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EFFECT OF WI-FI RADIATION ON SEED GERMINATION AND PLANT GROWTH - EXPERIMENT

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Abstract: With the rapidly increasing number of artificial sources of electromagnetic fields, it needs research of their effects to living organisms. The most common object of these studies is primarily a human who is exposed to electromagnetic radiation in the environment, at home and at workplaces. In this area are also observed the changes in behavior of animals and plants caused by the high frequency electromagnetic radiation. Plants are very sensitive because they can perceive a lot of perceptions from the environment. In this article, we observed the effects of Wi-Fi radiation on the growth plants, namely garden cress. One sample was exposed to long-term electromagnetic radiation in the vicinity of Wi-Fi router. The second sample was exposed minimum to that radiation. It has been shown that long-term exposure of Wi-Fi radiation in the vicinity of the cress causes changes in growth and development as well as visible changes of discoloration and vitality.

Keywords: electromagnetic field, Wi-Fi radiation, garden cress, plants

INTRODUCTION

Potential sources of thermal effects from electromagnetic radiation, which surrounds us every day, we can include electromagnetic waves of mobile phones, microwave ovens and Wi-Fi equipments.

Analysis of thermal and biological effects of electromagnetic fields is dedicated to a lot of attention and research activities. Part of results from this area is described in the documents [1-7]. The research of harmfulness of electromagnetic heating food in microwave ovens was realized on the Institute of biochemistry and environment in Switzerland [8].

Research and study of the impact of electromagnetic radiation from the antennas of mobile operators to the population of white stork is also described in article [9]. In the conclusions of this research is described that, nests population productivity which are located within 200 meters from the mobile operator transmitter was twice less than in nests in the distance more than 300 meters from the transmitter.

The ability of plants to react to surrounding changes is very important for them because very often they cannot change location. During the evolution in their organisms has been the effective mechanisms developed to ensure their survival. It was caused by the fact that plants not able to move. About the plants we use the term neuronal systems, not as by humans and animals, where we call the system as the nervous. The word "neuron" originated from ancient Greek and means "vegetable fiber" [10].

PROCEDURE AND CONDITIONS OF THE EXPERIMENT

In our experiment, we have planted the seeds of *Lepidium Sativum* (kind of garden cress) into two identical bowls. The same content of the seeds we filled to the bowls. The first sample (A) was in the room with minimal effect of the Wi-Fi radiation. The second sample (B) was placed in the room, in close proximity of the Wi-Fi Router (Model: Huawei B260) with the transmission frequency from 2.412 to 2.472 GHz. All other experimental conditions were the same. Both bowls were placed on the windows in the same height and on the same world side. They were secured the same conditions of daylight.





During the following 12 days received both plants the same measured amount of water at the same time. The prepared bowls with seeds in the beginning of experiment are shown in Figure 1. Weight of both bowls was 115 g.

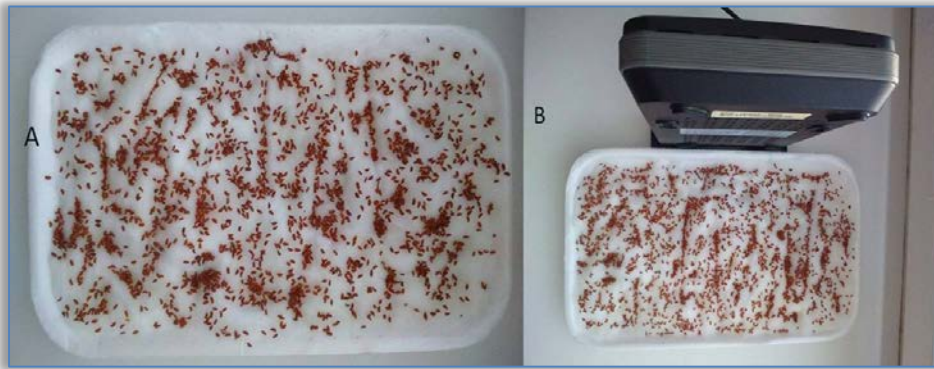


Figure 1. Prepared bowls with seeds – 115 g both bowls

RESULTS AND DISCUSSION

During the experiment we weighed the bowls on the digital weight, in the first, third, fifth, tenth and twelfth day. Changes in plant growth are documented in the following figures. Figure 2 presents the third day, Figure 3 fifth day, Figure 4 tenth day and Figure 5 twelfth day of the experiment.

