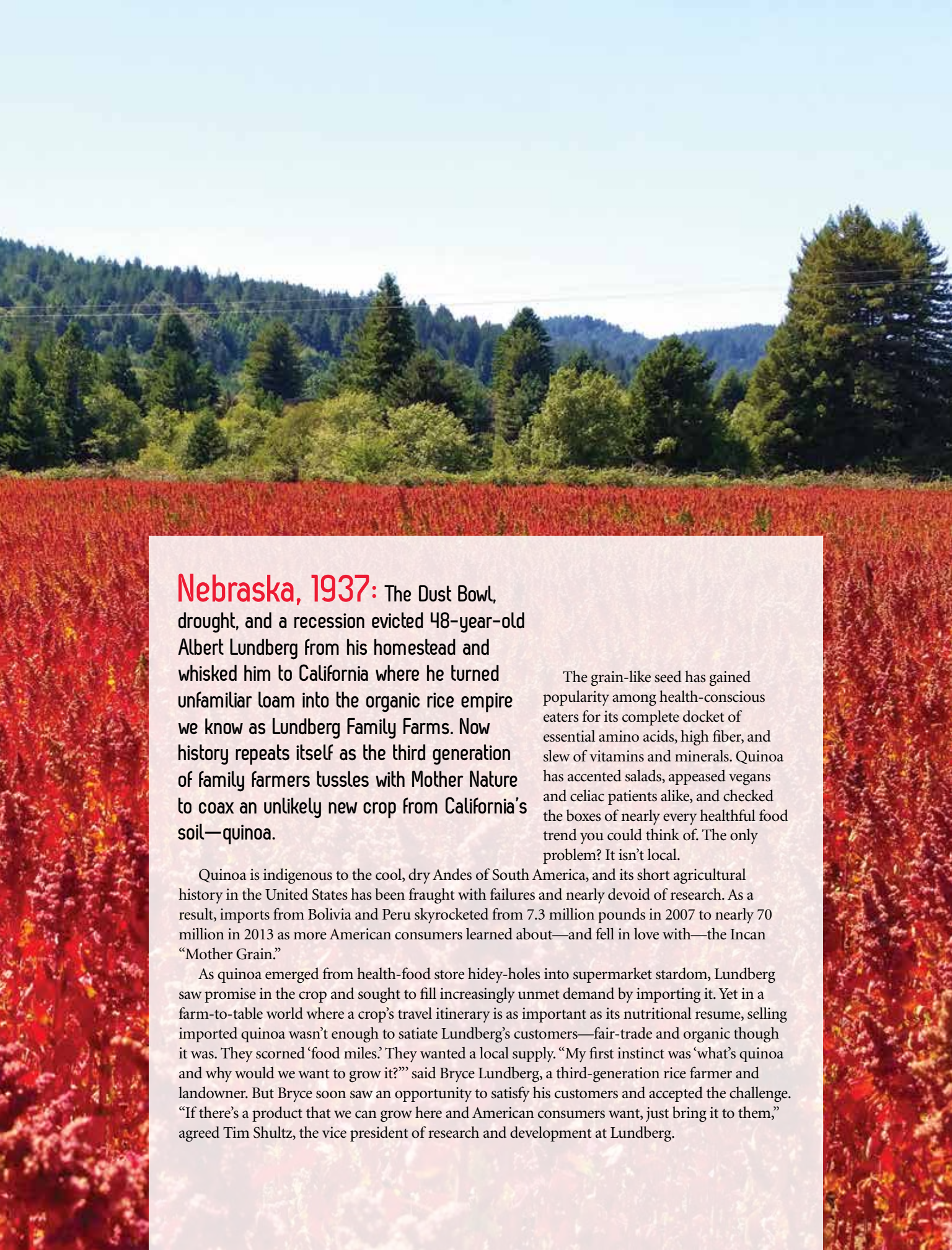




ALL AMERICAN **QUINOA**

The skyward seed
that descended
from the Andes

BY MICHAEL A. MILLER



Nebraska, 1937: The Dust Bowl, drought, and a recession evicted 48-year-old Albert Lundberg from his homestead and whisked him to California where he turned unfamiliar loam into the organic rice empire we know as Lundberg Family Farms. Now history repeats itself as the third generation of family farmers tussles with Mother Nature to coax an unlikely new crop from California's soil—quinoa.

The grain-like seed has gained popularity among health-conscious eaters for its complete docket of essential amino acids, high fiber, and slew of vitamins and minerals. Quinoa has accented salads, appeased vegans and celiac patients alike, and checked the boxes of nearly every healthful food trend you could think of. The only problem? It isn't local.

