

## SOME ASPECTS REGARDING THE QUALITY OF THE WATER FROM GÎRDANI AND FĂRÇAȘA (MARAMUREȘ COUNTY, ROMANIA)

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### ABSTRACT

The paper presents a study on water and soil quality in the area of Fărcașa and Gîrdani localities, Maramureș county with emphasis on water quality parameters that are beneficial for human health. According to the current Romanian standards, the following characteristics have been measured: pH, alkalinity, conductivity, hardness, oxidation degree, colour and turbidity, as well as the contents of ammonium, Ca, chlorides, Fe, Mg, nitrates and nitrites. The mineralogical composition was defined for the soil samples. As compared to the standard values, the samples from Fărcașa and Girdani (Maramureș county) prove a high quality of the water.

**Key words:** water quality, index and chemical parameters, X-ray analysis, Fărcașa (Maramureș county)

### INTRODUCTION

Water is one of the most important aliment which can not be replaced by anything else. The human being can not live without drinking water. In the same time water has a great effect on the human health. Thus, the quality of the water supply is one of the main aim of human society.

Some properties of the water must be controlled in order to define its quality.

**Hardness** of the water has a negative influence on the washing processes (including that of the human body) but, on the same time, as a protective factor has a positive influence on the cardiovascular pathology.

The performed studies revealed that the content of calcium (Ca), magnesium (Mg) and their compounds are controlling the water hardness (Pislarasu,1981).

The clinical studies indicate a positive effect of the calcium (Ca), magnesium (Mg), chromium (Cr), vanadium (V), manganese (Mn) and zinc (Zn) while sodium (Na), copper (Cu) and cobalt (Co) are responsible for the negative effects (<http://www.greenagenda.org>).

**Nitrates** are warm full only in high concentration which are rarely found in water. In fact only nitrites which results by reduction of nitrates are warm fully (generating a secondary toxicity of nitrates) in some cases: inside of human body or also in zinc galvanised pipes and reservoirs.

**Nitrites** (NO<sub>2</sub><sup>-</sup>) are resulting from nitrates generating the methamoglobinemia, which affect the young and some time also the adults (<http://www.greenagenda.org>). Nitrites are also incriminated for the gastric cancer, due to the generation of the nitrosamines formed in some conditions (“tertiary toxicity of nitrates”)

**Organic pollutants** from water are very diversified as a consequences of the permanent increasing of the synthetic substances in the industry. From the toxicity point of view only about 3,500 organic pollutants are relatively complete studied from which 600 are risky for human health (Burtica, 2002).

The underground water, as compared with surface water, is an important, less or unpolluted source, which can be easily used as drinking water, sometime only with minor /without disinfection ([http:// www.hydrop.pub.ro](http://www.hydrop.pub.ro) ).

**Turbidity** is controlled by the material suspensions in the water as clay, alluvial and organic/anorganic fine material, plancton and microorganisms. The turbidity of the water is also dangerous for human health due to the small particles which can act as a nutritive support for the germs.

**Colour** is due to the metallic ions, humic and fulvic acids as well as by the dissolved compounds of vegetal origin.

## MATERIALS AND METHODS

The present study was done on water and soil samples collected from Fărcașa and Gârdani area (Maramureș county). The total amount of analysed water samples is 4 litres collected from springs from both localities. Three samples of soil from the vicinity of springs were collected in order to establish the mineralogical composition

### Analytical methods

The water samples were analysed for:

- Turbidity (using a turbidimeter LP 2000);
- The amount of azotates, azotites, ammonium, iron and colour were determined using a molecular absorption spectrophotometer Hach 2000;
- Hardness, calcium and chlorides content as well as the oxidation degree were establish trough volumetric chemical methods;
- pH (using a Hanna pH-metre).

The mineralogical features of the soil samples were determined using X-Ray diffraction as described in the following methodology: the bulk samples with natural humidity were treated several days with hydrogen peroxide in order to remove the organic material, and to obtain a better dispersion. At the end of the reaction, after the removal of the excess hydrogen peroxide in a boiling water bath, the samples were treated 5 minutes in an ultrasonic device. Using distilled water, the < 63 μm fraction was sieved off, and than, by repeated centrifugation, the < 2 μm fraction was obtained. The dried samples were analyzed by XRD between 2°-70° 2θ using a Philips PW 1710 diffractometer equipped with Bragg-Brentano geometry, copper anticathode (45kV, 40 mA) and graphite monochromator.

## RESULTS AND DISCUSSION

The results and the main features of the analyzed water samples are presented in Table 1.

