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Popular Article

## Trend of Aquaponics in Aquaculture

**Mahesh Kumar Ramagiri**<sup>1 \*</sup>, **A. Chandrasekhara Rao**<sup>2</sup>, **K. Bheemeshwara rao**<sup>3</sup>

<sup>1</sup>Ph. D. Scholar, Department of Aquaculture, College of Fisheries Science, Muthukur, Andhra Pradesh Fisheries University<sup>1 \*</sup>,

<sup>2</sup>Principal, SMVKR Polytechnic college, Bhavadevarapalli, Krishna (dist), APFU,A.P

<sup>3</sup> Ph. D, Department of Fisheries Resources Management, College of Fisheries Science, Muthukur, APFU.

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**Dr James Rakocy** is the father of aquaponics. Aquaponics is an integrated method of growing plants and fish that primarily combines two sub-systems: hydroponics and aquaculture. The main idea is to divide and share nutrient resources between fish and plants while also effectively using water to generate two crops as opposed to just one. In urban and resource-constrained settings, this farming method is frequently employed to cultivate fish and vegetables in tandem. Aquaponics includes raising fish and horticultural plants together. Many plants can be used in aquaponics systems, but which ones are best for a given system will depend on the fish's maturity and stocking density.

Aquaponics systems are particularly suited for growing green leafy vegetables with low to moderate nutrient needs, such as capsicum, tomatoes, lettuce, cabbage, lettuce, basil, spinach, chives, and watercress. It generally functions as a recirculation culture system where fish are fed high-quality floating pellet feed and waste from the fish is pumped into troughs with horticulture plants for bio-filters. The water flow rate may be changed with the aid of a timer. In an aquaponics system, both the fish and the plants are entirely organic.

The method requires a large initial investment, but the ongoing costs are low and the profits are respectable. This system has the benefit of utilizing less water, less land, renewing waste, using less labour, etc. In an aquaponics system, there is a symbiotic link between the plants and the animals. Excreta from the fish feed the plants with nutrients, and the plants purify the water so that the fish

can thrive in a healthy environment.

### **Definition**

Aquaponics is cooperation between plants and fish and the term originates from the two words aquaculture (the growing of fish in a closed environment) and hydroponics (the growing of plants usually in a soil-less environment). Aquaponic systems come in various sizes from small indoor units to large commercial units.

### **Site Selection**

However, selecting an appropriate location is crucial, aquaponics systems work well in areas with little water available for the removal of fish wastes from the production system. Ammonia and other waste products are removed from water that has been treated, producing the same results as a flow-through setup. For a Backyard-type Aquaponics unit, a minimum of 150 m<sup>2</sup> of land or space is needed, and for a Small-scale Commercial Aquaponics unit, a minimum of 2000 m<sup>2</sup>.

### **What is the main objective of aquaponics?**

The main goal in aquaponic systems is to create plant growth by using aquatic animal waste. Consequently, aquaponics uses the fish waste as a fertilizer for the plants while the plants clean the water for the fish. The plants benefit from the existence of the fish and the other way around.

### **What is the process of aquaponic farming?**

In aquaponics farming, plants are grown in a grow bed, and fish are placed in a fish tank. The nutrient-rich water of the fish tank feeds the grow bed. This is where billions of bacteria break the ammonia into nitrites and into nitrates. Further, plants absorb these nitrates and grow.

The Aquaponics System has one Moving Bed Biofilm Reactor (MBBR) and Filtration Unit installed for water treatment.



