

How One Tech Entrepreneur is Rethinking Salad

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Paul Lightfoot doesn't fit the typical vision of a farmer. He's a former Wall Street lawyer and software CEO. But the outcome of his midlife crisis a decade ago wasn't a sports car or Mt. Everest excursion; it was a prescient observation about salad.

He saw a leafy greens industry that was not adapting to new consumer preferences and was both vulnerable to climate risks and contributing to rising greenhouse gas emissions.

“There were a series of headwinds that now are very obvious, but at the time were there only if you looked closely,” Lightfoot says. “The headwinds included vulnerability to weather volatility, which I knew would get worse as climate changed.”



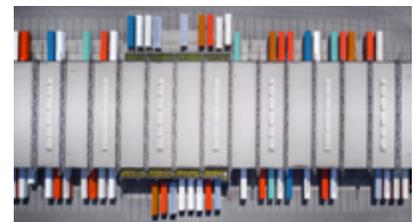
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—Paul Lightfoot

Lightfoot, whose own diet already included mostly organic and plant-based foods, realized that these climate-related risks were particularly pronounced for leafy greens producers located in what is known as the Salad Bowl of the World. California's fertile Salinas Valley produces well over half the lettuce in the US, with another large percentage coming from Yuma, Arizona, in the winter. It's a highly centralized, highly industrialized, highly efficient, and, in Lightfoot's view, highly vulnerable industry.



He envisioned growing leafy greens without pesticides in greenhouses located close to consumers in the Eastern US and sending his product to local grocery stores as packaged salads within a day of picking.



It's a model that sounds simple, and almost obvious, but it simply didn't exist. If his concept were to catch on, Lightfoot knew that over time it could change the balance of power in the leafy greens market. Just like what happened in the tomato market.

With no background growing or selling perishable products, Lightfoot decided to apply what he knew about optimizing supply chains through software to instead develop and optimize a sustainable supply chain for leafy greens. BrightFarms was born.

Rethinking the Salad Model

First, he wanted a decentralized network of salad-growing greenhouses located close to customers. Founded in 2011 as a venture-backed company, he created a vertically integrated supply chain starting with seeds and ending with packaged, ready-to-eat salad greens delivered to nearby grocery store shelves. The model gave BrightFarms total control while reducing costs and time to market.

Compare that to the traditional lettuce industry, where large brands like Dole and Fresh Express buy lettuce and other produce from a range of growers. In a giant facility, these agriculture processing giants combine lettuce from their own fields and from multiple growers, wash it, store it, and package it before shipping it across the country to arrive a week or so after it's picked from the fields.



BrightFarms' greenhouses use less water and less land compared to lettuce grown in fields.

In 2013, BrightFarms built a proof-of-concept, 54,000-square-foot greenhouse in Bucks County, Pennsylvania. They now operate in four states (with a fifth opening with month), growing their produce in 700,000 square feet of greenhouse space.

Lightfoot made good on his sustainability vision by growing the greens with hydroponics. The company says this method uses 80 percent less water and 90 percent less land compared to lettuce grown in fields. And, by producing the lettuce close to the end consumer, they say they use 95 percent less fuel for transportation than lettuce grown in the West and shipped to the East Coast.

1/3: Amount of global greenhouse gas emissions that come from agriculture.



The idea that consumers were beginning to care where their food came from is not a novel concept today. But a decade ago, it was a keen observation Lightfoot made during his years working with restaurants. He'd founded and led a venture-backed software company that catered to the restaurant industry. In BrightFarms' early days, trying to get locally-grown and higher-priced salads onto grocery store shelves wasn't easy. He told retailers, "You can gain a competitive edge if you're early to having a local salad program."

It took time and persistence, but retailers eventually recognized the wisdom in Lightfoot's pitch. BrightFarms salads are now in Walmart, Albertsons, Ahold Delhaize stores, and Kroger, to name a few.

"Right now, every major retailer in the United States either has a local indoor salad program or is working feverishly to get one because they're behind," Lightfoot says.

Disrupting America's Salad Bowl

As BrightFarms continued growing, retailers found themselves generally reaping 25 percent to 40 percent more in category sales when replacing their incumbent brand with BrightFarms products on the same amount of shelf space, according to Lightfoot. BrightFarms consumers are generally younger and more health-focused, buying larger grocery baskets, which helped as well.

60%: Amount of US consumers who see climate change as a threat to the country's well-being.

These consumers in particular are interested in and willing to pay more for sustainable products, but the advantages for consumers go beyond values. BrightFarms' indoor greens are on the grocery's shelf a day after picking them. That makes it a week fresher than traditional lettuce.

"One week," Lightfoot explains, "is a big deal in a category where the shelf life is two weeks."

