



# PERCEPTION OF SUSTAINABILITY OF INDOOR AQUAPONICS IN CHENNAI

Sughi Praarthana. M<sup>1</sup>, Dr. Kavitha P.S<sup>2</sup>,  
<sup>1</sup>PG Research Scholar, <sup>2</sup>Assistant Professor  
 Department of Home Science- Interior Design & Décor  
 Sri Kanyaka Parameswari Arts & Science College for women

<sup>2</sup>Address: No: 1, Audiappa Street, Chennai – 600001, Tamil Nadu, India.

## ABSTRACT

This research section represents a symbolic relationship of sustainability of indoor aquaponics and its perception among residents cultivating aquarium in Chennai region. It explores the vital role of aquaponics used in indoor aquarium, and the awareness among use of aquaponics thus emphasizing the significance of biological filtration for maintaining water quality and promoting healthy growth of both fish and plants. The awareness of indoor aquaponics in an aquarium at urban setting and the residents' perception towards sustainability of aquaponics is the main aim of this study.

KEYWORDS - Aquaponics, Sustainability, Aquarium

## INTRODUCTION

The growth of plants in hydroponic systems and combining growth of fish in aquaculture systems is known as aquaponics (Tarigan, Goddek & Keesman, 2021). The concept of sustainable agriculture are combined with hydroponics to create the new discovery known as aquaponics, which allow to boost the production of organic vegetables indoors in Chennai's hot and humid climate. (Surnar, Sharma & Saini, 2015).

"Aquaponics" is the term representing aquaculture and hydroponics. It means plants are grown in water which does not have soil as medium instead they use the waste produced by fishes, snails and other aquatic animals (Salam et al., 2014). In simple terms "Aquaponics is the integration of recirculating aquaculture and hydroponics" (Rakocy & Brunson, 1989).

## Research Gap and Purpose of the Study

The research analysis was conducted to determine whether the aquaponics system suits the indoor aquarium in Chennai region, climate and whether it is user friendly to have two mediums in a single space and the perception of sustainability of aquaponics among residents of Chennai who have aqua tank in their resident. Moreover the study on indoor aquaponics in Chennai can be broad and varied, encompassing many different areas of research and development. The ultimate goal of such studies would be to develop sustainable and efficient indoor aquaponics systems that can help meet the growing demand for fresh, locally grown produce in Chennai's urban areas.

## OBJECTIVES

1. To find out awareness of aquaponics and sustainability in cultivating plant growth by using aquatic animal waste in indoor aquariums.
2. To implement the sustainable aquaponic system in aquariums used in residents.

## RESEARCH METHODOLOGY

### Research design

Ex post facto research design was used. Aquarium which is used in the home settings is modified to grow indoor plants like pothos and corianders. An already existing hydroponic system is used on lakes and ponds to grow organic farming which was modified to grow indoor plants was the study conducted by the researcher.

### Sampling Design

The samples were the people in Chennai who have fish tank were chosen for the study. The sample size was considered as 85. The sample size was calculated by Cronbach value considered to be 0.87. The survey was conducted through interview method.