**Fish Tank and Filtration System**

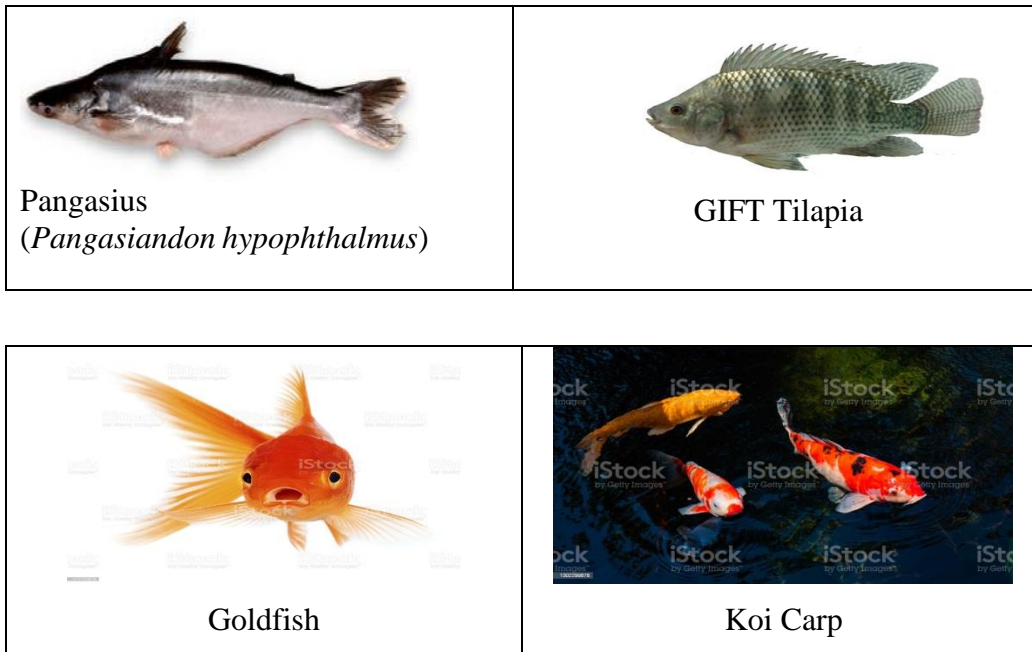


**Plant Grow-bed Tanks**



### What kind of fish is best for aquaponics?

Any species that can survive high density stocking, such as monosex tilapia (*Oreochromis niloticus*), pangasius (*Pangasiandon hypophthalmus*), or other species, is ideal for an aquaponics system.



Ornamental fish species like goldfish and koi are easier to maintain, more resistant to diseases and parasites, and less expensive. Small ornamental fish species, like angelfish, **tetras, and danios**, are great for indoor aquaponics systems.

### Water Quality in Aquaponic System

Water quality is important and optimum range of certain parameters required for successful fish culture in an Aquaponics System are as follows:

Sl. No.	Water Parameter	Optimum Range
1	Temperature	26 - 30 °C
2	Dissolved Oxygen	4 - 6 ppm
3	pH	7 - 8
4	Alkalinity	120 - 150 ppm
5	Ammonia	<0.05 ppm
6	Nitrite	<0.5 ppm
7	Nitrate	<5 ppm

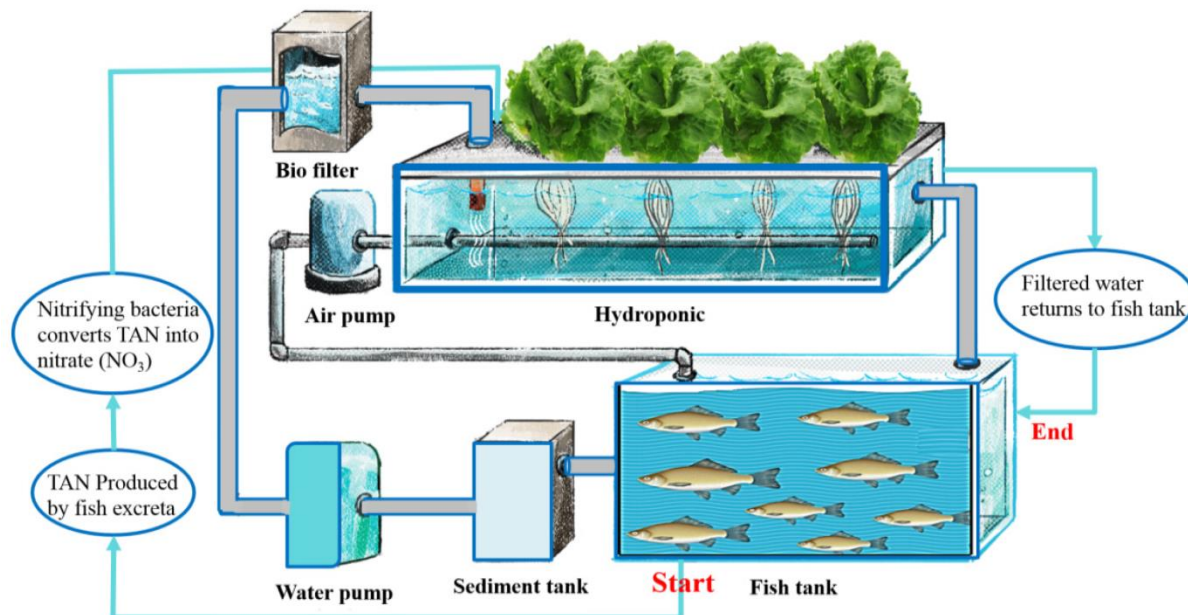
### What crops are best for aquaponics?

