

# Sustainable Farming in Your Backyard

by David Pennington

Imagine a lush, low-maintenance organic garden automatically nourished by a tank of tilapia. Imagine your dinner plate filled with fresh greens and fish from your own backyard. David Pennington currently designs and builds aquaponic systems for people wishing to grow food sustainably and teaches people how to build their own systems. He explains the system below.

Aquaponics is the combination of two concepts: aquaculture and hydroponics. Each of these two can present considerable waste issues, but combined into an aquaponic system they become a symbiotic and sustainable type of agriculture. The water in an aquaponic system recirculates from the fish vessels to the plants in a continuous loop. Beneficial bacteria in the system convert waste ammonia from the aquaculture section into nitrates, and plants in the hydroponic section gladly remove the nitrates. One of the key benefits of aquaponics is water conservation: only small amounts of water are added to replace water that leaves the system in the form of plants, fish, and evaporation.

Aquaponics is an almost infinitely scalable concept, the largest system to date was designed to annually produce 1,000,000 lbs of tilapia in a two story building with a footprint of only 22,000 square feet. By contrast, my portable demo unit (see picture) has two ten gallon grow beds which can grow herbs and lettuce for a small family. Smaller systems usually use gravel beds for growing media, while the larger systems almost always use floating rafts to grow plants on, with their roots hanging down into the water.

As an industry, aquaponics makes sense fiscally as well as ecologically, especially as waste is increasingly regulated and resources dwindle. By using the fish waste as fertilizer, the water filtration system for the fish becomes a profitable component instead of a resource drain. And when species such as tilapia are raised which can be fed land-based feed, an alternative can be created to replace the ocean fish which are being unsustainably harvested. Omnivorous species like tilapia can be fed weed species such as duckweed in addition to insect larvae, both of which can be raised on diets of waste we currently pay to treat or dispose of.

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