Alternative technology for the careful use of water resources by combining energy sources

Khudaiberdyyev M.B.

The head of the laboratory
Technology center of the Academy of Sciences of Turkmenistan
Mukhammedov Kh.
Scientific employee
Technology center of the Academy of Sciences of Turkmenistan
Annaorazova M.Ch.
Junior researcher
Technology center of the Academy of Sciences of Turkmenistan
Udavliev D.I.
Doctor of Biological Sciences, Professor,
Subbotina Yu.M.
Candidate of Agricultural Sciences, Associate Professor
State University of Food Production
Moscow, Russia

Abstract. The article deals with the problem of alternative use of energy in plant-microbial systems which use for soil enrichment by microbes. The article deals with interaction of legumes with nodule bacteria and blue-green algae. This contributes to the rational use of water and soil resources.

Researches on the cultivation of malt in vitro and nitric bacteria on the roots are described. It is assumed that the bacteria of legumes on their roots are in their DNA. The effect of a magnet, copper, silicon dioxide, charcoal, carbon fiber on bacteria was also studied. It was revealed what effect these substances have on the growth of bacteria. A significant influence of carbon fiber and a small influence of silicon dioxide was noted.

Beneficial effect of the microalgae complex on the soil and unique ability of algae to rapidly increase their biomass was noted. Activation of photosynthesis during the addition of silicon dioxide nanoparticles to the water, thanks to which plants synthesize more chlorophyll was revealed. Plants grew better and were more resistant to adverse environmental factors.

The article deals with special role of cyanobacteria and algae in self-cleaning of saline soils in Turkmenistan and rapid method for growing microalgae in the ponds. Based on the conducted research, an alternative technological scheme for the rational use of water resources in the agro-industrial complex is proposed.

Keywords: phytopathogens, antagonism, soil salinization, azotobacter, microalgae complex, cyanobacteria, nanoparticles.

The production of high-quality agricultural products is one of the most important tasks of the plant industry. An equally important circumstance is the need to preserve soil fertility, maintaining the environmental purity of agricultural production, resource saving. To fully utilize the potential of natural fertility of soils and plants, it is necessary to introduce adaptive forms of crop production, during which the plants were provided by the basic resources of the biological communities (vegetable-microbial systems) of the plants were protected from phytopathogens, stress resistant. One of these communities is the interaction of

leguminous crops with nodule bacteria, which do not enter into antagonistic relations between themselves and complement each other [11,12].

Purpose of the study. Examine the technology of careful use of water resources through the combined use of alternative energy sources.

Material and methods of research.

On the basis of literary data, analyzed by scientific papers, by effective use of earth and water resources of agro-industrial complexes, improve the ameliorative state of soils, with the help of bacteria (azotobacteria, cyanobacteria) creating a special environment "soil-forming microbes", revealed the possibility of more careful use of water resources, soil, which can contribute to the prevention of the yield of groundwater on the surface and restoration of saline lands [9,10,12].

Referring to the above data, various methods and technologies from special bacteria (azotobacteria, phosophobacteria, etc.) are created and implemented, and algae, which create a special environment of "soil-forming microbes", which contributes to the preservation of soil and water energy. Industrial cultivation and use of these most bacteria and algae opens up more opportunities in solving problems arising in the development of the global agro-industrial complex.

When writing the article, the following methods and technological methods were used. Biology of higher plants in vitro cells and biotechnology based on them: Textbook / Butenko R.G. / - M.: FBK-PRESS, 1991. - 160 P [1].

In order to carefully use terrestrial and water resources, the stated studies can be used in the preparation of projects aimed at solving the problems of barthings with the ice-based land and the use of enriched water in the complex "Helobopiato

For the purpose of the careful use of earth and water resources, the stated studies can be used in the preparation of projects aimed at solving the problems of bows with the oscolonation of land and the use of enriched waters in the complex "Helobopiato"

–Technology of microclonal reproduction of plants. / Kalinin F.L., Kushnir G. P., Sarnatskaya V.V. / – Kiev: Science, Dumka, 1992. – 232 P. [2].

– Basics of biotechnology processing of agricultural products. Methodical instructions for laboratory and practical training / Belookova O.V., Belotokov A.A. - Troitsk, 2015. – 84 P. [5].

