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Explore and Discover Europe through Nature”**
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Research on soil and water

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SOIL RESEARCH





Actual problem nowadays

Pollution is considered to be one of the most actual problems of the mankind. Accumulated waste makes harm to nature.

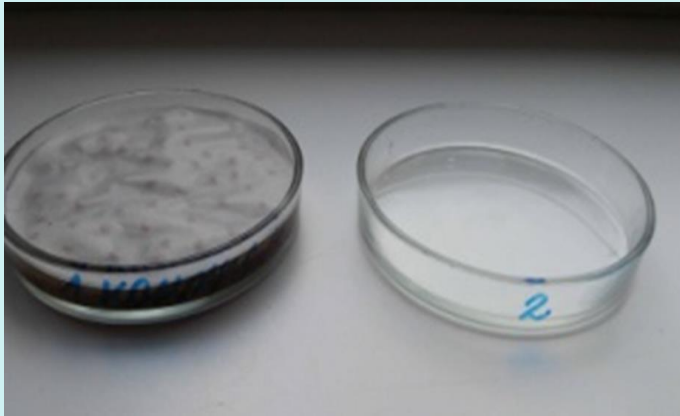
Town Visaginas is young. There are no industrial enterprises in it, but there are many green trees and bushes. We estimated the ecological problems in order to choose the object pollution investigation. We examined yards, streets and a forest zone. The level of air purity was estimated looking at the plants (bioindicators) (an ordinary pine, different kinds of lichen). Doing this kind of work, we followed directions Alekseev S. and Bekker's methods. A pine's needles in different parts (areas) of the town hasn't got damage, they're healthy. There are many lichens on the trees and bushes' trunks. Thus, we came into a conclusion that our town is rather clean.

Unfortunately, there are some problems, which can cause land and water pollution:

1. We found lots of cigarette-butts under balconies of some many-storeyed building.
 2. Mixture of sand and salt, which is used to powder the roads in a winter period, appeared to be on the lawns.
 3. We saw much plastic rubbish in the forest, not far from Visagino lake. Rotten paper is on the trees not only the first year.
 4. We found unapproved car parks on the town lawns.
 5. There were batteries in melted snow.
 6. Oil products appeared to be various. We saw them in rather unexpected places of our town.
 7. Household waste is regularly found near rubbish bins.
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We decided to use bio-testing. This method suggests studying the state of living organisms, to get information about their habitat. Bioindicators are often plants growing in wild surroundings. They negatively react on high level of pollution and let fix the accumulation place, the ways of harmful substance's appearance degree and expressiveness of toksin's influence on living creatures and also humans.

We used cress plants for our investigations. This is a rapidly growing plant and it grows up very quickly (100%).





Aims and tasks of investigations

01

To find and study information about bioindication, harmful influence of different pollution on living organisms.

02

To study the possibility to use cress plant prout seeds as the object of biotesting.

03

To master the biotesting method.

04

To make a test of soil and water to estimate its level pollution.

05

To study influence on growing cress plants seeds: *different car exits, plastic, substances, which batteries contain, salt, used on roads in a winter period of the yea, oil (petrol) products, substance found in cigarette-butts.*

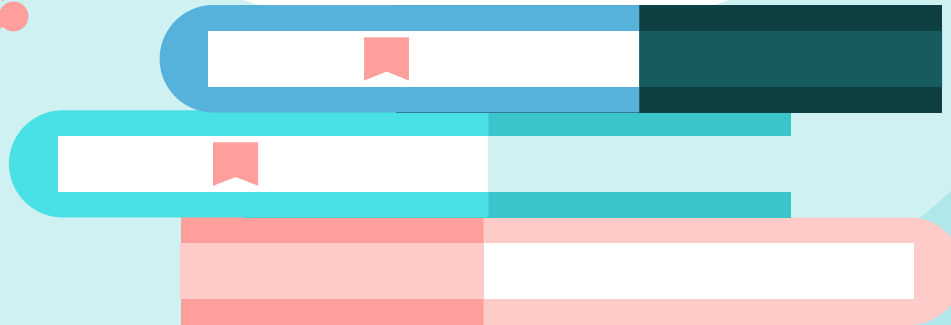
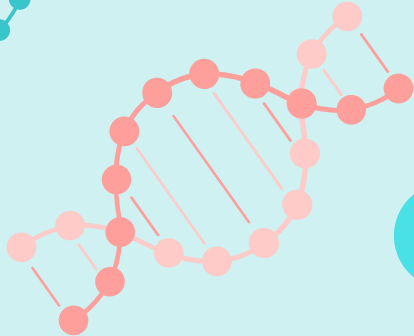
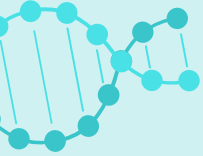
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To make an experiment on growing seeds in different conditions, to compare results.



