MATURING MARVEL

Growing beds inside the greenhouse at S&S Aqua Farm.

S&S Aqua Farm

Text by Vern Modeland; photos courtesy of Tom and Paula Speraneo

By ones and twos, by the bus load, and through the World Wide Web, hobby and commercial growers, scientists and suppliers are finding their way to the Ozark Mountain region in Missouri, where Tom and Paula Speraneo gently propagate the logic of making simplicity and sustainability a priority in aquaculture.

The Speraneo's S&S Aqua Farm was introduced to readers of *The Growing Edge* in the vol. 5 no. 2, Winter 1993–1994 issue ("The Genius of Simplicity" by John Wesley Smith). At the time, Tom and Paula were in the early stages of implementing what they had learned about creating and managing a combined aquaculture and hydroponics loop in a small greenhouse attached to their house. They successfully raised Tilapia to eating size, cleaning the water by pumping it into beds of creek gravel where tomato and cucumber plants and herbs thrived on the fertilizer, and then recycling the water back to the fish tank, but they dreamed of the commercial potential of a larger stand-alone system.

Their small system consisted of a salvaged 550-gal tank and three homemade 30 × 80 in. growing tables crowded together in a 12 × 24 ft space. So, wanting to expand their successful small production to a larger scale, with Small Business Administration support, they built a 50 × 80 ft, 14-ft-tall greenhouse and installed in it six commercial 1,000-gal tanks — each tank linked with four to six gravel-filled growing beds. "Nodes" are what Tom Speraneo calls the connected tank-and-table combinations.

"To be able to raise as much as 15 times per square foot of what you could raise out-of-doors and to be able to do it throughout the year and use only 10% of the water — it's awesome," says Tom. "We've found it is a really flexible system that can be scaled down and scaled up. Our newest design is about 49% more efficient than what we have [in the newer greenhouse], but that was six separate experiments when we started."

When they started out, Tom monitored water temperature and 14 water parameters, including the levels of ammonia and nitrogen, the dissolved oxygen, and the pH of the discharge water. He took readings from the Tilapia tank discharge and again at the end of one cycle through the growing beds. Today, he tests water quality about once a month.

Paula comments on what they learned: "It seemed like you need to know precisely everything that is going on. It gets back to that some things are better left alone. If you pay attention to your fish, and the fish are eating, and the plants are growing, and

Tom Speraneo giving a group of students a tour through the greenhouse.

Typical Speraneo "low-tech"

you can see your fish, it means the water quality is probably okay."

Tom shares an example of one of their early over-engineering efforts, "We are not using aeration any more. We had a blower in the little greenhouse. But Amber [their 16-year-old daughter] came to me and said 'you've got caps on all the drains from all the beds. Why don't you just put a cap on the water return and drill it full of holes?'"

He did as Amber suggested and tests showed higher dissolved oxygen in the water being returned to the fish tanks than he had been getting from rotary compression blowers that cost $390 each. "Plus it cut the [greenhouse] electric bill by $17 to 25 a month. And those blowers sounded like six vacuum cleaners going in there all the time," he says.

Something else they learned, the Speraneos say, is that there are as many different potential uses for their design of a closed growing system as there are builders interested in trying it. And that appears to be a rapidly growing group.

To better respond to a flood of questions and to guide others interested in trying to duplicate what they have managed to do, the Speraneos created an information packet for sale based on their extensive notes and records. In the packet, the customer receives 58 printed pages that provide a history of the project and description of the theory, design, construction, sanitation, and stocking procedures. The packet includes many detailed drawings, a list of parts, resources, and prices, and a bibliography. Their own brand of inoculum for purification of start-up aquaponic systems also is included with each packet.

The introduction states: "We have tried to incorporate the information most often asked of us as well as data we have learned and decisions we have made over the past several years. In most cases, we have included the reasons why we made these decisions. We don't assume that we have the 'know all-end all' method for this type of growing system. What we have described here is in operation and we know it works."