– In vitro microprium technology: educational and methodical. Manual / Timofeeva S.N, Smolkin Yu.V., Apanasova N.V., Yudakova O.I. / – Saratov, 2016 – 38 P. [11].

Research results.

Specialists of the Center for Technologies of the Academy of Sciences of Turkmenistan are working on the technology of obtaining and reproducing bacteria that fix nitrogen from the air in the tubers of the roots of legume plants grown in local conditions.

Non-vegetable bacteria supply a nitrogen bean plant. The plant uses this associated nitrogen and, in turn, delivers the carbon-containing organic substances with nodule bacteria.

After harvesting legumes, the underground part remains in the soil, overtakes, nitrogen falls into the soil enriching it with nitrogen.

Conducting experimental studies in the laboratory conditions from the nodules of the roots of beans, alfalf and malt, grown by the method of "In-Vitro", specialists of the Center for Technologies of the Academy of Sciences of Turkmenistan, nitrogen-intimating bacteria were obtained. Which are the main indicator of experimental experimental experiments during the ripening and growth of experimental plants. Currently, relying on the results of studies, conducted, with leguminous plants, scientists are assumed that nitrogen is formed in the nodule of plants, not due to contact with the soil, but is laid into DNA of these plants. It is the nepulats of leguminous plants that are able to record atmospheric nitrogen and translate it into forms that are available for assimilation by plants (nitrates).

When conducting laboratory studies on the leaves and stems of malt bacteria were not allocated. After that, the roots of the malt grown by the "In-Vitro" method were cut out and already in new roots, anew grown malt, by the same method, bacteria forming nitrogen were found. Therefore, it is assumed that bacteria of legume plants are in their DNA, which form their roots (figure 1).

Figure 1- The malt grown by
"in-vitro" method and bacteria isolated from it

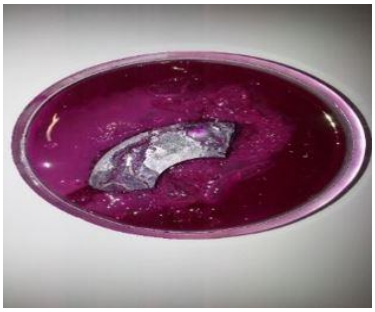
It is known that the amelioration is descended by washing waters in saline lands, which contributes to their recovery, it is also one of the main possibilities for improving the natural balance of land soil in irrigated conditions. It should be inclined that the effectiveness of these mercumions increases by 20-30% when using magnetized water on saline lands [4].

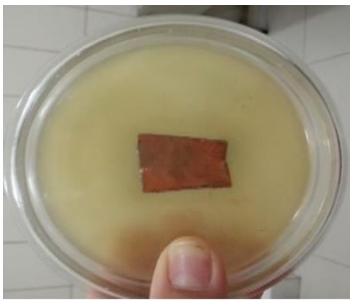
In the laboratory conditions during the research, the effect of the magnetic field on bacteria was studied, the magnet was placed in Petri bowl, while the slowdown of the growth of bacteria in the reach of its field was recorded. In subsequent studies, the impact on copper bacteria, silica, charcoal dioxide and glass fiber was studied. It was revealed, which effects have these substances on the growth of bacteria that silicon dioxide has a slight effect on the growth of bacteria and a considerable influence of carbon fiber (figure 2).

In the conditions of irrigated land, the yield of the soil depends on many factors and one of them is irrigation with water with enriched composition.

Numerous irrigation studies conducted by water irrigation by water algolized microalgae allows us to assert the favorable effect on the soil of the latter [6.9].

In strengthening the composition of irrigated waters in natural conditions, the number of and types of single-cell algae play an important role. This gives new perspectives in the concept of relationship between water enriched with microalgae and irrigated soil.





