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ELECTROTECHNOLOGICAL PROCESSING OF SUNFLOWER SEEDS WITH ULTRAVIOLET LIGHT

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Abstract:

Objective. Conducting experimental studies and analyzing the obtained results to confirm that it is possible to increase the fertility and viability of sunflower seeds by electrotechnological treatment with ultraviolet light.

Methods. Experimental studies on the electrotechnological processing of sunflower seeds with ultraviolet light were carried out in four repetitions in the developed ultraviolet irradiator laboratory stent.

Results. As a result of scientific research conducted in the following years, experimental studies on electrotechnological processing of sunflower seeds with ultraviolet light were developed. The obtained results showed that fertility in experiments 5, 8, and 13, viability in experiments 5, 6, and 8, root length in experiments 5, 6, and 11, and plant body lengths in experiments 5, 9, and 11 had the best indicators compared to other options. In the process of electrotechnological processing of sunflower seeds using ultraviolet light, the following parameters and modes were determined: power 30 w, wavelength 253.7 nm, the distance from the irradiator to the seed 10 cm, and the duration of irradiation 10 minutes.

The conclusion. When sunflower seeds are electrotechnologically treated with ultraviolet light, the power of irradiation lamps, the wavelength of ultraviolet light, the distance from the irradiator to the seed, and the duration of irradiation can be controlled. It allows you to irradiate seeds in the proposed method and get quality seeds.

Keywords: Sunflower seed, ultraviolet light, voltage, viability, wavelength, power, irradiator, bud, root, viability.

Introduction. It is known that the quality indicators of seeds prepared for planting play an important role in obtaining a high yield of agricultural crops, including sunflower, along with other agrotechnical measures. Because the use of high-quality seeds with similar biological properties, high germination, germination energy, viability and potential yield in laboratory and field conditions is a guarantee of abundant harvest [1-17].

Materials. To increase the productivity of the sunflower plant, its seeds are processed by chemical and electrotechnological methods before planting. The increase in seed germination and productivity after these treatments is being studied as a result of scientific research and is being used in field conditions.

As you know, ultraviolet radiation is part of the natural solar spectrum. Due to

its various effects, it has attracted the attention of doctors, biologists and other scientists [7, 14].

Today, when agricultural production is intensifying, rational use of new innovative solutions is required to increase crop productivity. These include the control of physiological processes in plants through the use of electrical methods and growth stimulants.

Based on the results of the scientific studies mentioned above, we conducted experimental studies on the ultraviolet radiation of sunflower seeds.

Methods. Experimental studies on the electrotechnological processing of sunflower seeds with ultraviolet light were carried out in four repetitions in the developed ultraviolet irradiator laboratory stent.

The results. In the course of the research, an experimental trial process of increasing the fertility of sunflower seeds of the local "Dilbar" variety was carried out by electrotechnological processing. For each experiment, 100 seeds were isolated. "Quartling" method was used in the process of separating seeds.

During the experiment, 30-watt ultraviolet lamps with a wavelength of 253.7 nm were used. Because the ultraviolet light has the following properties according to the wavelength: A (long wave 315nm - 400 nm) range - aggravation, B

(medium wave 280nm - 315 nm) range - neutralization and C (short wave 200nm - 280 nm) range - stress. This has a positive effect on the development of plants. The conducted research work was carried out in the S band of ultraviolet light.

Based on the above-mentioned studies, studies on determining the optimal parameters of the effect of ultraviolet light on sunflower seeds before planting were carried out in the following order. Experimental experiments were conducted on sunflower seeds of the "Dilbar" variety using ultraviolet radiation. In the technological process, in order to determine the optimal electrotechnological parameters for ultraviolet irradiation of seeds, they were treated for 5, 10, and 15 minutes, and the distance from the irradiator to the seed was 5 cm, 10 cm, 15 cm, and 20 cm. After irradiation, the seeds were placed on wet filter papers, placed in laboratory glass containers and left in a dark place with a temperature of 21-23° [10].

Fertilization of sunflower seeds was carried out visually and by calculation. In the first two days, buds began to appear. After two days, seed germination stabilized, and on the seventh day, all viable seeds were detected.

The results of seed germination and viability under laboratory conditions are presented in Table 1.