With the help of a local producer for the Public Television channel, they also created a 10-minute videotape that takes the viewer to the greenhouse, the growing beds, and fish tanks, shows the interconnections, and describes how it all works.

In 1993, the Speraneos shared with *G.E.* readers that they had "well over" 2,000 interested visitors come to their modest home and the greenhouse south of West Plains, Missouri. Mostly that was a result of the enthusiastic endorsements of friends and contacts that they had made when they were asking their own questions. Today, the total visitor count exceeds 8,000, Tom estimates.

"We're not on a regular list of tourist attractions, but we might as well be," he adds.

But visitors to S&S Aqua Farm are not seen as interruptions. "The time you spend with people who just drop by — it's good public relations. They'll spread the word that you're here and what you are doing," Paula says.

School children are invited to taste samples from the lush green beds, which include edible flowers. Overseas travelers have sought them out, as have orange-robed Buddhist monks who came from a monastery 40 miles away, near Willow Springs.

"We've had as many as 35 to 40 people show up here in groups, some two days early, some two days late, and some from South Africa that we weren't expecting at all," observes Tom.

"The article in *The Growing Edge* created a lot of contacts," Paula adds.

solution to greenhouse ventilation.

All the plumbing that links plant beds to fish tanks is overhead in the Speraneos' system.

So has the modern marvel of the World Wide Web. Using their home computer, that still must be shared with their two teenagers, Paula manages a Web presence for S&S Aqua Farm. They have a home page and a news group. Started late in 1997, the news group has quickly grown to almost 200 members trading voluminous e-mail on topics ranging from a new-comer's simple "how, why, how much, and where from" questions to such advanced ideas as the effects of biogas digestion on toxins other than bacterial and viral pathogens.

Those who are electronic-networking regulars represent many walks of life from all parts of the United States, plus Canada, the Virgin Islands, Australia, New Zealand, Scandinavia, and Europe. Leading-edge researchers, scholars, and homesteaders readily exchange information, experiences, and troubleshoot — with Paula gently but effectively keeping the flow of discussions on track and sometimes volunteering additional sources of information, on- and off-line, that she and Tom have gathered or know about.

The list has its own information-gathering capability. Paula recently surveyed participants as to what kind of fish are most popular among them, favored sources of seeds for their growing beds, and their most successful experiences with crops, fish, or crustaceans.

In part as an outgrowth of presentations by the Speraneos to area schools and extension clubs, two high schools have now added aquaculture projects to their vocational agriculture curriculum.

John Greer, agriculture instructor at Pleasant Hope, Missouri, recently shared with the news group how five years earlier he found himself teaching at a school that had a greenhouse. "Since that time, I have come to greatly enjoy horticulture and now have built an additional greenhouse that houses an entire aquaponic system like the one at S&S Aqua Farm," he said. "Working with high school students, we get the chance to kill plants at an alarming rate for one reason or another. We also have a chance to discover strange things that I never thought I would see.

We grow impatiens, begonias, various hanging baskets and other bedding plants [and] sell these plants in the community. Now that we have the new aquaponics lab we also grow these same plants there, usually using them as stock plants for cuttings. Some do well and some not so well. The ones that do well seem to grow and reproduce faster than we can keep up. For example, we took 550 cuttings in one class period that have grown since the 10th of December. I have impatiens running out of my ears in the middle of January."

Along with managing information and networking with the growing number of people who express interest or are trying to duplicate this sustainable system of low-impact, low-technology aquaculture linked to hydroponics, Paula and Tom Speraneo still energetically experiment with alternative crops and value-added products that might fit their own needs and interests and make them some money.

"Ornamentals will eventually make you more money than food, but food is more satisfying," Paula reflects.