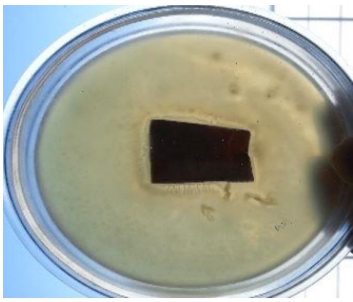



Figure 2 - Research Investigation of the development of bacteria under the influence of the magnet

Algae, which is part of irrigation waters, in its structure contain special bacteria (nitrogen-fixing phototrophic bacteria, green algae, cyanobacteria), creating a special medium of microbes for generating active substances and powered by carbon dioxide, which these microbes are isolated using the energy of the Sun (photosynthesis). In the process of photosynthesis (the formation of organic substances from inorganic substances by exposure to sunlight on plants, which contains chlorophyll) algae can quickly accumulate active substances in themselves. Another feature of the inherent algae is their ability to quickly increase their biomass and allocate bactericidal substances of intake soil.

For this reason, the Agriculties (D.A. Sulaiman and H. B. Singh from India, H.A. Vathanb from Japan) Living near water places, such as the ocean, the sea, lakes and reservoirs in one voice, claim that adding algae in Sowing land showed a distinctive healing effect. This is also evidenced by Russian scientists [3,6,9].

According to methods and technologies of cultivation, biologically active algae of freshwater, lakes and seas, work is actively working in microbiologists. Thus, given the sufficient provision of water by algae, especially in irrigated areas, it is possible to provide a meliorative effect of saline soils. As part of irrigated water, it is proposed to use phosphorus, organic matter and other additives including trace elements. Not bad help for the rapid development of algae microalgae are animals, poultry wastewater, as well as the wastewater of the food industry are rich in organic and mineral substances [6.9].

The studies have noted the activation of the photosynthesis process during fabrication of plants by adding micronano particles of silicon to the composition of water. It turned out that such plants synthesize more chlorophyll and other photosenthetic pigments, such as carotenoids and phytoestrogen, in addition, in the vegetable tissues, more biologically active substances, such as isoflavonoids and hydroxicaric acids. As a result of the studies, it was noted that the plants were not only increased faster, but also more resistant to diseases and other adverse environmental factors. [7, 8].

In this direction, azotobacteria, "biodendaving" and micronano particles of silicon dioxide, created in the laboratory, which were made to the composition of the irrigated waters used for the irrigation of sowing grounds were made.

After that, referring to the results of the study, the influence of the process of photosynthesis on the development of the expected fruits and algae is performed its performance (figure 3).

