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The Aquaponic Ecosystem Study as a Base of Applied Research in Bioinformatics

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ABSTRACT

This article is an enhancement of the author's chapter "Critical Review About Aquaponics Is Non-Boring Sciences, as a Base of Competence" about conceptual platform for the work of a network of regional experimental sites that work out various aspects of the implementation of design and research activities in the study of aquaponics. The chapter contains a description of the experience of creating a new component of the regional education system "Aquaponics in Education," the construction of the content of education in the educational organization, taking into account the new component, designing a unified network of interaction between educational organizations of various types for the implementation of the author's experimental program "the academy of non-boring sciences aquaponics." Methodical recommendations on the inclusion of innovative equipment Fish Plant Family Unit and Fish Plant Production in the educational system, the direction of design and research activities of students in the field of aquaponics are proposed.

KEYWORDS

Aquaponic Ecosystem Study, Base of Applied in Bioinformatics

INTRODUCTION

The world is becoming more and more connected, the idea behind the concept of the internet of things (IoT) was to help smart cities to take the maximum advantages of several technologies. Smart environment is a very important part that brings people together and their environment, the human evolution, this one impact all, beginning by environment (earth, water, pollution, quality of feed, etc.), and the technology (smart solutions, easy life, etc.). Carlos-Hernandez et al. (2018), they say the human population aggrandizes aggressively and need more and more mainly resources, such as: energy, water, food, and health service. Currently, the food production systems are enriching or adjusted for preparing the resources needed by the new society. This transformation effects the quality of water consequently the animals, plants, fish, and more them human at the outset. Among the solutions proposed to manage water consumption in agriculture is aquaponic. Aquaponic unites plants cultivation and fish farming in a closed ecological system, its mainstay is intelligible: Aerobic bacteria are using to convert the ammonia contained in the fish waste (urine and waste) at nutrients like nitrate that can be a source to the plant, as a result the purified water returns to the aquarium. It is defined as a mixed solution to supervise the environment with two processes: aquaculture and

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hydroponics. According to (FAO), in excess of 560 species of fish can be grown by this method. (Carlos-Hernandez, 2018). So, aquaponics systems have the ability to agreeing production from the specific source of nutrients a different vegetables and fish.

There are several advantages according to our needs, the aquaponics systems offer the possibility to grow small spaces in urban areas and a closed-circuit production with a fairly large water saving (according to sources 80% to 99% less water than the conventional method), moreover, the above-ground watering implies reduce the problem concerning plant diseases so more healthy food, for example, the chemical treatment and disinfecting agents are used limitedly or exclude, a better control growing because the controlling of temperature, pH, water, and nutrient. Furthermore, very little maintenance and weeding compared to the conventional method so no more than 5 to 10 Maximum of minutes per day to check the correct operation and feed the fish.

Besides, aquaponic can be used, for example, as an educational tool for university students, who can be apprentice the different fish and plants in aquaponics, so integrate the student in a deep environment and offer him a rich and concrete experience in technology. The implantation of plants and the fish's rearing used in certain research laboratories such as biology, nutrition, etc. Moreover, even the medical plants intended for the biology laboratory to enrich the experiments and tests carried out by those laboratories. And finally, the possibility of having different models and types according to the space and the system can be installing regrouped or separated.

This paper is organized as follow, the second section is dedicated to present a balance of sheet of regarding existing of aquaponic solution regrouped in the related works section, the third part is dedicated to present the health and economic benefits of an aquaponic system, section four is dedicated to the presentation of our proposition of a smart aquaponic based on phytotron solution, and finally the last section consist to present the conclusion and perspectives of the paper at hand.

The openness of education to the real social processes taking place in the country, the activation of interrelations with other elements of a holistic system, with the family and the microenvironment as a factor in the socialization of children's development, the creation of the pedagogy of relations in society becomes one of the promising ways of developing the education system. It will allow to take into account the impulses coming from the external environment, and to correspond to its real needs.

In the modern world, the inhabitants of megacities are increasingly interested in subsistence farming and high-quality food products. However, only those who have suburban areas can afford it. However, in urban conditions, you can only farm with hydroponics.

Currently, the method of combined breeding of fish and plants in a system with recycled water supply without use of soil, called aquaponics, is increasingly popular.

Working on the principle of the ecosystem of fish and plants, such technology is environmentally safe: fish provide nutrition to plants, and plants purify water. In the era of energy conservation and environmental priorities, aquaponics has been developed.

Despite the fact that the aquaponics technology is known all over the world, in Russia only a few farms have mastered it, one of which is in the Astrakhan region. The administration of the Astrakhan region decided to start education in the area of aquaponics through the education system.

BACKGROUND

The first mention of the joint cultivation of fish and plants is in the civilization of the Aztecs, then the ancient Chinese. In the 21st century, this technology is entering a new stage of development.

Traditionally, fish were grown in large ponds, or in mesh paddocks on the ocean coast, but in the past 35 years, significant progress has been made in recirculating aquaculture systems.

Their advantage lies in the fact that fish can be grown much more: up to 1 kg per 7.5 liters of water, thereby using only a portion of the water and space needed to grow the same amount of fish in a pond or net enclosure. In the XX century, along with aquaculture aquaponics began to develop.