Hypothesis

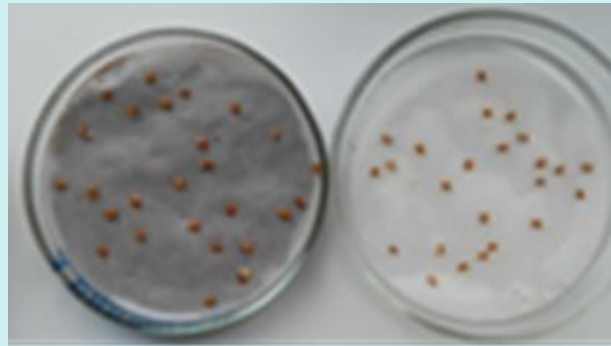
Growing cress plant's seeds depends on the quality of the environment. The cleaner soil and water, the better conditions for quality seeds. If there are polluted substances, the growth will be worse.



Method

Before the experiment some cress plant's seeds were examined on growth. Cress plant's seeds were grown in Petri cups, where washed lake sand was spread on 1 cm. level. It was covered with filter paper on top and moistened. 50 seeds were laid. They were covered with filter paper on top and covered with glass, but not densely.

The process of growing up took place under temperature 20-22 o C. The percent of grown-up seeds, compared with planted ones is called growth. Cress plants growth was 100% for 2 days.



Then the experiment started.

Process of research

Petri cups were 1/2 filled with substrate.

No. 1 – soil from the lawn, where cars were parked (20 m. from the place where sample No. 2 was taken);

No. 2 – soil from the side of a motor way;

No. 3 – soil from the lawn, in a park zone (130 m. from the place where sample No. 2 was taken);

No. 7 – soil in a garage co-operative near the stock of water;

No. 8 – soil in a garage co-operative near the barrels where oil products are poured.



- Clean substance was put into a cup No. 4, which will be moistened by solution, contained in batteries.
- Clean substance was put into a cup No. 5, which will be moistened by water solution, taken from the cigarette-butts. Substances dissolved in water came from cigarette-butts into water.
- Clean substance was put into a cup No. 6, which will be moistened by solution, taken from mixture of sand and salt, which is used in the struggle with glassy ice (100 gr. mixture on 500 ml. water).
- Clean substance was put into a cup No. 9, which will be moistened by solution, taken from different types of plastic. In order to prepare solution to moisten samples No. 4, 5, 6, 9 water was heated up to the temperature of boiling. The examined objects were watered.
- Clean substance was put into a cup No. 9, it will serve as a control variant.
- Substances in cups 1, 2, 3, 7, 8 were moistened by still tap water.