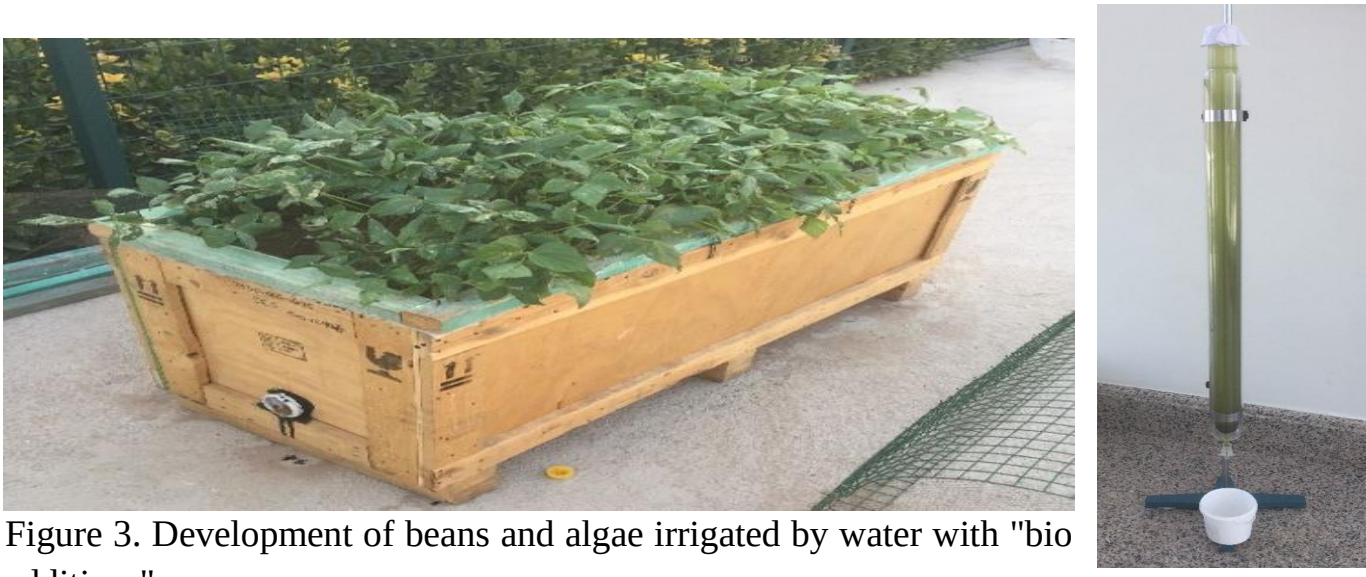


Figure 3. Development of beans and algae irrigated by water with "bio additives"

Relying on the results obtained, the importance of impregnation with phosphorus, silicon dioxide and other additives was noted.

Based on the developed single technological scheme of the effective use of Earth and water, especially 10-20 centimeter surface layer of water reservoirs and lakes enriched with nitrogen and phosphorus and with developed phytoplankton. Phytoplankton with water pump is collected in a special floating reservoir (figure 4).

After that, "Bio additive" in micro-nano, prepared on the basis of a sulfur mixture with biomass residues (cotton branch, wrench, ferry and other) which are an alternative view of fuel and silicon dioxide in micro-nano size in certain proportions.

Figure 4. View of a special tank for growing algae

Algae in the reservoir are provided by "saprophistic" bacteria, that is, by bacteria creating a special microbes and providing favorable conditions for the development of algae. In addition, under the influence of water waves, the tank is swaying, and the favorable temperature is maintained with sun rays, which favorably affects the development of algae. After that, the activated algae from the reservoir is added to the composition of the enriched water in the Helobiograph complex, activating the process of photosynthesis under the influence of sun rays, "saprofite" bacteria and their generating carbon dioxide are reused into the composition of the mixture.

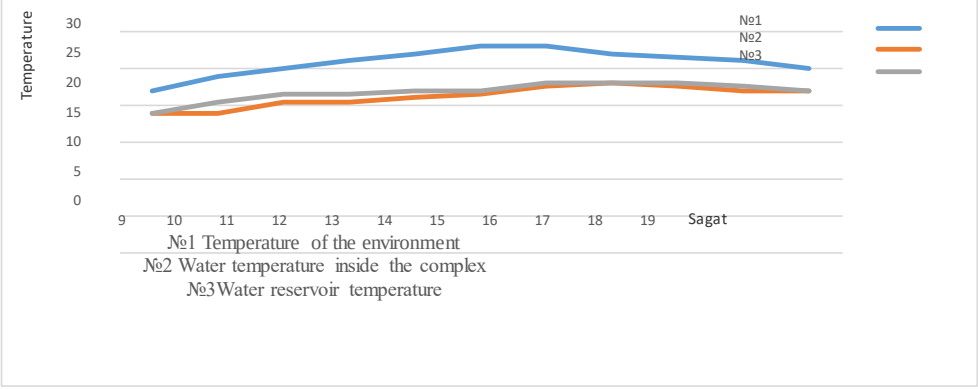


Figure 5 - Harmonicity of water temperature in the tank

Based on the studies, a single technological scheme of the careful use of water resources of the agro-industrial complex and the return of saline lands was developed (figure 6).