Lightfoot chose a popular crop. Prepackaged salads and lettuce continue attracting sales dollars and are the top-selling vegetable, based on national sales figures in mid-2020. In 2019, more than \$8 billion in lettuce was sold in retail locations, 5.3 percent more than in the previous year. BrightFarms is currently just a sliver of the lettuce market. In 2019, \$71 million in lettuce was grown indoors or “under protection” (using USDA lingo).



Lightfoot thinks that dynamic is about to change. He believes his niche lettuce industry could make up a good portion of all lettuce sold within five years as retailers and consumers grow increasingly frustrated with safety-related shortages and bad press. In 2020, leafy greens contaminated with *E. coli* led to 40 infections and 20 hospitalized in one recall, and potentially contaminated organic Romaine hearts led to another. The year before, two outbreaks pulled lettuce from the shelves. And in 2018, the FDA recalled lettuce from two outbreaks, including one from Yuma-grown lettuce infecting 210, hospitalizing 96, and killing five people. In a controlled indoor environment like a greenhouse, the plants are less susceptible to contamination risk.

Big Salinas growers scoffing at the idea of their dominance being threatened can look to the tomato industry for a reality check. Tomatoes make up almost half of sales for food crops grown under protection, at \$345 million in greenhouse tomato sales in 2019. In 1998, the total of **all** food crops grown under protection was about \$223 million. By 2014, most states in the US reported growing indoor tomatoes, with California, New York, Nebraska, and Minnesota all growing more than 10 million pounds in greenhouses annually.

In part, this explains how while American consumption of fresh tomatoes tripled between 1970 and 2010, domestic field-grown tomato production is back to 1970s levels. An increase in North American tomato imports is certainly another factor, but the trends overlap. Between 2004 and 2017, Mexican greenhouse tomatoes imported to the US grew from about 300 million pounds annually to 1.8 billion pounds. Greenhouse growers have undeniably transformed the tomato industry.

The market-shifting path set by greenhouse tomatoes should put Salinas and Yuma growers on edge—and helps explain how BrightFarms matured into a private equity-backed company, now majority-owned by Cox Enterprises. The investment into sustainable food production was a first for the company, which has historically invested in automotive and communications. But Cox was interested in cleantech opportunities and in food, Lightfoot says, and the timing was right. Also, private equity is an attractive source of funding in a sector where financing of working capital can be difficult.

Farming for the Future

BrightFarms' greenhouses use hydroponic methods, growing the plants in mineral-based water instead of soil. The company estimates that traditional agriculture uses seven times more water than BrightFarms; one reason that BrightFarms uses less is that they can reuse their water.

Meanwhile, California and Arizona face water shortages and threats to groundwater. The water used in Salinas, Lightfoot says, “is what I call fossil water. It’s like 20,000 years old, and every year they take more out than gets recharged in the natural processes.” Salinas growers’ groundwater supply is threatened by saltwater intrusion as the Pacific Ocean, 10 miles away, seeps into the aquifers. The communities are now spending millions fighting back the ocean.

BrightFarms also minimizes the need for artificial heating or cooling by building their greenhouses in cooler areas. “We used to buy carbon dioxide that plants consume to grow... and release it in our greenhouses,” Lightfoot says. Their new North Carolina facility will have heaters that release carbon dioxide created in the heating process back into the greenhouse, “so there’s one less step of carbon emissions from our processes.”

Providing carbon footprint labeling is another sustainability option that can show consumers a product’s impact.

Greenhouses do have energy costs, explains Lightfoot, but their model doesn’t require the enormous amounts of energy used in the lettuce processing facilities, which include large cold storage facilities and steps like washing and drying the product, which BrightFarms does not have to do. They’re also working on projects to add renewable energy microgrids to rely less on outside energy sources.

The model is well suited to a future where sustainability is not a trend, but table stakes. A new approach to crop production is quickly becoming an economic imperative in a world where agriculture is both being threatened by climate change and generates 10 percent of US greenhouse gas emissions.

| “We have to *changethewaycropsaregrown.*”

—Paul Lightfoot

And that includes vegetables and fruits beyond leafy greens, he adds. Lightfoot believes the agriculture market is full of unrealized greenhouse growing opportunities. Specialty crops like strawberries are also relatively centralized and rely heavily on pesticides. He says strawberries are ripe for disruption.

Microgreens are another growth crop that can be grown on a hyper-local basis with high per-unit pricing. Companies like Farm.One are successfully growing microgreens, herbs, and flowers in Manhattan and servicing restaurants. And AeroFarms is using indoor vertical aeroponic farming techniques in Newark, New Jersey.

Lightfoot’s perception of the US lettuce industry and consumer preferences has been accurate to date. If his vision of the future is fully realized, the entire agribusiness industry may want to start paying attention to what’s happening in those sunny greenhouses in the Midwest, Northeast, and Southeastern US.

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From her New Jersey home office, Debbie was watching the squirrels, rabbits, and birds long before it became a national pandemic hobby. She covers supply chain and the medical industry, and sometimes the supply chain of the medical industry.

