PRODUCTION OF ELECTROCHEMICALLY ACTIVATED WATER IN THE COMPOSITION OF MICROELEMENTS AND USE IN PRE-SOWING TREATMENT OF VEGETABLE SEEDS

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https://doi.org/10.5281/zenodo.8101476

Abstract. *The article presents the results of experiments to study the effect of treatment of electrochemically activated water in the composition of microelements on the germination of seeds in laboratory conditions before sowing.*

Keywords: *tap water, electrochemically activated water, microelement composite, electrolyzer, diaphragm, pH, electrode, anolyte, catholyte, melon seeds of the Obinovvot variety, watermelon seeds of the Kuziboy-30 variety.*

In recent years, consistent measures have been taken in our country to reform agriculture and introduce market mechanisms into the industry. The fulfillment of the tasks set, the improvement of the quality of agricultural products is in many ways closely related to the development of science in this area, the creation of new advanced technologies and their introduction into production. Especially in recent years, much attention has been paid in agriculture to the expansion of the cultivation of vegetables and fruit products, which are considered important for human consumption.

For example, the decree of the President of the Republic of Uzbekistan dated January 28, 2022 No. PD-60 “On the new development strategy of the Republic of Uzbekistan for 2022-2026” states that “Over the past period, the state and society” the President of the Republic of Uzbekistan adopted about 300 resolutions and more than 4000 laws aimed at radical reform of all spheres of life. Annex 2 to this resolution contains the State Program for the implementation of the new development strategy of Uzbekistan for 2022-2026 in the year of “Human Dignity and Active Good Neighborliness”, and in its 134 points in 2022 the main directions of rice crops will be increased by 4.4 thousand hectares and 75.9 thousand hectares and the yield will increase from 170 centners to 200 centners (1).

According to the State Statistics Committee, in January-September 2022, 1.6 million tons of vegetable crops were grown in our republic. This indicator shows that the volume of cultivation of vegetable crops in our republic increased by 8.2% compared to the corresponding period of 2021.

Also, in the Decree of the President of our country dated April 12, 2023 “On measures to improve the system of growing products on land areas along the edges of the fields of agricultural enterprises” PD No. 121 Assign the Agency for the provision of services in agriculture under the Ministry of Agriculture with the task of developing land along the edges of fields farms, growing products on them and organizing its guaranteed purchase. (2).

The above tasks include obtaining a high yield of vegetables and gourds among other agricultural products of our country, improving the quality of the products obtained to the level of world standards, expanding the range and improving cultivation technologies.

One of the factors for increasing the yield of vegetable and melon crops is pre-sowing treatment. Cultivation, preparation, processing, storage and sale of seeds, as well as variety and seed control is an important factor in ensuring food safety. To date, a number of chemical mixtures for pre-sowing seed treatment have been proposed. Many chemicals are scarce, labor-intensive to process, and cause environmental problems.

In this regard, in our studies, experiments were carried out to study the effect of pre-sowing treatment of vegetable crops with electrochemically activated water and its compositions with trace elements ($CuSO_4*5H_2O$ 0,1-0,01%) on seed germination. In the experiment, local varieties of melon Obi Novvot and watermelon Kuziboy-30 were used. The experiments were carried out in 3 repetitions, 4 variants for each variety. For each option, 20 quality sorted melon and watermelon seeds were selected. In option 1, watermelon seeds were kept in ordinary non-activated tap water (pH=7.5±0.1) and this option was chosen as a control.

The remaining variants are experimental, in 2 variants with the anolyte part of electrochemically activated tap water with an acidic environment (pH=3±0.1), in 3 variants with the analyte of electrochemically activated tap water (pH=3±0,1)+ SuSO4*5H2O 0,1% solution and in 4 variants with an analyte of electrochemically activated tap water (pH=3±0.1) + $CuSO_4*5H_2O$ 0,01% solution, melon seeds of all variants were wrapped in gauze soaked in sample water for 24 hours for 24 hours Left at 25 ^{0}C. The pH value of electrochemically activated water is continuously measured during the study using universal litmus paper.

Cations and their pH values in the test samples were checked in the central laboratory of the ARTSOFT district cluster in the Mingbulok district of Namangan region, and the total hardness and the number of anions were checked in the research laboratories of the State Enterprise “SUVOQAVA” and the Department of Chemical Technology of the Namangan Civil Engineering Institute. Since the above indicators have a different effect on the quality of activated water, physical and chemical changes and stability in the processes of the composition of trace elements during electrochemical water treatment.