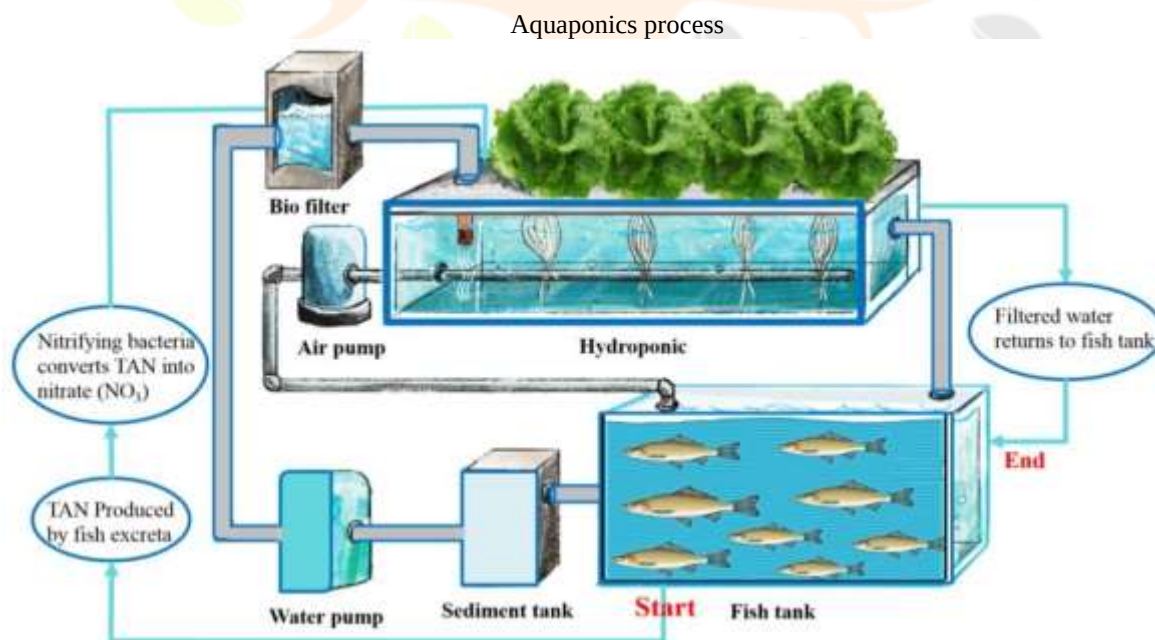
### Tools used for assessment

A self-developed questionnaire tool which was validated through pilot study and the reliability value was found to be 0.83, was adopted to get the details pertaining to aquaponics. The questionnaire comprises

1. Demographic profile
  - a) Personal details
  - b) Educational Qualification
  - c) Type of aquarium/fish tank
  - d) Type of housing
2. Familiarities and awareness of aquaponics among residents of Chennai

### Main study

The main study was conducted with 85 respondents obtained using the structured questionnaire through interview method. The questionnaire has been created with suitable image, definition, and benefits of aquaponics to avoid jargon barrier and easy understanding of the respondents.



Chemosensor, 2022

## RESULTS AND DISCUSSION

Table 1 depicts the familiarity of the aquaponics. It gives information about how many respondents are familiar about aquaponics, whether they implemented aquaponics and like to implement aquaponics. It provides general information like placement, size and year of maintenance of the fish tank. From the table it is evident that 35.3% respondents were placed their fish tank near the window, 41.2% respondents have the capacity of 5 gallons, and 54.1% respondents were maintained more than 5 years. 32.9% of respondents live in apartments. They are mostly not implemented but likely to implement the aquaponics system.

**TABLE 1**  
**Familiarity of Aquaponics**

| FAMILIARITY OF AQUAPONICS           |                      | N = 85 | Percentage (%) |
|-------------------------------------|----------------------|--------|----------------|
| Placement of fish tank              | Near the window      | 30     | 35.3           |
|                                     | In balcony           | 23     | 27.1           |
|                                     | Corner of the room   | 20     | 23.5           |
|                                     | Entrance             | 1      | 1.2            |
|                                     | Shelf                | 9      | 10.6           |
|                                     | Living area below TV | 2      | 2.4            |
| Housing type                        | Individual house     | 26     | 30.7           |
|                                     | Apartments           | 28     | 32.9           |
|                                     | Villa                | 18     | 21.1           |
|                                     | Studio type          | 13     | 15.3           |
| Size                                | 20 lt                | 35     | 41.2           |
|                                     | 45 lt                | 19     | 22.4           |
|                                     | 67lt                 | 14     | 16.5           |
|                                     | 90 lt                | 9      | 10.6           |
|                                     | 135 lt               | 7      | 8.2            |
|                                     | Others               | 1      | 1.2            |
| Maintenance of fish tank(yrs.)      | <5                   | 39     | 45.9           |
|                                     | >5                   | 46     | 54.1           |
| Implemented Aquaponics              | Yes                  | 1      | 1.2            |
|                                     | No                   | 84     | 98.8           |
| Like to implement Aquaponics system | Yes                  | 84     | 98.8           |
|                                     | No                   | 0      | 0              |
|                                     | May be               | 1      | 1.2            |

### Placement, Size and Year of Maintenance of Fish Tank based on housing type

Table 2 depicts the One Way ANOVA depicting the placement, size and maintenance of fish tank based on housing type. It was observed there was a significant difference in placement, maintenance of fish tank based on housing type at 5% level and no significance in size. It was found that individual house respondents have shown a significant difference in placement of fish tank ( $F = 2.686$ ) and years of experience in maintaining fish tank. ( $F = 3.117$ ).

**TABLE 2****One Way ANOVA on placement, size and year of maintenance of fish tank based on housing type**

|                                              |                | Sum of Squares | df | Mean Square | F     | Significance level |
|----------------------------------------------|----------------|----------------|----|-------------|-------|--------------------|
| Placement of fish tank                       | Between Groups | 18.755         | 4  | 4.689       | 2.686 | .037*              |
|                                              | Within Groups  | 139.669        | 80 | 1.746       |       |                    |
|                                              | Total          | 158.424        | 84 |             |       |                    |
| Size                                         | Between Groups | 14.546         | 4  | 3.637       | 2.024 | .099 <sup>NS</sup> |
|                                              | Within Groups  | 143.759        | 80 | 1.797       |       |                    |
|                                              | Total          | 158.306        | 84 |             |       |                    |
| Years of experience in maintaining fish tank | Between Groups | 2.846          | 4  | .711        | 3.117 | .019*              |
|                                              | Within Groups  | 18.260         | 80 | .228        |       |                    |
|                                              | Total          | 21.106         | 84 |             |       |                    |

**\*\*1 percent level of significance \*  $p < 0.05$  level NS Not Significant**

**Placement of Fish Tank Based on Gender**

Table 3 discusses t-test comparing the placement, size and year of maintenance of fish tank based on gender.

