

## Influence of Termic Treatment on *Armoracia Rusticana* Roots and Leaves, Total Polyphenols Content

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### Abstract

The studies were conducted on Romanian horseradish originated from three domestic farms, located in the plains, hills and mountain areas. The localization of the horseradish plant as well as processing and temperature treatment seems to have a big effect on total polyphenols content (TPPC) of roots and leaves. The modifications of TPPC are due to the increasing and decreasing of temperature and they maintain the same profile irrespective of the locations

### Introduction

*Armoracia Rusticana* contains a complex mixture of polyphenols and presents a high total antioxidant activity, confirmed also by the experimental studies.

Polyphenols are chemical compounds with more than one aromatic hydroxyl group on the aromatic ring inserted. Due to this structure, the redox properties, can be oxidized by the Folin Ciocalteu which form a blue coloration with maximum absorption at 750 nm [5].

“Phenolic composition of plants is affected by different factors –variety, genotype, climate, harvest time, storage, processing, and treatment” (Marrelli et al., 2012, cited by Tomson L. and Zanda K., 2014) [4,8].

### Experimental

The studies were conducted on Romanian horseradish originating from three domestic farms, located in the plains, hills and mountain areas [2] from where the samples were freshly harvested. The study was carried out in our laboratory (Environmental Research Test Laboratory, All samples were separated and rinsed in distilled water to remove potential impurities. The samples were washed with double distilled water and spread on clean plastic trays to allow the water to drain off.

Drying of leaf samples was performed in a vacuum oven at 60 °C for 36 hours and for the roots samples 48 hours. After drying, the samples were ground in a special mill plant. The freezing of samples were done at a temperature of -20 C°. The alcoholic extracts were obtained from the roots and leaves dried in the oven and the sample frozen in the freezer. and fresh roots and leaves were used as control batch.

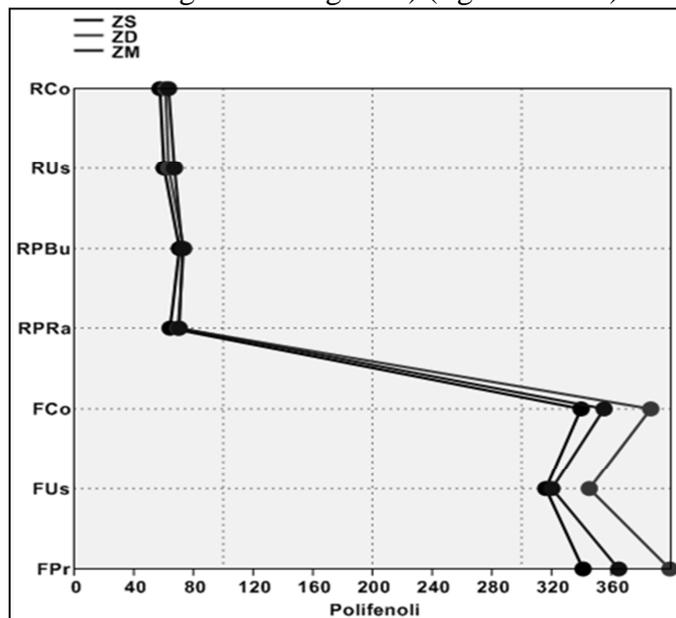
The total phenolic content (TPPC) of the plant extracts was determined according to the Folin -Ciocalteu spectrophotometric method. The absorbance was measured at 750 nm and total phenols were expressed as the gallic acid equivalents (GAE) 100 g<sup>-1</sup> fresh weight (FW) of plant material. To determine the total polyphenolic content, the alcoholic extracts were diluted 1:10. 0.5 mL alcoholic extract were mixed with 2.5 ml of Folin and Ciocalteu 1:10 solution and 2 mL 7.5% sodium carbonate solution.

All reagents used in the present study were of analytical grades and double distilled water was used throughout the analyses.

