

## INFLUENCE OF BIOLOGICALLY ACTIVE WATER ON PROCESSES OF GERMINATION AND SWELLING OF GRAINS

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**Abstract-** In this paper, the results of various information-sated water (biologically active water, BAW) on wheat grains of germinating capacity and swelling of peas grains are suggested. Water activation was spent by means of magnetization of water, saturation of water by means of silver and copper in the ratio 1 ion Ag or Cu on  $6 \cdot 10^6$  molecules of water and 1 ion Ag or Cu on  $10^{10}$  molecules of water. Results have shown that the most effective is application of saturation waters with concentration of copper in the ratio 1 ion Cu on  $6 \cdot 10^6$  H<sub>2</sub>O. Thus the superficial tension water makes size of an order  $41.3 \cdot 10^{-3}$  N/m. Thus it is established that exact measurement of factor of a superficial tension of water it is possible to supervise degree of activity of water.

**Keywords:** Silver, Water, Magnetize, Cooper, Supervision, Saturation, Swelling, Germination.

### I. INTRODUCTION

Among of problems of physiology of the entire living organism the special role belongs to researches of quality of used water. Water participates in the exchange processes occurring in biological systems, including the soil-plant system. Soil is deficit and not renewable resource. With all its diversity and by virtue of its multifunctional character, it is one of the most important bases for life on Earth, one of the major factors for balance of nature.

Soil is at the heart of current human development problems; in particular, it is at the core of the food and environmental concerns experienced nowadays worldwide. Nevertheless, soil is still used in an unsustainable way by human societies; and is actually done to mitigate soil degradation or to improve the situation of degraded soils world-wide. Local and global economic systems are accountable for this neglect.

The human more than 100 years everywhere uses industrial agricultural technology for manufacture of a foodstuff. The soil resources are maintained without restoration of their mineral structure. In this connection the metabolism is broken. There is a lack of the various microelements necessary for normal growth of plants. There is a necessity to apply the water which has been made active by various microelements [1-3].

This situation, which involves risks for both natural and human systems, is mostly due to ignorance in all spheres of society-from the simple citizen up to the decision maker about what soil is and why it is necessary to preserve it. Hence, soil is always absent from public debate, especially where social choices are concerned.

On the connection with deficit of different mineral elements in soil, more of agriculture plants suffer metabolism disease as hypomicroelementosis which reason the soil lacks some vital microelements for normal functioning of plants. Therefore, the paper devoted to activation of water by microelements in the form of ions of various metals get the special importance. The recent years often meet the works devoted to studying of a role of information-sated water (biological active water BAW) in the course of germination of various grains [4-7].

### II. METHODS

Under water activation the increase of getting ability of water in separate bodies and plants of various biological systems is understood. The thermal, electric, electromagnetic processing, the freezing-unfreezing (thawed snow), the magnetize, machining (influence of centrifugal force, transfer of the big speeds, sharp braking of a stream of moving water), ionization by ions of various metals with known concentration, the saturation by air and ozone are factors making the active water [7, 8, 9, 11].

As a result of external influence each unit of volume of water receives energy. Hydrogen communications which promotes formation of free radicals and changes the properties and structures of units-cluster responsible for physical and chemical properties of water is collapse. In process of activation long molecular the network of (H<sub>2</sub>O)<sub>n</sub> associates are broken off also water gets new properties [10]. It leads to change of size concerning the integrated characteristic of water with factor of a superficial tension  $\sigma$ . It is earlier established, with reduction of factor of a superficial tension degree of biological activity of water increases [17]. For finding of factor of a superficial tension used a method of definition of height of a rising of water on capillary tubes. The tubes applied by the authors have different internal radiuses

(0.193; 0.718 and 1.33 mm), defined by microscope MPB-2. The size of internal radius of each capillary was defined in its several sections. Measurements have shown that for each capillary these sizes within a measurement error did not differ from each other, hence tubes were cylindrical. Also the authors notice that for all three tubes the physical and chemical constant  $a$  ( $a^2=rh=2\sigma/\rho g$ ), is calculated for values  $\sigma$  of distilled water and is well coordinated with data meeting in the literature [12, 13].

