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RESULTS OF LABORATORY RESEARCH ON ENVIRONMENTAL CONTENT IN PHYSICS INSTRUCTION IN RELATION TO OCCUPATIONAL EDUCATION.

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Laboratory work on the study of the effect of electric current on cotton.
Aim: To inform students on how electric current, which travels through the soil, affects the growth, development, and productivity of a cotton field.
Necessary materials: 1) power source; 2) connecting wires; 3) carbon electrodes; 4) copper oxide rectifiers; 5) ruler; 6) clock; 7) thermometer; 8) different types of cotton.
Procedure: The goal is to study the effect of this current on the growth and development of cotton when the current passes through the soil. Because soil and cotton contain solutions of various salt and acid ions with certain concentrations. Soil contains calcium carbonate, sodium sulfate, sodium chloride, calcium chloride and other salts of hydrochloric acid. If the soil is artificially electrified or a certain amount of current passes through the soil, the effect of this current on cotton growth and development will be significant.

Soil water can be called a soil solution because substances are present in it as a true or colloidal solution. Gases in soil air in the soil solution - CO2, O2, N2, etc., anions - HCO3-, NO3-, NO2-, PO3-, Cl-, SO42-, cations - Ca2+, Mg2+, K+, NH4+, AL3+ trace elements - copper, zinc, lead, nickel, cobalt and other water-soluble organic compounds - carboxylic acids, amino acids, carbohydrates, alcohols and others are dissolved.

Soil arrangement assumes a significant part in its life and plant sustenance. The presence or nonappearance of particles of specific substances in the dirt arrangement shifts as per regular circumstances, particularly climatic circumstances.

There is a sum accessible in the dirt. At the point when manganese, copper, molybdenum, and in a few explicit circumstances, cobalt, zinc, iodine and other microelements are deficient with regards to, explicit illnesses are seen in crops, which produce low and low quality yields. For this situation, the utilization of fitting microfertilizers disposes of plant illnesses and works on the yield and nature of plant items. In many plants, how much sugar, starch or protein, nutrients and fats increments affected by micronutrients. The obstruction of plants to dry spell, high and low temperatures expands, their harm brought about by bugs and illnesses diminishes.

The lack of certain trace elements in the soil can be determined by the appearance of specific symptoms on the appearance of plants. It is also possible to find out the lack of microelements in plants. In this case, the growth and development of the plant slows down, they produce less. It is necessary to develop new methods of assimilation of microelements. In this case, the simplest method is absorption of microelements by plants as a result of electric current.
It is important to know the optimal value of the current density passing through the soil in the area of \uza.
For example, the optimal value of current density for cotton has been determined from scientific research
It is equal to 2.10-8-5.10 –8 A / cm2.
It is known that the current passing through the soil represents the one-way movement of ions in the soil or solution under the influence of an external electric field.

The acid, base and salts in the soil conduct electricity. Solutions that conduct electricity are called electrolytes. Electrolytes are separated into ions, electrolytically dissociated.

At the point when no power is gone through the electrolyte, the particles are equally disseminated all through the volume of the arrangement. At the point when an electric flow is sent from the dirt, cations go to the cathode, and anions go to the anode, so their number in the cathode and anode parts changes. As

the temperature climbs, the versatility of particles increments because of the lessening in arrangement consistency. The flow through the dirt addresses the one-way development of particles in the dirt or arrangement affected by an outside electric field. It, thus, influences the mineral supplements that cotton gets from the dirt through its underlying foundations.

Likewise, the particles in the soil and cotton collaborate with one another and emphatically affect the development and improvement of cotton.

Plants contain a great deal of nitrogen, phosphorus, potassium, magnesium, and iron, they are macroelements. Components like boron, copper, zinc, manganese, cobalt, and molybdenum are tracked down in limited quantities, and they are minor components. Micronutrients are required by plants just in restricted sums. Minor components can be caught up as anions and cations.

In field conditions, research facility work can be done at the exploratory site. For this, you want to get a consistent current source. Proper rectifiers are utilized as a consistent current source.

