

**THE IMPACT OF AGRICULTURE PRACTICED IN DAMBOVITA COUNTY ON THE
GROUNDWATER QUALITY**

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Abstract

This study contributes to creating an image overview on the current status of groundwater pollution in Dambovita County territory, as a result of the different methods and technologies practiced in agriculture, that cause pollution of water (surface and groundwater), soil/subsoil and air.

For cleaning up need to know the level of pollution. For this purpose, this research is aware of the new generation of specialists in the field of agriculture concerning the consequences of pollution, but finding for some remediation solutions.

Keywords: water pollution, groundwater, chemical fertilizers, pesticides

1. INTRODUCTION

In order to obtain large quantities of production/ha it performs inadequate fertilizations and plant protection for agricultural crops, what cause soil pollution and default of the groundwater from unsuitable fertilized agricultural areas.

Chemical fertilizers overdose is determined by the failure to take into account of the soil properties, the reserve of the available nutrients, and incorrect assessment for the specific consumption of plants for each nutrient in part, on the vegetative growth period.

2. MATERIALS AND METHODS

It was determined the content of nitrates in the water **using spectrometric method with 2,6-of dimethylphenol.**

Reagents and consumables

For analysis were used reagents of recognized analytical quality, and the distilled water.

Glacial acetic Acid 2,6-dimethylphenol, (solution 1,2g/l)

It is dissolve 1,2g ± 0,1g 2,6-dimethylphenol $(CH_3)_2C_6H_3OH$ in 1000ml ± 10ml acetic Acid

Store in glass container and is stable over time.

Blend Acid

In a glass bottle with capacity of 2000 ml mix carefully 500ml ± 5ml ortho-phosphoric acid (H_3PO_4) . Then is added 0,04g ± 0,005g aminosulphonic acid (NH_2SO_3H) stirring until its dissolution, store in a glass recipient with airtight stopper. The solution is stable over time.

Nitrate, reserve standard solution $\rho_N = 1000mg/L$

In a volumetric flask of 1000ml it is dissolve 7,218g ± 0,001g potassium nitrate (KNO_3) , dry at 105°C for 2h, in 750ml water. Make the volume up to the mark.

Nitrate, reserve standard solution $\rho_N = 100mg/L$

In a volumetric flask of 500ml pipette 50ml reserve solution. Make the volume up to the mark with water. The solution is kept in a glass bottle for up to two months. Only 1ml from this solution corresponds to the 0,1mg nitrogen from nitrate or 1ml solution corresponds to the 0,442mg NO_3^-

Apparatus

The Mass Spectrometer – allows you to make measurements of wavelength 324nm and is equipped with vats with optical path of 10mm (Fig. 1).

Laboratory glassware

- Erlenmeyer glass of 250ml;
- volumetric pipettes 5 ml;
- pipette provided with the suction pump.



Fig. 1. Spectrophotometer

Sampling

Due to the different types of practised agriculture, sampling points were selected randomly in order to ensure a good coverage of the entire area studied, as well as to provide data as little flawed on the current situation of groundwater blade from Dambovita County.

Laboratory samples have been taken in glass bottles and we analyzed as soon as possible after sampling.

For the analytical sample pipette 5ml of the laboratory sample. For blind sample pipette 5ml water (substituting volume of evidence taken from the laboratory sample) and shall be carried out in parallel with the actual sample.

In an Erlenmeyer flask we put 5ml of sample, than insert 35ml of mixture of acids and 5ml of the 2,6-dimetilphenol. Mix the contents of the beaker and leave to stand between 10 and 60 minutes. First of all, measure the absorbance of the sample blanks, using a tank with optical path of 10mm and a wavelength of 324 nm, after you read the absorbance of the sample, hat is compared to the calibration curve.

3. RESULTS AND DISCUSSION

In the nitrates case, the MAC (Maximum Allowable Concentration) imposed by law is 25 mg/l. The situation for this item it's a pretty serious as can be seen from table 1. Because 7 sampling points (Comișani, Dumbrava, Glodeni, Lucieni, Mărcești, Picior de Munte, Viișoara) considerably exceeding, in some cases there have been results, which are four times the limit imposed by law (Picior de Munte) or six times the limit imposed (Glodeni). A primary reason for this abundance of nitrogen in groundwater aquifers is the excessive use of fertilizers and pesticides on the basis of nitrogen.

