DETERMINATION OF ORGANOLEPTIC, PHYSICAL AND CHEMICAL INDICATORS OF EXISTING IN THE FOUNTAINS, WELLS AND SPRINGS

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ABSTRACT

In this article, the authors refers on the conducted study in Cernătești common, Țiu village from Dolj county, on the drinking water quality existing from local sources (fountains, wells and springs).

Regarding to the quality of collected samples from the ten locations as samples for analysis, following: the determination of the color, the determinations of taste and smell, the determination of pH, the determination of phosphates, nitrates and nitrites.

The determinations were conducted in the faculty lab using methods and adequate equipment. In the end, were established the causes which lead at the obtained result and were developed a succession of conclusions and recommendations.

INTRODUCTION

Water has been and remains indispensable to life, no matter how it is found and used. Because water forms one of the Earth's shells, under the name of a hydrosphere, being continuously found in motion and transformation.

The most important form of water accessible to mankind is drinking water.

Drinking water means water intended for human consumption, whether natural or after treatment, used for drinking, food preparation or other domestic purposes, irrespective of its origin and mode of supply, and water used in the food industry for the manufacture, processing, preservation or marketing of products intended for human consumption (https://ro.wikipedia).

This work refers to the artificially extracted water from wells and fountains, but also from natural springs.

Because the substance content in drinking water is different being influenced by several natural or artificial factors with major changes in the taste, the smell of water.

The human body cannot exist without water, influencing the metabolism inside the body and helping digest the food.

The human body needs healthy water without impurities of a chemical nature, without dangerous bacteria or too much salt.

Because in rural areas, wells and wells are the only source of drinking water for locals and they are fed with groundwater unpurified or filtered, they are true sources of illnesses and dangers to human health according to its use, water must meet certain quality requirements for drinking water and are listed in (STAS 1342-61).

MATERIAL AND METHOD

The drinking water supply for the inhabitants of Cernatesti common, Tiu village from Dolj county, is made from several wells and fountains existing within the commune, and this is a hill settlement, the quality of the water is influenced by the agricultural works that are carried out in the area, the soil erosion and in particular the drilling depths of the wells and wells, and the water abstraction possibilities.

For these studies, samples were taken from ten different locations at the same time, respectively on august 18, 2018, determining the following:

I. Organoleptic indicators: taste and smell

II. Physical and chemical indicators: pH, color, turbidity, water hardness

III. Chemical indicators: ammonium, chlorides, ox disability, nitrites

Water samples were harvested in glass bottles with rolled plug or in petri dishes that were immediately transferred to 1 liter glass containers, all of which were determined in the agrochemical laboratory of the faculty.

The methods and devices used are the laboratory ones, where it was determined:

Determination of taste and odor was done in the laboratory at a temperature of 20^0C, where notes were given according to the smell intensity, and conventional names were used for taste.

Color was performed by visual comparisons on a colorimetric scale, expressed in color degrees.

To determine the pH, a pH meter was used and worked using the electrometric method using a glass electrode. To calibrate the apparatus, we used a known pH buffer, and the electrodes were inserted directly into the water to be analyzed, automatically reading the pH on the screen.

Water hardness is the content of calcium and magnesium ions corresponding to the content of calcium and magnesium bicarbonates in water (Posea Paula, Cojocaru Ileana et al., 2005).

It is expressed in degrees of hardness.

Turbidity is achieved with the turbidimeter by the Tyndall effect, where the cloudy water becomes clear and the separation of the suspensions is done by laboratory methods.

Determination of oxidation (CCO) was achieved by oxidation of organic substances in water with $KMnO_4$ in acidic and hot media. Nitrites were determined by molecular absorption spectrometry.

Determination of chlorides was performed using the Mohr method, using the calculation formula:

$$mg_{Cl^-}/l = v \cdot f \cdot T_{Cl^-} \cdot 1000 : vp \quad (1)$$

where:

T_{Cl^-} =mgCl/1 ml silver nitrate solution 0, 1 n=3,55 mg $Cl^-/ml AgNO_3$;

vp= water to be analyzed;

v= the volume of titrant consumed;

f= known factor.

RESULTS AND DISCUSSIONS

The results obtained from the analyzes carried out for the 10 samples of water harvested in the village of Tiu, Cernatesti commune in Dolj county, regarding the organoleptic indicators are taste and smell, presented in table 1.

Table 1

Results of organoleptic and 10 water samples

Sample no.	The origin of the water sample	Depth	Location	Organoleptic indicator: taste	Organoleptic indicator: smell
1	Fountain with bucket	24 m	Tiu	Acceptable to consumers	odorless
2	Fountain with bucket	20 m	Tiu	Acceptable to consumers	odorless
3	spring	Under ground	Cernatesti	No perceptible changes	odorless
4	spring	Under ground	Cernatesti	No perceptible changes	odorless
5	hive	Under ground	Tiu	Very weak	odorless
6	spring	Under ground	Cernatesti	Acceptable to consumers	odorless
7	spring	Under ground	Cernatesti	Acceptable to consumers	odorless
8	spring	Under ground	Cernatesti	No perceptible changes	odorless
9	Pucked	48 m	Tiu	Acceptable to consumers	odorless
10	Pucked	35 m	Tiu	Acceptable to consumers	odorless

Source: authors

After analyzes, samples 1, 2, 6, 9 and 10 were the most conclusive and in sample 5 a very poor soil taste was observed, namely the surface water source and the direct contact with the soil around hive. Samples 8, 4 and 3 are springs with underground water, where the water does not exhibit perceptible changes.