Graphite is utilized as terminals. For this examination, it is suitable to utilize a detached terminal like graphite, since copper, zinc and other metal cathodes respond with soil arrangements and delivery a lot of minor components. These microelements adversely affect cotton. If copper or zinc is the electrode, they will react with the elements in the soil.

$$Cu + 2\,H_2SO_4 + CuSO_4 + SO_2 + 2\,H_2O$$

$$3\,Cu + 8\,HNO_3 + 3\,Cu(NO_3)_2 + 2\,NO + 4\,N_2O$$

$$Zn + 2\,HCl + ZnCl_2 + H_2$$

$$Zn + 2\,NaOH + 2\,H_2O + Na_2[Zn(OH)_4] + H_2$$

During laboratory work, electrodes are placed at different distances from the cotton.

The value of the supplied voltage is in the range of 5-10 (V), and the value of the current is taken in relation to the surface unit.

Of course, it is desirable to perform the laboratory work during the day, that is, when the photosynthesis reaction takes place. Laboratory work can be carried out in different cases, that is, at different values of voltage and current, at different intervals of electrodes.

1. Assembling an electric circuit using different types of soil cotton plant, carbon electrodes, voltmeter, ammeter, connecting wires, rectifier.

2. Determination of current density j using physical quantities such as I, U, R, p.

3. To observe the effect on the growth and development of cotton by passing a vine through the soil of the field where the seed was planted.

4. Observing the interactions between the ions in the soil and the cotton when the current is passed through the soil in the cotton field.

N	Name of the plant	Tension B	Amperage A	Electrolyte range, sm.
1. 2. 3.	Cotton Melon Watermelon			

Table 1.

After studying the topic "Movement of molecules", it is advisable to carry out laboratory work on topics such as "Determining the period of watering cotton depending on the curling of its leaves, i.e. drying", "Irrigation norms taking into account the temperature".

High-quality preparation of the land for planting, obtaining a high yield from the land where the seeds are sown are the main activities of agrotechnics, and in performing such work, students are required to acquire theoretical knowledge of physics, chemistry and biology, in addition to practical skills and competencies related to agrotechnics. The questions in the "Physical" section are a necessary step in the formation of students' understanding of agrophysics.

When studying the "Fundamentals of molecular physics and thermal phenomena", students should know the physical laws of the development of agricultural plants, pay great attention to the study of atmospheric phenomena and atmospheric pressure. It also requires a conscious approach to determining the timing of watering cotton. A number of assignments are based on issues such as the effects of electrical phenomena on agricultural plants, the nature of biopotentials and biocurrents in plants, the effect of soil electrification on plant growth and development, and plants in high-frequency electric fields.

Also, students will be shown experimentally the effects of electrical phenomena in the atmosphere on plant organisms. While studying "Atomic and nuclear physics", the students got acquainted with the problems of the effect of radioactive rays on the growth and development of cotton, radioactive irradiation of seeds before planting, improvement of selection work, increase of yield. We will briefly introduce some of the conducted laboratory works.

1. Explain the effect of humidity on the growth of cotton high class.

2. Determining the need for watering depending on the wilting of the cotton leaves, i.e. shriveling / upper class /.

3. Soil electrification to cotton growth and development
influence / upper class /

4. Effect of radioactive radiation on cotton growth and development, productivity / upper class /

It is realized that there are plant juices in organic products, leaves and different pieces of plants, and in the event that terminals are brought down into this squeeze, a feeble compound current source is framed, and the EC in it relies upon the thickness of the electrolyte. Understudies are informed that it is feasible to decide the thirst of plants for water and watering periods from such "current sources".

Giving data about the electrical opposition of the leaves of the cotton plant, directing tests on it assists increment the interest of understudies in concentrating on material science completely and profoundly.

Some research facility work and examinations in physical science were utilized to concentrate on chosen materials connected with seed planting and cotton care top to bottom.

Completing research facility work permits understudies to become familiar with the laws of nature, to utilize instruments accurately, to shape commonsense abilities and capabilities, to work freely, to deliberately apply hypothetical information to rehearse, that is to say, to production decreases.