Table 1. Results of the analyses of nitrate free

Nr	Sampling ponts	Average mg/L
1	Cobia	0,15
2	Comișani	45,97
3	Dumbrava	119,17
4	Finta	3,14
5	Găești	0,28
6	Gheboia	2,15
7	Glodeni	136,87
8	Lucieni	49,76
9	Mărcești	50,33
10	Picior de Munte	103,33
11	Târgoviște	8,95
12	Viișoara	71,74

Those levels can have adverse effects on the ecosystem and population, due to the fact that nitrogen is toxic for fish. And in the quantities listed, water consumption over the long term can have an impact on the health of children and of ruminants, due to the large number of reducing bacteria of nitrogen present in the digestive system. The rest of the samples analysed, do not exceed the parameters preset by law and interventions are not necessary. For cases with thresholds up than MAC, it is recommended to inform the population about the side

effects you may have the use and consumption of this water long-term both the population and the ecosystem. Current status of nitrogen concentrations in groundwater analysis can be seen in greater detail also in Figure 1, shown below.

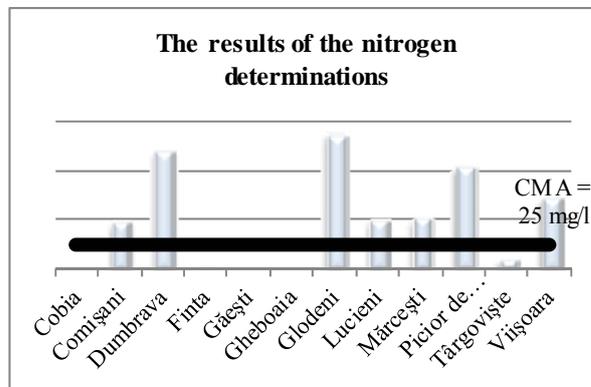


Fig. 2. Results of the analyses of nitrate free

The overdose of chemical fertilizers cause, as a results of surface cleaning, an increased accumulation of nutrients (nitrate, phosphat) in surface water (where have the emergence process of eutrophication), but also in the aquifer.

In the same 12 sampling points in the County also was determined the content of pesticides and fertilizers from the water. The results are presented in table 2.

Table 2 Water quality influenced by fertilizers and pesticides

Nr	Sampling points	Average [°d]	Average mg NO /l
1	Cobia	33,72	0,15
2	Comișani	19,64	45,97
3	Dumbrava	15,75	119,17
4	Finta	5,16	3,14
5	Găești	8,57	0,28
6	Gheboia	16,27	2,15
7	Glodeni	37,21	136,87
8	Lucieni	16,65	49,76
9	Mărcești	20,64	50,33
10	Picior de Munte	15,30	103,33
11	Târgoviște	14,7	8,95
12	Viișoara	10,14	71,74

Due to agriculture or agrozootechnic farms in the vicinity of sampling points, in the water samples were found large amounts of nitrogen. It can be seen, that due the large quantities of nitrogen were detected in some areas analyzed (Viișoara (**71,74 mg/l**), Picior de Munte (**103,33 mg/l**), Dumbrava (**119,17 mg/l**), Glodeni (**136,87 mg/l**)) nitrogen concentration is over the Maximum Allowable Concentration of nitrates in water (de **25 mg/l**).

4. CONCLUSIONS

Following the analysis carried out, the following conclusions can be drawn concerning the quality of groundwater:

For **nitrogen**, we can observe, from the results obtained that for the sampling points Comișani, Dumbrava, Viișoara, Lucieni, Picior de Munte, Mărcești the situation is serious. From the above points, the lowest recorded result is 45, 97 mg/l. These results can be correlated with the intensive use of chemical-based fertilizers of nitrogen. This loading can have adverse effects on the ecosystem and population, due to the fact that nitrogen is toxic for fish. In the quantities listed, water consumption over the long term can have an impact on the health of children and of ruminants, due to the large number of reducing bacteria of nitrogen present in the digestive system. The rest of the samples analysed, do not exceed the parameters preset by law and interventions are not necessary. For cases with thresholds up than MAC, it is recommended to inform the population about the side effects you may have the use and consumption of this water long-term both the population and the ecosystem.

This paper contributes to improve the database that contains the status of the groundwater of the Dambovita County. This creates a more complex idea on the phenomena of natural and anthropogenic pollution of groundwater that can cause damage to both the environment and human.

The accumulation of nitrates in the environment is the result of an excessive use of nitrogen-based fertilizers in agriculture, a large amount of nitrogenous waste from livestock and poultry farms, as well as the inadequate treatment of urban wastewater.

It is recommended that public notification in connection with the normally use of chemical fertilizers to avoid their overdose, because there are hazards both for ecosystem and for the population of the affected area.

It further recommends checking compliance for agrozootechnic farms with the requirements in force for environmental protection.

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