

# Aquaponics: Rethinking the Veggie Garden

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**Topangans Joe Plenys (L) and Eka Darville (R) have begun a project where they grow a wide variety of vegetables in water beds fertilized by a fish pond outside. Common aquaponic plants include bok choy, broccoli, cabbage, butter beans, spinach, onions, tomatoes, cucumber, lettuce, eggplant, celery, snow peas, sage, basil and chives.**

By Kateri Wozny

Topanga residents Eka Darville, 23, and Joe Plenys, 35, had tried every way to grow fresh vegetables on their property, but the hot, dry climate, ground squirrels and myriad of other critters thwarted them at every turn.

"The soil in the area has a high clay content that makes it very hard to grow vegetables," Darville explained. "You end up watering your plants twice a day."

Together, the two looked at different options and came across a book on aquaponics, a farming technique that uses fish manure as a base fertilizer and combines hydroponics (growing plants in water without soil) with aquaculture (fish farming).

According to UC Davis, Aquaponics first came into practice in the 1970s by the New Alchemy Institute, a research center that did pioneering investigation into organic agriculture, aquaculture and bioshelter design between 1969 and 1991. It evolved into The Green Center Inc. (thegreencenter.net), a non-profit educational institute that also supports projects that demonstrate ecologically derived forms of energy, agriculture, aquaculture, housing, and landscapes, and living in harmony with nature.

Darville and Plenys also attended a workshop in January at the Topanga Library on Aquaponics hosted by the Catalina Ecology Project, a group that travels the California coast and teaches nutrient cycling, fisherie and sustainable food production.

"It's very educational and a fun way to work with the land, connect to nature and create sustainability," Plenys said. "We are trying to emulate and diversify a real eco-system."

After two months of researching, beginning in December 2012, Darville and Plenys began to construct a media bed filled with a rock medium of expanded clay where water from a fish tank is pumped over the beds where the plants

grow. The system can be run two different ways: with a continuous flow of water over the rocks, or by flooding and draining the grow bed, in an ebb-and-flow cycle. Darville and Plenys chose the latter to imitate a tidal flow, the most reliable and simplest method of aquaponics, especially for beginners. Both systems are built into a wooden bay that has two 55-gallon drums countersunk into a wooden drain.

Although Mozambique Tilapia, a schooling fish that survives in water temperatures of 68-85 degree F, and is the preferred fish for aquaponics, Darville and Plenys have filled their 1,000-gallon fish tank with goldfish for now.

"We haven't put in the tilapia because we discovered the Canyon is too cold to sustain them," said Plenys. "We could do bass and catfish."

The two also plan on incorporating shrimp-like creatures called scuds, which eliminate fish solids, helps the whole system stay healthier and provides a source of food for the fish.

"We also have some freshwater clams to help clean the water and filter it," Plenys said. "Down the road, we'll incorporate freshwater prawns."

They also constructed a waterfall system to add oxygen to the water. A pump recirculates the water back to a tank at the top of the system and the process begins again.

"We add about four gallons of water a week because the waterfall does increase evaporation," Plenys said.

"The nice thing about this system is no water is wasted," Darville added. "[Unlike] conventional farming, you use 98 percent less water than soil-based bonding."

"The aquaponics plants grow three times faster, too," Plenys said.

Some of the vegetables Darville and Plenys are currently growing—and eating—include collard greens, kale, broccoli, cauliflower, cilantro, arugula, spinach, celery, lettuce, cucumbers and

red and green peppers.

"You can grow just about anything; squash and melons are hard because they take up too much space," Darville said.

Gina Cavaliero, chairman for The Aquaponics Association and managing director for her own farm, Green Acre Aquaponics, based in Brooksville, FL, says the Aquaponics trend is catching on.

"We have seen tremendous growth in the last three years," she said. "Whether it's for your community or your farm, anybody can do it and there are many benefits to Aquaponics: it's fun, sustainable and environmentally friendly."

