PROFILE OF MINERAL COMPOUNDS FROM GINGER *(ZINGIBER OFFICINALE)*

PIRVULESCU LUMINITA[1], BORDEAN DESPINA MARIA[2], POPESCU IULIANA[3], SIRBULESCU CLAUDIA[1], DRAGHICI GEORGE[2]

[1]Banat's University of Agriculture Sciences and Veterinary Medicine Timisoara, Faculty of Agricultural Management
[2]Banat's University of Agriculture Sciences and Veterinary Medicine Timisoara, Faculty of Technology Agricultural Products
[3]Banat's University of Agriculture Sciences and Veterinary Medicine Timisoara, Faculty of Agriculture

Abstract: *The goal of paper was a study regarding the determination of physical and chemical properties for fresh ginger, a spice herb much used in various cooked stuff.*

Key words*: ginger, dehydration, mineral content, cooked stuff.*

INTRODUCTION

Ginger, native from India and China, is a subtropical plant with a rich mineral content, vitamins and essential oils in the root.

Ginger is a spice strong condimented with a spicy flavor. The best variety is the Asian one with lighter peel.

Ginger is widely used in oriental cuisines. It is perhaps the most popular spice, being used in sauces, soups and main dishes, desserts and beverages. It is also an ingredient that balances and completes the food and dishes such as vegetables, seafood, white meat and fruits. Due to astringent and spices taste, it is very appropiate in cold cooked stuff, perfecting so many dishes tastes.

For sauces and side dishes, ginger is best used chopped and stewed. Cuts of 1 cm can be used in cooked dishes such as soups and dishes of beef.

Ginger is a healthy ingredient, having many benefits frequently used. It is an herb with many therapeutic properties, especially in combating respiratory and circulatory deseases (due to the rich content of potassium and sodium). It is refreshing, vasodilator, anti-asthmatic and gastroprotective effects.

MATERIALS AND METHODS

The ginger samples minerals were analyzed after dry burning of 10 g vegetal material in quartz capsules at 650^{o}C, for 4 hours. After complete burning a 0.5 N nitric acid solution was added up to 50 mL. The obtained solutions were used for total minerals contents determination by flame atomic absorption spectrometry (F-AAS) with high-resolution continuum source.

The standard solutions (1000 mg/L) were analytical grade from Riedel de Haen (Germany). The nitric acid 65% solution used was of ultra pure grade (Merck, Germany). All solutions were prepared using deionised water.

Analysis of heavy metals was made with ContrAA-300, Analytik-Jena device, by flame atomic absorption spectrometry (FASS) in air/acetylene flame.

RESEARCH RESULTS

According to the dehydration chart the stability of a product is increasing after removing 58% of the free water, which means 20 minutes termogravimetric dehydration at 110 °C (Fig 1).

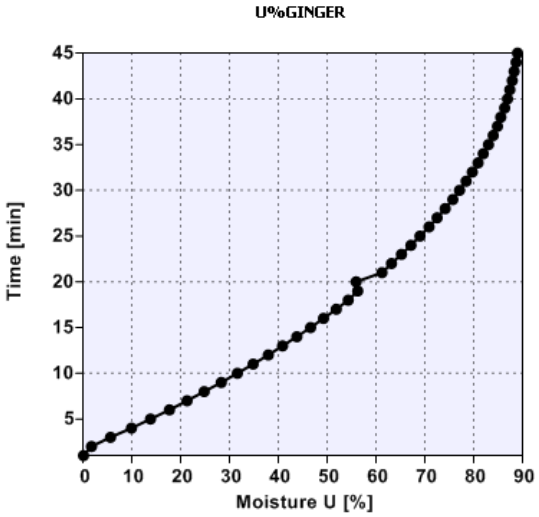

Figure 1. Ginger roots dehydration chart

The cluster analysis is also showing that after 19 minutes the stability of a dry ginger sample increases (fig 2).

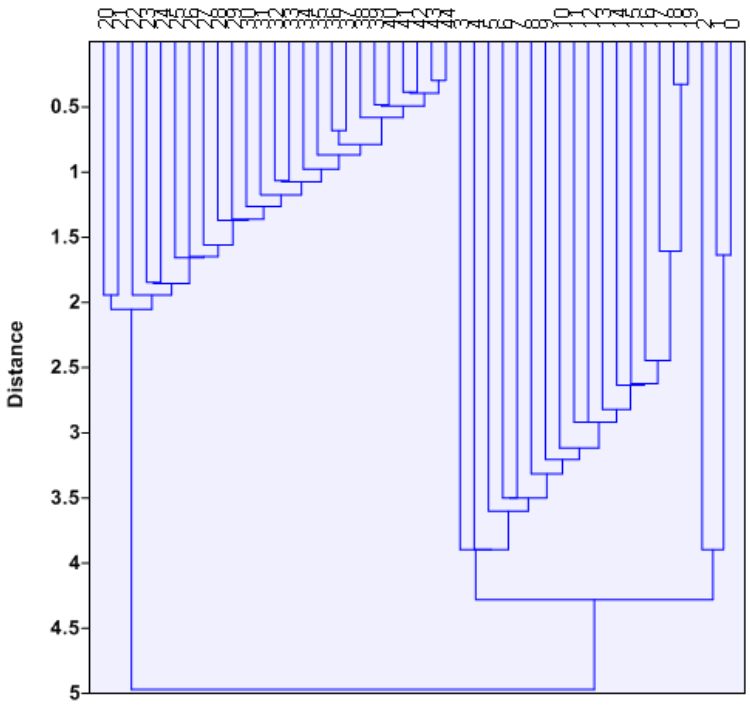

Figure 2. Graphical representation of the dehydration process clusters

By applying cluster analysis using single linkage algorithm and Euclidean similarity measure the data are grouped in 2 main clusters. First cluster is grouping the data for 19 minutes dehydration time, while the second cluster groups for the time period (20 – 44) minutes, while the correlation coefficient is 0,7305.

