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WHAT IS AQUAPONICS?

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(HTTPS://WWW.THEAQUAPONICSOURCE.COM/AQUAPONICS-CLASS-LIST/)

WHAT IS AQUAPONICS?

The most simple definition of Aquaponics **is the combination of aquaculture (raising fish) and hydroponics (the soil-less growing of plants)** that grows **fish** and **plants** together in one integrated system. The fish waste provides an organic food source for the plants, and the plants naturally filter the water for the fish.

The third participants are **microbes** (nitrifying bacteria). These bacteria convert ammonia from the fish waste first into nitrites, and then into nitrates. Nitrates are the form of nitrogen that plants can uptake and use to grow. Solid fish waste is turned into vermicompost that also acts as food for the plants.

In combining both hydroponic and aquaculture systems, aquaponics capitalizes on their benefits, and eliminates the drawbacks of

each.

The problems with traditional soil-based gardening

Pesticide and artificial nutrient usage

Weeds, pests, and soil-borne insects

The amount of water required

The heavy digging, the bending, the back strain

Knowledge required to know when to water, when and how to fertilize, and what is the composition of the soil

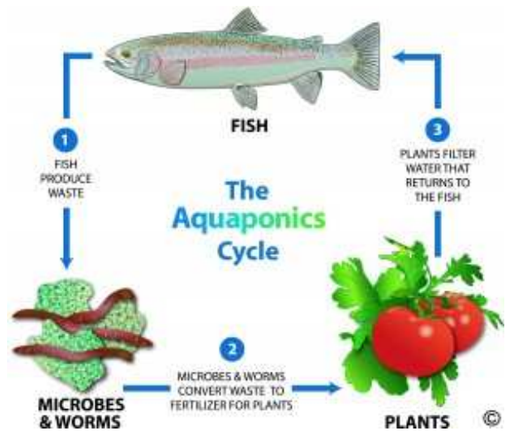
Location – traditional farms are often located thousands of miles from where the food is consumed

Food Miles – A Typical Meal

The Food	Common Place of Origin	WASD*
Tilapia	China, Ecuador, Indonesia	7,626 miles
Salad greens	US, Mexico, Canada	2,055 miles
Tomato	US, Mexico, Canada	1,369 miles
Herbs	US, Mexico, Turkey	3,456 miles
Strawberries	US, Mexico, Chile	1,944 miles

16,450 Food Miles

*Weighted Average Source Distance –A single distance figure that combines information on the distances from production to point of sale and the amount of food product transported. - Leopold Center's Food, Fuel and Freeways report, data for Chicago



These issues are all solved with hydroponics, but hydroponics has problems of its own

Traditional hydroponic systems rely on the careful application of expensive, man-made nutrients made from mixing together a concoction of chemicals, salts and trace elements. In aquaponics, you merely feed your fish inexpensive fish feed, food scraps, and food you grow yourself.

The strength of this hydroponic mixture needs to be carefully monitored, along with pH and total dissolved solids (TDS). In aquaponics you carefully monitor your system during the first month, but once your system is established you only need to check pH and ammonia levels weekly or if your plants or fish seem stressed.

Water in hydroponic systems needs to be discharged periodically, as the salts and chemicals build up in the water, becoming toxic to the plants. This is both inconvenient and problematic as the disposal location of this waste water needs to be carefully considered. In aquaponics, you do not need to replace your water; you only top it off as it evaporates.

Hydroponic systems are prone to a disease called “pythium” or root rot. This disease is virtually non-existent in aquaponics.

The problem with recirculating aquaculture

The tank water becomes polluted with fish effluent, giving off high (http://3cwmxj2d81j135u0ir33yc8a-wpengine.netdna-ssl.com/wp-content/uploads/2013/07/aquaculture1.jpg)concentrations of ammonia. Water has to be discharged at a rate of 10-20% of

the total volume in the tank daily. This uses a tremendous amount of water. *Again, in an aquaponics system you never need to discharge your water*



This water is often pumped into open streams where it pollutes and destroys waterways.

Because of this unhealthy environment fish are prone to disease and are often treated with medicines, including antibiotics. *Fish disease is rare in an aquaponics system.*

How Aquaponics changes the game

Waist-high aquaponic gardening eliminates weeds, back strain, and small animal access to your garden.

Aquaponics relies on the recycling of nutrient-rich water continuously. In aquaponics there is no toxic run-off from either hydroponics or aquaculture.

Aquaponics uses only **1/10th of the water** of soil-based gardening, and even less water than hydroponics or recirculating aquaculture.

