

Seed Central

Public-private partnership seeks to become the Silicon Valley of the seed industry

by Madeline Fisher



Five years ago, François Korn was sitting in a board meeting of the Seed Biotechnology Center at the University of California–Davis (UC-Davis) when talk turned to exactly how many seed and seed-related companies were

situated around the university. No one was quite sure, so when Korn returned to his office at SeedQuest—the central information website for the global seed industry, which he runs—he identified every nearby seed company he could and pinpointed them on a map. Fifty were located within an hour’s drive of campus, he discovered, and twice that many within a three-hour drive.

“So what we had was a seed industry cluster” in the backyard of UC-Davis, Korn says, “the premier agricultural university in the world.” He also knew the cluster held tremendous prospects for the region, if someone would just give it some juice.

It didn’t share the same rich culture of cooperation and exchange that flourished alongside competition in nearby Silicon Valley, for example. Similarly, a substantial gap existed between the research being conducted at UC-Davis and the needs of the area’s seed companies, despite efforts by the Seed Biotechnology Center to bridge the divide. So, Korn resolved to energize the cluster, and he started by giving it a name.

“We decided to call it Seed Central,” he says, “and to help the companies present in this region benefit from the fact that they are all right here.”

In the four years since Korn launched Seed Central with Seed Biotechnology Center director and UC-Davis professor Kent Bradford, the initiative has been doing just that. Thanks to its work, companies that collaborate with UC-Davis scientists today pay less in overhead and wrestle with less red tape. Consortia set up through the university are combining public and private funds to tackle research projects of mutual interest. Seed Central also boasts a vibrant

student program that exposes UC-Davis undergrads and graduate students to career opportunities in the seed industry.

Last but not least are Seed Central’s networking events. Once a month, upwards of 150 people meet either at UC-Davis or in Salinas to the south to hear an invited speaker and chat over food and drink. The gatherings, by all accounts, have been wildly popular. “Over the last two and a half years, about 1,200 individuals—unique users you would call them in web parlance—have attended,” Korn says proudly, including people from 100 different companies and a dozen universities, he estimates.

Talk may sound cheap compared with all of the other activity. But to those involved, the greater connection and trust fostered by these events are what’s making everything else possible. “One of the greatest things about all of this is that now we’re in contact and we listen,” Bradford says, noting, as one example, how industry concerns about finding skilled plant breeders have sparked new curricula and programs at UC-Davis.

“It becomes an ongoing conversation, and I think that’s critical,” agrees Seed Biotechnology Center research director Allen Van Deynze. “We’re an industry—not public, private, government, or whatever. We’re all in this together.”

Bringing Organization to the Industry

With its wet winters and dry summers, California is perfect for growing seed, and by the 1970s, the state was firmly established as a global center



Above: François Korn (left), owner and founder of Seed Central, and Kent Bradford, Seed Biotechnology Center director and UC-Davis professor. *Photo by Chris Akins.* **Right:** Allen Van Deynze, Seed Biotechnology Center research director, collects leaf tissue in order to extract DNA for the detection of induced modifications in tomato. *Photo by the Seed Biotechnology Center and courtesy of California Agriculture, © 2006 Regents of the University of California.*



of breeding and seed production for a diversity of crops, including vegetables, alfalfa, and sunflowers. When Korn arrived on the scene 36 years ago, however, he soon realized the renowned industry lacked something fundamental.

“It struck me right away that the seed industry didn’t organize its information very well: Information about products, information about markets, and so on,” he says. “It was such a striking difference from the previous [fertilizer] industry in which I had worked.” That’s why when the personal PC, internet, and other tools became available for consolidating and disseminating information worldwide, Korn left his position at a seed company to establish the global information clearinghouse SeedQuest.

Meanwhile, Bradford, a UC-Davis seed physiologist, was noticing a gulf between the university and industry. The depth of it hit home in 1988, he says, when he was at Penn State for a seed meeting. Hoping to

rustle up some industry funding for his research, Bradford was amazed to realize how many California companies were in attendance.