Early production from the big greenhouse was aimed at the commercial marketplace, particularly at the many restaurants in St. Louis about 200 miles away. Paula explains, "We sold for a while to a broker in St. Louis. Most of the basil was sold commercially. It grows so lush inside, and the plants are not weathered at all. The leaves grow so big that the product sells itself. We were shipping full plants because the restaurants use everything that is tender. It goes into a blender.

Amber Speraneo suggested 24-cent replacements for $390 oxygen enrichment blowers.

"That worked for a while, except you lose some things when you are not directly involved with the customer. The broker actually didn't care much where the product came from. We were meeting a price, and he wasn't paying air freight from California. We were delivering right to his door. Then, the herb supplier that he bought most of his product through wasn't getting the basil business so he told the broker that if he wasn't going to buy his basil (which is the quickest turn for everybody), he wasn't going to sell him his other herbs. So we sent up a couple of shipments the broker didn't accept, and we lost the product. Then, a supplier in Mexico would send basil for $2 pound for what they had been paying us $6.50. It wasn't worth it," she says.

Tom adds with a shrug, "Even though our basil would last about a week unrefrigerated and most of the imported kind lasts about two days, three days at the most because it has been packed in an aircraft and with no climate control."

Paula continues, "We still do produce some herbs but not for shipment into a wholesale market. I decided that for $2 a pound, we'd just grow lettuce and sell it to our neighbors. And that's what we do. We could do some winter basil production and sell it locally but if you're going to do winter basil you need extra heat and light. It gets to be a matter of economics. Folks will buy our salad mix in quarter-pound bags for the table, and if they don't eat it all, it will last a week in the refrigerator because of the way it is grown and handled."

"I'm trying to maintain our salad mix as primary so that we have the cash flow that comes from that. The experience we have from growing it and different varieties, since I sell it direct, gives us a lot of good market feedback," she says.

"We literally could not grow enough to saturate our market," Tom adds.

Paula explains further, "We use four to five lettuce varieties for the base ingredients. Usually 'Simpson,' 'Anuenue' (from Hawaii — could substitute a buttercrunch), 'Romaine,' and 'Salad Bowl.' We add 'Redina,' a beautiful red leaf lettuce that grows darkest in the cool months, some watercress, a few small mustard leaves, tender beet tops, and Swiss chard. We use other side greens from time to time. It just depends on the availability when it is time to harvest."

The ready-to-eat salad mix is packaged in gallon-size plastic bags for sale at the local Farmers Market. Paula has been active in the 60-member affiliation at West Plains. She just ended a year as the group's president.

The Speraneos also supply local natural food stores and have a regular client base they describe as people who are looking for organically grown fish, herbs, and vegetables that come from a visible local source. Customers include a local Asian ethnic community.

"Tilapia still is not a recognized name to most people. You still have to get the word out," observes Paula. "Our Asian ladies take care of that here for us. They come out and pick out their own fish from the tanks. Most of the Tilapia they were used to eating in their home country came out of ditches and ponds and they thought they wanted only small ones because of off-flavor. In their experience, the small ones tasted better. Now they'll take whatever [size] we can supply."

Value-added organic foods is another Speraneo experiment, marketed as "Ozark Originals," a trade name they have taken steps to protect through registration. The brand includes a choice of eight flavors of pepper sauces. The sauces come in 5-oz bottles, or as a three-pack cradled in a wooden box on sphagnum moss, and in larger sizes for restaurants and stores.

Tom also has found a market for custom aquaponic system designs and consulting. "We've done some fairly big designs. I'm doing some dairy farm and hog farm conversions. We're also getting a lot of experience on best use of space, how to place the beds, and how to design for folks who want to buy their greenhouse instead of building," he says.

A representative of the United Nations University has sought him out to inquire about delivering a paper on the S&S Aqua Farm system in 1998.

Perhaps Tom best sums up what has happened for the Speraneos since 1993 — "The most difficult task for us was defining our objective and then maintaining our focus on that objective."

And what are their growth plans now?

"To grow our kids." ❖

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