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On the Order and Essence of Different Methods of Seed Treatment and Soil Preparation of Some Essential Oil Plants

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Abstract This article provides data on the study of the effects of ultraviolet radiation and recommendations for the cultivation of essential oil crops, which are currently essential products in the pharmaceutical industry. This article mainly, provides information on the order of cultivation of essential oilseeds before sowing and the treatment processes using different effects before sowing the seeds of sown plants.

Keywords Medicinal, Seed, Plant, Soil, Layer, Processing, Cultivation, Raw material, Ether, Resource, Technology, Ultraviolet rays, Electromagnetic field

1. Introduction

In the Decree of the President of the Republic № PD-4670 dated April 10, 2020 "On measures for the protection, introduction, processing and rational use of available resources of wild species of medicinal plants", Presidential Decree № PD-5229 dated November 7, 2017 "On measures of pharmaceutical sector to improve the system, as well as the Decree of the President of the Republic of Uzbekistan № PD-5742 dated June 17, 2019 "On measures for the efficient use of land and water resources in agriculture" and "Action strategy for the development of the Republic of Uzbekistan for 2017-2021 on 5 priority areas of the environment - the protection of the natural environment and measures to solve the environmental problem without harming the health of the population, the timely and unconditional implementation of the measures that we have carried out in the framework of scientific research.

Objective: to assess the nature of the impact of ultraviolet rays and electromagnetic fields in a temporary mode on the treatment of seeds of essential oil plants.

In recent years, the country has achieved high incomes by improving land and water relations, optimizing agricultural land and simplifying the procedures for their distribution, introducing modern market mechanisms in the use of land and water resources, innovative and resource-saving technologies, and reducing fields of low-yielding cotton and grain crops. Systemic measures are being taken to grow export products [1].

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2. Main Part

It is known that most of the drugs produced by pharmaceutical companies around the world are made from medicinal plants. The rapid development of the pharmaceutical industry in many countries, including the Republic of Uzbekistan, has led to a sharp increase in demand for such medicinal plants. It should be noted that, due to the limited resources of naturally growing medicinal plants, the pharmaceutical industry can meet the need for medicinal plant raw materials, mainly through the cultivation of medicinal plants.

In recent years, the country has carried out consistent reforms in the field of protection of medicinal plants, rational use of natural resources, the creation of plantations for the cultivation of medicinal plants and their processing.

In Uzbekistan, there are over 4300 plants belonging to the local flora, 750 species are medicinal, of which 112 species are registered for use in scientific medicine, of which 70 species are actively used in the pharmaceutical industry.

In 2019, US $ 48 million worth of processed products was exported [2].

However, due to the fact that the technology of growing medicinal plants has not yet been worked out in specialized farms, forests, dekhkan farms and other forms of ownership in the country, they are grown without scientific justification. Therefore, providing the pharmaceutical industry with high-quality, abundant, inexpensive and environmentally friendly raw materials remains a serious problem. This, of

course, requires that farms engaged in the cultivation of medicinal plants be provided with specialists who are well versed in the technology of cultivation of medicinal plants [3].

At present, the destruction of the ozone layer under the influence of the anthropogenic factor continues. In this regard, the study of the influence of ultraviolet radiation and electromagnetic fields on plants is highly relevant both from a theoretical and practical point of view.

Research work is aimed at improving the technology of growing essential oil crops. The work was carried out in areas with different soil, water and climatic conditions. At the beginning of the experiment, the soil was cultivated first.

Soil fertility and obtaining high crop yields depend on agrotechnical measures, tillage and preparation of the soil. Because, with proper soil cultivation, the state of physical, chemical and biological properties improves and the efficiency of agrotechnical measures increases. It is impossible to introduce a plant into a culture without soil treatment.

The soil, if necessary, should be softened in the arable horizon. With surface plowing, organic and mineral fertilizers, microorganisms of the arable horizon of the soil are distributed evenly, which leads to an increase in soil fertility. When the soil is compacted, the capillary porosity increases. In the lower layers of the soil, due to the moisture reserve, the sown seeds are provided with sufficient moisture. In irrigated agriculture, land leveling is of great importance for the cultivation and care of crops, which creates conditions for high-quality planting, irrigation and care.

