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PROSPECTS OF APPLICATION OF ELECTROTECHNOLOGICAL METHODS IN SILKWORM GROWING

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ABSTRACT

This article shows the possibilities of increasing the resistance of the silkworm to various diseases, the amount of silkworm production using an air aeration device when growing the silkworm. High humidity and strong gas heat in the wormhole have a negative impact on the life of the worms. It causes additional diseases. Therefore, depending on the outside air temperature every two hours, it is necessary to open the doors and windows and ventilate for 15-30 minutes.

KEYWORDS: *Ionic; Aerotonizer; Silkworm; Electric Field; Electron; Corona Discharge; Air Ion.*

INTRODUCTION

In order to further develop the silk industry of the country, the Resolution of the President of the Republic of Uzbekistan ShavkatMirziyoyev dated March 29, 2017 No 2856 "On measures to organize the Uzbek cotton industry" sets out the main measures to reform the silk industry. In this historic resolution, special attention is paid to the provision of breeds and hybrids suitable for the climatic conditions of the country, as well as increasing the volume and quality of cocoon raw materials grown [1].

Silkworm rearing and silkworm rearing in Uzbekistan is one of the leading sectors of agriculture and industrial production in the country.

Now, in the conditions of transition to a market economy, the capacity and forms of privatization of agricultural and industrial enterprises of the silk and silk industry of Uzbekistan have changed. It is known that Uzbekistan ranks 4-5 in the world in the production of silkworm cocoons and raw silk [2].

Improving the efficiency of production in the agricultural sector, the development of its material and technical base has become one of the main factors of scientific and technological progress. It is difficult to imagine the technical aspects of the management of the agricultural system today, without electricity, which is the most convenient, yet unique type of energy, and in turn without the improvement of production processes.

Fresh air and light regime play an important role in the growth and development of silkworms. In the process of respiration, worms release a lot of "carbon dioxide" gas and moisture. Especially at the age of IV-V, worms breathe strongly. High humidity and strong gas heat in the wormhole have a negative impact on the life of the worms. It causes additional diseases. Therefore, depending on the outside air temperature every two hours, it is necessary to open the doors and windows and ventilate for 15-30 minutes. If the air is cool, the ventilation time can be reduced to 10-15 minutes, which naturally leads to excessive energy wastage and constant labor to reheat the room [3]. In this regard, in order to eliminate these inconveniences and increase the efficiency of silkworm breeding, the article considers the application of electro technological methods in the process of feeding silkworms.

It is known that today foreign and domestic scientists believe that light negative ions in the atmosphere have a positive effect on humans and livestock in certain doses, light and heavy ions with a positive signal do not have such an effect. gas exchange in the lungs and enzyme activity have been found to increase protective function.

In fact, how is air aeration done? The air around us contains neutral atoms, molecules and ions of its constituent gases. Ions or aeroions are formed when neutral atoms and molecules of gases in the air donate their electrons or add foreign electrons. As a result of this process, negative or positive charge ions are formed in the air [4].

Negative aeroions have been shown to stimulate biological processes and have a beneficial effect on living organisms. Natural ionization of air occurs under the influence of radioactive substances in the soil and air, as well as cosmic rays. There are 700… 1000 air per 1 cm3 outside and less than 100 aeroions in the rooms.

In rooms where living organisms live, such as livestock farms, the small amount of negative aeroions is explained by the high humidity and dustiness of the air, which causes gas ions to combine with very fine liquid or solid particles to form heavy ions. There are also heavy ions in the air that respiratory organisms emit, with more positively charged ones in them. This adversely affects the physiological state of the organism. Therefore, it is necessary to maintain a certain concentration of negative aeroions at all times by artificially ionizing neutral particles of air in the rooms [4,5].

Needle electrodes or small-diameter wire are used as crowns in the discharge gaps used to aerate the air in silkworm rearing rooms, which are given a negative potential of 10… 80 kV from a high-voltage source. The second electrode is the barrier of the chambers, mainly the floor with a galvanic contact through the ground with the positive pole of the source [6].

Equipment used for aeroionization should fill the air of silkworm rooms with the required amount of light negative ions and not adversely affect them and the service personnel. Electrical aerators using a crown discharge meet these requirements.

Corona discharge is one of the characteristic discharge forms for strong non-homogeneous electric fields. To form such a discharge, at least one of the electrodes of the discharge gap must have a radius of curvature not large. When a certain voltage is applied to the discharge gap, the voltage near the electrode with a small radius of curvature reaches 15 kV sm and above. Intensive shock ionization of gas atoms around it begins, forming positively and negatively charged ions moving towards the corresponding polar electrodes. With the ionization of air, there is a process of recombination of positive ions and electrons, which combine to release large amounts of photons when the atoms return to a neutral state, resulting in the formation of a specific oil. This was called the radiating area corona layer, or inner zone, or crown sheath, around the electrode with a small radius of curvature, and the electrode was not corona. In the remaining part of the air gap, called the outer zone of the crown, no conductive channel is formed and the inter-electrode space does not completely lose its insulating properties. The voltage between the electrodes must be increased again for the gap to be completely perforated.

