Growing Farms of the Future

The world is growing hungrier and agricultural systems are increasingly challenged to produce more food with fewer environmental resources. Countries from Bangladesh to Canada, and cities from Berlin to Baltimore, are employing an ancient farming technique to the 21st century—aquaponics is growing orchards in the desert and yielding harvests in the city, and EPS is helping to make it possible.

Aquaponics is a sustainable method of farming that combines conventional aquaculture, (raising aquatic animals such as snails, fish, crayfish or prawns in tanks), with hydroponics (cultivating plants in water) in a symbiotic environment. In normal aquaculture, excretions from the animals being raised can accumulate in the water, increasing toxicity. In an aquaponic system, water from an aquaculture system is fed to a hydroponic system where the by-products are broken down and utilized by the plants as nutrients. The water is then re-circulated back to the aquaculture system.

For the water-strapped, aquaponics can seem like a miracle solution. It both farms fish and grows plants in floating EPS 'rafts' using the same closed-loop, freshwater system with just a tenth of the water that traditional agriculture requires. In raft based aquaponics (also known as float, deep channel and deep flow) the plants are grown in holes on EPS foam rafts that float on top of water separate from the fish tank. Water flows in a continuous loop from the fish tank, through filtration components, to the raft tank where the plants are grown and then back to the fish tank.

Raft based aquaponics is the most commonly used method in commercial systems as it provides the versatility to grow a wide variety of leafy plants and herbs and can be set up relatively inexpensively. In a commercial system, the raft tanks can cover large areas, best utilizing the floor space in a greenhouse. Plant seedlings are transplanted on one end of the raft tank. The EPS foam rafts are pushed forward on the surface of the water over time and then the mature plants are harvested at the other end of the raft. Once an EPS raft is harvested, it can be replanted with seedlings and set into place on the opposite end. This optimizes floor space, which is especially important in a commercial greenhouse setting.

Even in countries where water shortages aren't an immediate problem, aquaponics holds some promise of cutting down on transportation costs because it can be done on a fraction of the land of traditional agriculture. In Berlin, an old 21,500 square foot brewery is being converted into an urban aquaponics farm that is expected to yield 24 metric tons of fish and 34 metric tons of vegetables annually.

While aquaponics isn't the miracle solution that will raise yields at the rate that the world needs, it is proving to be successful a part of the global agricultural economy. ■

EPS Shines Through

Temple University Professor Robert Trempe's course *Architectural Design VI* gives students the opportunity to take on a special topic in architectural design. In one project, talented students let the light shine on a whole new application of EPS.

"The students are expected to learn about new techniques in full-scale architectural manufacturing including the translation of complex computational geometries and physical production employing CNC [Computer Numerical Control] technologies," Trempe said.

Students used a CNC machine to carve intricate patterns out of EPS foam. The purpose of the project was not only to get students familiarized with the latest materials and technologies but also to reveal the "condition of light through a sequence of transformative patterns." Each student designed a window panel of the corridor between the Tyler Cafe and the Architecture building, which came together as one impressive installation.

"I'd like people to know that the role of an architect is much larger than simply following building code, that architects are passionate in the crafting of space and spatial experience," Trempe said. This project reiterates the possibilities for EPS are endless. ■

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