**TABLE 3****T - Test depicting Placement of Fish tank based on gender**

|                        | N  | Mean | SD    | "t"  | Level of Significance |
|------------------------|----|------|-------|------|-----------------------|
| Placement of fish tank | 43 | 2.19 | 1.097 | .375 | .004**                |
|                        | 42 | 2.45 | 1.611 | .377 |                       |

From results it is evident that male respondents have high significant difference in the placement of fish tank at 1% level significance.

**Awareness on Aquaponics**

Table 4 discusses the Awareness on aquaponics system by the respondents. It depicts t- test comparing the positive and negative comments on aquaponics.

**TABLE 4****T - Test depicting Positive and Negative comments of Aquaponics**

|                    | N  | Mean  | Standard Deviation | Standard Error Mean | Sig. (2-tailed) | Level of Significance |
|--------------------|----|-------|--------------------|---------------------|-----------------|-----------------------|
| Negative statement | 43 | 18.40 | 2.904              | .443                | .602            | .559 <sup>NS</sup>    |
|                    | 42 | 18.71 | 2.708              | .418                |                 |                       |
| Positive statement | 43 | 26.21 | 12.735             | 1.942               | .132            | .021*                 |
|                    | 42 | 22.64 | 8.401              | 1.296               |                 |                       |

From the results it is evident that male respondents have shown a high significant difference with relation to the positive comment about aquaponics  $F=0.132$  (5% level of significance).

**CREATING AWARENESS TO RESIDENTS****Step 1: Fish Tank Preparation**

The fish tank is placed near the open area (window) to get natural sun light. Add water, fit water pump, and some decorative items (stones, plants, etc.) and then add fish.

**Step 2: Grow Bed Preparation**

Plastic tray or any other container can be used as a grow bed, put hole at bottom corner to drain excess water and fill with grow media then add small plants or sprouts.





### Step 3: Fitting Fish Tank and Grow Bed



#### Fitting Fish Tank and Grow Bed

The grow bed should be placed above the fish tank and pipe should connected from fish tank to grow bed with the help of pump, it transports the water to plants.

### Step 4: Maintenance of Both Fish Tank and Grow Bed



#### Maintenance of Fish Tank



#### **Maintenance Of Grow Bed**

- Feed fish daily
- Check plants for pests and diseases
- Keep an eye on water temperature
- Change water and clean fish tank at regular interval, etc.

#### **AQUAPONICS SYSTEM IN RESIDENCE**



**Aquaponics at Early stage**



**Aquaponics at Later stage**

### Outcome of the Research

It could be concluded that respondents in Chennai city having fish tank are not familiar about aquaponics but after given awareness to respondents about aquaponics they like to implement aquaponics in their houses. Aquaponics is a sustainable and space saving design which is at least in need to the current generation. Hence the researcher has provided knowledge about the aquaponics and perception of sustainability has changed.

### BIBLIOGRAPHY

Rakocy, J. E. & Brunson, M. W. (1989). Tank culture of tilapia. College Station, Texas: Southern Regional Aquaculture Center, 5-10.

Rakocy, J. E., Masser, M. P. & Losordo, T. M. (2006). Recirculating aquaculture tank production systems: aquaponics- integrating fish and plant culture. SRAC Publication, 454 1-16.

Salam, Md. (2014). Feasibility of tomato production in aquaponic system using different substrates. Progressive Agriculture. 25. 54-62. 10.3329/pa.v25i0.24075.

Surnar, S. R., Sharma, O. P., & Saini, V. P. (2015). Aquaponics: innovative farming. International Journal of Fisheries and Aquatic Studies, 2(4), 261-263.

Tarigan, N. B., Goddek, S., & Keesman, K. J. (2021). Explorative Study of Aquaponics Systems in Indonesia. Sustainability, 13(22), 12685. <https://doi.org/10.3390/su132212685>

Ujjania, V., & Sharma, B. (2021). An Overview of Aquaponics System. 10.13140/RG.2.2.28474.41925. The best plants for aquaponics, Brooke, n.d.

<https://www.howtoaquaponic.com/plants/best-plants-for-aquaponics>