Presowing soil treatment is carried out to create favorable conditions for full germination of seeds and subsequent care. Through cultivation, the soil is given the desired structure and moderate density, and weeds are removed.

Tillage is carried out as follows:

- current land planning;
- sowing the same depth of seeding and mass growth to provide a soft soil layer;
- weed control.

The evenness of the soil allows the seeds to be at the same depth, which makes it possible to water efficiently. The quality and efficiency of all maintenance work carried out during the growing season largely depends on the evenness of the fields. Every year, when plowing fields, it is necessary to inspect the furrow, where the tractors turn the ground, the land is leveled. A base grader, reinforced concrete beams and wooden rollers are used to level the ground.

Another activity is related to moisture and softening of the soil layer. Soil preparation for sowing begins with harrowing.

When harrowing, it is necessary to maintain moisture in a soft soil layer and eliminate weeds. Preparing the land for planting begins with plowing. During the rainy season, attention should be paid to soil, moisture and its integrity. The soil should be in a granular state and with crushed soil. Retention of moisture in the soil is achieved.

Harrowing is often done in conjunction with mulching. Weed germination can be stopped by harrowing, where moisture is retained and evaporation is prevented [4].

Plants with a high content of essential oils and other biological compounds are widely used in medicine, as well as raw materials for the pharmaceutical, food, cosmetic and perfume industries. The most promising are essential oil plants, which we studied in two environmental conditions.

The studied essential oil plants do not grow in the desert zone, their germination under natural conditions due to global climate change and the lack of moisture is low. Therefore, it seems relevant to research aimed at finding ways to influence seeds in order to increase their germination, activate vital processes, but at the same time do not reduce the quality of phyto-raw materials.

For the research work were selected plants narrow-leaved lavender - *Lavandula officinalis L*., Oregano - *Origanum vulgare L*., Salvia officinalis - *Salvia officinalis L*., Elecampane high - *Inula helenuim L.* with essential oils and medicinal properties.

In medicine, seeds, flowers, leaves, sometimes roots and rhizomes of essential oil are used as a remedy for various diseases and as an antiseptic [5,6].

In our research work, we carried out pre-sowing treatment of the seeds of the selected plants. The treatment was carried out in order to obtain the maximum germination of seeds. The epidermis of plant leaves and seed shells are permeable to medium and long wave UV radiation [7].

The seeds of the selected essential oil plants were treated with UV rays and an electromagnetic field in the laboratory of the joint stock company “SCB Agromash” under the Ministry of Agriculture of the Republic of Uzbekistan. Plant seeds were treated in the following order:

At the first stage, the seeds were irradiated with ultraviolet light (UV) (Table 1).

Table 1. Ultraviolet (UV) irradiation of seeds

Plant name	*Salvia officinalis* L.	*Lavandula officinalis* L.	*Inula helenuim L.*	*Origanum vulgare* L.
Irradiation time	$9^{05} – 9^{20}$ $9^{05} – 9^{25}$ $9^{05} – 9^{30}$	$9^{05} – 9^{20}$ $9^{05} – 9^{25}$ $9^{05} – 9^{30}$	$9^{05} – 9^{20}$ $9^{05} – 9^{25}$ $9^{05} – 9^{30}$	$9^{05} – 9^{20}$ $9^{05} – 9^{25}$ $9^{05} – 9^{30}$

To irradiate the seeds, 300 seeds were isolated from each of our plant species, and 100 seeds were placed at 3 different levels of radiation. In addition, 100 seeds were obtained for control as we would need untreated seeds to get the results of the above effects.

At the second stage, the seeds were treated in an electromagnetic field (EMF) (table 2).

In this case, 300 seeds were isolated from each of our plant species for treatment of seeds in an electromagnetic field, and the seeds were placed in 3 different radiation levels, 100 pieces each. In addition, 100 seeds were obtained for control as we would need untreated seeds to get the results of the above effects.

