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## HERBS AND SPICES AS IMPORTANT SOURCE OF ANTIOXIDANT AND PHENOLIC CONTENT IN BLACK RADISH DRESSING

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**Abstract.** Taking into account the new requirements in food stuff behavior to improve the quality of products by creating products rich in biologically active compounds with real benefits for the health of consumers, the main direction of the investigations was focused on the use of black radish juice in the form of salad dressing in addition with herbs and spices like Peppermint and Herbs de Provence, a herb mixture contain savory, marjoram, rosemary, thyme, and oregano. This study aimed to achieve an innovative dressing obtained in two prototypes by the same production method, one flavored with 1% Peppermint and the second flavored with 1% *Herbs de Provence*. The recipe was optimized in order to adjust the radish juice to the right sugar content by concentrated and sweetened with honey. The chemical assessment consisted of both the analysis on the raw material, as well as on the final product. Common physicochemical methods were applied for the dry matter, ash content, total acidity, vitamin C content and sugar content. Total phenolic and antioxidant activity were assessed by using Folin Ciocalteau method, and DPPH method, on final product. According to the study, it was found that the use of black radish juice in obtaining dressing for salads has been demonstrated, and from a sensory point of view the flavor dressing prototype with 1% *Herbs de Provence* was better accepted by consumers, according to the general hedonic score and had a higher content of biologically active compounds.

**Keywords:** *Black radish, salad dressing, honey, functional food, sensory analysis.*

### Introduction

According to the literature, black radish juice (*Raphanus sativus* L. var. *Niger*) has been shown to lower plasma cholesterol levels and to dissolve gallstones in mice. Glucosinolates, the main secondary

radionuclide metabolites, have already demonstrated antioxidant properties and their ability to lower liver cholesterol (bile lithiasis). This disease is considered a current public health problem. (Blažević, J. et. al., 2009)

Dressings are viscous or liquid consistency preparations used in the preparation of salads. They have the role of improving the taste, organoleptic properties and appetite growth, stimulating gastric secretion due to the ingredients in the composition and relieving digestion, increasing the nutritional value of the preparation of the components. Alginic acid known as stabilizers of food systems (dressings, mayonnaise, ice cream, fruit concentrates, beer), gelling agent (jelly, pudding, glaze). They are substances without toxicity. It was not considered necessary to establish an acceptable daily intake for alginic acid and most alginates, except for propylene glycol alginate for which the acceptable daily intake is 0-25 mg / kg GV. (Juan-Mei Li et. al., 2016). Studies on the medicinal properties of herbs show the contribution of the phytochemical constituents, namely polyphenols. These are phytochemicals that are part of the vegetable kingdom and have antioxidant properties. (Salanta, L. C., 2014) Polyphenols help protect cells in the human body against free radicals that can lead to heart disease, Alzheimer's and even cancer. (Del Rio, D., 2010)

## **Materials and methods**

The materials used in this study are: black radish, honey, alginic acid, Herbs de Provence, Peppermint. These were purchased from specialized stores in Cluj-Napoca area. The recipe was optimized in order to adjust the radish juice to the right sugar content by concentrated with honey and alginic acid known as stabilizers of food systems (dressings). The radish were immediately washed, peeled and subjected to mechanical processing. The juice obtained is then passed into the concentration process and finally sweetened with honey and flavored with selective herbs and spices. The heating was made with caution to avoid the formation of hydroxymethylfurfural aldehyde, a compound considered harmful to health.

Total phenolic and antioxidant activity were assessed by using Folin Ciocalteu method, and DPPH method, on final product.

Total phenolic compounds content was determined, based on Folin-Ciocalteu method. For the extraction of phenols was used as solvent a solution methanol. Samples were left to macerate for 24 hours in a refrigerator with methanol then were vacuum filtered. After that the

collecting extract was concentrated at Rotavap true elimination of excess and then recovering in 10 ml MeOH.

A volume of 0.25 mL extract was mixed with 1.8 mL of water and 0.120 mL Folin–Ciocalteu reagent. After 5 minutes, 0.340 mL solution Na<sub>2</sub>CO<sub>3</sub> (7.5%) was added, and samples were filled. Samples were left to room temperature for 90 minutes before measuring the absorbance at 750 nm. A calibration curve was used for different concentration of gallic acid standard solutions ( $r = 0.999$ ) in order to quantify the phenolic content present in sample. Results were expressed as mg equiv. gallic acid/kg. All the analyses were done in triplicate and the mean values were considered.

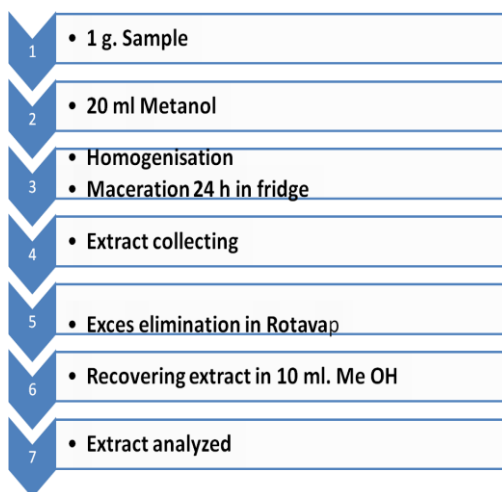


Fig. 1. Extraction of the samples - scheme

The DPPH scavenging activity assay was performed according to a method reported by Farcas *et al.* (2016). This method is based on the ability of stable free radicals of 2,2-diphenyl-1-picrylhydrazyl to react with hydrogen donors. A volume of 3.9 ml of DPPH freshly prepared solution in methanol was allowed to react with 100 µl aqueous extract at room temperature in a dark place. After 30 min, the absorbance was read at 515 nm against the blank (methanol). The antioxidant activity was calculated as follows:

% DPPH scavenging activity =  $[(A_{\text{DPPH}} - A_s) / A_{\text{DPPH}}] \cdot 100$ , where  $A_{\text{DPPH}}$  was the absorbance of 2,2-diphenyl-1-picrylhydrazyl solution, and  $A_s$  the absorbance in the presence of the sample.