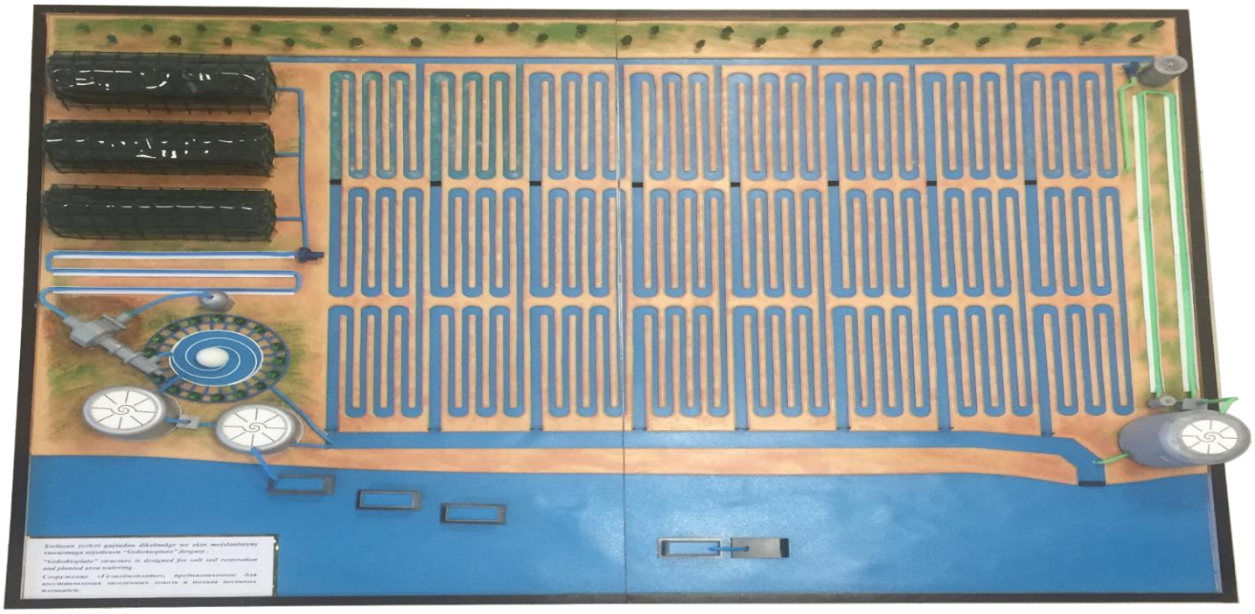


Figure 6 - Helioplato complex

Conclusions. For the purpose of the careful use of earth and water resources, the stated studies can be used in the preparation of projects aimed at solving the problems of bows with salinity of land and the use of enriched waters in the "Heliobioplato" complex.

References

1. Butenko R.G. Biology of higher plants in vitro cells and biotechnology based on them: Texstbook – M.: FBK PRESS, 1991. – 160 P.

2. Kalinin F.L., Kushnir G. P., Sarnatskaya V.V. Technology of microclonal reproduction of plants – Kiev: Science, Dumka, 1992. – 232.

3. Kogan I.I. Algae of the reservoirs of the Turkmen SSR: Diss. dr. biol. sci. -Ashgabat: 1963. – 356 P.

4. Nazarmammadov O. The benefits of higher aquatic plants when cleaning drainage water from biogenic substances and heavy metals. Science and Technology in Turkmenistan № 4. – 2008. – P. 32 - 41.

5. Basics of biotechnology processing of agricultural products Methodical instructions for laboratory and practical training / Belookova O.V., Belotokov A.A. - Troitsk, 2015. – 84 P.

6. Experience in the use of wastewater for irrigation…dslib.net>selxoz-melioration…pri stochnymi –vodami [Internet source, appeal date 10.09.2020].

7. Workers I.S. The use of mineralized water in agriculture. Ashgabat: Ilım, 1984. – 182 P.

8. Stasevich K. Nanoparticles for agriculture // Science and Life. 2018. [Internet source //www.nkj.ru.news/33751, appeal date 10.08.2020].

9. Subbotina Yu.M., Smirnova I.R. Modern biotechnology of environmental processing and recycling of livestock waste // Integrated aquaculture technologies in farms. Materials of Internat. sci.-pract. conference. (M:. December 9, 2016). M.: "Quill"2016. – P. 161 - 166.

10. Sytnikov Zh.M. Biotechnology of nitrogen-fixing microorganisms and prospects for the use of drugs based on them. Biotechnology. V. 5. № 4. Kiev, 2012. – 34 P.

11. Timofeeva S.N., Smolkina Yu.V., Apanasova N.V., Yudakova O.I. Micropropagation technologies in vitro: Textbook – Saratov, 2016 – 38 P.

12.Khudayberdyev M.B., Mukhammedov Kh, Rakhiev D.B. An innovative technology for the efficient use of water resources in the agro-industrial complex. Issue № 6 "Science and Technology in Turkmenistan". Ashgabat: 2018. – P. 74 - 80.