Research center chips away at the substance of tracking down the sliding contact coefficient of the dirt, deciding the thickness and porosity of the dirt, soil and seed dampness, heat limit and warm conductivity of the dirt with respect to the proposed seeder (procedure) and innovation.

are introduced in Table 2.

Laboratory work with environmental content in teaching physics in connection with labor education

N	The topic of laboratory work	Classes		
		VII	VIII	IX
1.	Determination of soil and seed moisture		+	
2.	Determinationofsoilandseedcapillarity.		+	
3.	Study of the effect of electric current on cotton.		+	
4.	Ultrasonic treatment before sowing.			+
5.	Experimental determinationof the effect of electromagnetic			+

	waves and isotopes on seeds.			

Table 2

During the growing period of cotton, the temperature is high in the upper layer of the soil during the day, and the temperature is the same in the defined soil layers at night. First, when the weather is cold, it is important to maintain the same specific heat capacity and temperature of the soil in different layers of the soil, that is, at certain depths. Secondly, the thermal conductivity of the soil is of great importance for plant life, and the soil can cool down after a long time, or on the contrary, it can cool down quickly.The specified laboratory work can be performed by students in class and extracurricular activities, as well as in production practice.

Below we will consider some of the laboratory work performed in different classes.

Assessment of the impact of the electric field on the seed

The purpose: To familiarize understudies with the nature of germination of seeds established affected by an electric field, to acquaint them with the logical and research works of Uzbek researchers who are making in the field of applying an electric field to seeds and other plant seeds.

The substance of the work: It is realized that dry seed is a dielectric. Assuming that the seed is set in an electric field, it will be captivated by the electric field. Thus, the germination of seeds is of great and the yield is high.

Employees of research institutes of Experimental Biology of Plants and Nuclear Physics in Tashkent conducted a series of laboratory works on the effect of electric field, radioactive and X-ray rays on seeds of various types.

Germination is accelerated due to the effect of the electric field on the seed.

It has been shown that the development and advancement of seeds is advanced affected by an electric field. For instance, up to 6 ts of wheat seed in an electric field or 25% higher seed quality and yield contrasted with control wheat relies upon the bearing and term of the electric field openness.

Speed increase of seed germination is of incredible financial significance. Early germination of seeds, thus, permits to save the seed financially. In school conditions, it is feasible to utilize an electrophoresis machine and an anode battery as an electric field to light seeds. An electrophoresis machine makes an electric field between level capacitor plate.

The potential difference created between the capacitor plates using an electrophoresis machine is measured using a S-96 type kilovoltmeter. It is determined that the voltage is close to 18 kV when the distance between the conductor balls of the electromagnet machine and the discs with a diameter of 40 cm is 3 cm.

To process the seed in the electric field, it is necessary to place the seed on the bottom of the plate of the electrophoresis machine, and then create an electric field. It is ecologically desirable for the value of the electric field to be normal.

In order to achieve high accuracy, each experiment should be carried out three times at different times with seeds in 3 packets in an electric field of the same intensity.

The seed intended for the experiment must be of the same variety, of the same mass, and of the same shape. During the preparation of the experiment, the reader will learn that the intensity of the electric field affecting the seed is 1-6 (kV/cm) and the duration of the field is 1-5 (s).

Equipment: Flat capacitor of electrophoresis machine, paper bag with seed, scales and stones, 2 same pole switches.

Procedure:

1. Prepare 6 paper bags with 100 seeds of different sizes each.
2. Making an electrical circuit consisting of capacitor plates of an electrophoresis machine and a switch-on device. For this, the wire going from the conductor ball to the electro machine, to the capacitor plates is placed in a single-pole switch-on device.

3. The number of seeds on the lower condenser plates is recorded. Balls are placed at a distance of 3 cm from the condenser. The electric field strength is equal to E + 6 kV/cm. It is necessary to connect the switch and record with a stopwatch how long the seed was in the electric field / t q 10 s /.

