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using Phytormediation to remove hardness from water

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1) Phytoremediation is a method for removing toxic substances from soils, waters using plants and microorganisms. Phytoremediation is a set of methods for the treatment of wastewater, soil and atmospheric air using green plants. It became an effective and cost-effective method of cleaning the environment only after it discovered the heavy metal hyper accumulator plants that can accumulate up to 5% nickel, zinc or copper in their leaves in terms of dry weight - that is, ten times more than normal plants. The biological significance of this phenomenon has not yet been fully disclosed: it is possible, for example, to assume that the high content of toxic elements protects plants from pests and makes them more resistant to diseases.

2) Water hyacinth was able to absorb not only organic substances that pollute water, but also such heavy metals as zinc, cadmium and copper, as well as radio-nuclides. Water hyacinth or eichornia (from the Latin Eichhornia crassipes) belongs to the Pontederiaceae family and is divided into a separate genus Eichornia. This species was first discovered in the tropics of South America. In addition, the plant is successfully grown in artificially created reservoirs, aquariums and winter gardens. Its varieties have white, pale purple and blue shades. Hyacinth is a tropical plant, so it is necessary that it has 12 hours of sun every day. In the middle lane in winter, this can be achieved if you additionally hang a fluorescent lamp above the container in which the flower grows. When there is insufficient light, the leaves of eichornia begin to fall off. In addition, it is necessary to protect the flower from drafts and temperature changes.

3) The absorption of copper, lead, cadmium and zinc ions from aqueous solutions by water hyacinth under model conditions was studied. It is noted that plants withstand excess of MPC of these elements in the water, remain viable and successfully multiply. According to the experimental procedure, the concentration of metals decreases by more than 5 times for zinc, 2 litres for cadmium, 4 times for lead, and add 2 drops of “*Eriochrome Black T indicator”.* Titrate slowly with 0.01M EDTAuntil the solution becomes blue. At the same time, there was no significant accumulation of these metals in the vegetative mass of eichornia. Thus, the efficiency of using water hyacinth plants for the purification of water for various purposes from heavy metals has been shown.

4) Water hyacinth feeds on insecticides, phosphates, phenols, heavy metals with inclusions of cadmium, nickel, silver, and also toxic alcohols and radionuclides. The plant is truly unique - it blooms beautifully, it can absorb pollution from water, it does not require complex technical operation. Some cities in Russia have begun experiments with the use of biological water purification, for example, in Balashov, Saratov region, a tropical flower from Amazonia grows on sewage canals. In some parts of United States (more precisely, in Florida), water hyacinth was deliberately introduced into drainage ditches and streams to purify water on its way to a lake or reservoir, which in many cases led to the creation of hyacinth farms. Such farms can be part of a system for cleaning contaminated water discharged subsequently into the lake, since these plants effectively reduce the level of nutrients and BOD, as well as assimilate heavy metals (they can also be used in the tertiary treatment of contaminated water at some wastewater treatment plants).

5) The water hyacinth has indeed many problems in the Ébrié lagoon. Indeed, some of these problems are very harmful and continue to harm the aquatic biodiversity of the lagoon and the daily activities of Abidjan. It is therefore essential to reduce the amount of hyacinth in our lagoon. However, reducing it to waste is not beneficial to anyone. The water hyacinth is not only a plant that is harmful to biodiversity but it is also a threat to the life and everyday use of Ivorians. The regular use of Ebrié lagoon by Ivorians previously for various reasons is becoming more and more difficult: one of the main reasons is the invasion of water hyacinth The water hyacinth covers a large part of the surface of the water bodies (especially that of the Porto-Novo lagoon). The roots of like many plants have negative charge to them. If there is a bigger charge on metal, sp there is a grater attraction of the water hyacinth.