Source: authors

Harvesting water from the 10 different locations

The presence of particulate matter was more pronounced in samples 1 and 6, where the value found was 21 and 10, 8 respectively, compared to the admissible limit that is 5. Also the samples taken: 4, 5,10,8 have values over the limit, but samples 2, 3, 7, 9 were within normal limits.

From the hardness analyzes, no sample was within the normal range, and samples 2, 7 and 8 had the highest values, leading to the conclusion that there are excess potassium and calcium salts in the table 2.

Table 2

Determination of turbidity and hardness of analyzed samples

Sample no.	The origin of the water sample	Determination of turbidity [NTU]	Standar turbidity value [NTU]	Determination of hardness [German degrees] minimum	Type of water	Standard hardness value [NTU]
1	Fountain with bucket	24	5	28	Hard	5,00
2	Fountain with bucket	4,72	5	47	Hard	5,00
3	spring	1,7	5	27,53	Hard	5,00
4	spring	6,9	5	10,2	Middle	5,00
5	hive	8,1	5	34	Hard	5,00
6	spring	11,8	5	25,9	Hard	5,00
7	spring	2,5	5	34,7	Hard	5,00
8	spring	7,8	5	34,7	Hard	5,00
9	Pucked	3,7	5	26,8	Hard	5,00
10	Pucked	7,9	5	27,5	Hard	5,00

Source: authors

Table 3

Determination of ammonium, chlorides and nitrites in analyzed samples

Sample no.	The origin of the water sample	Ammonium [mg/l]		Chloride [mg/l]		Nitrite [mg/l]	
		Determined	Accepted	Determined	Accepted	Determined	Accepted
1	Fountain with bucket	0,071	0,50	85,89	250	Undetectable	0,50
2	Fountain with bucket	Undetectable	0,50	62,40	250	Undetectable	0,50

3	spring	0,120	0,50	59,56	250	0,012	0,50
4	spring	23,87	0,50	9,93	250	Undetec table	0,50
5	hive	0,014	0,50	12,76	250	Undetec table	0,50
6	spring	Undetec table	0,50	17,02	250	Undetec table	0,50
7	spring	Undetec table	0,50	70,10	250	Undetec table	0,50
8	spring	0,217	0,50	14,19	250	Undetec table	0,50
9	Pucked	Undetec table	0,50	25,53	250	Undetec table	0,50
10	Pucked	0,48	0,50	17,10	250	Undetec table	0,50

Source: authors

Regarding the existence of chlorides in the analyzed samples, the determined values were within the allowed limits.

Determined nitrites were undetectable, except for sample 3 having a value of 0.25, this being not a hazard because the limit is 0.50.

In Table 4 are presented the results obtained for the determination of oxidisability where the low values of oxygen consumption in concentrations between 0.25-1.76 are very low and fall within the permissible limits.

Determination of pH in all water samples recorded values ranging from 7 to 7.6, falling to good drinking water consumption.

The color of the water was determined using the qualitative method, namely by comparing water samples to be analyzed with the color of the bidystiled water taken as a control, using vertical colorimetric tubes using a white background.

Table 4

Determination of oxidability and pH of analyzed samples

Sample no.	The origin of the water sample	Oxidability [mg/O_2/ l]		pH [pH units]		Color
		Determined	Accepted	Determined	Accepted	
1	Fountain with bucket	1,60	5,00	7,1	6,5-9,5	Acceptable
2	Fountain with bucket	1,52	5,00	7,2	6,5-9,5	Acceptable
3	spring	0,25	5,00	7,6	6,5-9,5	Acceptable
4	spring	1,76	5,00	7,0	6,5-9,5	Acceptable
5	hive	0,64	5,00	7,6	6,5-9,5	Acceptable
6	spring	0,48	5,00	7,4	6,5-9,5	Acceptable
7	spring	0,64	5,00	7,3	6,5-9,5	Acceptable
8	spring	0,56	5,00	7,0	6,5-9,5	Acceptable
9	Pucked	0,64	5,00	7,5	6,5-9,5	Acceptable
10	Pucked	0,48	5,00	7,1	6,5-9,5	Acceptable

Source: authors

CONCLUSIONS

Based on the researches we made, we obtained the results for the organoleptic determinations of the 10 samples of water, which were within the permissible limits.

The results obtained for turbidity determination were conclusive with positive values for samples 2, 7 and 8, and the rest of the samples were well above the allowed limit.

This result is also influenced by surface water abstraction in inadequate rooms or the use of leaking water pipes.
The hardness of the water in this area is very high, characterized by harsh waters, with the exception of the spring 4 which has a medium hardness type.
The physico-chemical results obtained at the other analyzed water samples were within the limits imposed by the legislation in force.

RECOMMENDATIONS

Informing the inhabitants of Greceşti village, Busu village about the quality of the existing waters for drinking from wells, fountains, springs and ponds.

Emergency measures to reduce unwanted effects on the hardness and turbidity of the waters in the area.
Identification of sources causing these undesirable water effects in terms of its quality.

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