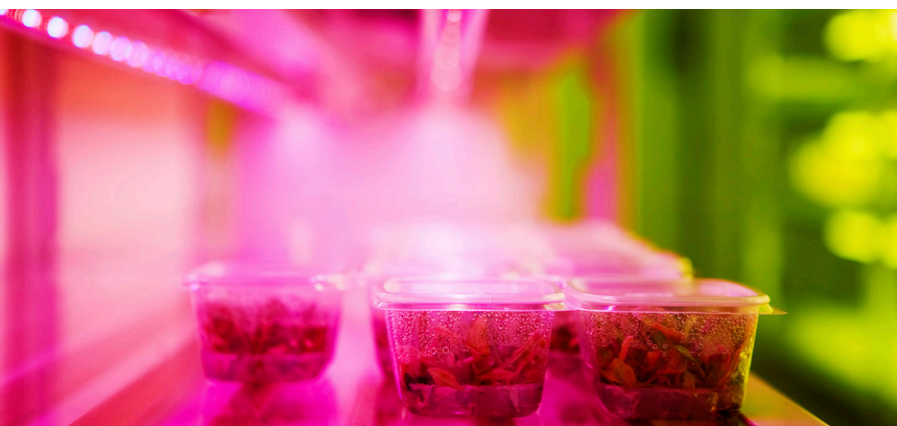
Then a colleague from Louisiana told Bradford how he’d soon be swinging through California to try to acquire some funding of his own.

“I had an epiphany,” Bradford says with a laugh. The industry he wanted to connect with was back at home. When he returned to Davis, Bradford began reaching out to local seed businesses, and before long, they’d assembled an informal research group that still exists today, focused on applied projects. Later, he joined with a group of seed industry executives, the university, the California Seed Association, and others to create a proper hub of public-private research collaboration on campus. Their efforts culminated in the Seed Biotechnology Center, which opened in 1999 with Bradford as director and Korn as an advisory board member.

The point of this brief history is that Seed Central didn’t happen overnight. “This is an evolution, a 20-year story,” says George Kotch, vice president of R&D, America Pacific region, at the seed company HM.CLAUSE in Davis. The company has been one of UC-Davis’ and Seed Central’s most enthusiastic supporters, he adds. And so has Kotch, for that matter. Before joining HM.CLAUSE, for instance, Kotch volunteered for six months at the Seed Biotechnology Center, where his goal was not only to help the university, but to meet industry folks throughout California. He found he didn’t have to leave his office. “The number of companies that visit the center is huge,” he says. “It’s a hub of activity.”

Today he sees Seed Central beginning to generate the same magic for the region. “Really what we’re trying to do is create a Silicon Valley among seed companies: Flowers, veggies, corn, soybean, everything,” he says.





Emphasis on Specialty Crops

Of course, it's hardly a new idea to leverage industry clusters and public-private partnerships to advance research, bring science to market faster, and spur economic growth. The concept is almost passé in the health and computer sciences, and even the plant and ag sciences have well-established models in North Carolina's Research Triangle Park and Seed Valley in the Netherlands.

What sets Seed Central apart, though, is its emphasis on specialty crops, especially vegetables. Investment in vegetable breeding pales in comparison to what's being poured into corn and soybean—and yet the need for the latest research and biotechnology tools is just as great. "More and more of the research that companies want is cutting edge," Bradford says. "They're competing on science now, especially in the vegetable world."

To deliver that science, the team is making impressive use of the research consortium. Coordinated by Van Deynze, consortia typically originate in weekly meetings between the university and industry, where companies discuss common research goals. Once a project has been decided on—for example, the sequencing of a certain genome—a group of companies signs up to fund it. (The state used to pay half the cost, but the program was axed in a recent round of budget cuts, Bradford says.)