All experiences activity degree find relative to settling vat water or so called control water. Preliminary processing of control water was carried out by its upholding within 24 hours at temperature 23-26 °C. Thus the water structure becomes stable. Time of upholding is 24 hours optimum as upholding of water less than 24 hours lead increase in casual components of an error of measurements. Because the structure of water has not reached stability, and more than 24 hours are inexpedient, as leads increase in duration of researches on the one hand, and occurrences of the processes connected from ability to live of microorganisms another.

Degree of activity of water express in percentage by quantity of the sprouted grains concerning the control. Factor of a superficial tension of control water  $\sigma=67.91 \cdot 10^{-3}$  N/m. We have used the following information sated waters: silver, copper and magnetic (in a constant magnetic field). It is declared that saturation of water by ions of silver and copper with known concentration made by a method of electrolyzer [14, 15]. In world practice at activation of water by silver ions use concentration of 1 mg/l and 66 mg/l, or on  $6 \cdot 10^6$  and  $10^8$  molecules of water on 1 ion of silver.

The first standard is at level of the bottom border of maximum concentration limit for the medical water. The second American standard uses for drink of man at long time. Process of magnetizing of the control water spend in a Capron tube with a diameter of 5 mm and length 10 m in a form of a spiral with 40 coins placed in a cylindrical constant magnet by induction  $B=3500$  Gs. Size of a magnetic induction  $B$  defined by a method of a separation of a core from soft iron with the area of contact in 1  $sm^2$ , force of separation  $F=1$  kg through Capron tube pass control water.

The vessel with control water was above on 1 m from a magnet with an induction  $B=3500$  Gs. The size of a magnetic induction  $B$  defined by formula of

$$B = \sqrt{(\mu_0 F) / S}$$

where  $\mu_0 = 1.26 \times 10^{-6}$ . For this water the factor of a superficial tension equal  $58.1 \cdot 10^{-3}$  N/m.

### III. RESULTS

On the basis of received data, the table of size of a superficial tension for information sated and control water is composed in Table 1. The time sequence of quantity of the sprouted grains of wheat and soft wheat of a grade in «Teter» firm, counted through 3 till 33 hours when almost all grains sprouted are shown in Figures 1 and 2, respectively.

Table 1. Factors of a superficial tension and activity of water depending on type of information influence

No.	Type of water	$\sigma$ ( $10^{-3}$ N/m)	$\alpha$ (%)
1	Distilled	72.21	-
2	Drinking in 10 min after tankage	57.21	11.1
3	in 2 hour after tankage	61.85	9.9
4	in 24 hour (control)	67.91	0
5	Air saturation	62.27	9
6	Ozone saturation in 10 min	58.35	16.3
7	in 1.5 hour	62.32	8.96
8	Magnetized water ( $B=3500$ Gs)	58/1	16.8
9	Silver $N(H_2O)/N(Ag)=6 \cdot 10^6$	57.43	18.2
10	Silver $N(H_2O)/N(Ag)=10^8$	61.1	11.14
11	Silver $N(H_2O)/N(Ag)=87000$	56.65	19.87
12	Copper $N(H_2O)/N(Cu)=6 \cdot 10^6$	41.3	64.4
13	Copper $N(H_2O)/N(Cu)=10^8$	43.7	55.4

Apparently from Table 1, by management of concentration of ions of various metals, it is possible to receive desired size of activity of the water, necessary for the control of exchange processes in biological systems. It is obvious that the greatest value of a superficial tension received in case of the distilled water. The least value of a superficial tension turns out at copper application at concentration 1 ion of copper on  $6 \cdot 10^6$  molecules of water.

