

Development of natural ultrapure hydrogen peroxide and its application in agriculture and medicine

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Abstract

The characteristics and areas of application of a new agent for stimulating plant growth and development, antiseptic treatment and prevention of coronavirus and bacterial infection based on environmentally friendly and sterile aqueous solutions of hydrogen peroxide, obtained by methods of electrophysical action on distilled water, are considered. The absence of chemical stabilizing additives makes ecoperoxide hydrogen a versatile broad-spectrum agent with proven efficacy for both large-scale and home use.

Keywords: hydrogen ecoperoxide, environmentally friendly aqueous solutions, plant growth stimulation, antiseptic treatment, prevention of coronavirus and bacterial infection.

Introduction

The aim of the work is to study the characteristics and areas of application of natural ultrapure hydrogen peroxide in agriculture, veterinary medicine and medicine.

Together with the scientists of the laboratory of photobionics of the Federal Research Center of Chemical Physics of RAS, FSBSI FSAC VIM and RPA "Hydrogen Ecoperoxide" under the scientific supervision of Academician of the Russian Academy of Sciences D.S. Strebkov research has been carried out and methods and technical means have been developed for obtaining ecologically pure aqueous solutions of hydrogen peroxide from distilled water to stimulate plant growth and prevent viral and bacterial infections [1].

This technology has no analogues in the world in terms of environmental parameters. An environmentally friendly solution of hydrogen peroxide obtained in accordance with patent applications is called "Ecoperoxide".

At present, an interstate standard is used to obtain hydrogen peroxide (peroxide), which "applies to aqueous solutions of hydrogen peroxide obtained by the electrochemical method through persulphuric acid (medical and technical grade A) and by the organic method based on liquid-phase oxidation of isopropyl alcohol (technical grade B)" [2], which is accompanied by the addition of toxic stabilizing additives (sulfuric acid, sodium benzoate, arsenic, etc.) to the obtained highly concentrated solution of hydrogen peroxide to prevent its decomposition, which is achieved by binding the stabilizer with H_2O_2 . It is the presence of toxic stabilizers in hydrogen peroxide solutions obtained in accordance with GOST 177-88 that does not allow their use in veterinary medicine, agriculture, including plant growing, as well as medical practice, with the exception of external use. As follows from GOST 177-88, hydrogen peroxide is intended for use in the chemical, pulp and paper, textile and medical industries. In addition, hydrogen peroxide bound by the stabilizer is less effective than in the free state as applied to biomedical processes and reactions. In the case of intravenous administration of hydrogen peroxide solution, which is practiced abroad, this is preceded by an expensive purification from toxic stabilizers and any chemical impurities.

Environmentally friendly hydrogen peroxide

In accordance with [3], the presence of hydrogen peroxide at a mass concentration of up to $100 \mu\text{g}/\text{dm}^3$ (0.1 mg/l) is a sign of the biological usefulness of natural water, and the absence of hydrogen peroxide in natural water is a sign of deterioration of the biological usefulness of natural water.

It is known that rainwater has a stimulating effect on the growth and development of plants, which is associated with the content of hydrogen peroxide (peroxide) in it (H_2O_2) from 0.4 to

2.8 mg/l, which is formed in the atmosphere. Back in the 19th century, it was established that in Moscow the concentration of hydrogen peroxide was "in rainwater" 0.4–2.8 mg. for 1 liter". In the southern regions, due to high solar activity, the concentration of hydrogen peroxide in rainwater reaches 2.8 mg / l [4, 5, 6].

An environmentally friendly solution of hydrogen peroxide with a concentration exceeding the natural one, obtained as a result of electrophysical action on water. When it was obtained, the natural mechanism of the formation of hydrogen peroxide in the atmosphere was reproduced. Eco-peroxide "is stable during storage, which is essential for its practical application.

Ecoperoxide is a non-explosive, non-flammable, non-corrosive, non-toxic solution, does not pose a hazard to the environment, and is safe for transportation by any means of transport. Ecoperoxide is produced with a hydrogen peroxide concentration of 10 mg / l in a volume of 0.1 and 5 liters and with a concentration of 1.5 mg / l in a volume of 1 and 5 liters.

Using eco-peroxide to stimulate plant growth and development

Ecoperoxide is effective for stimulating plant growth and development, including those eaten raw or processed. Ecoperoxide has a beneficial effect on plants, increasing resistance to diseases and adverse factors, accelerates flowering and improves the quality of fruits.

Experimental testing of Ecoperoxide diluted to a concentration of rainwater (0.3 - 2.8 mg / l) on various species and varieties of cultivated plants yielded the following results: increase in seed germination from 20 to 50%;

acceleration of growth of aboveground and root systems of plants by 35-80%; an increase in biomass by 15–40%;

a significant increase in the quality of plants with an increase in the content of chlorophyll in them up to 20%.

When processing seeds in eco-peroxide, seeds are disinfected, biological processes are stimulated, metabolism, saturation with useful microelements, improved germination, resistance to diseases, increased immunity, and faster germination of seeds. An increase in yield and product quality is also achieved by spraying an aqueous solution of hydrogen peroxide with a natural concentration of 1 - 2.8 mg / l with cold fog installations of grain, vegetable and fruit and berry plants, including using quadcopters (Fig. 1, 2).