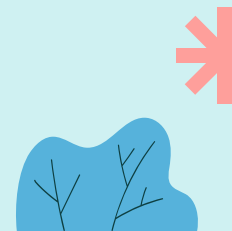
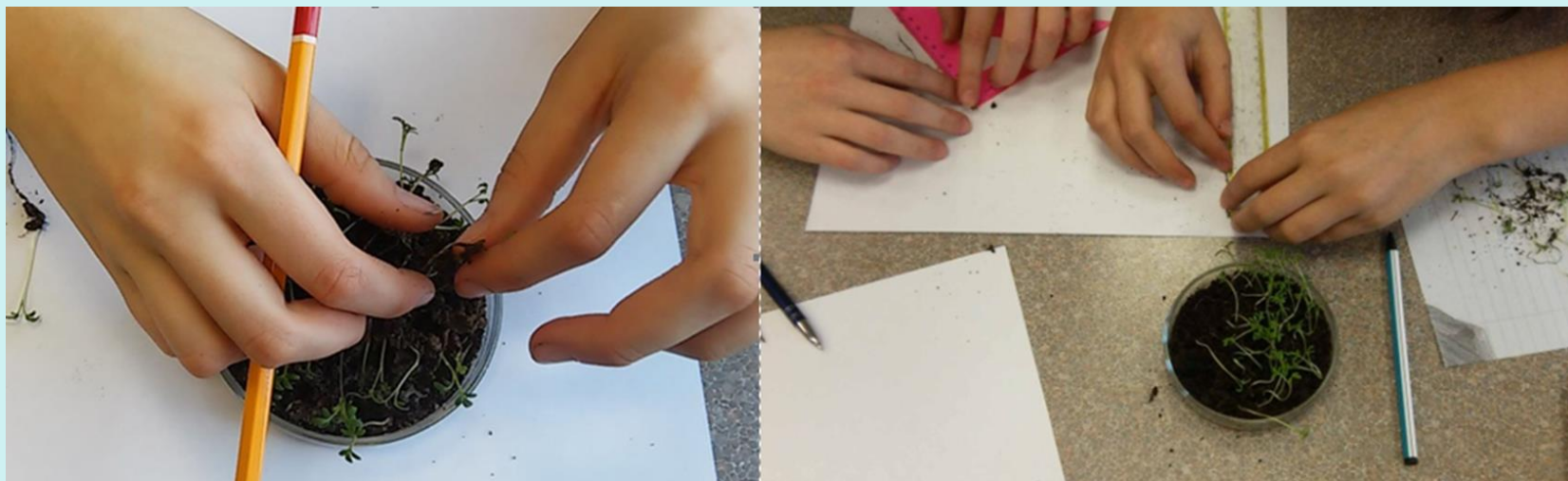


- 50 cress plant's seeds were put on the surface of substance in every cup.
- Seeds were covered with the same substances.
- Top levels of substances were moistened to make it equal to low levels.

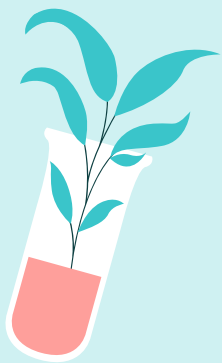


We had been watching for growing seeds for 10 days, supporting the humidity of substances on the same level. The results of the experiment were written down in a table.





Results

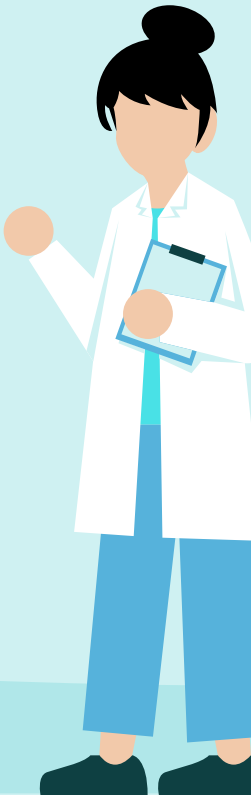


Growth was 100% on the second day. It's possible to make an experiment with this lot of seeds.



All tests were divided into two groups. Experimental group 1 – samples of soil No 1, 2, 3, 7, 8.

Experimental group 2 (No 4, 5, 6, 9) clean substance with seeds were moistened by different solution, may be they contain different dangerous substances.



Try to do yourself the
same research!





Water

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Water is the
second most
important
substance for
human beings that
goes after oxygen

- The significance of water is very broad, and a sufficient intake of water is one of the basic conditions for health.
- Even though water is beneficial for a human, it can and disadvantages too. Primarily, this relates to the quality of the water.
- According to the World Health Organization (WHO)-85% of all diseases in the world are transmitted through water. Every year, 25 million people die from these diseases.



