

The 5th International Young Naturalists' Tournament
Municipal Autonomous Institution of General Education of the city of Novosibirsk
«Gymnasium №12»

Problem №14

«Wi-Fi routers and garden cress»



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The task

In 2013, five young students claimed a sensational discovery that garden cress (*Lepidium sativum*) won't germinate when placed near two Wi-Fi routers. Reproduce their experiments under controlled conditions to support or dismiss their conclusions.

Hypothesis

Radiation from Wi-Fi routers adversely affects the growth of plants.

Purpose of the study

Reproduce an experiment to study the effect of radiation produced by Wi-Fi routers on the germination of seeds and the development of a full-fledged garden cress plant.

Objectives of the study

1. Using the literature sources justify the hypothesis of the study and outline the research plan.
2. Reproduce the original experiment in the conditions of the school laboratory.
3. Carry out a series of similar experiments, changing external parameters: device power, seed quality etc.
4. Draw conclusions from the experiments.

Theoretical part of the study



A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet.



Wi-Fi are wireless networks that provide the reception and transmission of information between access points and customers. Wi-Fi networks usually operate in the 2.4 GHz band.

Theoretical part of the study



Cress (*Lepidium sativum*), sometimes referred to as garden cress, is a rather fast-growing, edible herb.



Cress grows well in loose soil and a sunny location. Start outdoors between one and two weeks before the average last frost. Sow seeds 1/2-inch deep, spaced 1 inch apart. Rows should be 6 inches apart. You can also place a line of seeds along prepared rows and cover lightly. Keep consistently moist. Seedlings should emerge in 5 to 15 days. Thin seedlings when 1/2 inch tall, to 2 inches apart.

Seeds for growing

Experiment 1

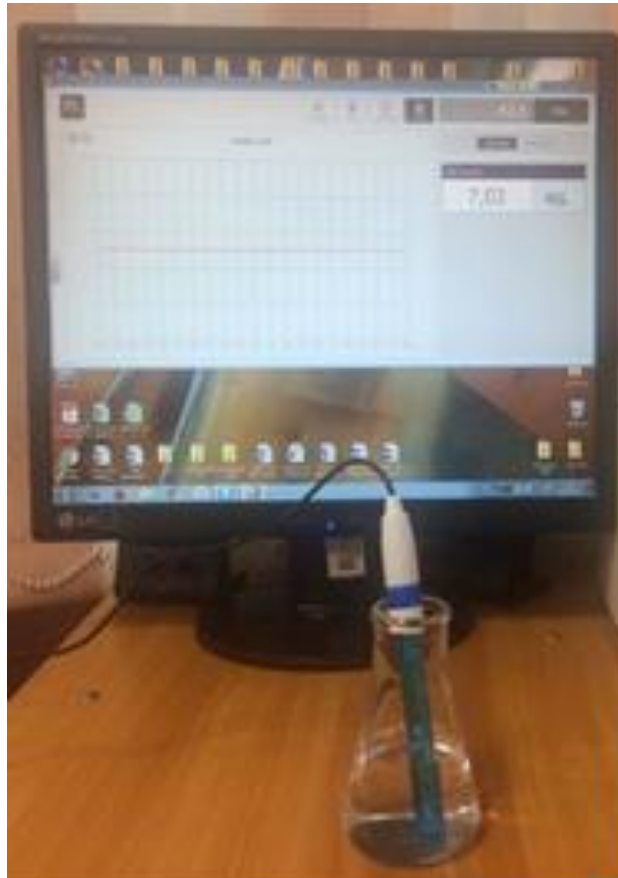
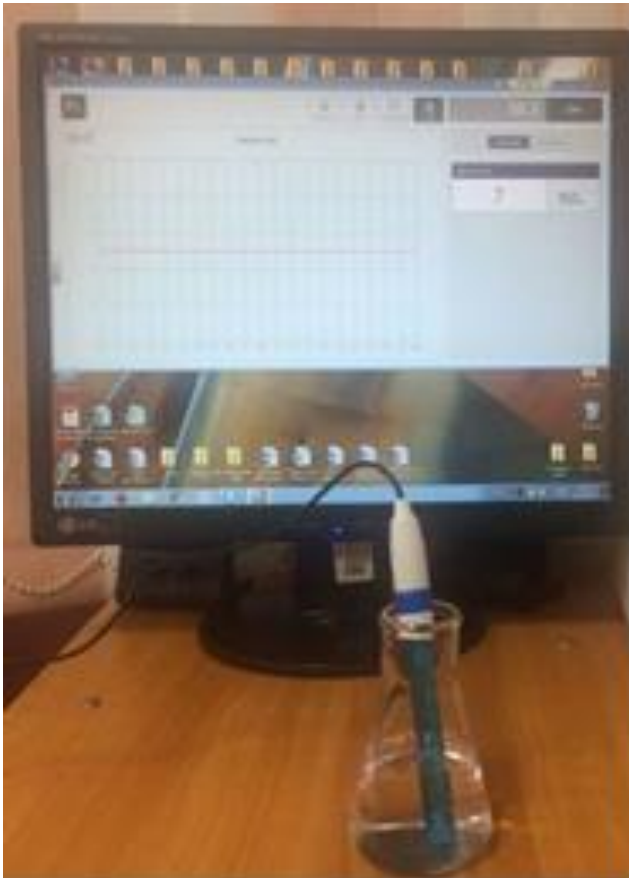
The purpose is to find out how the electromagnetic radiation of the Wi-Fi system affects the physical properties of natural water.