Table 2. Electromagnetic field (EMM) treatment procedure

Plant name	*Salvia officinalis* L.	*Lavandula officinalis* L.	*Inula helenuim L.*	*Origanum vulgare* L.
Irradiation time	9^{08} - 9^{23} 9^{08} - 9^{28} 9^{08} – 9^{33}	9^{08} - 9^{23} 9^{08} - 9^{28} 9^{08} – 9^{33}	9^{08} - 9^{23} 9^{08} - 9^{28} 9^{08} – 9^{33}	9^{08} - 9^{23} 9^{08} - 9^{28} 9^{08} – 9^{33}

At the third stage, the seeds were simultaneously irradiated with ultraviolet light and treated with an electromagnetic field (UVI + EMF) (Table 3).

Table 3. Simultaneous radiation of seeds with ultraviolet light and treatment with an electromagnetic field (UVI + EMF)

Plant name	*Salvia officinalis* L.	*Lavandula officinalis* L.	*Inula helenuim L.*	*Origanum vulgare* L.
Irradiation time	9^{47} – 10^{02} 9^{47} – 10^{07} 9^{47} – 10^{12}	9^{47} – 10^{02} 9^{47} – 10^{07} 9^{47} – 10^{12}	9^{47} – 10^{02} 9^{47} – 10^{07} 9^{47} – 10^{12}	9^{47} – 10^{02} 9^{47} – 10^{07} 9^{47} – 10^{12}

At this stage, the seeds were irradiated with ultraviolet light and treated with an electromagnetic field simultaneously with the same 2 different effects as above.

Thus, in our study, 1000 seeds of each plant species were selected. Seeds were selected by the method of determining the quality of plant seeds [8].

Treatment of plant seeds in UV, EMF and UV + EMF can be seen in the following diagram (Fig. 1).

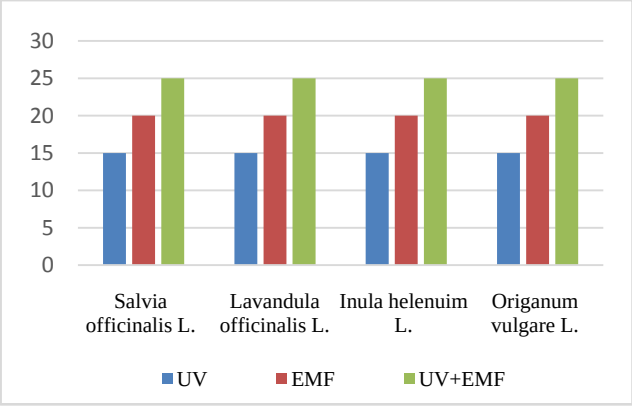

Figure 1. Degree of seed treatment (processing time in minutes)

Plant seeds after treatment with UVI, EMF and UVI + EMF on the same day from 1400 to 1800 were sown in the National Botanical Garden of Uzbekistan, Faculty of Biology, Tashkent. According to our research plan, the seed treatment was carried out twice, because the sowing of the treated seed was carried out under two different conditions. The second seed treatment was carried out after 7 days in the same order. The research was carried out in the same way as in the first experiment.

Plant seeds, treated with UVI, EMF on the same day from 1400 to 1800 according to the study plan, were sown in the experimental plot of Tazhribakor, Syrdarya region, in the vicinity of Gulistan district. According to the plan of research work, furrows and aisles were separated, depending on the type of plants, and planting work was carried out.

The purpose of using these methods is to maximize seed germination. After irradiation, the seeds become active due to metabolism and begin to multiply, and at the same time pass into a state of germination. Ultraviolet rays cause changes in nucleic acids that affect the growth, division, heredity of cells, i.e. the main manifestations of life [9].

We have achieved good results thanks to our research methods. Moreover, the germination capacity of the irradiated seeds was higher than that of our control seeds. The seeds of UVI, EMF and UVI + EMF are processed at all three levels. In 20 minutes of irradiation, the germination rate reached 95-98%. The rest of our irradiation work also showed better results than seeds obtained for control, i.e. seeds sown for control germinated 75-82%, treated for 15 minutes 86-91%, and treated for 25 minutes observed 90-93% seed germination.

3. Conclusions

Improving the condition of the soil before sowing essential oil plants leads to a positive result - this is the first step to a positive result of the work that we started.

Treatment of plant seeds in UVI, EMF and UVI + EMF serves to ensure high germination of seeds. This results in less damage during seed germination. In the course of research, the stimulation of germination and the energy of seed germination have been ascertained.

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