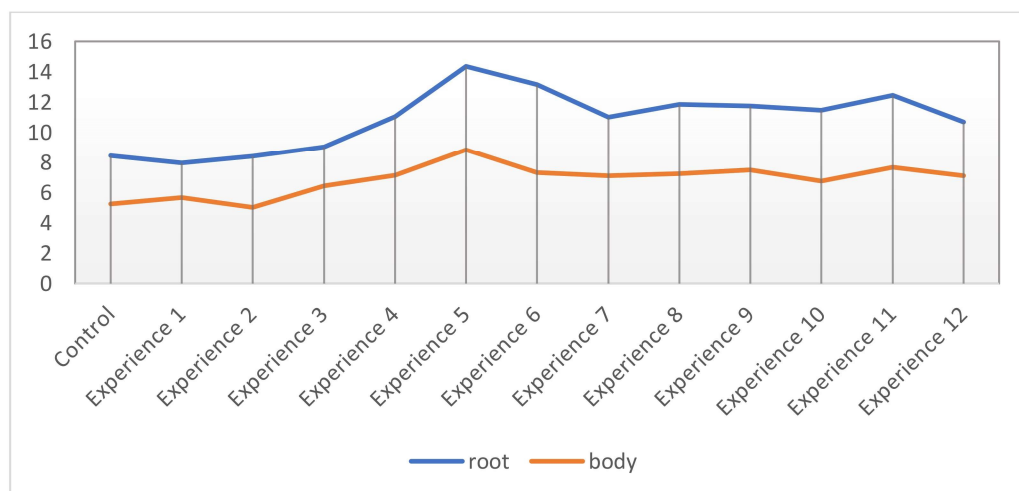


Figure 1. Graph of the effect of ultraviolet light on plant root and trunk

Figure 1 shows the graph of the effects of ultraviolet light on plant roots and stems, showing the best root and stem development in experiment 5 compared to the control and other experiments.

Table 1

Effects of ultraviolet light processing on germination and viability of sunflower seeds

No	Variants	Distance from the irradiator to the seed, cm (h)	Irradiation duration, min (t)	Seed germination %	Seed viability %	Root length (cm)	Plant body length (cm)
1	Control	-	-	94	90	8,45	5,25
2	1- experience Wave length $\lambda=254$ nm	5	5	99	93	7,965	5,66
3	2- experience Wave length $\lambda=254$ nm	5	10	94	88	8,43	5,02
4	3- experience Wave length $\lambda=254$ nm	5	15	99	94	9,04	6,45
5	4- experience Wave length $\lambda=254$ nm	10	5	97	93	11,065	7,13
6	5- experience Wave length $\lambda=254$ nm	10	10	100	97	14,36	8,845
7	6- experience Wave length $\lambda=254$ nm	10	15	99	95	13,15	7,32
8	7- experience Wave length $\lambda=254$ nm	15	5	95	92	11,03	7,11
9	8- experience Wave length $\lambda=254$ nm	15	10	100	95	11,87	7,24
10	9- experience Wave length $\lambda=254$ nm	15	15	99	94	11,77	7,505
12	10- experience Wave length $\lambda=254$ nm	20	5	98.33	90	11,467	6,7667
13	11- experience Wave length $\lambda=254$ nm	20	10	95	88.33	12,45	7,6667
14	12- experience Wave length $\lambda=254$ nm	20	15	100	91.67	10,683	7,1

The results of the experiments show that fertility in experiments 5, 8, and 13, viability in experiments 5, 6, and 8, root length in experiments 5, 6, and 11, and plant body length in experiments 5, 9, and 11 were observed to have the best indicators compared to other options.

Discussions. The analysis of the results presented in the table shows that among the experiments carried out in comparison with the control option, in

experiment 5, it was observed that the length of the root increased by 59.1 mm, and the length of the stem increased by 35.92 mm. Based on this, the following parameters and modes were determined in the process of electrotechnological processing of sunflower seeds using ultraviolet light: wavelength 253.7 nm, distance from the irradiator to the seed 10 cm, and duration of irradiation equal to 10 minutes. At these recorded values,

sunflower seed germination is 100 percent, viability is 97 percent, root length is 14.36 cm, and plant body length is 8.845 cm.

The conclusion. When sunflower seeds are electrotechnologically treated with ultraviolet light, it is possible to control

the power of the irradiation lamps, the wavelength of the ultraviolet light, the distance from the irradiator to the seed, and the duration of irradiation. It allows you to irradiate seeds in the proposed method and get quality seeds.



Figure 2. Examples of experiments

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C O N T E N T S

PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY	
J.Sidiqjanov, N.Nabidjanova	
Development of shrinkage calculation for men's shirt base pattern manufactured by the garment dyeing method.....	3
N.Nabidjanova, J.Sidiqjanov	
Method development of applying shrinkage values into base pattern of men's garment dyed shirt.....	10
F.Bozorova, A.Djuraev	
Experimental review of the rubber pad of the new design of the sewing machine.....	15
M.Mirxojayev	
Manufacture of single cotton fabric with new composition, specified bend from yarn gathered from local raw material cotton fiber.....	22
A.Khamitov, B.Akhmedov, J.Ulugmuradov	
A study to determine the change in porosity indicators of the shoe upper hinge in technology processes.....	28
M.Rasulova, K.Khodjaeva	
Study of operating modes in the process of selection and tailoring of package materials in the preparation of men's outerwear.....	34
M.Chorieva	
Analysis of the protective properties of fabrics for special clothing of oil and gas extraction field workers at high temperatures.....	41
G.Gulyaeva, I.Shin, K.Kholikov, M.Mukimov	
Research of knitting structure stability parameters.....	47
R.Rozmetov	
Study of the influence of drying agent temperature on raw cotton and its components.....	52
A.Gofurov, T.Tuychiev, R.Rozmetov, M.Axmedov	
Results of research on an improved cotton regenerator.....	57
GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES	
A.Mukhammadiyev, I.Usmonov, Sh.Uktomjonov	
Electrotechnological processing of sunflower seeds with ultraviolet light.....	64
A.Yamaletdinova, M.Sattorov	
Application of effective methods in the transportation of high-viscosity oils.....	69
N.Khashimova	
Analysis of the prospectiveness and safety of the use of plant raw materials in the enrichment of flour and bread products.....	76
O.Mansurov, A.Xamdorov, O.Qodirov	
Operation process and experimental results of continuously fruit and vegetable drying equipment.....	81