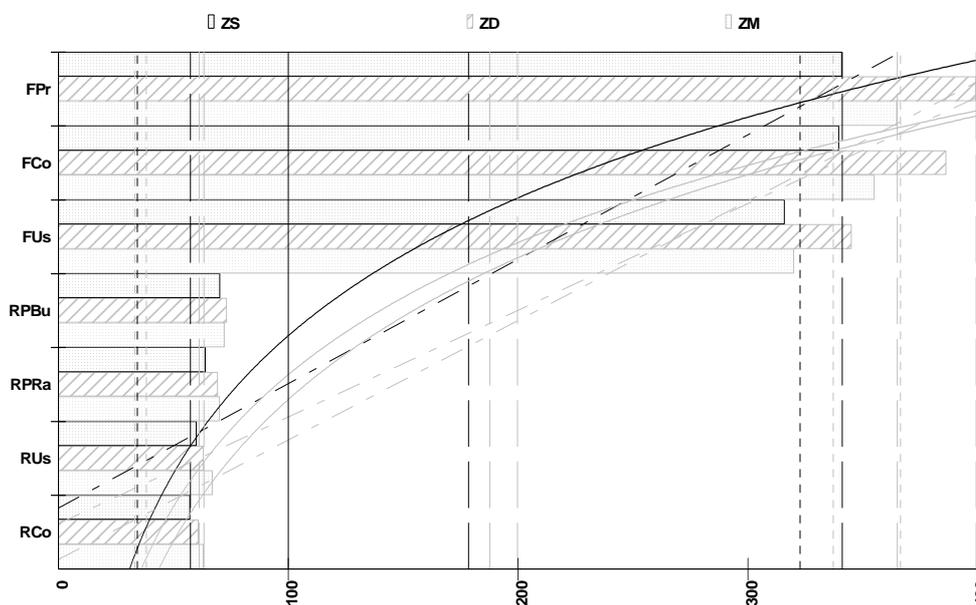
The data were statistically analyzed and graphically represented using PAST software [3].

**Results and discussion**

The roots present 5 times less TPPC (57.49 - 73.42 mg GAE 100g<sup>-1</sup>FW) compared to the leaves content (316.12 - 399.28 mg GAE 100g<sup>-1</sup>FW) (figure1 and 2).



**Figure 1.** Horseradish Polyphenols concentrations based on the area of origin of samples  
 Legend: FPr = Fresh horseradish leafs; FUs = Dry horseradish leafs; FCo = Frozen leafs;  
 RPRa = Grated horseradish; RPBu = Horseradish pieces; ZS = plain area; ZD = hills area;  
 MA = mountain area



**Figure 2.** Horseradish roots and leaves TPPC profiles evolution  
 Legend: FPr = Fresh horseradish leafs; FUs = Dry horseradish leafs; FCo = Frozen leafs;  
 RPRa = Grated horseradish; RPBu = Horseradish pieces; ZS = plain area; ZD = hills area;  
 MA = mountain area

Higher content of TPPC in horseradish leaves compared to roots is confirmed by other scientific studies (Calabrone L. et al, 2015, Tomsone L. et al, 2010), [1, 6].

The horseradish leaves show the highest variation in polyphenol content compared to the roots content. The highest TPPC (figure 1), irrespective of the preserving method show the horseradish samples collected from the hills area (fresh: 399.28 mg GAE 100g<sup>-1</sup>FW; dry: 345.27 mg GAE 100g<sup>-1</sup>FW; frozen: 386.50 mg GAE 100g<sup>-1</sup>FW).

In the case of horseradish roots preparation, grated horseradish presents less TPPC compared to horseradish sliced in small pieces (figure 1 and 2), which is confirmed by (Marrelli et al., 2012)[4, 7].

### **Conclusion**

The modifications of TPPC are due to the increasing and decreasing of temperature and they maintain the same profile irrespective of the locations of the plant.

After the analysis it is concluded that the best method for preserving TPPC of horseradish leaves is by freezing and for the roots by drying. At the same time we could observe that different environmental conditions of the plants locations affect TPPC significantly.

The highest content of polyphenolic compounds was in horseradish leaves extracts, and these extracts could be incorporated in foods especially meat products.

### **References**

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