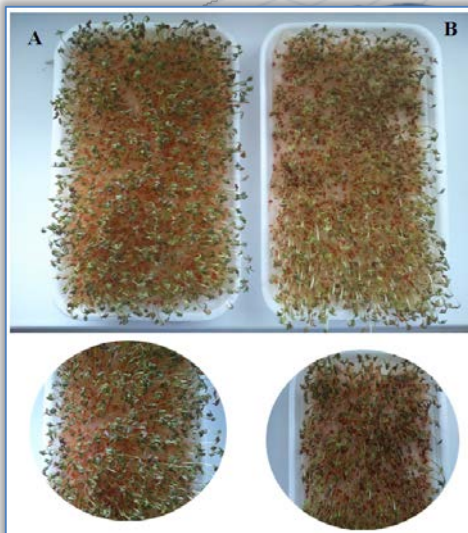


Figure 2. Third day

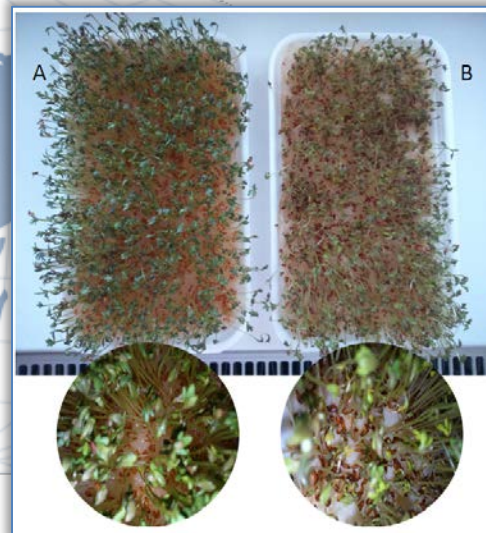


Figure 3. Fifth day



Figure 4. Tenth day

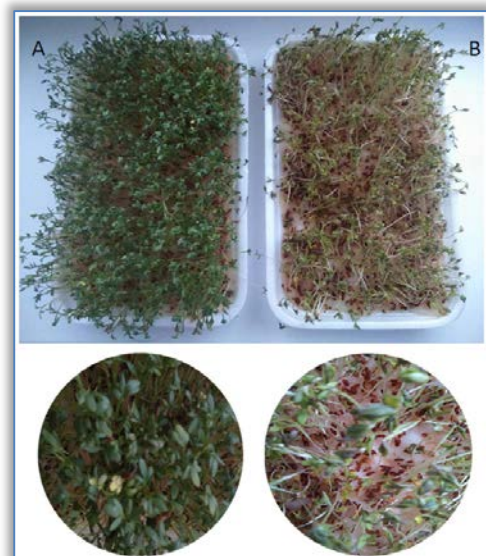


Figure 5. Twelfth day





To day fifth of the experiment, the plants showed of small differences of germination and growth. After the fifth day, a large part of seeds placed near the Wi-Fi router has not germinated. Many of these seeds were dead and had dark color, which was significantly different from the seeds in the second bowl. The germinating sprouts near wireless router were shorter and weaker.

On the tenth day of the experiment plants near to the Wi-Fi router, which germinated, had problem with growth and their length has not changed. Also, it was reduced water intake of these plants and was weighed the significant weight difference between the first and second sample. The differences of the measured weights of the two bowls during the experiment are shown in Table 1 and Figure 6. On the last twelfth day, garden cress outside electromagnetic radiation (sample A) was visually vital and had clearly green color. Sample B was withered and the vegetation was less dense as by the sample A.