CHEMICAL TECHNOLOGIES	
B.Uktamaliyev, M.Kufian, A.Abdukarimov, O.Mamatkarimov	
Temperature dependence of active and reactive impedances of PMMA-EC-LiTf / MGTF ₂ solid polymer electrolytes.....	86
M.Ikramov, B.Zakirov	
Innovative completely soluble NPK gel fertilizers based on biopolymers with controlled release of nutrients.....	91
A.Khurmamatov, A.Matkarimov	
Results of experiments of studying the composition and purification of technical waters.....	97
A.Nuritdinov, A.Kamalov, O.Abdulalimov, R.To'raxonov	
Obtaining composite materials based on polycarbonate.....	104
U.Eshbaeva, D.Safaeva, D.Zufarova, B.Baltabaeva	
Ir spectroscopic analysis of biaxially directed polypropylene and polyethylene polymer films.....	110
U.Eshbaeva, A.Nishanov, D.Zufarova	
A new adhesive composition for the manufacture of corrugated cardboard...	115
D.Salikhanova, M.Ismoilova, B.Adashev, M.Muratov	
Analysis of emulsions obtained in ultrasonic homogenizer and magnetic stirrer devices.....	123
S.Ravshanov, J.Mirzaev, S.Abdullayev, J.Obidov	
Comparative analysis of physical-chemical parameters of domestic triticale grain.....	128
M.Urinboeva, A.Ismadiyorov	
Cleaning natural and associated gases from sulfur compounds.....	132
MECHANICS AND ENGINEERING	
U.Kuronbaev, D.Madrakhimov, A.Esanov	
Influence of the clearance between the punch and the matrix on the formation of burr on the insect teeth of the developed saw cutting machine...	135
D.Kholbaev	
Control of cotton pneumotransport facility through scada system.....	142
D.Kholbaev	
Cotton pneumotransport pipeline control through mechatronic (Scada) system.....	147
R.Muradov	
Ways to increase the efficiency of gining machine.....	151
S.Utaev	
Results of the study on changes in the performance indicators of engines when operating in diesel and gas diesel modes.....	155
B.Mirjalolzoda, M.Abduvakhidov, A.Umarov, A.Akbaraliyev	
Improved gin saw cylinder.....	161
ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION	
S.Khudaiberdiev	
Analysis of the most up-to-date server database management systems.....	164
N.Aripov, Sh.Kamaletdinov, I.Abdumalikov	
Using the factor graph to evaluate the quality of output data for shift-daily loading planning.....	170
B.Kholhodjaev, B.Kuralov, K.Daminov	

Block diagram and mathematical model of an invariant system.....	175
A.Yuldashev	
Historical and theoretical foundations of public administration and leadership	184
ECONOMICAL SCIENCES	
A.Isakov	
Strategy and forecasting of effective use of investments in business activity..	188
K.Musakhanov	
Agro-tourism entrepreneurship development model in Namangan region.....	193
N.Makhmudova	
Innovative mechanisms of the development of service sectors in small business and private business subjects in developed asian countries.....	201
Kh.Kadirova	
Conceptual foundations of the development of the financial market of Uzbekistan.....	206
G'.Shermatov, Sh.Nazarova	
Specific challenges of small business utilization in health care.....	211
R.Tokhirov, Sh.Nishonkulov	
Econometric analysis of the impact of innovative development of business entities on economic growth on the example of Uzbekistan.....	215
O.Hakimov	
Problematic issues of taking loans from commercial banks.....	223
T.Musredinova	
Development of an economic strategy for promoting products and services to foreign markets.....	230
F.Bayboboeva	
Fundamentals of economic security in small business activities.....	234
A.Ergashev	
Improvement of commercial banks' capital and its economic evaluation methods.....	240
G'.Shermatov	
Improving the methodology of identifying and management of risks affecting the activities of commercial banks.....	247
Sh.Lutpidinov	
Issues of the development of freelance activity under the development of the digital economy.....	253