The standard compounds (gallic acid, quercetin) and reagents: 2,2-diphenyl-1-picrylhydrazyl (DPPH), Folin-Ciocalteu, methanol, aluminium chloride, sodium carbonate, sodium nitrite and sodium hydroxide were purchased from Sigma Aldrich or Merck (Darmstadt, Germany).

## Results and discussions

From the physical and chemical point of view, the qualities of the black radish were highlighted by the comparative analysis of the results obtained with the literature. (Fig. 2)

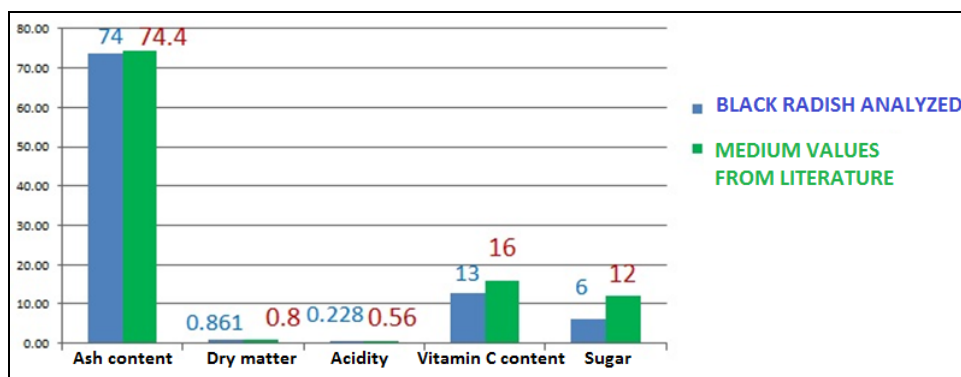


Fig. 2. Common physicochemical methods on black radish

Results on antioxidant capacity by DPPH method:

The results of antioxidant activity showed that the sample that had been flavored with Provence Herbs showed higher values of free radical capture activity (RSA), 26.51% DPPH, compared to mint flavored dressing and 21.17% DPPH. This can be explained by the fact that Provance Herbs are a traditional herbal mix consisting of savory, marjoram, rosemary, thyme, and oregano. The functional aspect of the mix used in culinary preparations is due to all the plants that make up it. Following the analysis of the results on the antioxidant potential of black radish dressing, it has been demonstrated that the antioxidant potential is directly proportional to the type of spice or flavoring used. (Table 1)

Table 1

Absorbance and percent inhibition values obtained from the analysis

Sample type	Absorbance	% DPPH
Dressing with <i>Peppermint</i>	0.458	21.17
Dressing with <i>Herbs de Provence</i>	0.427	26.51

Results on the determination of total polyphenols by the Folin Ciocalteu method:

Table 2

Absorbance and concentration values obtained from the analysis

Sample type	Absorbance	Concentration mg/ml	mg GAE/ 100g sample
Dressing with <i>Peppermint</i>	0.042	0.057016	54.73
Dressing with <i>Herbs de Provence</i>	0.049	0.066519	59.86

Based on the Table 2, as can be seen, an increase in total polyphenols in the Herbs de Provence dressing (59.86 mg GAE / 100 g product) compared to the peppermint dressing sample (54.73 mg GAE / 100 g product) due to the synergistic effect between the plant mix that this spice contains.

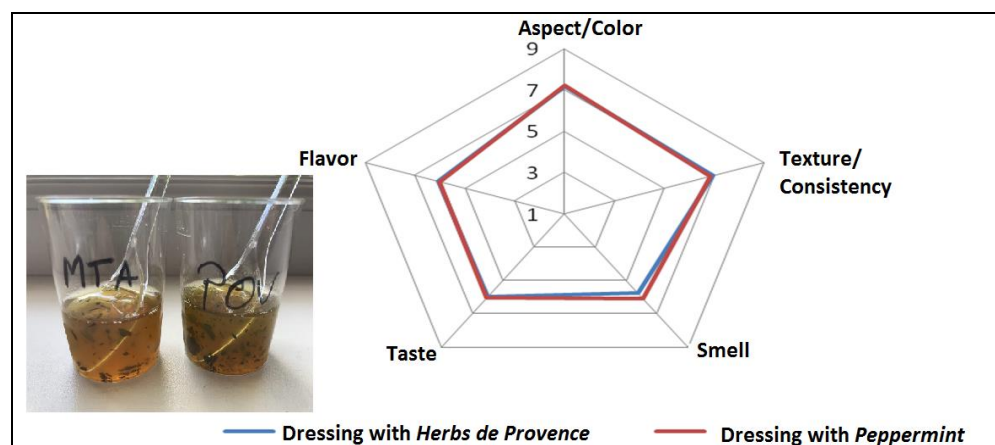


Fig. 3. Hedonic score on sensory characteristics

## Conclusions

The raw material used, the black radish, in order to obtain the aromatized dressing, corresponds to the physical-chemical quality parameters pursued. It has been found that flavored dressing with herbs of Provence has been preferred by consumers in terms of color, texture, taste, and flavor. In terms of antioxidant capacity and total polyphenol content evaluated by UV-VIS absorption spectrometry, it was found that flavored dressing with *Herbs de Provence* had higher values compared to *Peppermint* flavored dressing due to the plant complex that this spice contains (savory, marjoram, rosemary, thyme, and oregano).

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