

## Aquaponics – An Introduction

The technology of Aquaponics represents a relatively new concept in fish production and has seen increased interest and use over the past few years. The technique involves the integration of recirculating fish culture with hydroponic plant production. In fish-only re-circulating aquaculture, nutrient-rich water is removed from the system and discharged to the environment on a regular basis to manage nutrient levels within the system. In aquaponics, this nutrient-rich water is seen as a commodity instead of a waste, and is used to grow plants. Once the plants have utilized the nutrients and cleaned them out of the water, the water is returned to the fish for further fish culture, and the perpetual cycle begins again.

Some of the major advantages of this technology are;

- Two marketable products are produced for the price of one
- Aquaponic products show a 50% better growth than those grown directly in soil
- Water reuse rates are close to 100% (only water replacement required is for evaporation etc..)
- Viewed as a highly sustainable method of production



Fish Tanks and Aquaponic Beds in a greenhouse set up

So far aquaponics has seen particular development in Australia, Israel and parts of the USA simply because;

- They have limited freshwater supplies (maximising the use of water is crucial)
- The environmental conditions in these countries are excellent for hydroponic plant production (high levels of sunlight and high temperatures)
- They are sustainably aware with regards to Aquaculture production

Currently, a limited number of products have been produced in Aquaponic systems but this is mainly due to the infancy of the technology. With regards to fish species the following are recommended having been seen to work well within aquaponic systems.

**Tilapia** – The most commonly grown species in aquaponic systems due to high tolerances to water quality and fast marketable growth. Tilapia production is highly competitive worldwide however and so it is felt that efforts in the long are better focused on more of a niche species.

**Barramundi** – Well researched in association with aquaponics. Barramundi produces a bass like product which could be well received in a variety of regions. Barramundi are fast growing fish which can be grown in high stocking densities making them ideal for recirculation technology.

**Sturgeon** – The idea of sturgeon production being combined with aquaponics is to provide some form of return during the 6 year period required to produce caviar. Currently most sturgeon farms receive zero income during this period making sturgeon production highly capital intensive in the medium to short term. With the production of herbs / salads etc... these could be sold to help offset the yearly operating costs being incurred.

On the plant side the following have been seen as particularly effective in aquaponic systems.



Lettuce grown in an aquaponics system.  
(As you can see the roots are suspended directly into the water)

The profitability of an aquaponics system is based mainly on the plant production. Plants grown in aquaponics can often fetch a high price and can be sold as organic products. Obtaining a regular buyer for the plants produces is therefore vital to the systems success. The profit made on the fish is usually around that spent in operating costs. With this in mind an aquaponics system can actually be a more efficient and economically viable alternative to simply growing hydroponic plants.

Macalister Elliott & Partners Ltd have a large amount of in-house experience in the setting up of aquaponic systems. This is often through the design of a pilot scale system which allows all parties to assess the effectiveness of the technology and the best plants and fish species for the specific climatic and economic conditions.

Should you wish to discuss aquaponics in more detail or are interested in setting up an aquaponic facility, please contact Max Goulden at Macalister Elliott & Partners on the contact details below.

**Lettuce** – Excellent for aquaponic systems due to the high water content. Fast growing and marketable.

**Tomatoes** – 50% of tomato production worldwide currently occurs as hydroponic production and as such the product is known to work well in an aquaponic environment.

**Basil, Coriander** – Some of a number of herbs that are known to grow well in aquaponics environments.

**Cucumber** – High water content makes it ideal for an aquaponic system although direct sunlight can pose a problem.



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