International Journal of Basic and Applied Biology
p-ISSN: 2349-5820, e-ISSN: 2349-5839, Volume 6, Issue 2; April-June, 2019, pp. 67-69

http://www.krishisanskriti.org/Publication.html

Inspect the Effect of Assemble Aquaponics System to Protect the Bio Treasures: Indigenous Fish, Fresh Water, Land & Environment

Rakhi Das[1], Dr. Pradeep Srivastava[2] and Dr. Shriparna Saxena[3]

[1]Ph.D. scholar, Dept. of Applied Aquaculture Barkatullah University, Bhopal, M.P. India
[2]Professor, Dept. of Limnology, Barkatullah University, Bhopal, M.P. India
[3]Assistant Professor, Dept. of Applied Aquaculture, Barkatullah University, Bhopal, M.P. India
E-mail: [1]rakhidas238@gmail.com, [3]shriparnaroysaxena@gmail.com

Abstract—*Aquaponics is a name of developed farming system in where agro and aqua production are possible from a single field. Present time our planet loss its natural treasures by various way. Secure the bio treasures from relentless destruction, aquaponics seems to be a superior system for natural asset utilization. The experiment was execute here for culture the indigenous fish (Pangasius pangasius) with vegetables (green chili) using minimum land and water resources. One Crops residue utilized here as a nutrient for another crops, so environment friendly atmosphere make the product toxic free. To assemble floating raft aquaponics system, total four segment (Fish rearing tank, Clarifier tank, Biological filter tank & Floating raft plant medium) were connected with each other by input and output channel. Specific growth rate of fish were tested by one sample T test and it was statistically significant. Vegetable production were reach desired level in this system.*

1. INTRODUCTION

Now a days our planet people suffering a lots of chronic issues which have a direct or indirect relation with nature. In these, Land infertility, insufficient fresh water, food toxicity, depletion of indigenous fish and plant species are sensitive issues. Utilizing extra range of chemical fertilizer and pesticides make the land infertile and produce toxic crops. These pesticides and chemical fertilizer runoff from the land by rain and mixed in fresh water source, which pollute the water and destroy the natural habitat of aquatic organisms. Pesticides can lead a dominant role to destruct our biodiversity silently [4]. To restore our biodiversity from relentless destruction aquaponics seems to be a smart endeavour for farming the indigenous fishes and native vegetable by utilizing minimum land and water resources. Basically it produce two crops at same time from same field. Aquaponics is a type farming systems in where crops can be produced without loss of valuable flatlands [2]. Waste managed here as a nutrient, so this system creates marvellous effect on environment. Mainly this system follow the re circulatory culture's rule and hydroponics farming law for produce fish and vegetable from one systems.

2. MATERIAL AND METHODS:

Mainly aquaponics is a one kind of intensive farming system in where re circulatory system adopt for rearing the fish and hydroponic medium utilized for growing the plants without supporting the soil. To execute this trial, total four segment connect with each other by PVC pipes. 132 gallon capable environment friendly plastic tank used here as a fish rearing tank, two 21 gallon capable plastic drum utilized here as a clarifier tank & biological filter tank. 40 litre capable plastic drum divide by two equal size and utilized here as a plant medium. Another 52 gallon capable plastic tank was established here as an additional tank. At beginning period this tank was utilized here for collect the rain water for minimum utilization of fresh water after ending of rainy season it was use for store the tap water and de chlorinated the water before using it for culture purpose. Basically soil is avoid here for plant substratum, so combination of gravel and coco peat were utilized here as a plant substratum. Fish rearing tank played an important role for running the system systematically. Artificial feed were introduced here in fish rearing tank for fulfil the food necessity demand. Fish excreta and wasted feed create ammonia in this system. So converting the ammonia from nitrite to nitrate, clarifier tank and biological filter tank support the whole procedure silently. Nitrate made in biological filter tank and it convey into plant medium by inlet PVC channel. Plant uptake nitrate as an essential nutrient and lower the nitrate level before the water passing into fish rearing tank again. Total system was fabricated to adopt limited land space.

Figure 1: Fabricated Floating raft aquaponics.

Figure 2: Green chili seedling on floating raft medium

2.1. Fish fry rearing and vegetable seed germination:

Pangasius pangasius basically is a riverine origin [3]. Popularity for hybrid pangasius culture and destruction of their habitat, now their seed are not available in fish seed market. Primarily seed were collected from local fish seed supplier and getting a healthy disease free strain, reared them in glass aquarium. When they were in fingerling stage then release them into main fish rearing tank. At first stage vegetable Seed were germinated by implied tissue paper method and after germination seedling were placed into coco peat rich substratum. When they were big enough for uptake the nutrient from the system medium then transferred them into main floating raft plant medium.

2.2. Protocol used for the analysis vegetable up gradation & specific growth rate of fish:

For Inspect the vegetable up gradation Big Hub 3-in-1 high precision soil water pH test meter/ hydroponics analyser was used to measure light, pH and moisture content of plant medium. Because for getting better production from plant, proper water and light with nutrient should be confirmed. Specific growth rate of fish measured by recording the periodically data to apply the following SGR law.

SGR protocol (% body weight gain /day) = (lnWf –lnW_i x100)/t.