Negative ions and electrons formed in the corona layer move through the electric field lines of force, creating a stream of charged particles in the outer zone of the corona discharge. In this case, the free electrons are added to the neutral molecules of the gas, forming new negative aeroions, primarily to oxygen, and, they, too, move towards the grounded positive electrode.

The needle discharge device consists of a metal mesh with a square or triangular grid, the nodes of which have steel needles with a length of 20… 40 mm and a tip with a radius of curvature of 0.1… 0.3 mm. The wire mesh is pulled from the metal tube to the prepared frame. The frame is hung on the ceiling surface on one or more high-voltage insulators like a chandelier. The tips of the needles point towards the area.

Needle discharge equipment ensures even distribution of aeroions in small rooms. They are used for local ionization of air in rooms or in the area where living organisms live.

Wire coated electrodes ensure a sufficiently even distribution of ions in large volume rooms. In this case, the crown electrodes are mounted using high-voltage insulators attached to the ceiling or walls of the room.

The maximum concentration of negative aeroions on the surface perpendicular to the electrode axis is formed under the wire and decreases as it moves away from its axis. Under the conditions of mechanical strength, the wire diameter is assumed to be the minimum allowable (up to 0.1 mm).

The voltage at which an electric field is generated by a crown discharge is called critical. It is found in the empirical expression of Pickney:

$$\mathbf{E_0= 30{,}3\rho(1\ ]}\ \frac{0{,}298}{\sqrt{\rho R r_0}}\mathbf{)10^5},$$

here: $\mathbf{E_0}$-critical intensity of the crown discharge, В/м; **ρ**-relative density of air, кг/м^3, (density of air under normal conditions ρ_0=1,29 кг/м^3-in relation to); r_0-radius of the crown electrode, м.

The initial discharge voltage of the crown discharge for wire surface type electrodes:

$$\mathbf{U_0= E_0 r_0 ln}\frac{2h}{r_0},$$

h-the distance from the crown electrode to the surface, м.

When the source voltage is multiplied by a value above the critical value, the current, A/m, which corresponds to the unit length of the corona wire electrode, increases in a quadratic relationship.:

$$\mathbf{I} = \frac{\varepsilon_0 \pi^2 k U(U-U_0)}{h^2 \ln(2h/r_0)},$$

here: $\boldsymbol{\varepsilon_0}$-electrical constant, Ф/м ($\boldsymbol{\varepsilon_0}$=8,85·10^{-12}Ф/м); **k**-the mobility of negative aeroions, м^2/(В·с) [**k***1,8·10^{4}м^2/(В·с)]; **U**- voltage between electrodes, В.

The number of aeroions, obtained from the unit of length of the coiled wire electrode:

$$\mathbf{n_1= I/e} = \frac{\varepsilon_0 \pi^2 k (U-U_0)}{h^2 \ln(2h/r_0) e},$$

e-aeroion charge, Cl (**e**=1,6·10^{19}Cl).

In rooms where silkworms are kept, including rooms where other living organisms live, coronary aeroionizers should operate in a mode that prevents the formation of ozone and its oxides, as they contribute to the formation of electric discharges at large currents. Limiting resistors with a resistance of 108 108 1010 Ohm are connected in series with the crown electrodes to stabilize the discharge current.

Electric corona air ionizers consume less electricity even in the relative size of the rooms of silkworm rearing rooms. The reason for this is that the average lifespan of aeroions is 10 s. A discharge current equal to one-tenth of a milliampere is required to produce the desired concentration.

The required discharge current to the crown, A:

$$\mathbf{I = enV/\tau},$$

here: **n**-the desired concentration of aeroions, ион/см^3; **V**-the ionizing volume of the rooms, см^3;**τ**- The average duration of the "life" of aeroions, с.

The effect of aeroions on biological objects depends on the concentration of ions, the operating mode of the equipment during the day, the duration of the cycles and the breaks between them.

In any case, the concentration of aeroions should not exceed the cut-off value - 106 ion-cm3. The operation of the aeroionizers is controlled by programmed equipment and is automatically maintained by changing the daily measures during a given cycle.

In addition to the beneficial physiological effects on living organisms, artificial aeration of the air reduces the number of dust and microorganisms and consequently reduces disease, increases silkworm productivity.

Observations have shown that the ionic composition of the room differs from the ionic composition of the outside air due to the fact that silkworms are kept indoors. Some of the light ions coming through the air settle on the elements of the ventilation system, while the light ions left inside the building disappear into heavy ions. As a result, silkworm disease and malnutrition are observed. Theoretical and scientific experiments are being carried out to study the effects of artificial electrical ionization on the environment of the silkworm breeding room. At the same time, the incidence of silkworm disease in ionized air is expected to decrease by 5-10%, feeding by 12%, and silkworm productivity by 3-6%. Ionized air was given in combination with aeration 3 to 6 times a day, depending on the age of the silkworms.

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