Results regarding metal ions from ginger, obtain by by flame atomic absorption spectrometry (F-AAS) are presented in table no. 1 and figure no. 3.

Table 1

Moisture [%]	Zn [ppm]	Cu [ppm]	Fe [ppm]	Mn [ppm]	Cd [ppm]	Pb [ppm]	Ni [ppm]	Mg [ppm]	Ca [ppm]	Na [ppm]	K [ppm]
88,95464	13,93	3,058	34,5	7,437	0	0,062	0,036	663,25	1031	1908,75	2442,75

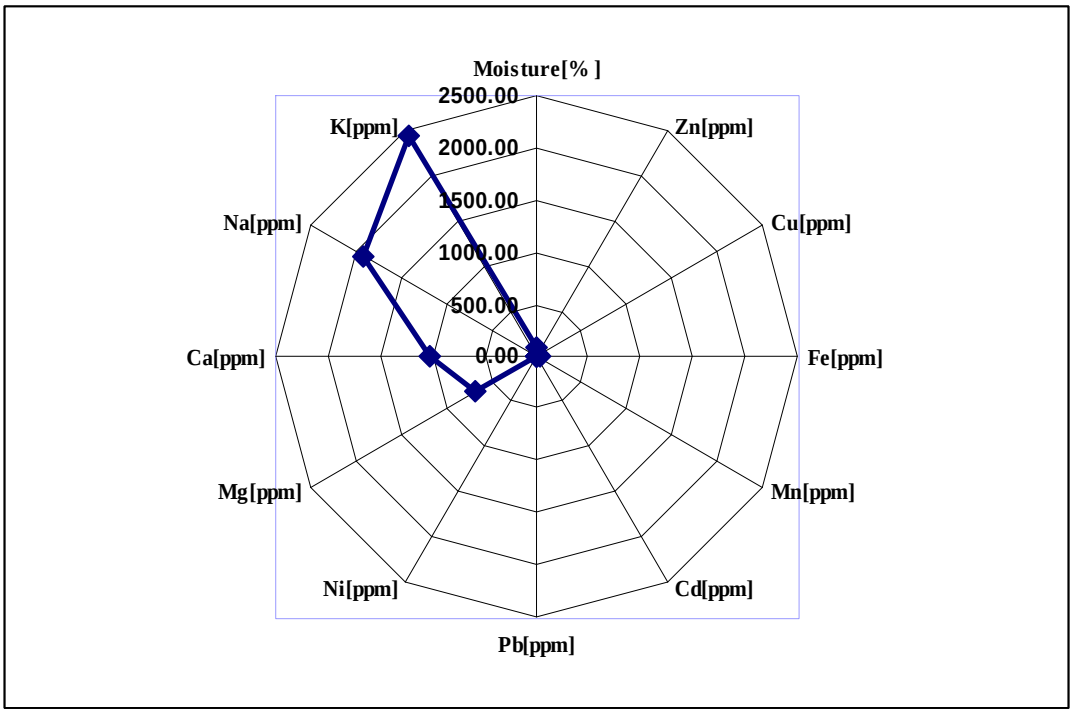

Figure 3. Star representation of minerals distribution in ginger roots

The mineral content recommended ginger roots for high content in K (2442.75 gKg^{-1}), Ca (1031 gKg^{-1}) and Mg (663.25 gKg^{-1}).

Statistical analysis was performed using PAST software, which runs on standard Windows computers and is available free online.

CONCLUSIONS

The stability of ginger sample increase after removing 58% of the free water.

By applying cluster analysis using single linkage algorithm and Euclidean similarity measure the data are grouped in 2 main clusters. First cluster is grouping the data for 19 minutes dehydration time, while the second cluster groups for the time period (20 – 44) minutes, while the correlation coefficient is 0,7305.

High content in potassium, calcium and magnesium recommended ginger roots for frequently using in cooked stuff.

REFERENCES

1. Dicționarul plantelor de leac., Ed. a 2-a, rev., (2008), Editura Călin, București; pag. 55.

2. Haniadka, R; Saldanha, E; Sunita, V; Palatty, P. L.; Fayad, R; Baliga, M. S. (2013). "A review of the gastroprotective effects of ginger (Zingiber officinale Roscoe)". *Food & Function* **4** (6): 845–55.

3. Hammer, Ø., Harper, D.A.T., Ryan, P.D. (2001) PAST: Paleontological statistics software package for education and data analysis. Palaeontologia Electronica 4(1): 9pp. http://palaeo-electronica.org/2001_1/past/issue1_01.htm

4. McGee, Harold (2004), On Food and Cooking: The Science and Lore of the Kitchen (2nd ed.). New York: Scribner. pp. 425–426.