*Table 1. The features of water samples from Girdani and Fărcașa (Maramureș county) compared with standard values (CMA)*

Parameters/measure unit	CMA value	Gîrdani samples	Fărcașa samples
Alkalinity, mval/l	-	6.7	5,1
Ammonium, mg/l	0,5	sld	sld

Calcium, mg/l	100	104.24	72,94
Conductivity, $\mu$ S	2500	420	420
Chlorides, mg/l	250	6.73	6,73
Colour, unit. of colour	Acceptable and unmodified	Acceptable and unmodified	Acceptable and unmodified
Hardness, g	Min. 5	15.93	15,93
Iron, mg/l	0,2	0	0
pH	6,5 – 9,5	7.6	7,2
Magnesium, mg/l	50	18.24	24
Oxidation degree	5	1.11	0,79
Nitrates, mg/l	50	udl	udl
Nitrites, mg/l	0,5	udl	udl
Turbidity, UNT	< 1	0.98	0

The turbidity values < 1 as well as the features of the water under detection limit (udl) for ammonium, nitrates, nitrites and iron indicate unpolluted water, without material in suspension, microorganisms and organic compounds. The high content of calcium and magnesium suggest the positive influence of the water in cardiovascular pathology.

The X-Ray diffraction pattern (Fig 1) indicates the following mineralogical features of the soil samples:

- the presence of clay minerals (illite and chlorite), accompanied by muscovite and quartz.
- The clay minerals are considered to have remarkable qualities according to “filtration” / “absorption” / “decantation” of the different chemical compounds. Any way there must be also some other reasons responsible for the quality of the Gîrdani and Fărcașa water (Maramures county).

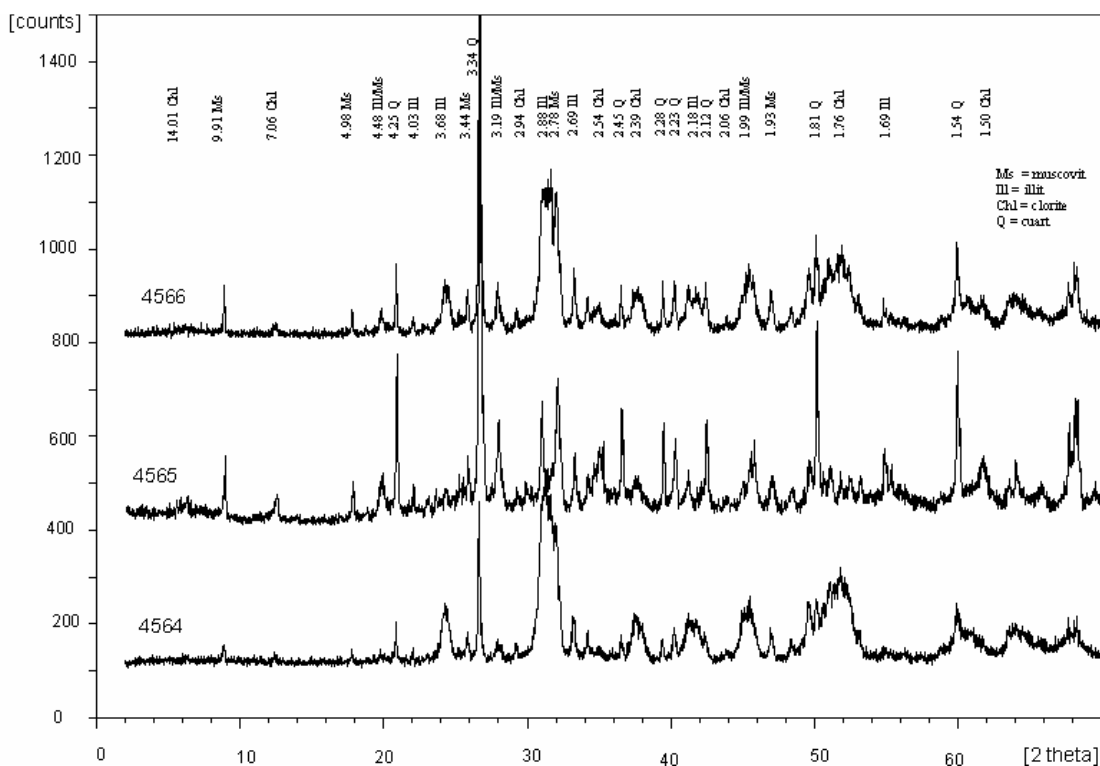


Fig. 1 X-Ray diffraction patterns of the analyzed soil samples

## CONCLUSION

The present study was done on spring water from two localities located in the same alignment in order to check out its quality. The chemical features of the water samples as well as the mineralogy of the soil from spring vicinity reveals values very close to the standard ones. Such characteristics suggest a possible source of drinking water for the localities in the area.

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\*\*\* 458/2002 legislation regarding the drinkable water quality;  
\*\*\*Directive 98/83/EC.