

The Farm of the Future Will Grow Plants Vertically and Hydroponically



Is this how Jack grew his beanstalk? It sure isn't Old MacDonald's farm.

HERMAN K. TRABISH: MARCH 16, 2012

Temecula Valley Strawberry Farm (TVSF) grows its plants straight up, uses no soil, very few chemicals and requires 85 percent less water than farmers who grow strawberries in rows on the ground. Yet its yield is approaching the same three pounds of strawberries per plant as that of the row farm its owner ran until three years ago.

Before Ken Feitz, Jr., came home from California State University at Chico and convinced his father, Ken Feitz, Sr., to move to the farming method of the future, the senior Feitz had a 10-acre strawberry farm that cost him \$25,000 per acre per year in expenses to operate.

The shift to one acre of vertical, hydroponic farming, the younger Feitz said, required an essentially one-time infrastructure expense of about \$33,000. It paid largely for drip irrigation equipment and 2,300 Verti-Gro towers, each of which accommodates five pots, one at each of the five levels on the tower. Each pot contains four strawberry plants.



The one-acre TVSF is expected to yield 2.5 pounds of strawberries per plant in this, its third year of operation. That would be 112,500 pounds of strawberries. They will be sold at three dollars per pound, producing \$337,500 in total revenue for the one acre for the year.

The family's traditional row farm yielded about 18,000 plants per acre, Feitz Jr. said, and each plant in the mature farm produced about three pounds of strawberries. (The vertical farm is heading toward a three-pounds-per-plant yield.) The row farm's 54,000 pounds of strawberries per acre, at three dollars per pound, generated \$162,000 per acre, per year in total revenue.

That is not the whole story. After the Feitzes bought the three-acre site for TVSF, they discovered their well, capable of giving up no more than twenty gallons per minute though they had taken on the inordinate expense of drilling to nearly 800 feet to get to the water, was inadequate. It supports the limited water consumption of vertical, hydroponic farming, but would be entirely insufficient for other purposes.



They installed a pump, a holding tank and other water infrastructure on part of the one-acre farm site. (The site's other two acres are used for buildings and parking.) The water infrastructure means the one-acre farm is even less than an acre. A full acre could accommodate another 300 towers with an additional 1,200 pots and 4,800 plants. That would increase the per-acre yield to 130,000 pounds and bring the per-acre, per-year revenue to \$390,000.

The Verti-Gro farming method used by the Feitzes was developed by Tim Carpenter, the founder of Verti-Gro Inc., in Florida, and is used creatively at Disney's Epcot Center. The method is more well-known in the East, where its 70 percent lower land requirement makes it a greenhouse solution.

The Feitzes are the first to use it for farming in California, where farmland and sunshine have always been abundant. "If we had plenty of water," said Verti-Gro business partner Erik Cutter, the founder of EnvironIngenuity, "we still would not be looking at it."

But water is an issue, and the Verti-Gro method, even though dubbed hydroponic, uses 85 percent less water, Cutter said.

It is likely to appeal to Californians for another reason, Feitz Jr. said. Since

the plants are potted not in soil but in triple-grind redwood bark, there is no need for the annual methyl bromide soil pre-treatment that traditional strawberry farming necessitates. “Methyl bromide,” Feitz Jr. said, “is nasty, nasty, ozone-depleting, harsh, harsh stuff.”

Since vertical, hydroponic farming does not use soil, Cutter explained, it is not plagued by soil-borne pests and requires no pesticides.



A mild fertilizing solution that includes thirteen vital trace elements is dripped hydroponically for five minutes, three times daily. Because the solution goes directly to the plants’ roots, the method uses 80 percent less fertilizer and the pH, crucial to plant health, is readily optimized.

“It is not organic,” Cutter said, “but organic strawberry farmers can use methyl bromide, which is carcinogenic.” Cutter, who is a biochemist, described the Verti-Gro method as “hospital-grade” farming. “Hydroponics are easily as good as organic and possibly better.”

Hydroponic vertical farming also facilitates energy savings in several ways, according to Cutter. First, the dramatically lower water consumption from water dripping down tiers of plants also means much less electricity is consumed in pumping water and driving sprinklers.

More significantly, the higher per-acre production revenue means economically viable smaller farms can be located nearer population centers, necessitating less transport as well as affording consumers the opportunity to harvest their own produce.



TVSF hopes to sell its entire crop through its U-Pick promotion, which would have local strawberry lovers take advantage of the site's denser, off-the-ground fruit and do their own on-site harvesting.

Cutter estimates that TVSF's U-Pick approach, if it eliminates the need to deliver the crop to market, could reduce fuel consumption by 90 percent. This would also mean potentially enormous emissions reductions associated with the method.

The reduced use of fertilizers and pesticides, both of which are often hydrocarbon-based products, also reduces the fossil fuels and emissions associated with the life cycle of the fruit.

TVSF is open for free visits March through August, Thursday through Sunday of each week. It has announced an open house on March 17, weather permitting. The site is located at 5452 Fifth Street, Fallbrook, California, 92028. The phone number is (951) 212-5805.