Where:

lnW_f = The natural logarithm of the final weight.

lnW_i = The natural logarithm of the initial weight.

T = Time (Days) between (lnWf – lnWi x100) /t.

2.2. Statistical analysis:

With the help of Microsoft excel and online statistical analysis tools, fish specific growth rate data was analysed. Website address of this Statistical tools is (www.sthda.com/english/wiki/ t-test-formula). Mainly one sample T-test formula was applied here.

3. RESULT AND DISCUSSION:

3.1. The SGR of fish:

In this floating raft aquaponics system, throughout the whole culture period SGR of Pangasius pangasius varies from 0.70 to 2.09. This trial running from July to august. Monthly data were recorded here for analysis basis. Data were tested at 5% significance level. In this system average specific growth rate of fish was reported as 1.36, which exhibit statistically significant. The present works can be correlated the work of shete et al., (2012). In their article they narrated that they constructed aquaponics system for production of Gold fish and spinach together, SGR of fish in their system varies from 2.33 to 2.80 [6].Disease was also found this system but they didn't affect the specific growth rate of fish..

Table 1: Data represents Specific growth rate of Pangasius pangasius fish (monthly record basis).

Culture Period	SGR % (Specific growth rate) of Pangasis pangasius fish
July	0.71
August	1.38
September	0.7
October	1.92
November	2.09

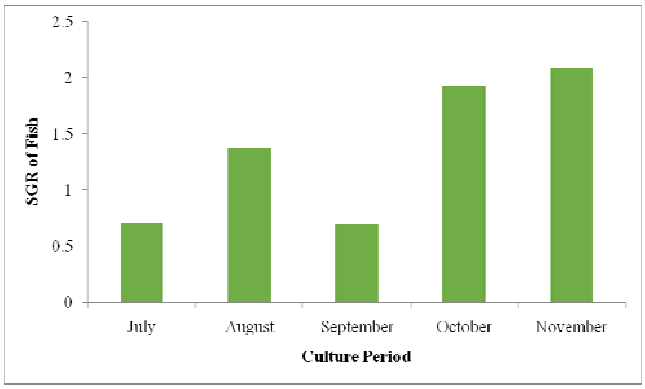

Figure 3: Graphical plot of SGR rate of fish during culture period.

3.2. Vegetable production:

Total 12 plant were sown in two plant medium. Basically Green chili is uncommon crops for farming them in floating raft plant medium. Because Floating raft plant medium only used for leafy vegetable production. But it was possible to achieve 6.224gm chili from this system by periodically ploughing basis. Soil borne disease was absent in this system because gravel and coco peat combination were utilized here as a plant substratum.

3.3. Culture environment:

Waste management is the main theme of any type of aquaponics system. Liquid fish waste utilized here as a fertilizer for plant and solid waste were dumped out periodically outside theculture system by dig a hole. Proper aeration, temperature, pH, dissolve oxygen of water of this system maintained and checked regularly. For this reason this system proved the matter thatorganic and fresh food can be accomplished spontaneously by fabricate this system.

4. CONCLUSION

Aquaponics is an elegant type of farming system. Basically its blend the different fields of science in one field. To secure the bio organisms from continuous depletion this farming system support us to re store these thing easily. Disease can also attack this systems like other culture systems but avoid the use of antibiotics, pesticides or chemical fertilizer for crop production, fresh and toxic free food can be achieved from this system. Occupying a small space and minimizing the necessity of water for culture have a great effect on our farming system. Save the environment by regulate the waste management, rearing indigenous fish and produce toxic free organic native vegetable to adopt this system, we can secure our biodiversity effortlessly.

5. ACKNOWLEDGEMENT:

This trial was execute with the aid of Jawaharlal Nehru Memorial Fund fellowship given basis. All the financial help were continued in the whole trial period.

REFERENCE

[1]– A. C. Dwivedi, P. Mayank, S. Tripathi, and A. Tiwari, “Biodiversity: The Non-natives Species Versus the Natives Species and Ecosystem Functioning,” *J. Biodiversity, Bioprospecting Dev.*, 2017.

[2] A. A. Edenworks, Y. S. A. King, and A. City, “Yousef S . Al-Hafedh and Aftab Alam 2006 . Recirculating aquaculture in Saudi Arabia : aquaponics and greenwater . Proc . 6th International Conferences on Recirculating Aquaculture , Roa,” no. May 2016, 2006.

[3] S. Gupta, “Pangasius pangasius (Hamilton, 1822), A Threatened Fish of Indian Subcontinent,” *J. Aquac. Res. Dev.*, 2016.

[4] I. Mahmood, S. R. Imadi, K. Shazadi, and A. Gul, “Plant, Soil and Microbes,” *Plant, Soil Microbes*, vol. I, no. March 2016, 2016.

[5] N. Savidov, “Evaluation of Aquaponics Technology in,” *Program*, 2005.

[6] A. P. Shete, A. K. Verma, M. P. S. Kohli, A. Dash, and R. Tandel, “Optimum stocking density for growth of goldfish, carassius auratus (Linnaeus, 1758), in an Aquaponic system,” *Isr. J. Aquac. - Bamidgeh*, vol. 65, no. 1, 2013.