Van Deynze then identifies the key scientists to partner with on the research; for the recently completed pepper genome, for example, he tapped a Korean team that was already working on the genome but lacked the money to finish it. The resulting data then always go into the public domain, although participating companies may get pre-publication access or receive proprietary information on their own genetic material. UC-Davis has also become

skilled at negotiating intellectual



Left: Photo courtesy of iStock/stevanovicigor.
Above: Photo courtesy of Lance Cheung/USDA.

property agreements covering the consortia, so projects aren't often held up by legal issues.

The main advantage for companies—especially small- to medium-sized ones lacking big R&D budgets—is that they can cooperate on research projects that are too expensive or risky to undertake alone, says John Mizicko, president of Eurofins STA Laboratories in Gilroy, CA, a diagnostic lab for the plant and seed industries. Then once the data are in, companies can use them to develop and improve their own products.

"That's when the competitive part starts," says Mizicko, who sits on Seed Central's advisory board. "Up until then it's not competitive. It's solving a problem."

But companies aren't the only ones to profit; the new data help everyone, especially since many projects might not happen otherwise, or at least not as quickly. The example Van Deynze says he's proudest of in this respect is the spinach genome: Work began on the sequence just three months after the idea to go after it was raised. "We had a consortium of seven companies that said, 'Let's do this,' and they just pushed it as hard as they could," he says. "And a year later we delivered the [genome]." Acquiring public money, in contrast,





Above: Photo by Brian Prechtel/USDA.
Right: Photo by Stephen Ausmus/USDA.



might have taken a year or more—if funding could be obtained at all.

It's not just genome sequences either. "There's technology around every door here," Bradford says. One that's

now a priority is

a method for instantly creating "double haploids," discovered in *Arabidopsis* by the late UC-Davis plant biologist Simon Chan. The ability to make haploid plants—also called inbred lines—in one stroke has been available in corn for some time, Bradford explains. But doing this in other crops, such as tomato, has proven very difficult; generating inbreds in those cases still requires six to eight laborious rounds of self-fertilization. So "to have a technology that lets us create a [double haploid] on command for any crop we want" would reduce costs and effort enormously, Bradford says.

He adds that sometimes the Seed Biotechnology Center is criticized for "selling out" to industry. But to him, the progression from basic research to commercial plant breeding is happening just as it should, in line with the land grant mission. "We have this very fundamental research in *Arabidopsis*, just looking at how chromosomes work. And then we can try to adapt it to other crops, make it less risky, show that it works," he says. "And the companies that work with us are right on the cutting edge. As soon as [the technology] is ready, they're going."

Investing in the Region

While the Seed Biotechnology Center has been strengthening its relationships with companies, Korn has been working tirelessly to bring them aboard Seed Central. For an annual fee, companies can participate in all of Seed Central's programs and events, and 28 have now signed on—many of them global businesses with California connections, including HM.CLAUSE, Nunhems, Enza Zaden, Sakata Seed, Syngenta, and Monsanto. But these companies aren't simply lending their names to the endeavor or attending an occasional social hour; they're actively investing in the region.





“Our next door neighbor is UC-Davis,” says Julie Ho, director of alfalfa breeding and molecular breeding at Wisconsin-based Forage Genetics International, of the company’s new research farm, which opened in June 2013. Monsanto and other seed companies have set up shop in Woodland 10 miles to the north, she notes. “But we chose to be right next to the university to enhance our existing collaborations with the university’s researchers and establish new ones,” she says. “It’s been going very well.”

“We’ve seen an expansion of the seed sector in the Davis area since the creation of Seed Central,” agrees Matthew Johnston, CEO of HM.CLAUSE—including an expansion by his own company. HM.CLAUSE recently relocated its corporate offices from Modesto, CA to Davis, Johnston explains, creating in the process several new positions. He credits Seed Central with helping recruit the necessary talent. “Without a doubt, our participation in Seed Central has increased our visibility in the area, and we can claim quite a few new hires to contacts we made through it,” he says.

