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STIMULATE GROWTH OF SEEDLINGS OF CUCUMBER SEEDS UNDER THE INFLUENCE OF COMBINED OPTICAL RADIATION

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The influence of the optical parameters vyrominyuvannya on growth of seedlings of cucumber seeds. Revealed that by the combined action of optical radiation for different processing times increase morphometric parameters studied seedling seed.

Ultraviolet radiation, infrared radiation, seed, crop quality, processing mode.

Features of plant growth and development involving the use of modern technologies of seed to increase yields [6]. These technologies include stimulation of seed germination by the action of growth regulators, as well as of certain physical factors, including treatment with ultraviolet, infrared, laser irradiation, irradiation of the electromagnetic field and so on.

Processing of optical radiation is considered to be one of environmentally friendly technologies increase crop yields [4,5].

The purpose of research - set the exposure radiation on the lamp voltage, temperature, seed treatment, which would ensure the effective stimulation of biological processes in seeds (grains, vegetables, greenhouse, etc.) in their cultures irradiation of infrared and ultraviolet light lamp ART-400.

Materials and methods research. To determine these parameters (voltage lamps ART seed treatment temperature and exposure) conducted multivariate experiment where seeds as a response to the combined optical radiation were taken seed germination.

For the analysis of bulk samples taken seed, GOST 12036-85 selected humidity 12%. On the irradiated seeds Mounting allocated 20 g each. Sprouting seeds were carried out in Petri dishes on filter paper moistened with water at t = 28 ° C according to GOST 12038-84 "Seeds selskohozyaystvennыh cultures. The method for determining vshozhesty. "Every day spent UAH germinated seeds as a percentage relative to the total number of seeds in a batch.

Results. For addiction, which connects the value response function of the inputs (if additive noise random nature), applied povnofaktorne planning the second order. Value factors and their variation intervals are given in Table. 1.

Using standard methods of construction plans for the second order [1,2] constructed a matrix design of experiments, calculation of regression coefficients, adequacy and performance data, as follows.

After the measurements and calculations were obtained regression equation:

$$72,2+1,6\,X_1-3,1X_2+3,22X_3-1,6\,X_1\,X_2+3,2X_1\,X_3-1,6\,X_2\,X_3-$$
$$-1,6\,X_1^2+3,2X_2^2+4X_3^2, \quad (1)$$

where Y - output parameter that characterizes the germination of seeds; X1 - on the lamp voltage, V; X2 - seed temperature, ° C; X3 - exposition, min.

Check significance of regression coefficients performed at significance level α = 0,01 by Student's test [2]. All coefficients in equation (1) proved significant.

Based on data verification equation for the adequacy criterion Fisher [2] concluded that equation describes the actual process and therefore allows us to estimate the impact of each factor on fluctuation response.

To find the optimal points considered system of equations obtained by equating to zero the values of the components of the gradient obtained from the expression [2]:

$$\partial y = 2b_{ii}X_i + \sum_{j=1}^{n} b_{ij}X_j = 0, \quad (2)$$

where Hee, Hj - encoded value factor by which the derivative is taken, and with him interacting factors, respectively; Bi, bii, bij - regression coefficients.

For expression (1) obtained following system of equations:

$$\begin{aligned} \frac{\partial y}{\partial x_1} &= 1,6 - 1,6x_2 + 3,2x_3 - 3,2x_1 = 0; \\ \frac{\partial y}{\partial x_2} &= 3,1 - 1,6x_1 + 1,6x_3 + 6,4x_2 = 0; \\ \frac{\partial y}{\partial x_3} &= 3,22 + 3,2x_1 - 1,6x_2 + 8x_3 = 0. \end{aligned} \quad (3)$$

For the system of equations (3) were the factors mentioned in the optimal point: x1 = -0.016; x2 = 0.401; x3 = -0.315, which corresponds to the value of such natural settings: the voltage of the lamp - 224 V; seed temperature - 46 ° C; exposition - 2.5 min.

Research field crop seed germination due to the fact that the combined optical radiation affects the livelihoods of seed development of these plants and yield.

To conduct field experiments seeds oprominyuvalos combined infrared and ultraviolet optical radiation lamp ART voltage 219 V, 224 V, 230 V at 46 ° C and 1 min exposure, 2.5 min and 5 min.

Field experiments were conducted on the farm,, Plant Greenhouse "Brovary rayon.

Seeds treated with combined optical radiation a day before sowing and vysivalos on an area of 1 m2, directly in the greenhouse (frequency of four times). The density planting technology got out at the rate of 1.4 million units. seeds per hectare. To control vysivalos as seed, untreated combined optical radiation. Control of seed germination was carried out by a statistical method [3].

Results of seed germination and field studies are shown in Fig. 3.

These results imply that the germination of seeds treated with radiation lamps ART voltage 224 V, temperature seed 46 ° C and 5 minutes exposure is 98% in control - 65%. At 2.5 min exposure field similarity changed by only 1% compared to the maximum value. Reducing exposure to 1 min leads to a decrease in germination to 85%.

Germination of seeds exposed lamp voltage ART 219 and 230, different from the control at 5 ... 6%.

Conclusions

The results of processing the results of optical stimulation of seed germination greenhouse crops for example cucumber seeds have confirmed the effectiveness of the combined action of ultraviolet and infrared lamps ART-400.

Field studies have shown that preplant treatment of seeds greenhouse crops optical radiation can increase productivity by 20 - 25%.

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