

# Aquaponics

20<sup>th</sup> February

## What are the problems of aquaponics?

‘Aquaponics’ is a portmanteau of ‘aquaculture’ (the raising of fish, snails, crabs and other aquatic animals in tanks) and ‘hydroponics’ (growing plants without soil). It is the marriage of the two, where each system supports the other. Fish produce waste which contains ammonia. This is then processed by microbes (nitrifying bacteria) into vermicompost for the plants. The plants then keep the water in the tank clean and filtered.

Although aquaponics solves many of the problems with traditional, soil-based farming, the two individual practices have issues of their own:

### Hydroponics:

- Hydroponic systems are prone to Pythium, a disease otherwise known as “root rot”, which doesn’t exist in aquaponics.
- Traditional hydroponics requires you to provide your plants with man-made nutrients that are expensive and rich in chemicals. In aquaponics, you feed your fish fish feed, food scraps, etc, which is not costly. The fish’s waste, after processing by microbes, provides the plants with nutrients.
- Water in hydroponic systems builds up salts and chemicals which are toxic to plants. This means water needs to be removed and replaced regularly, with the disposal of the water requiring careful consideration.
- The mixture provided to plants in traditional hydroponics needs to be concocted carefully, with expensive equipment to measure pH, etc. Aquaponic systems only require monitoring in the first month, as once conditions are stable, you only need to check the tank weekly, or if the fish/plants seem unhealthy.

### Aquaculture:

- Water is pumped into rivers and streams, damaging and/or destroying waterways.
- Tank water can become polluted due to too much ammonia, requiring water to be discharged. In aquaponics, the microbes break down the ammonia to be absorbed by plants.
- Due to the factors above, the fish often live in an unhealthy environment, to the extent that they sometimes must be treated with antibiotics. Fish disease is exceedingly rare in an aquaponics system.

As you can see, marrying the two practices of aquaculture and hydroponics solves a lot of the issues presented by the practices when done alone. However, the practice of aquaponics is not perfect either – it has some distinct issues:

- Tank water temperature – different fish require different temperatures for optimum cultivation. Allowing the temperature in the tank to go too far above or below this optimum level can result in fish and/or plants dying due to a lack of oxygen. The most popular fish species for aquaponics is the tilapia – they require a water temperature of over 25°C to grow well.
- Overcrowding – many aquaponics systems have been criticised for confining the fish to very small spaces. Having an overly dense population of fish can lead to waste build-up and larger fish eating smaller ones. The recommended ratio is one fish for every 20 litres of water.
- Waste/ammonia build-up – If done incorrectly/inefficiently, too much fish waste is produced for the microbes and worms to convert into ammonia fast enough. If it is converted, it will lead to an excess of ammonia that will kill fish and the water will need to be diluted, removed and converted.
- Vermiculture – Worms are used for removal of solids from waste and soil, however, worms redistribute solids to make for easier decomposition, possibly increasing their bulk.

If these issues are managed carefully, aquaponics has the potential to become a new, modern farming practice that may revolutionise the way we produce, sell and eat our food.