<i>pH Indication</i>	<i>Bottled water</i>	<i>Distilled water</i>	<i>Tap water</i>
Before placement between routers	7,00	7,03	7,09
After irradiation with EMP during 6 hours	6,79	6,28	6,26
Wi-Fi impact	- 0,21	- 0,75	- 0,83

Conclusion: the electromagnetic radiation of a system of two Wi-Fi routers changes the basic physical characteristics of water, in particular pH. And this may mean that if radiation from two Wi-Fi routers influence the water, it will affect all natural water systems containing water (intercellular water).

Experiment 2

The purpose is to find out how the electromagnetic radiation of the Wi-Fi system affects the physical properties of natural water.



Experiment 2

The purpose of the experiment is to observe and quantitatively describe the effect of radiation produced by Wi-Fi routers on seed germination and the development of a full-grown garden cress plant.



21 plants



17 plants

Thus, under the same external conditions, the electromagnetic radiation of the Wi-Fi routers favorably affects the activity of the emergence of the planted seeds.

Experiment 2

The purpose of the experiment is to observe and quantitatively describe the effect of radiation produced by Wi-Fi routers on seed germination and the development of a full-grown garden cress plant.



№1

21 plants

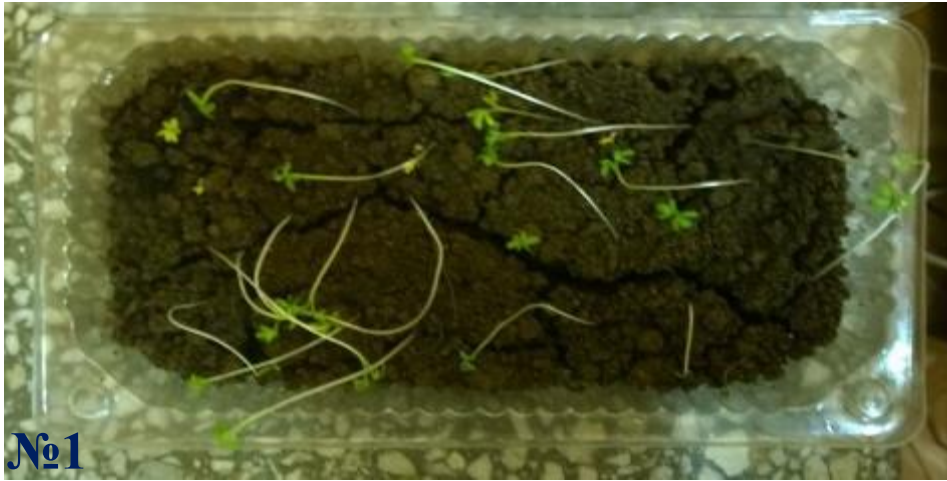


№2

21 plants

Electromagnetic radiation increases the evaporation of moisture from the surface.

Experiment 2



The plants began to die in the container placed between the routers: they dry up near the ground, new leaves do not appear.

Experiment 2

<i>Day</i>	<i>Number of shoots, plants</i>	
	<i>Container 2, located at a distance exceeding 10 meters</i>	<i>Container 1, placed between routers</i>
3rd day. The sprouts appeared	21	17
4th day.	21	21
5th day. The leaflets appeared.	21	15
6th day.	Plants continue to grow	Plants are sluggish. New leaves do not appear
7th day.	Plants are strong, healthy, there are 6-8th leaflets	The sprouts wither, leaves dry, some dry out at the base. Six sprouts died.
8th day.	All the plants are growing	11 sprouts died.

Experiment 3

№1



№2



Experiment 3

<i>Day</i>	<i>Number of shoots, plants</i>	
	<i>Container №1, placed under electrostatic protection</i>	<i>Container №2, located in the same conditions, but without protection</i>
3rd day. The sprouts appeared	13	17
4th day.	16	20
5th day. The leaflets appeared.	16	21
6th day.	The sprouts have a length of 4.5 cm and are inclined toward the soil.	Plants continue to develop. The sprouts are upright and 3.2 cm long.
7th day.	All sprouts are strongly inclined. Brown spots appear. Five sprouts died.	Plants are strong, healthy, appear 6-8th leaflets. The sprouts are upright and 3.8 cm long.
8th day.	At the base of the shoots, decay occurs, plants are pale green in color. 8 sprouts died.	All plants develop. The sprouts are upright and 4.5 cm long.

How to reduce the impact of electromagnetic radiation from Wi-Fi routers

The following simple rules will prompt you how to protect yourself from WiFi radiation:

- install routers at a distance of at least 40 cm from their workplace and certainly not to sleep next to the included router;
- disable your access point if you do not intend to use the Internet;
- do not hold the laptop on your lap.



Conclusions

1) Electromagnetic Wi-Fi radiation has a beneficial effect on the germination of seeds. Under the same external conditions (temperature, humidity and light), the growth of cress-salad seeds is higher in the tray that is located between the two routers.

2) At the stage of formation of a full-grown garden cress plant, EMP adversely affects growth. The leaves develop poorly, the plant at the root turns black and the sprouts become dead.



References

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