**Scientific theory: how does an aquaponics system work?**

Aquaponics is a circulating system that takes advantage of natural biological processes. Below, each part of the system (plants, fish, water and bacteria) are explained:

1. **Plants: what do they need and how do they grow best?**

Firstly, it is important to address the plants that are best adapted to the aquaponics system. This system best supports plants that have low nutrient requirements like watercress, basil, chives, spinach, herbs and lettuce

1. **Fish: requirements for best fish production**

Certain fish are better because they are more tolerant to changes. Tilapia is the most commonly used fish in the system. Fish that have been included in the system include "tilapia, trout, perch, Arctic char, and bass…tilapia is tolerant to fluctuating water conditions such as pH, temperature oxygen, and dissolved solids"

1. **Water**

In an aquaponics system, water quality is directly correlated with plant quality. Plants need certain minerals to thrive, and these minerals are provided by the fish waste. In a non-hydroponic growing situation, the minerals come from soil.

1. **Bacteria: how do these bacteria help?**

A vital part of the aquaponics system is the removal of ammonia that is excreted as a metabolic waste product from the gills of fish. If there is a too high of a concentration of ammonia then the fish will die

<https://www.appropedia.org/Aquaponics?gclid=Cj0KCQjwqPGUBhDwARIsANNwjV5podqXAvPQ3abzk6d2OrU9RmPAGKy22bdZ5HbL5YErZPLMR97XsdgaApsJEALw_wcB>

In very simple terms, aquaponics works because the fish and plants are both providing services for each other, the way they do in natural ecosystems like in oceans, rivers and lakes. Fish create waste which is then in turn used as food for plants. By taking up fish waste, the plants clean and filter the water for the fish, keeping their environment safe to live in. In this system, neither the fish nor plants can thrive without the other.

<https://foodprint.org/blog/the-magic-behind-aquaponics-and-why-it-isnt-really-magic/>

Process –

**3 Designs of Aquaponics: NFT, Media Beds, Deep water Culture & Vertical Aquaponics**