No harmful petro chemicals, pesticides or herbicides can be used. **It's a natural eco system!**

Gardening chores are cut down dramatically or eliminated. The aquaponics grower is able to focus on the enjoyable tasks of feeding the fish and tending to and harvesting the plants.

Aquaponic systems can be put anywhere, use them outside, in a greenhouse, in your basement, or in your living room! By using grow-lighting, and space can become a productive garden.

Aquaponic systems are scaleable! They can fit most sizes and budgets, from small countertop herb systems (https://www.theaquaponicsource.com/counter-top-aquaponics/), to backyard gardens (https://www.theaquaponicsource.com/home-aquaponics-system/), to full scale farms, aquaponics can do it all!

And the best part – You get to **harvest both plants and fish** from your garden. Truly raise your entire meal in your backyard



(http://3cwmxj2d81j135u0ir33yc8a-wpengine.netdna-ssl.com/wp-content/uploads/2013/07/IMG_4658.jpg)Instead of using dirt or toxic chemical solutions to grow plants, aquaponics uses highly nutritious fish effluent that contains all the required nutrients for optimum plant growth. Instead of discharging water, aquaponics uses the plants, naturally occurring bacteria, and the media in which they grow in to clean and purify the water, after which it is returned to the fish tank. This water can be reused indefinitely and will only need to be topped-off when it is lost through transpiration from the plants and evaporation. There are a few primary methods of aquaponic growing widely in use today:

Deep water culture (DWC) or *raft based* growing uses a foam raft that is floating in a channel filled with fish effluent water that has been filtered to remove solid wastes. Plants are placed in holes in the raft and the roots dangle freely in the water. This method is most appropriate for growing salad greens and other fast growing, relatively low-nutrient plants. It is also most commonly used in larger commercial-scale systems.





Raft-based Aquaponics

Media-based aquaponics

Media growing involves growing plants in inert planting media such as expanded clay pellets or shale. The media provides both the biological filtration (conversion of ammonia to nitrates) and mechanical filtration (removal of solid wastes) in the same system. Media based systems are great for home and hobby scale systems so you can grow a wide variety of crops. In particular, large fruiting plants do really well in addition to leafy greens, herbs and other varieties. Examples of media-based systems are the Harmony (pictured), the AquaUrban 60 gallon system (https://www.theaquaponicsource.com/shop/full-systems/aquaurban-sleek-systems/aquaurban-sleek-aquaponics-system/), and the AquaBundance system (https://www.theaquaponicsource.com/home-aquaponics-system/)



The Harmony System (media beds)

Nutrient Film Technique (NFT)

NFT systems work by flowing nutrient-rich water through a narrow trough, such as a PVC pipe. Plants are placed in holes drilled in this pipe, and the roots dangle freely in this stream of water. This method of growing works very well for plants that need little support, such as strawberries (pictured) and other herbs. NFT is also a great way to utilize unused space because they can be hung from ceilings above other growing areas.



Vertical Aquaponics

One of the greatest aspects of aquaponics is its ability to grow an incredible amount of food in a very small area. No method does this better than vertical aquaponics. Plants are stacked on top of each other in tower systems such as the AquaVertica (https://www.theaquaponicsource.com/shop/build-your-system/vertical-aquaponics/aquavertica-tower-4-ft-copy/). Water flows in through the top of the tower, and flows through a wicking material that the plants roots absorb water and nutrients from. The water then falls into a trough or directly into the fish tank. This form of agriculture makes the most of each square foot of space, and works very well with leafy greens, strawberries, and other crops that do not require support to grow.





The AquaVertica System (https://www.theaquaponicsource.com/shop/build-your-system/vertical-aquaponics/aquavertica-tower-4-ft-copy/)

For a complete guide to designing, building, starting, and maintaining an aquaponics system, be sure to take a look at out our *Aquaponic (https://www.theaquaponicsource.com/shop/educate-yourself/aquaponic-gardening-a-step-by-step-guide-to-growing-fish-and-vegetables-together/) Gardening (https://www.theaquaponicsource.com/shop/educate-yourself/aquaponic-gardening-a-step-by-step-guide-to-growing-fish-and-vegetables-together/)* book. This bestselling book is considered the "bible" of the aquaponics industry, and gives the reader a complete understanding of this type of agriculture. We also offer a popular Online Class (https://www.theaquaponicsource.com/shop/educate-yourself/aquaponic-gardening-online-course/) that builds off of the book, and is the most comprehensive aquaponic gardening training you will find anywhere, apart from taking one of our in person classes (https://www.theaquaponicsource.com/aquaponics-class-list/)!



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