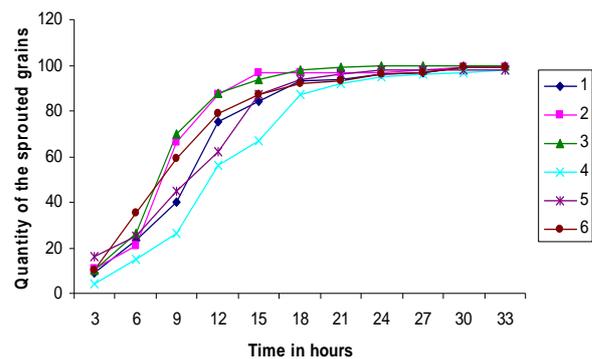


Figure 1. Time dependency of quantity of the sprouted grains of wheat of «Teter» firm on influence of the made active waters:  
1- control-settling water; 2- on 87000 molecules of water 1 ion Ag; 3- on  $6 \cdot 10^6$  molecules of water 1 ion Ag; 4- on  $10^8$  molecules of water 1 ion Ag; 5- magnetized water ( $B=3500$  Gs); 6- water in water pipe

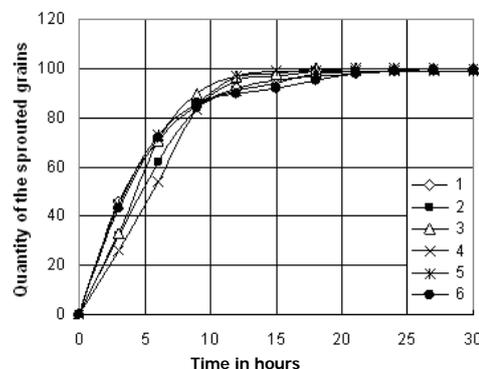


Figure 2. Time dependency of quantity of the sprouted grains of soft wheat of «Teter» firm on influence of the made active waters:  
1- control-settling water; 2- on 87000 molecules of water 1 ion Ag; 3- on  $6 \cdot 10^6$  molecules of water 1 ion Ag; 4- on  $10^8$  molecules of water 1 ion Ag; 5- magnetized water ( $B=3500$  Gs); 6- water in water pipe

Apparently from Figures 1 and 2, the germination of grains is differing depending on wheat grade. The steepness of the time characteristic on quantity of the sprouted grains considerably differs in a case of magnetized water and of silvered water with concentration 1 ion on 6 million molecules of water.

The role of BAW in the course of swelling of speeds of peas water in  $\Delta m / \Delta t$  and  $\Delta m$  have been divided into control and investigated in Figures 3 and 4, respectively. Various information influence on investigated part of water on a difference of weights in unit of time (forces of suction) defined in BAW. Results of experiments after swelling of grains of peas have confirmed the laws that: the factor of a superficial tension of investigated water in more actively water is less and it is more swelling of grains of peas.

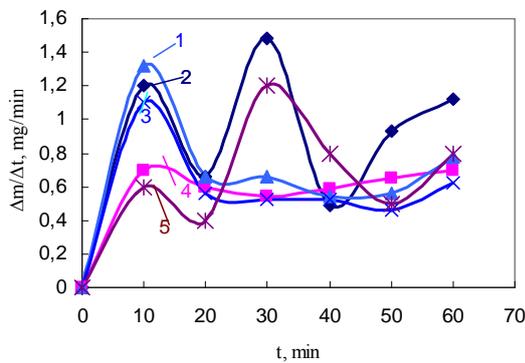


Figure 3.  $\Delta m / \Delta t$  of swelling of peas ( $t$  in min.) under influence of water by various information saturation:  
 1- 1 ion Cu on  $6 \cdot 10^6$  molecules  $H_2O$ ; 2- 1 ion Cu on  $10^8$  of  $H_2O$ ;  
 3- 1 ion Ag on  $6 \cdot 10^6$  of  $H_2O$ ; 4- 1 ion Ag on  $10^8$  molecules of  $H_2O$ ;  
 5- distilled water (control)