Fig. 1. Kit for spraying eco-peroxide in horticulture.



Fig. 2. Eco-peroxide sprayer for vegetable and fruit tree plantations.

Ecoperoxide, after appropriate dilution, can be used both in small farms (farms, personal plots, gardening partnerships, urban gardens), and in large (agricultural enterprises specializing in the cultivation of grain, vegetables, fruit and berry , decorative and other crops, including the use of greenhouses, aero- and hydroponics technologies, capillary irrigation, in areas with high solar radiation, with short daylight hours and beyond the Arctic Circle, as well as in forest nurseries for afforestation, reforestation, urban greening, as well as the cultivation and maintenance of high quality grassy covers of lawns, golf and football fields.

Ecoperoxide for disinfection and prevention of coronavirus and bacterial infections

Hydrogen peroxide is traditionally used as an antiseptic. At the same time, even such pathogenic microbes as the causative agents of cholera and typhoid fever, anthrax spores, which are very stable in the external environment, die. The ability of hydrogen peroxide (when administered intravenously) to successfully fight bacterial, fungal, parasitic and viral infections, as well as stimulate the immune system and prevent the growth of tumors has been established by a large number of laboratory and clinical studies. After intravenous injection of H_2O_2 into the body, killer cells, T-lymphocytes, responsible for the tension of the immune system, acquire a higher activity [7, 8, 9].

Aging magazine published an article by employees of Tel Aviv University and Shamir Medical Center. Research Director Professor Shai Efrat Sackler School of Medicine. The article says that after 60 sessions of hyperbaric oxygen therapy, patients showed an elongation of telomeres by 38% and a decrease in the number of dying cells by 37%. Telomeres are the DNA sequence at the ends of chromosomes. When telomeres become short, the cell cannot reproduce and dies. The accumulation of cells unable to divide is one of the causes of aging.

Eco-peroxide is a carrier of atomic oxygen and, according to GOST 32460-2013, the presence of hydrogen peroxide in drinking water is a sign of the biological value of natural water.

The ecological and safe composition makes eco-peroxide a universal disinfectant, antiseptic, non-allergenic agent.

The scope of application of eco-peroxide is medicine, cosmetology, veterinary medicine, sanitary and hygienic processing in everyday life and at work.

Eco-peroxide can be used to sanitize the mouth, throat and nasal cavity by rinsing or irrigating. To protect the respiratory tract from coronavirus and bacterial infections, it is advisable to use nebulizers that provide spray droplets of up to 5 microns. In fig. 3 shows an Omron Comp Air NE-C74 nebulizer for inhalation with an air compressor, Japan. The maximum volume of the container is 7 ml. Creates an airborne mixture with droplets of 1 - 5 microns at a rate of 0.3 ml / min. The airborne mixture is delivered through a face mask or nozzles for the mouth and nose for 5 minutes. A solution of eco-peroxide in distilled water with a concentration of 1 - 5 mg / l is used. The concentration of hydrogen peroxide, the duration and frequency of inhalations must be agreed with the attending physician.



Fig. 3. Nebulizer with air compressor.

In fig. Figures 4, 5 show samples of portable nebulizers with an ultrasonic peroxide spray.

As a disinfectant, eco-peroxide is effective and does not cause allergies when treating skin (for example, hands, face, nipples of a nursing mother) and wounds with capillary blood flow. For the purpose of disinfection, it is also possible to process clothes, surfaces, equipment, appliances, rooms, kitchen utensils, feed, animals, birds, aquariums, swimming pools. Removes the odor associated with the vital activity of microorganisms, for example, in the mouth, as well as when keeping animals, birds, aquarium fish. It is a wonderful, eco-friendly, non-allergenic means of preventing mastitis in cows. Experimental batches of eco-peroxide for the prevention of coronavirus infection were delivered to India and Ukraine.



Fig. 4. Compact portable nebulizer, made in China. Dimensions: 140 x 110 x 60 mm, container capacity 10 ml, spray rate no less than 0.25 ml / min, droplet size no more than 3.7 microns, powered by AA batteries or via USB cable.



Fig. 5. Portable medical inhaler for children and adults. Power consumption 2 W, operating frequency of the piezoelectric nebulizer 110 kHz, container capacity 10 ml, atomization rate not less than 0.25 ml / min, droplet size not more than 3.7 microns, powered by AA batteries or via USB cable 5 B, 1 A.

Conclusion

In 2020, RPA Ecoperoxide of Hydrogen LLC was established as a startup for the production of environmentally friendly aqueous solutions of hydrogen peroxide to stimulate plant growth, anti-septic treatment and prevention of coronavirus and bacterial infections.

The patented technology makes it possible to produce an aqueous solution of H₂O₂ without toxic stabilizing additives while maintaining the disinfecting and antiseptic properties of standard hydrogen peroxide. Eco-peroxide also effectively stimulates plant growth and development.

Ecoperoxide is a universal product with a wide range of actions with proven effectiveness, suitable for both professional and home use. The potential of eco-peroxide is very large, from in-

creasing the yield of grain, vegetables and fruit and berry crops to preventing coronavirus and bacterial infections, from treating animals and birds to preventing diseases when growing fish in ponds and disinfecting water in swimming pools. We need millions of liters of eco-peroxide and production in all regions of Russia. We need support for a startup from investors and the state.

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