Table 1. Samples weight differences

Day of the experiment	Weight [g]	
	Sample A	Sample B
1.	115	115
3.	121	125
5.	118	148
10.	107	149
12.	105	152

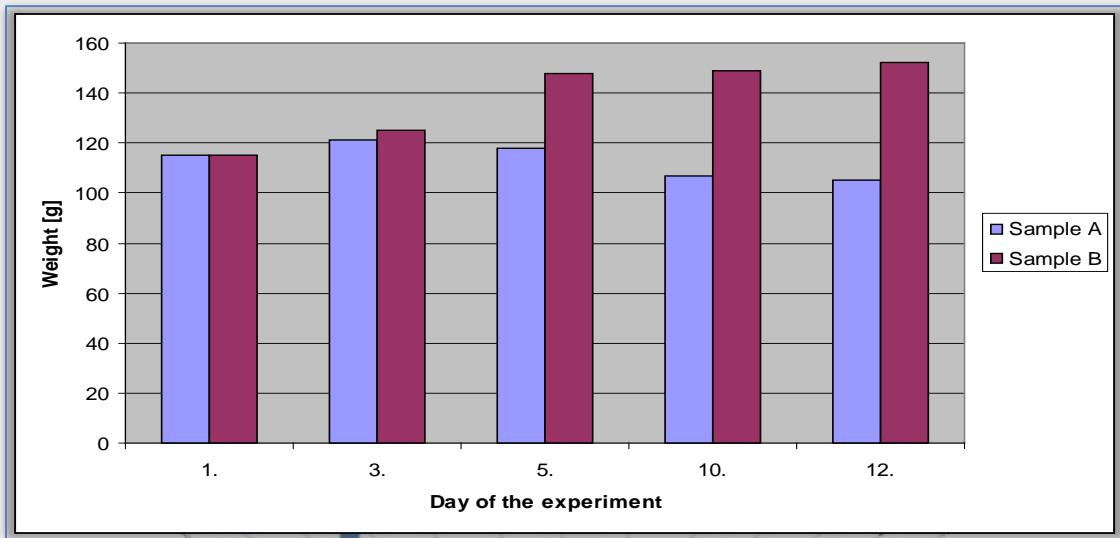


Figure 6. Samples weight differences - graphically

CONCLUSION

Microwaves from Wi-Fi devices are characterized by its thermal effects. Microwave electromagnetic fields are absorbed in the materials containing water, into heat. To the largest absorbers of microwave electromagnetic radiation include cactuses and succulents in general. Effect of Wi-Fi radiation on plants is influenced by several basic factors:

- ≡ Thermal effects of electromagnetic field are directly dependent on the frequency of waves, which means that with increasing frequency grows thermal effect on living organisms.
- ≡ Total amount of received thermal energy depend on the water content contained in the vegetable fibers. Water content determines the electrical properties.
- ≡ Surface area of vegetable fibers that is exposed to microwave radiation.
- ≡ Electric field strength.

If the amount of thermal energy is more than the plant can absorb, may occur to thermal overload of plant organs and the whole organism. The influence of high-frequency electromagnetic field due to the internal temperature increase of plants can cause the physiological and metabolic changes that influence their growth. Adverse changes in the green part of the planet may lead to ecosystem changes. With effect of Wi-Fi radiation and other electromagnetic microwave radiation we cannot these changes exclude.

The experiment has demonstrated the negative effects of Wi-Fi radiation on the plants of garden cress, but for the confirmation of that argument will be necessary to repeat this experiment. The result was the slowing of plants growth, physiological and metabolic changes and genetic mutations that can lead to death of the plants. It is therefore necessary to continue research this issue, to be able to more accurately describe the changes in plants caused by high-frequency electromagnetic fields.

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