Quinoa is indigenous to the cool, dry Andes of South America, and its short agricultural history in the United States has been fraught with failures and nearly devoid of research. As a result, imports from Bolivia and Peru skyrocketed from 7.3 million pounds in 2007 to nearly 70 million in 2013 as more American consumers learned about—and fell in love with—the Incan “Mother Grain.”

As quinoa emerged from health-food store hidey-holes into supermarket stardom, Lundberg saw promise in the crop and sought to fill increasingly unmet demand by importing it. Yet in a farm-to-table world where a crop's travel itinerary is as important as its nutritional resume, selling imported quinoa wasn't enough to satiate Lundberg's customers—fair-trade and organic though it was. They scorned ‘food miles.’ They wanted a local supply. “My first instinct was ‘what's quinoa and why would we want to grow it?’” said Bryce Lundberg, a third-generation rice farmer and landowner. But Bryce soon saw an opportunity to satisfy his customers and accepted the challenge. “If there's a product that we can grow here and American consumers want, just bring it to them,” agreed Tim Shultz, the vice president of research and development at Lundberg.

At the time, no one in the US knew much about the 5000-year-old pseudo-cereal from Lake Titicaca. But being no stranger to agricultural innovation—trailing back to Albert’s son, Harlan Lundberg, who championed organic rice farming in the 60s—Lundberg was up to the task. Homer Lundberg often protested his brother’s newfangled propositions, but they were so successful that he was always glad he lost the arguments. “I think Harlan’s attitude set up the idea that you’ve got to look outside. Not just at what you’re doing, but what’s out there,” said Homer. “And that’s the kind of impetus that brought us to be open-minded enough to try quinoa.”

The trouble is, they had almost nothing to go on. “Being a new crop for us and for the United States, there’s not a research station we can go to and get the textbook on quinoa. We’re figuring that out for everyone else,” said Shultz. Quinoa lacks the century-long history of research and experimentation that rice has—it just doesn’t exist yet in the US—but that is quickly being amended by the Lundberg family and friends.

Lundberg formed an Avengers-style team of students, researchers, and farmers to hash out quinoa’s mysteries together. Notably, the company works with grain expert Kevin Murphy, who heads up Washington State University’s substantial quinoa research program; Frank Morton of Oregon’s White Mountain Farm, who developed hardy seeds for Lundberg’s Antique White blend; and Adam Peterson, who uses climate maps to identify suitable farming areas where he encourages farmers to grow quinoa. Every day Lundberg is more savvy than the last, but they were met with resistance from Mother Nature when they began experimenting five years ago in the Sacramento Valley near their headquarters in Richvale.

Quinoa is a hardy plant when it comes to frigid temperatures, frost, and high-speed winds, but crumbles beneath the power of the sun at its zenith. Temperatures above 90 degrees during the flowering stage of growth sterilize the flower. “You’ll have a nice plant and

it looks like there should be seed in it, but when you go to grab the head, there will just be dust,” said Bryce. Rain before harvest also washes away much hope of cultivation for vast swaths of the US, causing mature seeds to sprout early and rendering them useless. “Sprouted-on-the-stem quinoa . . . That would be a new angle,” joked Shultz, “but not a very reliable one.”

Other fields were blanketed by pests. In warmer areas, aphids and lygus bugs laid siege to mature seed, significantly depleting yields before it ever reached our plates. Stem borer beetles wage war on quinoa’s vascular system, which it uses to usher food from its roots to its stalk, leaves, and delightful seeds. Last year, a field in the Valley beat the heat, defied seasonal rains, and promised excellent yields—and the bad bugs thought so too. “Aphids took nearly the whole crop out,” said Shultz.

It was like playing roulette with nature, but Bryce can reminisce with a smile. “Ask me how much quinoa we harvested this year over by our operation in Richvale,” he quizzed.

I obliged. “How much?”

“Oh, zero,” he replied with a chuckle, admitting that this year’s harvest would come from the coast. The Lundbergs were overdue for another migration west.

Radiant streaks of copper and red wisped in the wind, stippling the horizon with a fiery mosaic effect. And the mountains . . . well, the stoic Andes were more than 4,000 miles removed. I stood in a quinoa field less than 50 feet above sea level in Lolita, California, one of Lundberg’s breakthrough coastal locations for farming the crop. “Boy, isn’t that a beautiful landscape?” chimed Bryce.

All poetry aside, Lundberg struck geographical gold in Humboldt County, where the bulk of the company’s quinoa is produced. The mild ocean breeze puts Humboldt at roughly 15 degrees cooler than inland trial sites, so the crop has a dramatically greater likelihood of surviving California’s unforgiving summers. Adding to that are frugal skies. From Mendicino down to Pescadero, rain is unlikely during the crucial month

of September, according to Shultz. In fact, there is enough rain and fog during the fall-spring wet season to keep the crop well-watered sans irrigation, suggesting that quinoa could be a local source of sustainable nutrition in a future wrought from climate change and drought.

