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Ceres co-founder Robert Goldberg, left, and chief scientific officer Richard Flavell work at their Malibu lab.

A Few Rush to Exploit New Biotech Crops

■Genetics: Young firms such as Ceres see this as a golden age. Despite protests, they are inventing the next generation of plants.

By PAUL JACOBS, TIMES STAFF WRITER

Worldwide protests against genetically engineered crops are on the rise. America's trading partners are calling for labeling of foods that contain ingredients from genetically modified plants. Federal regulators are reexamining the rules for assuring the safety of biotech foods.

Against this tumultuous backdrop, a handful of young companies are busily inventing the next generation of biotech plants—crops that promise increased food production and improved nutritional content, or that offer a renewable, low-cost supply of medications and industrial chemicals.

These small firms see this as a golden age of plant biology, and they are betting that the controversies will cool and the world will warm to their innovative products.

One of the newest and most promising of these emerging companies is **Ceres** Inc., started in 1997 by a UCLA professor and his corporate partners with more than $50 million in private capital. After leasing unused lab space on the university campus, the company now sits in what at first blush seems the most unlikely of places for an agricultural research facility — high on a hill above Malibu Canyon, with a glorious view of the Pacific.

Like its competitors, which include the large seed producers as well as smaller firms, the company is rushing to exploit new developments in plant biology. The advances include the rapid decoding of genes, high-speed methods for isolating gene products and discovering their function, and efficient ways to transplant desirable genes from one species into another.

The search for genes is called genomics, and says UCLA biologist Robert B. Goldberg, a co-founder of Ceres, the company is "trying to position itself to be the premiere plant genomics company in the world and compete with **DuPont** and **Monsanto** and **Novartis**."

Goldberg says that unearthing just a few important genes—he calls them "undiscovered diamonds"—from the tens of thousands present in a few species of plants will be enough to put the company over the top. "We're looking for breakthrough traits," he said.

And the company may already have some of them, licensed from UCLA and other University of California campuses. These are genes that can boost grain tonnage by increasing the size of seeds, by growing seeds not just from flowers but in leaves, and by producing seeds without pollination.

Cranking up food production will be increasingly important to feed a growing world population—more important in many parts of the world than advances in genetic engineering that lead to new medications, says Richard Flavell, Ceres' chief scientific officer.

"In that part of the world where 3 billion people suffer from nutritional deficiency, your first thought is not how to get [medicine] to people, but how do I feed them," Flavell said.

The hiring of Flavell was a coup for the fledgling company. He's the former director of the John Innes Centre in England, a world leader in plant genetics. Last year, he was elected to Britain's Royal Society—a body that includes numerous Nobel laureates and that was once headed by Sir Isaac Newton.

"To kick-start the firm," Flavell said, the company has farmed out its gene sequencing—the decoding of the chemical building blocks of plant DNA—to **Genset**, a French company that has one of the world's largest factories for deciphering plant, animal and microbial genes.

And it is working closely with university scientists at University of California campuses in Los Angeles, Santa Cruz, Berkeley and Davis.

"The business strategy is to get immediate access to mature programs," he said, by licensing technology already developed and working with established researchers.

Ceres recently broke ground on its first greenhouse. "Most of our plants are in enclosed cabinets," Flavell said, "But we're moving to a bigger scale, we're ramping up. In a couple of years we'll be into crop plants."

The company is planning to work with the large seed companies to distribute its products. "If we want to penetrate large markets, as a small company, we can't do that efficiently by

ourselves," he said.

But eventually, Ceres could develop its own line of seeds. "We want to be a product company, and not just a technical supplier," Flavell said.

Goldberg helped found the company after a successful collaboration with **Plant Genetic Systems** in Belgium that led to a new method for creating plant hybrids that is widely used in the seed industry.

That work, Goldberg said, convinced him of the power of collaboration in producing improved plant varieties, and he set out to establish a nonprofit institute that would bring together academic scientists on several campuses.

But he had difficulty finding the money he needed, even with the argument that the new technology would help feed the world. "I went to Hollywood people," he recalled a recent interview. "They could see cancer, but they couldn't see hunger."

He turned instead to the head of Plant Genetic Systems, Walter De Logi, a Caltech-educated astrophysicist who in 1996 had just sold his company to international seed giant **AgrEvo** for $750 million.

Goldberg recalls the conversation this way: "I said, 'Do you want to start an institute?' He [De Logi] looked at me and he said, 'Do you want to start a company?'"

They finally agreed to do both. De Logi and venture capitalist Edmund "Ned" M. Olivier of **Oxford Bioscience Partners** raised the money to start Ceres and fund the Seed Institute at the four UC campuses and the University of Utah. In exchange for providing $5.75 million over five years to underwrite university researchers, Ceres gets first crack at the rights to their inventions. An independent university committee oversees the collaboration to protect the university from potential conflicts of interest.

De Logi is Ceres' CEO; Olivier chairs the company's board of directors; Goldberg sits on the board.

Company executives say they have no immediate plans for a public stock offering. They say they have enough capital to last a couple more years, and may get additional rounds of private financing before contemplating a stock offering.

Ceres quickly outgrew its leased university lab and moved to the **Hughes Research Laboratories** in Malibu, which had space available after downsizing—an illustration of how new technologies can fill the gaps in a local economy left by shrinking, older industries, in this case aerospace. It now has 80 employees, most of them scientists.

And it is not alone in seeing an opportunity to harness the power of plant genomics to create crops with improved traits, including increased production levels. In fact, there seems to be the genetic equivalent of a gold rush going on, with a number of companies racing to stake their claims on useful plant genes.

Insiders say that the research is revving up despite the controversies swirling around genetically modified foods.

"I think contrary to what the public perception is about the state of genetically modified organisms and the state of biotechnology, behind the scenes it is going farther and faster than ever before," said Dean V. Cavey of Verdant Partners, an investment banking and consulting group that specializes in crop genetics.

In fact, investors in Ceres and other companies are hoping that by the time a new generation of genetically modified crops is ready, three to five years from now, the public will be satisfied that the crops present no hazards to consumers or to the environment.

"There's no question that the protests are putting a damper on the field at the moment," said Michael Fromm, president of **Mendel Biotechnology** in Hayward. But improvements in the speed and scale of gene discovery "reached a fever pitch in the genomics of the 1990s," he said, and promise marked improvements in food production and quality.

"The opportunities are immense," said Richard Kouri, chief business officer at **Paradigm Genetics** in Research Triangle Park, North Carolina. The early work in plant genetics was mostly to help farmers, Kouri said. "Now we're shifting more to output traits, health related, industrial related, and food related."

Paradigm, Mendel and Ceres are among the newer companies that have joined the race to discover genes for traits that can be transferred to crops.

There's room for many more of these companies, says Verdant Partners' Ken Moonie, but the anti-biotech protests have made it difficult for additional start-ups to enter the field.

And that's good news for companies like Ceres and the others that have already secured the initial capital they need.

"Timing in this world is everything," Moonie said.