Simple methods to determine drinking water quality

There are a few ways to determine whether the water is clean or contaminated.

The first method is the simplest and often quite reliable – to assess its smell, transparency, and colour.

If there is a suspicion that unnecessary or hazardous substances may have entered the water, you should beware of:

- smell;
- any colour or sediment;
- oily stains;
- any taste.

Finding out the quality of water Experimenting part

In our work we have studied and compared the water quality from open reservoirs(5 lakes), tap water, bottled water, aquarium water, sewer, garage. For our experiment we have used 11 samples.

Organoleptic water indicators

Colour determination of water

- To determine the colour of water we took a glass vessel and a piece of white paper.
- Filled the vessel with water and identified the colour of the water on the white background of the paper.



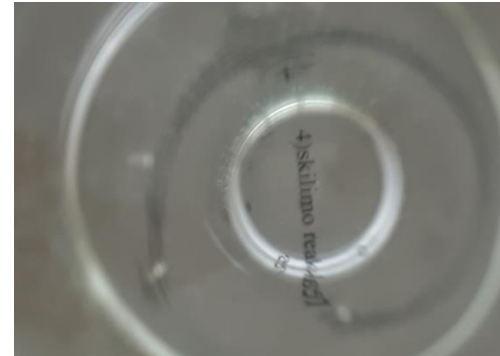
Results

- Water in five samples turned out to be colourless.
- In four cases water had a slight shade
- In two cases water had a noticeable yellowish-brown tint.
- In a water sample taken from a garage cooperative, an oily membrane was noticed.

Determining the transparency of water

A transparent measuring cylinder with a flat bottom can be used to determine the transparency of water. A sheet of paper with text printed in Times New Roman 12 pt is placed under the cylinder and water is poured in until the font can be seen from above through the water.

By measuring the height of the water column with a ruler, we express the level of transparency in centimeters. The higher the height of the pole, the greater the level of transparency.



Results

- Tap water, bottled water, aquarium water, water from lake was transparent, the level of transparency varies from 25 to 28,4 cm.
- Water from lake Kukuižė was muddier with a brown tint. Which can be explained by the location of lake on the raised bog. the level of transparency is 21 cm. Cyclops were found in the water.
- The level of water transparency from the sewage pipe – 17 cm.
- The muddiest water was taken from the garage cooperative, level of transparency was 5 cm.





The smell of water

- The smell of water is caused by odorous substances in it, that enter naturally and with sewage.
- 100 ml of water is poured into a flask, corked and shaken intensively for 5-10 seconds. Then the cork is taken out and the smell of the water is determined using the sense of smell. The intensity of the odour is estimated on a scale (of 1-5 points). The analysis is taken place at a room temperature and when the water is heated to 50-70 °C.

Results

In a bottled water and tap water no smell could be found.

Foreign odors are found in:

- in all samples from lakes – a slight smell of lake water;
- tap water, infused for 10 days - a pronounced smell of stagnant water.
- water from the sewer - a pronounced smell of hydrogen sulphide.
- water from a sample taken in a garage cooperative has a pronounced smell of engine oil, gasoline.

An experiment to determine dust contamination of meltwater

- To determine the dust contamination in the snow, the meltwater(taken from Visaginas lake) was filtered through filter paper.
- By using such a method, dusty sediment and greasy spots are detected on the filter paper, which is not surprising, since those spots were clearly visible on the ice of lake Visaginas



Photos taken of the Visaginas lake ice



JBL EasyTest 6in1

- Unfortunately, simple methods of evaluating the quality of water do not determine the presence of harmful soluble impurities in water, such as nitrates, nitrites, and other salts, chlorine. Therefore, the JBL EasyTest 6in1 water test can be used for this purpose.