Seed companies aren’t the only ones being attracted by the cluster’s new vitality. Several private equity and venture capital firms have recently arrived to take advantage of the region’s burgeoning seed and agribusiness sectors, Johnston says. And Korn has lately been reaching out to businesses in the supply chain, including growers. Even the public is beginning to take

notice. In Woodland, for example, residents are

starting to call their town by a familiar name: Seed Central. “I think it’s great,” Bradford says. “They should be conscious of the importance of this.”

The industry is now hoping to capitalize on the newfound attention to address a long-standing concern: How to attract and train the next generation plant breeders, plant physiologists, agronomists, and others in the ag industry. Large seed companies specializing in corn and soybean typically get the first crack at job candidates, Kotch says, followed by vegetable companies, and then flower seed breeders. Meanwhile, the number of students graduating in these fields has dropped both due to changing demographics (fewer kids growing up on farms) and the decline of public plant breeding programs. The pool of talent has shrunk so much, in fact, that the industry is now recruiting students at the undergrad level through, for example, internships



al appreciation for the alumni and friends of UC Davis whose generosity made the Buehler Center possible

Seed Central’s networking events are very popular. Once a month, upwards of 150 people meet either at UC-Davis or in Salinas to the south to hear an invited speaker and chat over food and drink. Photo to the left by Chris Akins. Above photo by Donna Van Dolah.



and financial support, in preparation for hiring them once they complete their graduate degrees, Ho says.

In response to these concerns, Seed Central has developed a program that gives students from many UC-Davis departments the chance to visit seed companies, meet and shadow seed professionals, and participate in internships, Korn says. Meanwhile, UC-Davis has a new targeted curriculum in plant breeding for undergraduates, as well as the Plant Breeding Academy, a popular professional development course that gives people already working in the seed industry the chance to hone their skills.

Investing in the next generation obviously doesn't produce speedy results when an undergrad degree takes four years to earn and a Ph.D. several more. But Bradford believes no other goal of public-private partnership is quite as important, and he gives the seed industry a lot of credit for seeing this, too. "None of this would have happened if not for some community-minded and far-sighted individuals in the seed industry who supported us and said, 'this is an investment to make,'" Bradford says.

Perhaps that's because seed companies are used to taking the long view, he adds. "You may not get the benefit for 10 years. But when you're a breeding company, 10 years is the norm."

The Power of Communication

With several new initiatives under way, exactly where Seed Central will be in 10 years is anybody's guess. A new Plant and Seed Collaborative Research (CoRE) Laboratory



Left: Participants engaging at a Seed Central event. Photo by Chris Akins. **Above:** Photo by Peggy Greb/USDA.

at UC-Davis, where public- and private-sector scientists would work side by side, is being considered. And Korn has launched a complementary initiative to Seed Central, called "Food Central," which aims to extend Seed Central's success to the food sector, the healthcare sector, and beyond.

Whatever the future holds for Seed Central, however, one thing is a pretty safe bet: The heart of the initiative will always be frequent contact and quality communication. When you have those elements, everything else falls into place on its own, Korn says. "You don't need to make enormous effort to encourage start-ups or research collaboration and so forth. Communication is enough to generate all that."

To make the point, Korn draws on one of his favorite anecdotes. One of Seed Central's past networking events featured a speaker from the California berry producer Driscoll's, and afterward, Korn witnessed a conversation between her and an onion breeder. "The breeder was saying, 'Look, you're working on strawberries and raspberries, and you need flavor science. We're working on onions and we need flavor science. We need the same science, and we would never compete. So let's talk and exchange ideas,'" Korn recalls. This, he concludes, "is success."

It seems incredible that something as simple as communicating can be so powerful. But Korn turns it around. "I think it is powerful," he says, "because it is so simple."

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