In studies, when examining watermelon seeds for the corresponding options, it was noted that 10 out of 20 seeds in the 1st control variant, 12 in the experimental variant 2, 8 in the experimental variant 3 and 14 in the experimental variant. variant 4 began to germinate (Table 1).

Table 1

Effect of electrochemically activated water on the germination of watermelon seeds (variety Kuziboy-30)

#	Variants	Number of seeds, pieces	Soaking time, hours	Temperature, ^{0}C	Number of germinated seeds, pieces
1	Plain non-activated tap water (pH=7,5±0,1)	20	24	22-25	10
2	ECHA (electrochemically activated) tap water anolyte part (pH=3±0,1)	20	24	22-25	12

3	ECHA tap water anolyte part (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,1% solution	20	24	22-25	8
4	ECHA tap water anolyte part (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,01% solution	20	24	22-25	14

After checking the germination of watermelon seeds soaked for 24 hours for research, on March 20, 2023, 1 piece of watermelon seeds were sown in plastic cups 12x12 cm in size. The soil in the cups is specially prepared in advance on the basis of humus, peat, dry leaf particles, sand, natural fertilizers. Every 5 days after sowing, the seeds were checked for their germination and development. For the first 5 days, i.e. in the test on March 24, 2023, the number of germinated sprouts on 1 control variant, 14 on 2 experimental ones, 9 on 3 and 16 on 4 variants. After the second five-day period, i.e., on March 29, 2023, it was found that 15 seeds sprouted in the 1st control, 17 in the 2nd, 13 in the 3rd, and 18 in the 4th (Table 2).

Table 2

The effect of electrochemically activated water on the germination of watermelon seeds in the soil (variety Kuziboy-30)

#	Variants	Quantity glasses of sony	Sowing time, day, month, year	Germination temperature, °C	Number of seeds sown, pieces	Quantity Germinated seeds of the state (26.03.2023) pieces	Quantity Sprouted seeds state 2.04.2023 pieces
1	Ordinary non-activated tap water (pH=7,5±0,1)	20	20.03.2023	22-25	20	12	15
2	ECHA tap water analytical part (pH=3±0,1)	20	20.03.2023	22-25	20	14	17
3	ECHA tap water analytical part (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,1% solution	20	20.03.2023	22-25	20	9	9
4	ECHA tap water analytical part (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,01% solution	20	20.03.2023	22-25	20	16	18

Table 3

The effect of electrochemically activated water on the germination of melon seeds in the soil (Obi novvot variety)

#	Variants	Quantity cups pieces	Sprouting temperature, °C	Germination temperature, °C	Number of seeds sown, pieces	Quantity Germinated seeds of the state (26.03.2023) pieces	Quantity Sprouted seeds state 2.04.2023 pieces
1	Ordinary non-activated tap water (pH=7,5±0,1)	20	20.03.2023	22-25	20	10	17
2	ECHA tap water analytical part (pH=3±0,1)	20	20.03.2023	22-25	20	12	17
3	ECHO tap water analytical part (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,1% solution	20	20.03.2023	22-25	20	7	14
4	ECHA tap water analytical part (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,01% solution	20	20.03.2023	22-25	20	8	17

Analysis of the above research results shows that, in variant 2, a greater number of germinated seeds was observed compared to control 1. However, in solutions of electrochemically activated tap water (pH=3±0,1)+ $CuSO_4*5H_2O$ 0,1% и pH=3±0,1)+ $CuSO_4*5H_2O$ -0,01% seed germination was significantly lower. A bad result can be considered that a high concentration of trace elements in the anolyte adversely affects the viability of the samples. Melon seedlings in a glass were left for another 8 days for complete germination. The germination of the remaining seeds was ensured.

CONCLUSION

- the method of neutralization in electrochemically activated water with composite microelements before sowing vegetable seeds is of great importance due to its low cost, high germination and development of seeds, environmental efficiency compared to other methods;

- the anolyte part of electrochemically activated water (pN=3.5-4) can be used to neutralize melon seeds before sowing with electrochemically activated water in the microelement composition;

- in laboratory conditions, the most optimal conditions can be considered the treatment of vegetable seeds of electrochemically activated water with a microelement composition, keeping the seeds in a cloth soaked with the mixture for 24 hours at a temperature not lower than 24 ° C

- anolyte (pH=3-3.5) part of electrochemically activated tap water can be used in pest control of vegetable crops.

- a part of electrochemically activated water with an acidic environment (pN=3-3.5) is more stable, unlike a part in an alkaline environment, and can be used up to 15 days from the date of receipt.

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