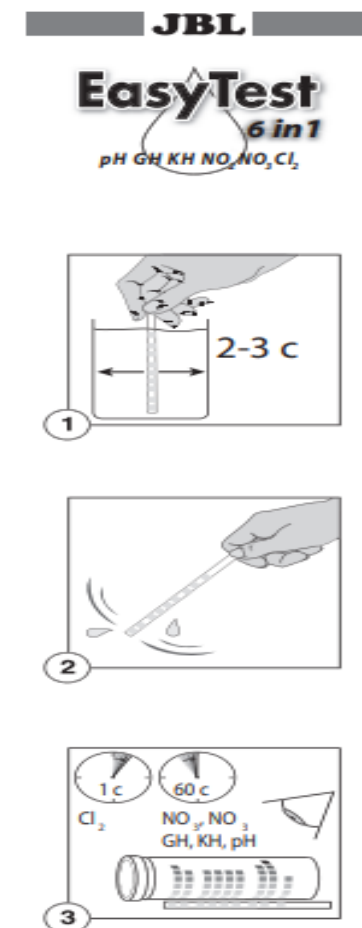


JBL EasyTest 6in1

- Quick water test strips determine the following values:
 - - Disinfectant in tap water: Chlorine test;
 - - Water acidity: pH test between 6.4 and 9.0
 - - Water stability: KH test from 0 to 20°dH
 - - Total water hardness: GH test <1 to > 21°dH
 - - Toxic nitrogen compounds: NO₂ 0 to 10 mg/l
 - - Cause of algae: NO₃ 0 to 250 mg/l

JBL EasyTest 6in1

- To get precise results, the strip must be dipped in the water for 2-3 seconds, taken out and shaken off.
- By holding the strip vertically let the water go through the test and after 1 minute compare the results by using the colour scale on the package.





Photos of water test strips

The test is convenient, fast, precise, and easy to use.

Water results with test strips JBL EasyTest 6 in 1

Number	NO ₃ mg/l	NO ₂ mg/l	GH	KH	pH	Cl ₂ mg/l
1	0	0	>21°d	20°d	7.6	0
2	50	0	>14°d	20°d	7.6	0
3	0	0	>14°d	20°d	7.6	0
4	0	0	>7°d	15°d	7.2	0
5	0	0	>4°d	6°d	6.8	0
6	0	0	3°d	10°d	6.4	0
7	0	0	>21°d	20°d	8.0	0
8	250	0	>4°d	20°d	7.6	0
9	100	0	>21°d	20°d	7.6	0
10	0	0	>7°d	10°d	7.2	0
11	0	0	>7°d	15°d	7.6	0

Results

- Samples taken from a sewer pipe and from a water source in a garden society, showed that the norms for the amount of nitrate ions were exceeded.
- In four samples, the norms for total water hardness were exceeded.
- In eight samples, the norms for temporary water hardness were exceeded.

Final findings

- Various results from these methods confirmed the hypothesis. Trusting the indicators that were approved by studies, Lake water taken from all sources is clean. The cleanest samples were taken from lakes Šventas and Smalvos. Water samples taken from Visaginas and Kukuižė lakes were a bit worse. Water hardness standards were slightly exceeded.
- Moreover, water taken from lake Kukuižė, in which cyclops were found, had smell and colour. This is due to the location of this lake on a high bog.
- The samples of drinking water Nestle, and fresh tap water met the requirements of clean water. Water hardness standards were slightly exceeded as well.
- Samples that were taken from the aquarium water and tap water that were both infused for 10 days, had a characteristic smell and yellowish colour. Water hardness standards were slightly exceeded.
- Spring water taken from the gardening community was hard and the number of nitrate ions exceeded the norms. According to these indicators, water from lakes is even cleaner. Therefore, the use of spring water is not recommended.
- The dirtiest water was taken near the garage „Motoras“ and from the hotel drains. „Idilė“.

Conclusion

World Water Day is celebrated on the March 22nd since the UN has established it in 1993.

This day emphasizes the importance of fresh water. It is celebrated in order to draw people's attention to the problems associated with the purity of water, its quantity.

Currently, 2.2 billion people do not have access to safe water.

The amount of fresh water on Earth has decreased due to improper human use, population growth, deforestation, pollution of our planet.

Taken into consideration the global problem of the lack of fresh water, our main task is keeping the water sources clean.





Sources:

- <https://www.un.org/ru/observances/water-day>
- <https://www.worldwaterday.org/>
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