#### Recommended Plants for Aquaponics

- Tomatoes. The humble tomato plant does exceptionally well in this water-based system. ...
- Leafy Lettuce. Lettuce that is grown in aquaponics is one of the most productive leafy greens in an aquaponics system. ...



- Watercress. ...
- Peppers. ...
- Cucumbers. ...
- Cauliflower. ...
- Cabbage. ...
- Strawberries.



Layout of Small-scale Aquaponics Unit

### What is a good bacterium in aquaponics?

Nitrifying bacteria play an essential role in an aquaponics system. The nitrifying bacteria convert fish waste, which enters the system as ammonia, into nitrates that fertilize the plants.

### What are the key features of aquaponics?

These are the four common components of every Aquaponics system:

- Aquarium (fish tank).
- Grow bed for plants.
- A method of transporting water from the fish tank to the grow bed (water pumps are often used).
- A method to drain water from the grow bed back into the fish tank (pipes or siphons are often used).

### What is the use of aquaponics?

Aquaponics is a sustainable and natural method of growing plants and aquatic animals. It promotes a symbiotic relationship between plants and marine animals, allowing small backyard



growers and commercial growers to cultivate nutritious and organic crops and raise edible fish.

- Organic and Nutritional Benefits. ...
- Food is Grown All Year Round.
- Reduces Water Usage. ...
- No Soil, No Weeding.
- Accelerated Plant Growth. ...
- Two Incomes for Commercial Aquaponics Farmers. ...
- Reduces the Planet's Carbon Footprint. ...
- Supports a Self-Sufficient Way of Living.

#### What are the disadvantages of aquaponics?

- High upfront costs.
- Higher operational costs than soil culture.
- High energy requirements.
- Requires daily maintenance.
- Skill and knowledge from two separate agricultural fields required.
- Requires testing of water quality for fish and plants.
- Multiple ways entire system can fail.
- Limited plant selection.

#### REFERENCE

Amadori, Michael (July 5, 2011). "Fish, Lettuce and Food Waste Put New Spin on Aquaponics". Newswise. Archived from the original on February 26, 2013. Retrieved April 24, 2013.

Benoît, Stalport; Frédéric, Lebeau; Haissam, Jijakli (2018). "Smart Aquaponics: development of intelligent management tools for aquaponic systems adapted to professionals, urban communities and education". hdl:2268/221709.

Christopher Somerville, Moti Cohen, Edoardo Pantanella, Austin Stankus and Alessandro Lovatelli, 2014. "Small-scale aquaponic food production – Integrated fish and plant farming". FAO Fisheries and Aquaculture Technical Paper 589, 2014, pp 288.

Folorunso, Ewumi Azeez; Roy, Koushik; Gebauer, Radek; Bohatá, Andrea; Mraz, Jan (2020). "Integrated pest and disease management in aquaponics: A metadata-based review". *Reviews in Aquaculture*. **13** (2): 971–



995. doi:10.1111/raq.12508. S2CID 224852600

Menon, Rashmi; Sahana, G.V.; Shruthi, V. "Small Scale Aquaponic System". *International Journal of Agriculture and Food Science Technology*. **4**: 941–946.

Rakocy, James E.; Masser, Michael P.; Losordo, Thomas M. (November 2006). "Recirculating aquaculture tank production systems: Aquaponics—integrating fish and plant culture" (PDF) (454). Southern Regional Aquaculture Center. Archived from the original (PDF) on September 15, 2012. Retrieved April 24, 2013

Ravindranath, K., 2017. Aquaponics – an Integrated Fish and Plant Production System for Urban, Suburban and Rural Settings. NFDB Newsletter *Matsya Bharat*, Vol. 8, Issue 5, January-March 2017, pages 5-15.

Rogosa, Eli. "Organic Aquaponics". Archived from the original on May 29, 2013. Retrieved April 24, 2013.

Royte, Elizabeth (July 5, 2009). "Street Farmer". The New York Times Company. Archived from the original on 6 December 2011. Retrieved 8 March 2011.

