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CHANGE BIOPOTENTIAL CUCUMBERS PRELIMINARY TREATMENT OF SEEDS IN A MAGNETIC FIELD

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These results change bipotentsialu sprouts seeds of cucumbers at his treatment in a magnetic field. Established biopotential changes depending on the magnetic induction and velocity of seeds in a magnetic field. Identified the most effective treatment regimes

***Biopotential, cucumbers, magnetic induction, the speed of the seeds*.**

Formulation of the problem. Now the urgent task is to increase the yield of vegetable crops and product quality while reducing the use of chemicals.

This opportunity provides the use of electro-technological methods of processing the seed in the electric field of corona discharge, electromagnetic field, electromagnetic radiation, and more.

Analysis of recent research. Based on the analysis of electro methods of processing the seed crops can conclude that the most promising of these is magnetic treatment. This method is compared with other energy efficient and safer for staff, while ensuring improve productivity, reduce plant disease and improve the quality of vegetable production. For the successful implementation electrotechnologies necessary to establish the mechanism of action of magnetic field on crop seeds and determine the optimal treatment regimes. Now found that under the influence of the magnetic field changes the rate of chemical reactions and their balance shifts [2]. This causes a change in redox potential.

The purpose of research - The establishment of the magnetic field to change biopotential cucumbers.

Materials and methods research. Experimental studies biopotential changes cucumbers were conducted on laboratory facility (Fig. 1). Seeds moved on the conveyor through a magnetic field created by permanent magnets.

In the study of the influence of magnetic induction to change its governing biopotential cucumbers changing the distance between the magnets in the range 0 - 0.5 Tesla. Magnetic induction measured teslameters 43205/1.

The velocity of the seeds through the magnetic field was 0.6 m / s, and temperatures - 20 ° C.

Fig. 1. Device for magnetic treatment of seeds.

Processed in a magnetic field cucumber seed varieties "Skvyrskyi" germinated and measured values of redox potential (ORP) of germs.

To measure the ORP was developed measuring electrode, which is a platinum plate with the sharp tip of a knife. Platinum electrode introduced into the germ sprouted seeds. As an auxiliary electrode used standard hlorsribnyy electrode. With ionomer I-160M determined difference ORP sprouts raw and processed seed in a magnetic field [4]. Experiments performed in threefold repetition, and their reproducibility was determined by criteria Cochran at 5% significance level nom.

The influence of the speed of the seeds at magnetic treatment on change biopotential cucumber sprouts were performed using the method of experimental design [1]. By changing the feedback received biopotential cucumber shoots at magnetic treatment. For important factors took magnetic induction (X1) and the speed of the solution (X2). The limits of change of magnetic induction was determined on the basis of one-factor experiments. The value of the upper, lower and main levels accounted for magnetic induction 0.02; 0.65 and 0.11 T, to the speed of the seeds - 0.4; 0.6 and 0.8 m / s. In studies used a composite orthogonal centrally plan (Table. 1).

1. Matrix experimental design *seed treatment with magnetic cucumbers.*

Telephone point	Type point	*X0*	*X1*	*X2*

1		+	-	-
2	The core of the plan	+	+	-
3	PFE 22	+	-	+
4		+	+	+
5		+	-	0
6	Star point	+	+	0
7		+	0	-
8		+	0	+
9	Center plan	+	0	0

Experiments performed in randomized order in threefold repetition. Each row of the matrix defined planning dispersion and uniformity of criteria checked by Cochran.

The regression equation found in the form:

$$\Delta БП = b_0 + b_1 X_1 + b_2 X_2 + b_{11} X_1^2 + b_{22} X_2^2 + b_{12} X_1 X_2. \quad (1)$$

The coefficients of the regression equation and their significance was determined by a known method, and the adequacy of the resulting regression equation was estimated by Fisher criteria [1].

Results. In the seeds of cucumbers occurring variety of chemical and biochemical reactions that are mainly redox. Stimulation cucumber associated with increasing their speed. Change the speed of chemical and biochemical reactions that occur in the plant cell, affects the biopotential plants.

Under the influence of magnetic field on seed increases the rate of chemical reactions [3]:

$$\omega_i = \omega \exp \mu(\hat{E}^2 \hat{A}^2 + 2\hat{E}\hat{A}v_n) N_a / 2RT, \quad (2)$$

where: ω - speed chemical reactions without the magnetic field, mol / l · s; μ - reduced mass particles kg; B - magnetic induction, T; v - velocity of the particle, m / s; K - coefficient that depends on the concentration and type of ions, and the number peremahnichuvan m / s · T; Na - Avogadro's number, molecules / mol; R- universal gas constant, J / mol · K;

T - Temperature solution C.

Changing the redox potential (ORP) seeds determined by the Nernst equation [5]:

$$\Delta\varphi = S_t(\lg fC_2 - \lg fC_1) = S_t(\lg C_2 - \lg C_1), \quad (3)$$

where: St - steepness of electrode characteristics of the electrode / O units. pX; f - activity coefficient, C1 - concentration of ions to the magnetic treatment, mol / L; C2 - ion concentration after magnetic treatment, mol / L;

or

$$\Delta\varphi = S_t(\omega_2 - \omega_1). \quad (4)$$

Steepness of electrode characteristics is given by:

$$S_t = 2{,}3\frac{RT}{zF}, \quad (5)$$

where: z - valence ion; F - Faraday number, C / mol.

