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Cherries as a source of iron, copper and zinc

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Abstract The purpose of this paper is to determine the Fe, Cu and Zn contents in 21 analyzed cherry samples. The cherries come from 5 locations in Caras Severin County as well as from the supermarket. Fe, Cu and Zn are considered essential for the proper development of physiological processes in both plants and animals, including humans. In each case, the required dose is different. The determinations were performed by the FAAS method. The average values for Fe and Zn are in the literature but their distribution is uneven by location. The highest values were identified in cherries from Moldova Nouă, an area recognized as having pollution problems due to tailings dumps from mining. The lowest values were identified in the supermarket samples. As expected, the concentration of copper in cherries from Moldova Nouă exceeds both, the average value and the maximum allowed limit. In the samples from the other locations, the concentration of this essential metal is within normal limits, according to the data in the literature.

Key words

essential microelements, pollution, provenience

Cherries are especially appreciated for their aroma, taste, color but also for their nutritional intake. Like most fruits, they are a main source of carbohydrates (6.85 - 16.80%), vitamins, phenolic and carotenoid compounds, represented mainly by the substances that give them color and flavor as well as water and minerals [4]. These microelements are considered essential for the proper development of physiological processes in both plants and animals, including humans. In each case, the required dose is of course different. Of these, Cu can also show toxic action if it exceeds certain limits, so that the Romanian legislation in accordance with the European one imposed the limit of 5 ppm or 5 mg / kg for its presence in fruits [17].

Minerals are part of human daily nutrition and are just as necessary as carbohydrates, proteins and lipids. Of the 10 metallic minerals (K, Mg, Ca, Fe, Cu, Co, Zn, Na, Mn, Mo) and 6 non-metallic ones (Si, P, S, Cl, I, F) most are also found in fruits [2, 15]. Due to their appreciable content in mineral substances and water, fruits (along with vegetables) have an important role in self-regulation of acid-base balance (acid-base homeostasis), ie the regulation of pH in all human tissues [3, 10, 18, 19]. As can be seen from the data presented above, cherries contain significant amounts of minerals, vitamins B1, B2, PP and C, polyphenols represented by red anthocyanin dyes [16, 18, 19].

Material and Method

The cherries come from 5 locations in Caras Severin County (Buchin Area, Armeniş Area, Luncaviţa Area Mehadica Area, Moldova Nouă Area), as well as from the supermarkets (Caransebeş).

We had 21 samples of cherries, 15 samples collected from the above mentioned locations (three from each location) and 6 samples from supermarkets (3 of Romanian origin and 3 of Spanish origin).

The determinations were performed by the FAAS method, based on the protocol described by Gogoasa, 2015 [12].

To view the sampling locations see figure 1.

Fig. 1. Cherry sampling locations [20]

Results and Discussions

The contents of these 3 essential metals, in the samples of cherries analyzed are presented graphically in figures 2, 3 and 4.

Fe and Zn are not considered toxic metals even in higher doses while Cu, given the importance of the limit values, which if they exceed 5 ppm can produce toxicity at a higher consumption.

The mean values for Fe and Zn are in the data in the literature [1, 9, 11, 14] but their distribution is uneven, by location.

The highest values of iron (7.2 ppm), copper (8.4 ppm) and zinc (5.66 ppm) were identified in cherries from Moldova Nouă, an area recognized as having pollution problems due to tailings dumps from mining [13].

The lowest values of microelements were identified in the samples from supermarkets: iron in Romanian cherries (3.56 ppm), copper in Spanish cherries (0.32 ppm) and zinc in Romanian cherries (0.78 ppm).

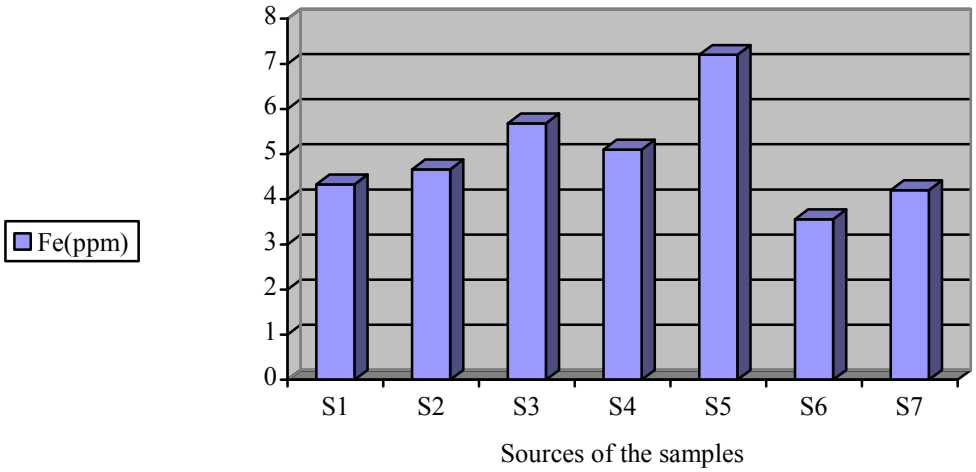

Fig. 2. Variation in Fe content (mg / kg or ppm) in cherries

Legend: 1-Buchin Area;2-Armeniş Area; 3-Luncaviţa Area; 4-Mehadica Area; 5-Moldova Nouă Area; 6- Romanian cherries from supermarkets; 7- Spanish cherries from supermarkets.