4. The seeds placed in the electric field should be put in a bag, and it is necessary to write down the magnitude of the electric field intensity / E and t /.

5. Repeat the experiment at Eq6 kV/cm, tq5 s and tq2 s for seeds in another bag.

Perform the experiment at an electric field strength of E q 10 kV/cm and fill in the table.

Questions for self-examination.

1. How does an electric handle influence a seed?
2. What ought to be the size of the electric handle strength following up on the seed?
3. How could a seed be handled in an electric field?
4. Which of its actual properties change when the seed is treated in an electric field?
5. How to actually look at the aftereffects of the investigation?

Electric field strength E (kv/sм)		Experience numbers		
N		1	2	3
1.	6	2	5	10
2.	8	2	5	10
3.	10	2	5	10

Table 3

Experimental determination of seed moisture. In class X, the laboratory is performed using devices such as a fiber hygrometer and a psychrometer to measure the absolute and relative humidity of the room. Based on the above concepts, seed moisture can be found experimentally using a drying cabinet as follows.

Tools and materials. 1. Hygrometer, psychrometer. 2. drying cabinet. 3. Metal plates are made of copper, iron, aluminum. 4. Wire conductors of different resistance. 5. Electric light bulb or kerosene lamp. 6. Bux. 7. Sample of seeds.

Drying cabinet is rectangular or cylindrical, made of metal plates, copper, iron, alumin.The bureau can be warmed by electric flow utilizing an opposition wire, an electric bulb or a lamp fuel light. While warming with an obstruction wire, the temperature is kept consistent at a specific level by setting an indoor regulator in the dryer bureau.

Within the drying cupboard is partitioned into a few racks with the assistance of punctured metal plates. On these racks, an example of the seed to be dried is put with a container. There are two openings on top of the bureau, a thermometer is put in one, and one serves for the arrival of water fume. On the front side, there will be major areas of strength for an entryway.

Leaving a hole in the dryer cabinet and covering it with a movable cover allows the cabinet temperature to be controlled.

The temperature inside the cabinet should be brought to 105-110(0C). Because when you open the closet and put the clothes on, its temperature drops to 80-85 (0 C). After the box with the seed is kept in the cabinet for 1.5 hours, one box is taken as a sample, its mass is determined using a weighing scale, after knowing the number of the box, it is put back in the cabinet and weighed again after half an hour. If the mass difference does not exceed 0.1 g at the next weighing, drying is stopped.

$\eta\kappa \frac{m_1 - m_2}{m_1} 100\%$ /1/ determined using this formula.

Notwithstanding dampness identification, there are various techniques, for example, buildup mechanical assembly, power meter, heat, mugginess meter and infrared beams.

To explore in the example, it is important to accomplish the accompanying work, that is to say, a light with a force of 500 W is introduced on a mount and associated with a power source. In addition to moisture detection, there are a number of methods such as condensation apparatus, electricity meter, heat, humidity meter and infrared rays.

Experiment on determination of seed moisture using infrared rays: We will discuss the experimental determination of seed moisture using infrared light below.

Tools and materials: 1. Technical or analytical scales. 2. Libra stones. 3. A light bulb with a power of 500 W. 4. Aluminum box. 5. Seeds.

In order to experiment in the lesson, it is necessary to do the following work, that is, a light bulb with a power of 500 W is installed on a tripod and connected to a power source. 50 g of the seed mass, which is resolved utilizing a specialized or logical equilibrium, is taken and spread in an exceptional aluminum box 10 cm away from the spot where the illumination of the electric bulb falls. The mass of the aluminum amalgam is resolved utilizing a logical equilibrium. After the seed is illuminated for 1-1.5 minutes, it is turned over and the opposite side is additionally lighted for 1-1.5 minutes. Subsequent to shutting the container, the mass of the dried still up in the air.

$$\text{Seed moisture}\eta = \frac{m_1 - m_2}{m_1} \cdot 100\% \qquad /2/$$

determined using this formula.