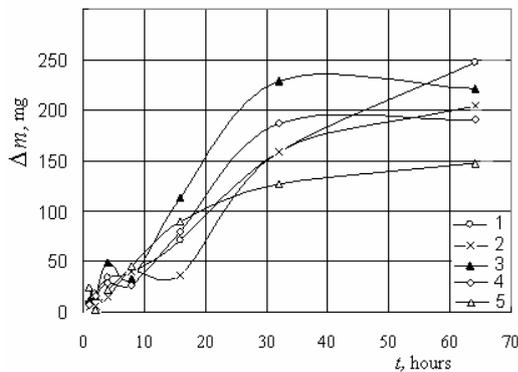


Figure 4.  $\Delta m$  of swelling of peas ( $t$  in hour) under influence of water by various information saturation:  
 1- 1 ion Cu on  $6 \cdot 10^6$  molecules  $H_2O$ ; 2- 1 ion Cu on  $10^8$  of  $H_2O$ ;  
 3- 1 ion Ag on  $6 \cdot 10^6$  of  $H_2O$ ; 4- 1 ion Ag on  $10^8$  molecules of  $H_2O$ ;  
 5- distilled water (control)

Results of experiments on swelling of grains of peas have confirmed the laws previously received by the authors. In consecutive phases of swelling of grains the waters enriched by ions of copper and silver have appeared the most active.

Apparently from Figures 4 and 5, the swelling of peas from used water occurs in the various images. Influences of water with ions of silver and copper concentration 1 ion on  $6 \cdot 10^6$  molecules of water strongly differ.

In all cases within the first hour with an interval of 10 minutes and in further within 64 hours intervals corresponding to swelling phases measured an increment of weight of grains of peas.

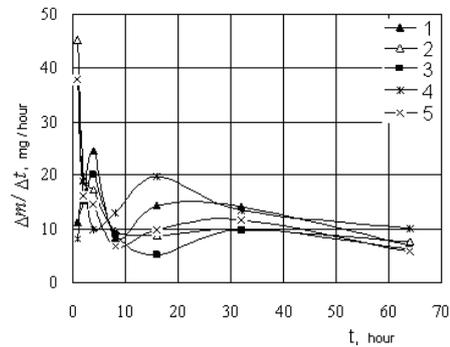


Figure 5.  $\Delta m / \Delta t$  of swelling of grain peas ( $t$  in hour) under influence of biological active water:  
 1- 1 ion Ag on  $6 \cdot 10^6$  molecules  $H_2O$ ; 2- 1 ion Cu on  $6 \cdot 10^6$  of  $H_2O$ ;  
 3- 1 ion Cu on  $10^8$  of  $H_2O$ ; 4- 1 ion Ag on  $10^8$  molecules of  $H_2O$ ;  
 5- distilled water (control)

In all experiments in initial phases the increment of weight and speed functions ( $\Delta m=f(m)$  and  $\Delta m/\Delta t=f(t)$ ) have periodicity explained as follows. The maximum sizes of cages depend on the laws of the physics defining speed of diffusion of molecules or ions of various metals in water environment. In large cases the cytoplasm is divided into structures of the smaller sizes, cellular organelle, appreciably to facilitate possibility of fast interactions between specific molecules at the expense of reduction of a way which they overcome before face and enter reaction with each other. One of the reasons, that the cages have small sizes consists in that that they spontaneously without a stop are stirred [16].

Other reason is connected with existence of an optimum parity between a surface and a cage exchange. Fortunately the surface area in comparison with its volume is great in a cage arrives more number of molecules of water and nutrients in unit of time. With increase in diameter of sphere the relation of the area of its surface to volume sharply decreases under law  $\sim 1/r$ .

Thus it is established that exact measurement of factor of a superficial tension of water, it is possible to supervise degree of activity of water.

#### IV. CONCLUSIONS

The results shown that by enriching the information sated of water using the different metal ions possible to operate water biological activity. It is revealed that more superficial tension of water has its less biological activity. Enriching water by ions of various metals, in particular, by ions of Ag, Cu, and also making active water in a constant electromagnetic field, it is possible to accelerate germinating capacity and swelling of grains of various agricultural crops, for example cereal and bean cultures.

In swelling of grains, the waters enriched by the ions of copper and silver with concentration of 1 ion on 6 million molecules of water have most caused a stir. Thus it is established that based on the exact measurement of factor of a superficial tension, it is possible to supervise degree of activity of water.

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## BIOGRAPHIES



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