Pests haven’t been showing up in force, either. To keep it that way, Shultz and his team are planting phacelia as a welcoming bouquet for beneficial insects as part of their pest management program. Phacelia’s sweet nectar beckons bugs like hoverflies whose larvae eat aphids for breakfast. “This enables us to use natural pest control systems, rather than chemicals, to address insect pressure,” said Shultz, in full-fledged Lundberg spirit of leaving the land better than you found it. Not that pesticides are an option anyway—California’s strict legislation hasn’t approved any for the brand-new crop.

Successfully raising quinoa from seed to harvest is only a skirmish in the larger war against the inevitable pressures of an organic ecosystem. Lundberg must forge cultivars that are consistent and well-adapted to the California coast in





On the shelves

Tri-color Blend

Organically grown on a few hundred acres in Loleta, the Tri-color Blend comes from a population of white, brown, red, and black seeds. Intentionally bred for its variability, each savory seed pops with unique texture and nutty flavor. “The darker ones have a little pop to them, and the white ones are just really pliable,” said Shultz. This blend is a great solitary standout or a rich anchor for leafy greens.

Antique White

This mellow seed offers a fluffy texture and delicate aroma, making it the perfect sidekick for a variety of colorful recipes. But don't let the gentle flavor fool you: each serving packs 7 grams of fiber and 7 grams of protein—more than other traditional white quinoa on the market. The 10- to 15-minute cook time makes it easy to whip up seconds or thirds on any night of the week.



Thin Stackers

Don't have 15 minutes but want the taste of Titicaca on your way out the door? Thin Stackers are light but rewarding grain cakes made from red rice and homegrown quinoa. They stand up beautifully on their own, but their true calling is to support your favorite toppings for a symphony of breakfast delight. Plus, 2 grams of protein per serving will kick start your brain for the workday.



Lundbergs on the Loam

Although farming experience certainly helps, it isn't the only advantage that catapulted Lundberg Family Farms to the forefront of agricultural ingenuity. For Lundberg, family makes farms possible. Albert started a landslide of generosity when he gifted his farms to his four sons and, throughout the decades, the Lundberg's have added their own invaluable perspectives to the family cache of wisdom and kept their flock focused on what matters most.

Albert Lundberg

Leave the land better than you found it.

Eldon Lundberg

Treat family as equals.

Wendell Lundberg

Don't be selfish when you can be generous.

Homer Lundberg

There isn't a single job in this operation that somebody can't do better than I can. And that's not humility—it's the essence of management, really.

Bryce Lundberg

None of us had to buy the land from the family...and that's been an example that goes back to Francis and Albert, that we, Tim and my generation, need to continue and move to the next generation. We want to be a fourth- and fifth-generation business.

effort to expand their feasible growing region. While some of their seed is bred by third parties like Frank Morton and the Organic Seed Alliance, Lundberg also relies on their own field trials to test their varieties' genetic mettle for heat- and pre-sprouting resistance, yield, weed resistance, texture, aesthetics, and of course bigger seeds, a popular request from American consumers. It takes six to seven years to forge a stable variety, but robust genetic selections are well worth the wait. Currently, 20 of 320 test plots at Loleta show pure lines.

After a jaunt down the trail, we came upon a seed field that was sizzling with beads of scarlet. Here, Lundberg separated red seeds from a well-adapted "tricolor" population in hopes that red seeds beget red quinoa. And many did express red, but not enough to constitute conclusive evidence that the method works. "With [the trials] we're closer, but you have to have a lot of tools in the tool kit and you've got to use them all," said Bryce. With that philosophy in mind, Lundberg is also experimenting with color-sorting black seeds before ruling out the method for sure.

But pounds-per-acre isn't the most important metric for Lundberg when developing quinoa varieties—it's flavor. "Do you taste your quinoa?" That's one of the first things they ask researchers, said Shultz. Delicious smells often waft from the Richvale test kitchen, betraying quinoa that traded field trials for culinary ones. However, Lundberg doesn't gamble with the flavor and mouthfeel of their quinoa. A TA.XT texture analyzer monitors the exact pressure at which a seed pops in two, and an electronic tongue detects precise levels of flavor-producing compounds in organic material. Leaving no room for employee debate, Lundberg has the instrumentation to achieve flavor symbiosis with uncanny accuracy.