Then change the PLO will be:

$$\Delta ОВП = -\frac{2{,}3^2\,\mu N_a K}{zF}\left(\frac{KB^2}{2} + v_n B\right). \quad (6)$$

Biopotential determined by the formula:

$$БП = 820 - ОВП. \quad (7)$$

Then change biopotential be:

$$\Delta БП = -\frac{2{,}3^2\,\mu N_a K}{zF}\left(\frac{KB^2}{2} + v_n B\right). \quad (8)$$

or

$$\Delta БП = A_1 B^2 + A_2 Bv, \quad (9)$$

where: A1 and A2 - coefficients.

Factors that go into the equation (9) can not be determined analytically. They are determined on the basis of experimental data.

Experimental changes depending biopotential cucumber sprouts of magnetic induction at a speed of seeds in a magnetic field of 0.6 m / s are shown in Fig. 2. Changing magnetic induction from 0 to 0,065 T biopotential value increases and with further increase of magnetic induction begins to decrease. When a magnetic induction greater than 0.15 T magnetic treatment effect is not significant - biopotential cucumber virtually unchanged and does not exceed 32 mV compared with the control.

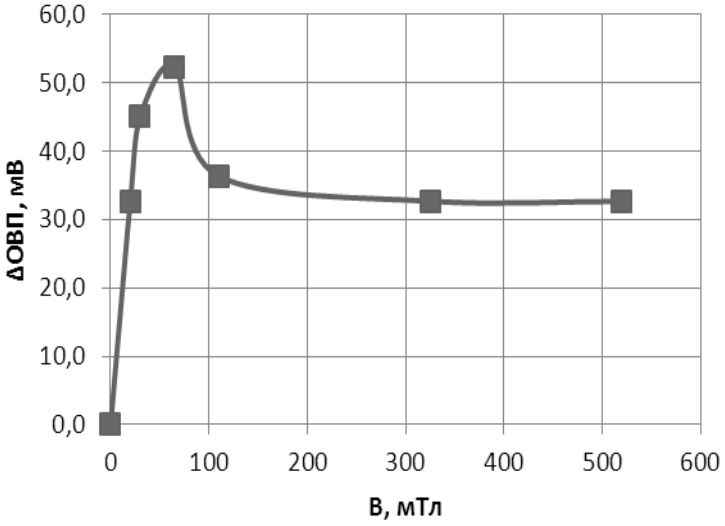

Fig. 2. Dependence of change of biopotentials cucumbers magnetic induction.

The results of the multivariate experiment was obtained regression equation in physical terms is:

$$\Delta БП = 34{,}825 + 1124B - 33{,}426v - 18.519Bv - 8532B^2; \quad (10)$$

Dependence of change of biopotentials cucumbers on magnetic induction and speed in the magnetic processing shown in Fig. 3. Most biopotential cucumbers changes when a magnetic induction of 0,065 T. Reducing the speed of the seeds in the magnetic field leads to an increase of biopotentials cucumbers.

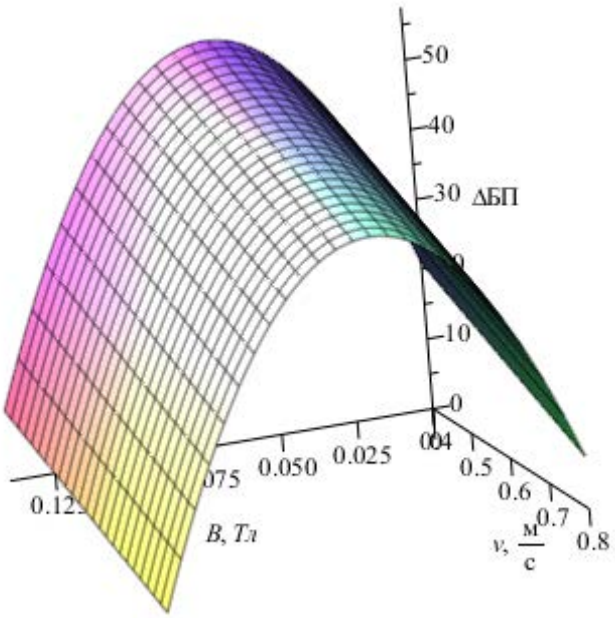

Fig. 3. Change biopotential cucumbers at magnetic seed treatment.

Thus, our experimental studies of changes in bioelectric potentials cucumbers at magnetic treatment confirmed the correctness of theoretical relationships and made it possible to identify the factors that go into these as well.

Conclusion. Found that change biopotential cucumbers at magnetic treatment depends on the square of the magnetic induction and velocity of seeds in a magnetic field. The most effective mode of treatment occurs when magnetic induction of 0,065 T.

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Pryvedeny of research results Changed byopotentsyala rostkov semyan cucumbers at a obrabotku s magnetic field. Ustanovleny dependence Changed byopotentsyala from mahnytnoy induction and velocity of motion semyan a magnetic field. Opredeleny most эffektyvnye regimes processing.

Byopotentsyal, ohurtsy, Magnetic induction, movement velocity semyan.

The results of studies of changes in biological potentials sprouts cucumber seeds as they are processed in magnetic field are described. The dependence of biological potentials on magnetic induction and speed of seeds in magnetic field are determined. The most effective treatment regimes are identified.

Biological potential, cucumbers, magnetic induction, speed of seeds.

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SEQUENCE DETECTING DAMAGE AND DEFECTS ON THE SURFACES

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The conceptual foundations for further technical support as repairs and maintenance of vehicles. The analysis and determined implementation of technological bases of holographic methods for improving the operational safety and reliability of machines in the course of farming operations in crop and livestock production.

Details svlskohospodarski machine damage, defects, holography, flaw detection, diagnosis, non-destructive testing, laser, optical system.

Formulation of the problem. Study damage and defects, determine the parameters of acceptable or marginal conditions, the impact of the change of the surface state of parts of the main types of loads carried on two custom designed plants that provide the necessary parameters of interaction (type of load, type of interference fields, their