Alfalfa sprouts **-** Alfalfa (*Medicago sativa* L.) belongs to the Leguminosae family; it is called the "father of all plants" and is considered the green food of the millennium. An important quality of alfalfa is the strengthening of the immunity. The alfalfa sprouts are a good surce of phenolics, especially flavonoids (Zincă and Vizireanu, 2013). Sprouts contain high amounts of vitamins A and C, coumestrol, liquiritigenin, isoliquiritigenin, and saponins (Hong et al, 2011, Oleszek, 1998 and Plaza et al, 2003).

MATERIAL AND METHOD

The experiments were performed in 2015-2016, at the Laboratory of Secondary Metabolits in Food Industry, of Faculty for Environmental Protection, University of Oradea.

For this study, 3 types of sprouts: fenugreek, red onion and alfalfa sprouts were taken. It was made 3 repetition for every sample.

Total Phenolic content

The total phenolic (TP) content was determined by using the Folin-Ciocâlteu (1927) colorimetric method developed by Singleton and Rossi (1965). A diluted extract (0.5 ml) or phenolic standard was mixed with 2.5 ml Folin- Ciocâlteau reagent and after 5 minutes 2.0 mL sodium carbonate (7.5%). The absorption was read after 2 h at 20°C, at 750 nm. For the

preparation of calibration curve 0.5 ml aliquot of 0.2, 0.4, 0.8 and 1.2 μM/ml aqueous gallic acid solution were used as the standard and expressed as mg of gallic acid equivalent (GAE) (Gergen, 2004).

Total Flavonoid compounds content

The total Flavonoid compounds content (FC) was measured with $AlCl_3$ colorimetric assay (Atanassova et al, 2011). The absorbance was measured at 510nm. As standard we used quercitine.

Vitamin C- Ascorbic acid was extracted using metaphosphoric acid and the extract was titrate with iodine solution starch indicator (Kallner,1986).

Peroxidase activity - spectrophotometric determination following the formation of tetraguaiacol at 470 nm wavelength (Kim and Yoo, 1996).

Protein content – Bradford methods (Bradford.1976), for red onion and alfalfa sprouts, where the amount of protein is smaller, and Kjeldhal methods for fenugreek sprouts where the amount of protein is higher (Nielsen, 2003).

RESULTS AND DISSCUSIONS

Results obtained after performing analyses for the 3 type of studied sprouts were content in table 1.

Table 1.

Mean values for bioactive compounds in analyzed sprouts

Sprouts	**mg GAE/ 100g FW** (mean value)	**Flavonoids mg Q/100g FW** mean value	**Vitamin C mg/100 g FW** mean value	**Peroxidase activity U/g W/min** mean value	**Protein g%** mean value
Fenugreek	89.16±0.1	30.84±0.05	31.9±0.2	3.96±0.04	22.95±0.2
Red onion	89.47±0.3	77.46±0.09	44.81±0.1	0.3±0.001	1.28±0.02
Alfalfa	87.92±0.2	42.34±0.05	29.65±0.3	2.55±0.02	3.04±0.03

Total Phenolic Polyphenol content is close at the 3 types of sprouts, and has values between 87.92 mg% for alfalfa and 89,47mg % for red onion. differences being insignificant.

Flavonoid content – the highest content of flavonoids was in red onion and the lowest in fenugreek sprouts.

Vitamin C – the red onion has the highest content of vitamin C followed by fenugreek. The high level of flavonoid in red onion was mentioned by Lee SU et al., 2008.

Peroxidase activity – in the studied samples peroxidase has the highest activity in case of fenugreek, 12.7 times higher than in red onion and 2.5 times higher than in alfalfa sprouts.

Protein content – was significantly higher in fenugreek sprouts: 17.9 times higher than in red onion and 7.5 than in alfalafa sprouts.
Similar results regarding the content of polyphenolic compounds and flavonoids, in Fenugreek and alfalfa sprouts have been reported by Randhir et al, 2004; Zincă et al, 2013.

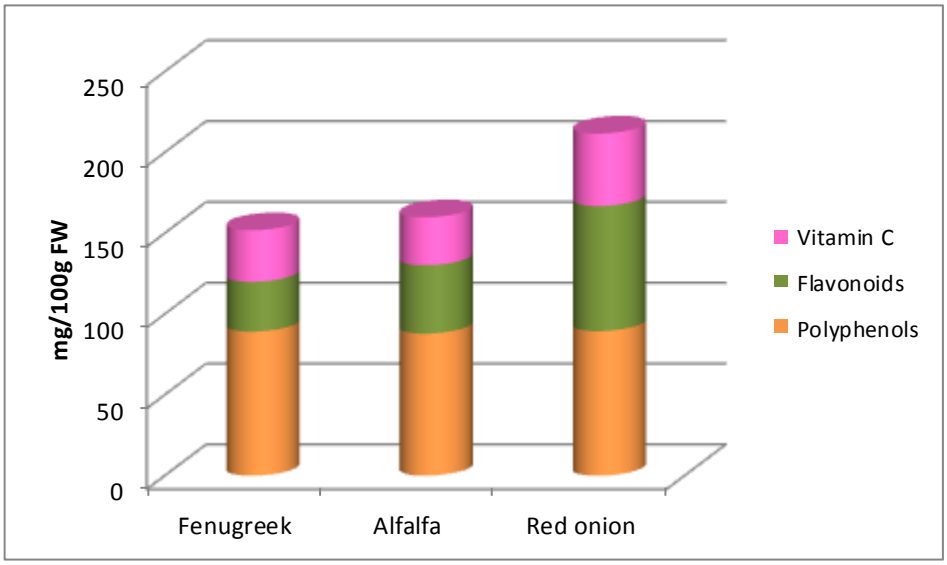

Fig. 1. Graphical representation of content in antioxidant compounds

CONCLUSIONS

Analyzing the results obtained for the studied samples it can be concluded:

- All the sprouts samples analyzed have a high content of antioxidant compounds: polyphenols, flavonoids and vitamin C;
- Fenugreek and onions sprouts have similar content in polyphenols, but red onion sprouts had the highest content of flavonoids and vitamin C;
- Fenugreek sprouts are a good source of vegetable protein and antioxidant enzymes;
- The use of sprouts in the diet can improve the health of the body. These products can be added to salads and in some cooked foods but after the heat treatment.

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