Even with the most scrumptious variety, though, a literal interpretation of farm-to-table quinoa would leave a bitter taste in consumers' mouths. Quinoa is wrapped in a naturally occurring layer of saponins—foul-tasting phytochemicals meant to deter bird and animal

chompers. Bryce rebuked Internet-fueled propagations that the compounds are toxic, but agrees they double as a highly effective human deterrent as well. As if to perpetually remind himself of what not to feed to his customers, Bryce helps himself to a saponin-covered seed at least once a day.

The soapy coating is difficult to remove, and the cost of employing the proper infrastructure can be limiting to enterprising farmers in the US. But Lundberg had something most early adopters don't—more than 7 decades of experience in milling organic rice. In rice milling, kernels are abraded to remove their outer layers in a process called scarification. Submitting quinoa to a slightly modified scarification process helped oust the unwanted suds almost twice as efficiently. And Lundberg extracts more than just foul flavors—they are stockpiling saponin for its potential as a natural pest repellent for their crops.

"If you ask Kevin Murphy what's the next quinoa, he'll tell you 'quinoa.'" Said Bryce. Although it must dodge rain to survive, quinoa shakes off dry spells that often parch California's crops. It slinks from the beating sun but stands



defiantly in arid, windy climes. It scoffs at saline soils—an increasing issue for Californian growers, the result of years of irrigation—and it brings diversity to the dairy farmers of Humboldt. Shultz speculates it will be the fifth highest dollar-value crop in the county this year, boosting a depressed economy and raising excitement within the farming community. Globally, a stable US supply could relieve pressure on South American farms that may soon approach the limits of their ecosystem. "I see a great future in quinoa," beamed Bryce.

With two varieties already on store shelves, Bryce and his team believe their work has just begun. "We have a lot more questions than we have answers, but that's one of the things I love about the job. We get to see if we can figure it out. How cool is that?" said Bryce. With three production years under their belt, Lundberg can focus on trends: optimal nutrition for the crop, natural systems to combat pests, crop rotations, and environmental impact on seed nutrition, to name a few. Watchmen diligently eye quinoa storage to catch any insects that seek an easy snack. Researchers pour over tomes of trial data to determine proper cover crops, fertilizers, and much more. They dive deeper into quinoa's ample diversity, scouring for selections that will increase its suitable growing area and flesh out the nuances of a food new to the American people.

It's an elephantine task often masked by the idyllic notion of pioneering a colorful crop on American soil—even Bryce gets caught up in the romance once (or twice) in a while. "Isn't it nice in the quinoa field right on the edge of the Pacific Ocean?" he mused. Although he gets a twinkle in his eye at the thought of what his family and company have accomplished so far, he is excited about the opportunities that still lie ahead, borne out of his grandfather's generosity, family values, and the Lundberg tradition of blazing a trail in the future of food.

This might need a good description.



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A grain drill is used to plant quinoa in Humboldt County. The heavy machinery sows the seeds at a precise distance and depth, important metrics that Lundberg is still dialing in. However, quinoa exhibits morphological plasticity, an agronomic property that allows the plant to grow to fill the space allowed for it, even when the number of plants per acre varies.



Quinoa field at 8 weeks. Quinoa starts off slowly, dedicating all its energy into developing a deep root system. After 40 days, it explodes out into colorful swaths. To aid its efforts, it is organically fertilized with gypsum and potash, which nourish the soil with potassium and calcium.

The Proof is in the Process

Some believe quinoa can't be grown below 10,000 feet, yet Lundberg grows it in the Imperial Valley, Mendocino, Humboldt, and the Olympic Peninsula. Here we walk you through key points in the process, from seed to shelf.



Mature quinoa at 100 days. Lundberg waits for quinoa to dry on the stalks before harvesting with a combine after learning that still-green plants are difficult to harvest. They estimate that 14 to 16 percent moisture is the magic number, but are still researching the myriad variables that affect it.



A combine harvests Cherry Vanilla quinoa near Elk, California. The combine cuts the dry stalks and separates the seed from the straw through an onboard threshing process. The machine then sifts the grain from other organic matter. Lundberg is careful not to discard the excess, because some of the tiny seeds don't make it into the combine's grain bin.



Seed is loaded up for transport. At this point, the quinoa is hauled back to the granary in Richvale. The yield varies from farm to farm, but Lundberg cultivates around 800 acres per year and believes that number could rise to 1,000 acres in 2017.



Quinoa is collected for cleaning. Seed is amassed in grain bins with specialized screen floors that allow air to be pumped through the seed to keep it fresh. It will be cleaned and stored in the granary until Lundberg receives orders and sends it to the processing plant. There the saponin will be removed before packaging and shipping to grocers around the country. **en**