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ELECTROTECHNOLOGICAL PROCESSING OF SUNFLOWER SEEDS WITH ULTRAVIOLET LIGHT

MUKHAMMADIYEV ASHIRAF

Head of the laboratory. Institute of Energy Problems of the Academy of Sciences of the Republic of Uzbekistan

USMONOV INOMJON

Head of the department, Institute of Energy Problems of the Academy of Sciences of the Republic of Uzbekistan
E-mail.: others_27@mail.ru

UKTOMJONOV SHERMUROD

Doctoral student of Kokand branch of Tashkent State Technical University named after Islam Karimov
E-mail.: usta101090@gmail.com, phone.: (+99894) 133 62-28

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 21-23º [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.

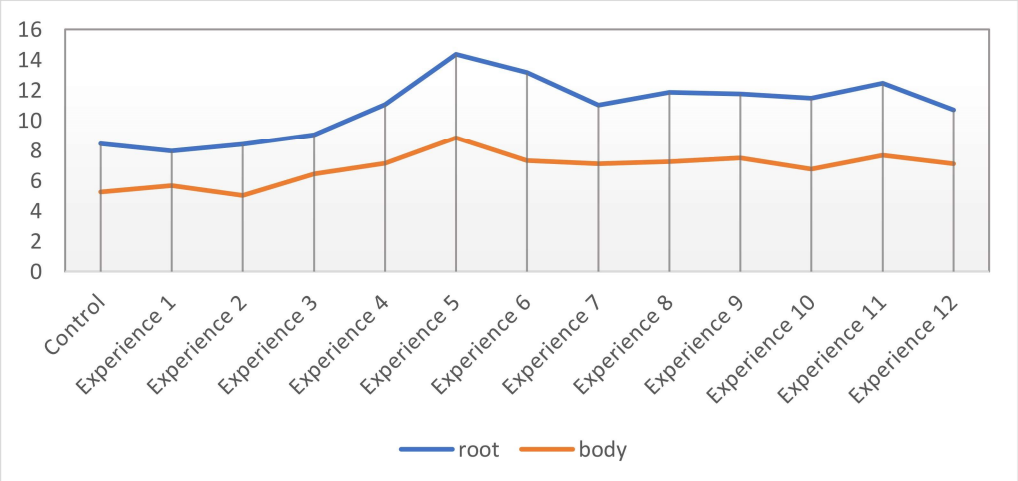

Figure 1. Graph of the effect of ultraviolet light on plant root and trunk

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

№	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 λ=254 nm	5	5	99	93	7,965	5,66
3	2- experience Wave length λ=254 nm	5	10	94	88	8,43	5,02
4	3- experience Wave length λ=254 nm	5	15	99	94	9,04	6,45
5	4- experience Wave length λ=254 nm	10	5	97	93	11,065	7,13
6	5- experience Wave length λ=254 nm	10	10	100	97	14,36	8,845
7	6- experience Wave length λ=254 nm	10	15	99	95	13,15	7,32
8	7- experience Wave length λ=254 nm	15	5	95	92	11,03	7,11
9	8- experience Wave length λ=254 nm	15	10	100	95	11,87	7,24
10	9- experience Wave length λ=254 nm	15	15	99	94	11,77	7,505
12	10- experience Wave length λ=254 nm	20	5	98.33	90	11,467	6,7667
13	11- experience Wave length λ=254 nm	20	10	95	88.33	12,45	7,6667
14	12- experience Wave length λ=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.

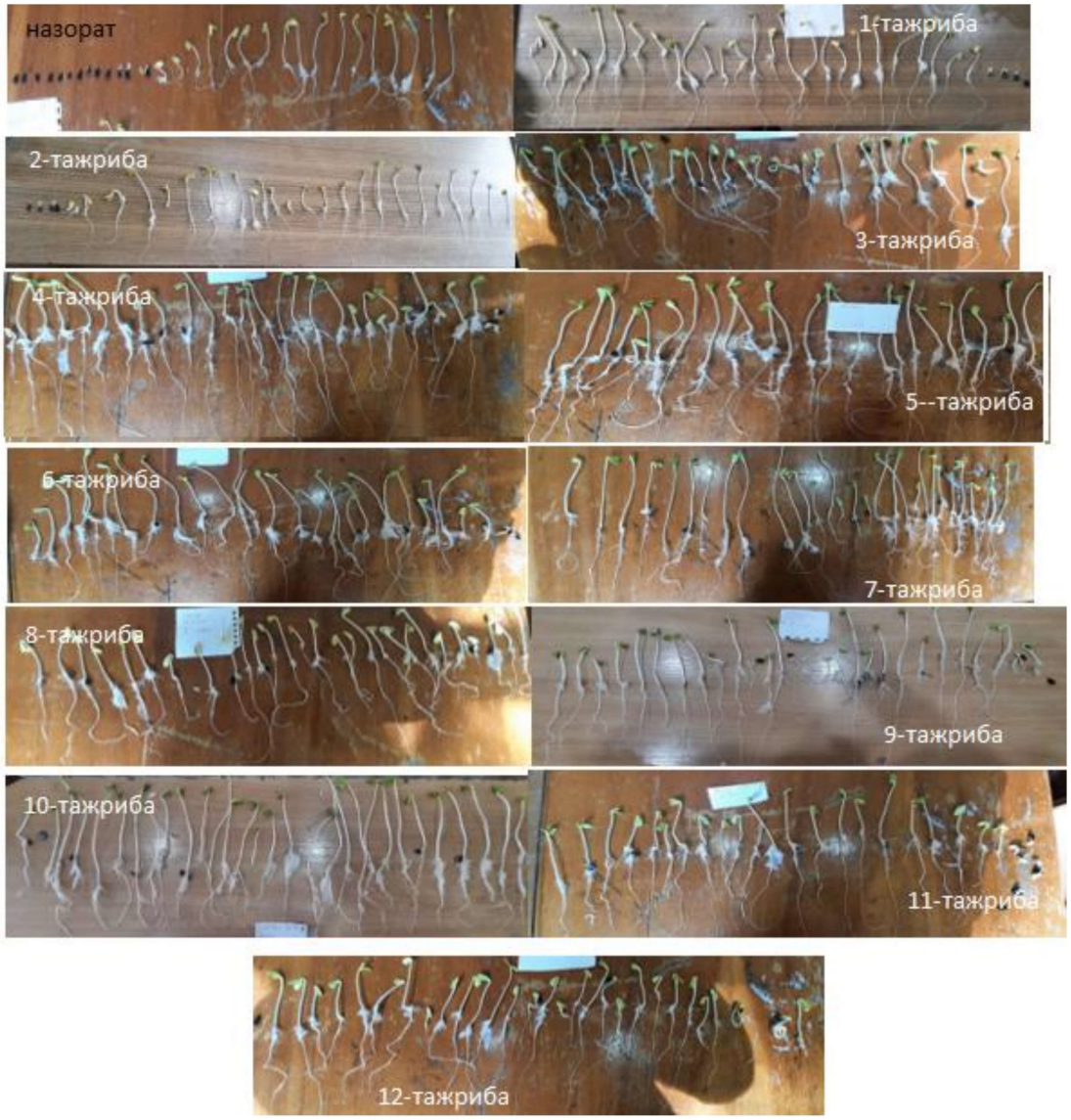

Figure 2. Examples of experiments

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CONTENTS