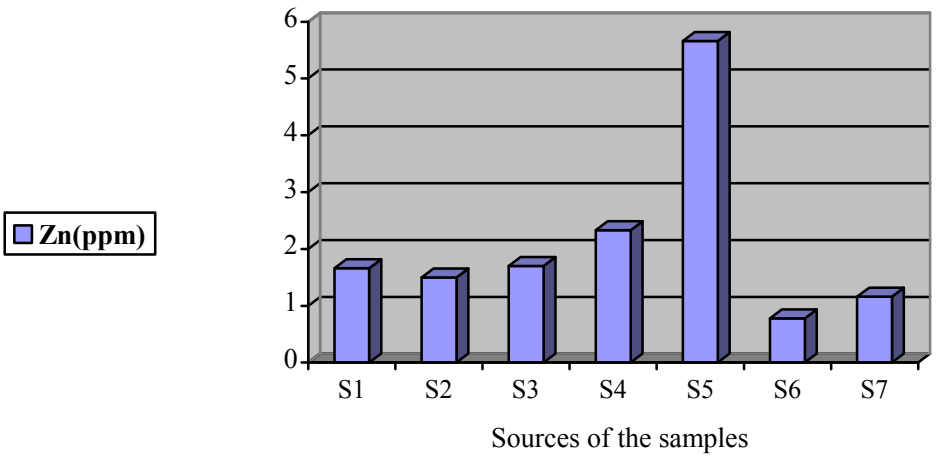

Fig. 3. Variation in Zn content (mg / kg or ppm) in cherries

Legend: 1-Buchin Area;2-Armeniş Area; 3-Luncaviţa Area; 4-Mehadica Area; 5-Moldova Nouă Area; 6- Romanian cherries from supermarkets; 7- Spanish cherries from supermarkets.

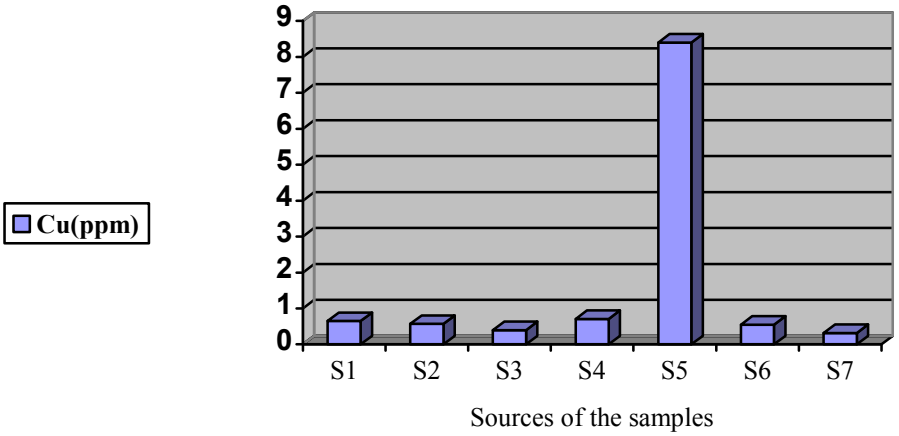

Fig. 4. Variation in Cu content (mg / kg or ppm) in cherries

Legend: 1-Buchin Area;2-Armeniş Area; 3-Luncaviţa Area; 4-Mehadica Area; 5-Moldova Nouă Area; 6- Romanian cherries from supermarkets; 7- Spanish cherries from supermarkets.

As expected, the concentration of copper in cherries from Moldova Nouă exceeds both the average value (1,79 ppm) and the maximum allowed limit which is 5 ppm [17].
In the samples from the other locations, the concentration of this essential metal is within normal limits, according to the data in the literature [9, 11].

Conclusions

Fe and Zn are not considered toxic metals even in higher doses while Cu, given the importance of the limit values, which if they exceed 5 ppm can produce toxicity at a higher consumption.
The average values for Fe and Zn are in the literature but their distribution is uneven by location.
The highest values of iron (7.2 ppm), copper (8.4 ppm) and zinc (5.66 ppm) were identified in cherries from Moldova Nouă. The lowest values of microelements were identified in the samples from supermarkets: iron in Romanian cherries (3.56 ppm), copper in Spanish cherries (0.32 ppm) and zinc in Romanian cherries (0.78 ppm).

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