Founded in 2011, the Aquaponics Association has more than 300 members and hosts conferences and events, such as "Tour de Tanks," where members can show off their backyard Aquaponics systems across the nation. "This gives members great exposure and a chance to learn from one another," Cavaliero said.

## CREATING YOUR OWN SYSTEM

If you are planning to create your own aquaponics system, visit [backyardaquaponics.com](http://backyardaquaponics.com) for a thorough guide online, a Forum with FAQs, Event listings, Q&As and other useful information. There is also a magazine, "Backyard Aquaponics."

•**Legal Constraints**—In California, there are restrictions on what fish can be used. According to the California Department of Fish and Game, Nile Tilapia, Mozambique and Tilapia Zilli are the only three Tilapia species that are allowed in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Imperial counties. If a person resides in one of these counties and plans to raise tilapia in an aquaponics system, license registration as an aquaculturist is required.

•**Types of Systems**—There are three types that Backyard Aquaponics has tested

**Media Filled Beds**—The simplest form of Aquaponics. The system uses containers filled with rock medium of expanded clay. Water from a fish tank is pumped over the media filled beds and plants grow in the rock media. This style of system can be run two different ways: with a continuous flow of water over the rocks or by flooding and draining the grow bed.

**Nutrient Film Technique (NFT)**— a commonly used hydroponic method but is not as common in aquaponic systems. In NFT systems, nutrient water is pumped down from small, enclosed gutters and the water flowing down is a very thin film. The plants sit in small plastic cups, allowing their roots to access the water and absorb the nutrients. NFT is only really suitable for certain types of plants, generally leafy green vegetables. Larger plants will have root systems that are too big and invasive or they become too heavy for the lightweight gutters.

**Deep Water Culture (DWC)**—works by floating plants on top of the water, allowing the roots to hang down into the

water. This method is commonly practiced in commercial settings. DWC can be done by floating a foam raft on top of the fish tank.

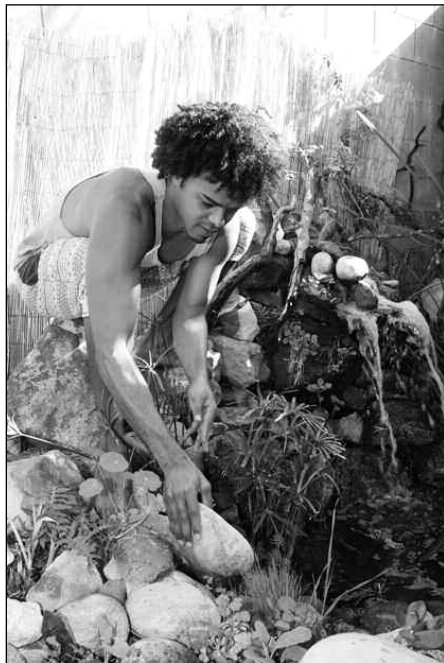
It is best to grow the fish in a fish tank, however, and pump the water through a filtration system, in which the floating rafts filled with plants float on the water surface and extract the nutrients.

"It's like a 'gateway drug' once you start thinking in terms of how everything is interconnected with everything," Darville said. "You think about the silicone that you should be using and how everything that you use will affect the fish or vegetables. My thinking has expanded on the way I view food production systems and all the different products that we use in our lives."

## FUN AQUAPONICS FACTS

- Aquaponics uses less than two percent of the water that traditional farming does.
- It's energy-efficient: our current systems use one-tenth of the energy conventional farming does.
- It has 8 to 10 times more vegetable production in the same area and time.
- It's pure, clean and natural: USDA Certified Organic and Food Safety Certified. ■

(Source: Wikipedia)



**Eka Darville places rocks around the fish pond that fertilizes the plants inside the greenhouse. With his partner, Joe Plenys, they also constructed a waterfall system to add oxygen to the water in the pond. A pump recirculates the water back into the tank at the top of the system and the process of fertilizing the plants begins again. "The nice thing about this system is no water is wasted," Darville said. "[Unlike] conventional farming, you use 98 percent less water than soil-based bonding."**

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