The experiment can be repeated a second time by taking 1 g of seed. The 100 g seed sample obtained in this way is spread on an aluminum plate with a size of 15 x 15 /cm2/. Then the second side of the seed is turned over, irradiated for another 2 minutes, placed in a box and its mass is determined. After determining the seed mass after irradiation, the moisture content is calculated using the formula /2/. The results of both experiments are close to each other.

From the experiment, it is concluded that the moisture content of the seed refers to the mass of water released as a result of drying.

An experiment on leaching soil salt using elect: It is known that if the water permeability of the soil is small, then the effectiveness of washing the soil salt will be low. At this time, the use of constant electric current in the scientific research on increasing the water permeability (filtration) property of the soil shows that the method of electromelioration is appropriate. With the help of constant electric current, physical and chemical processes take place in the soil, the water-air and nutrient regime of the soil is improved, salts harmful to plants are removed from the soil. In the electroremediation method, anode and cathode electrodes are placed on the ground at a certain distance from each other in order to wash the soil salt.

Anode consists of several electrodes welded together and located at a certain distance. Then a constant electric current is supplied to the cathode by the anode. Let's look at some of the complex physical and chemical processes that occur in saline soil under the influence of constant electric current. In a constant electric field, the positive and negative ions in the soil begin to move towards the opposite electrodes. In this process, hydrogen ions are separated and accumulate around the cathode in the form of gas, while sodium and calcium ions do not accumulate on the cathode, they accumulate around the cathode and begin to form alkaline solutions.

$Na^{\kappa} + OH^{-} \rightleftarrows Na\,OH$

$Ca^{2\kappa} + 2\,OH^{-} \rightleftarrows Ca\,/OH/_2$

At the non-oxidizing graphite, platinum anode, gas is released and anions are oxidized:

$$4\,ON^- - 4e \rightarrow 2\,H_2O + O_2$$

$$2\,CL^- - 2\,e \rightarrow CL_2$$

If the anode is oxidizing, for example steel, the material is oxidized:

$$Fe - 2\,e = Fe^{2+}$$

Iron ions react with water to form Fe(ON)2 and increase the concentration of hydrogen ions:

$$Fe^{2к} + 2\,H_2O \qquad Fe(OH)_2 + 2\,H^+$$

Consequently, in the climate around the anode, how much rN diminishes, and around the cathode, it increments. At the point when pH diminishes in the climate affected by a steady electric flow, the hydrogen particle uproots sodium into the dirt arrangement, because of which the sodium particle moves to the cathode.

At the point when the particle assimilated at the cathode is extracted from the dirt, the convergence of Sa2 particles in the dirt arrangement increments. Recovery of saline terrains depends on this rule, see the VIII class "Science" reading material.

Likewise, when the climate pN changes, affected by a consistent electric flow, a few parts that are normally insoluble in the dirt are broken up. Thus, the course of compound cycles in the dirt changes dramatically. At a certain value of the constant electric field strength, the composition of the soil solution changes. In this case, its moisture permeability increases sharply. That's why it is good to combine the electroremediation method with the washing of water in saline lands with low water permeability. The trick here is that when a constant current passes through the saline soil, the filtration rate increases, which forces the salt ions dissolved in the brine to move down through the pores and compress the highly mineralized groundwater into the lower horizons.

From the materials described above, it can be seen that in the electromelioration method interrelated physical and chemical processes occur in the soil at the same time. For this reason, it is appropriate for teachers of physics and chemistry to methodically develop the goal of analyzing this method with students.

Questions for self-examination.

1. What is the main reason for the low efficiency of salt washing?
2. Explain from an ecological point of view the reason for the use of constant electric current in increasing the efficiency of salt washing.
3. Explain from the point of view of ecology what physico-chemical processes occur when a constant electric current passes through saline soil.
4. Explain the physical nature of electroreclamation from an ecological point of view.
5. Explain what changes occur in the soil solution at a certain value of the constant electric field strength.
6. Does the pace of filtration increment or lessening when a consistent electric flow is gone through saline soil? Make sense of why this would be the situation.

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