

Public–Private Collaboration to advance **Agronomy**

by Madeline Fisher

Over the past decade, Lee Sommers, director of the Colorado State University Agricultural Experiment

Station (AES), estimates he's had to chop the AES budget by nearly one-third. Thirty years of flat federal spending on agricultural research is one reason why there's less money these days for AES, which supports research programs across Colorado. But the real hit came in 2008 when the economy slumped, leading the state to cut funding for higher education sharply. The good news, perhaps, is that faculty positions have so far been spared, says Sommers, an ASA and SSSA Fellow. "But obviously if you've had a 30% reduction in funding, you don't have the support staff [you need] or the operating budget. And so programs are affected."

Sommers' story is nothing new to anyone connected with the U.S. land grant university system, but there does seem to be new urgency over how to respond. In the early months of the economic crisis, it was easy to believe that "normal" times would soon return, and with them rebounding public funding for agricultural

research, education, and extension. But as the downturn persists, many have become convinced that another source of support needs to be found. One of them is University of Minnesota agronomy professor and ASA and CSSA Fellow Vernon Cardwell, and the solution he's proposing is for public-sector researchers to strengthen their ties to private industry.

Academia and industry have obviously worked together for decades, Cardwell says. But industry money has historically flowed mainly into plant breeding programs—and, recently, genetics and genomics research—rather than into crop management and agronomic disciplines. Meanwhile, companies like Pioneer are building their own programs and staffs in agronomy while struggling to fill existing positions with well-prepared graduates. And on top of all this, the world faces a mounting set of agricultural challenges, including food safety and security, nutrition and health, bioenergy, and climate change.

"So, where are the resources to sustain the research and technology development for the future—federal and state? My answer is 'no.' I don't think we'll be able to turn that around," said Cardwell at a symposium on public–private partnerships that he co-organized at last fall's ASA, CSSA, and SSSA Annual Meetings in San Antonio. "So, the public–private partnership is an area we need to think about to build a future that is sustainable."

Done right, these collaborations don't just infuse public research and extension programs with needed money, proponents say; they can also boost the legitimacy of work done by both companies and universities and strengthen the agricultural community as a whole. But getting them right also isn't easy. Finding areas where the research interests of universities and companies intersect can be tricky, since companies ultimately need to develop new products for sale. Working with industry also requires a mind-set and skills that most faculty and staff don't have and may be reluctant to develop.



iStockphoto/Kernalbas

Most importantly, private–public partnerships don’t just happen by themselves. Instead, they require real time and energy that people already consumed by research, teaching, and extension responsibilities may not have to give.

“I’m still stunned by the [industry] money that’s out there, but it’s labor-intensive money,” says Iowa State University (ISU) plant pathology professor Greg Tylka, who developed and ran an ambitious public–private partnership program for ISU Extension from 2002 to 2010. “So, you need good people, you need a good staff. But if there are good ideas, industry is willing to pay for them.”

Cost of Doing Business

That willingness to pay can be irresistible to cash-strapped research programs. But private dollars also

come with some attached strings that university scientists aren’t necessarily used to thinking about, Sommers says. For example, while academic researchers—and, especially, graduate students—typically publish their scientific findings as soon as possible, companies often benefit from keeping research results private, at least until patent applications or related issues can be addressed.

Moreover, businesses that will readily give money for supplies, graduate student stipends, and other direct research expenses often balk at paying indirect costs that support university infrastructure, libraries, maintenance, and so on. But these indirect expenses “are a real cost of doing business,” Sommers says, and when an external entity doesn’t pay them, the university finds itself subsidizing the research program. “So, it’s critical that both di-

rect and indirect costs are understood and negotiated up front.”

This is also true of intellectual property rights, something Sommers knows firsthand from recent developments at Colorado State. More than 95% of the wheat varieties grown in the Great Plains today have come from public breeding programs at Colorado State, Kansas State, and other land grant institutions, Sommers explains, and these programs have received decades of generous support from the region’s wheat industry—the wheat growers.

Lately, however, the private sector has been building its own wheat breeding programs and entering partnerships with various universities to develop new varieties. The issue is that the genetic material, or germplasm, in today’s wheat varieties almost never comes from one source. A typical Colorado State variety, for



Photo courtesy of Clarke McGrath

example, derives about half its genetic material from varieties developed at and shared by other universities. "So the long-term viability of the public breeding programs depends upon an open exchange of germplasm amongst those programs," Sommers says.

This is why four universities—Colorado State, Kansas State, Oklahoma State, and Texas A&M—entered into a formal "material transfer agreement" (MTA) in 2011. Under the MTA, a university can still forge a separate agreement with a company; however, the university isn't allowed to share with that company (or any other outside entity) germplasm derived from another university's breeding materials for five years, unless it has that institution's written consent.

By imposing the time restriction, the MTA aims to ensure that the university partners can continue sharing germplasm freely, or on the flip side, that public germplasm resources don't unwittingly become proprietary to a company. And while universities are the ones signing on (four more recently adopted the agreement), the real push for the MTA has come from wheat growers. "The farmers want to continue to have choice between a public variety and a commercial variety," Sommers says, "as opposed to what has developed in both corn and soybeans, where essentially all seed is private-sector varieties."

The wheat industry's desire to protect public breeding programs underscores a larger point: Publicly supported research will always be needed, even by agribusiness itself. "There's a lot of fundamental or basic research where you're not going to see a product for maybe 10 to 20 years after the work has been conducted," Sommers says. "And yet, future com-

mercial products are going to be upon that basic research" paid for with public funds.

Extension-Crop Adviser Partnership

A similar argument can be made for preserving public outreach and

extension programs. But if support for agricultural research hasn't exactly flourished in recent years, extension in many ways has fared worse. Before 1980, for example, each of Iowa's 99 counties had an extension agent who worked with local growers to solve problems on their farms; today, just 11 extension field agronomists cover



Photo courtesy of Pioneer Hi-Bred International

the state's entire 23 million acres of corn and soybeans. So, naturally, the remaining staff has struggled to meet all the requests for assistance, and in 2004, a survey of 400 Iowa corn and soybean producers confirmed the suspicions of ISU administrators: Extension was no longer the farmers' primary source of information. Instead, more than 90% of them identified crop consultants and agronomists at fertilizer and chemical retailers, seed companies, grain elevators, co-ops, and other businesses as their go-to advisers on crop production.

But there was also some good news. Of the 100 private-sector Certified Crop Advisers (CCAs) who were likewise surveyed at random, more than 80% identified ISU Extension as *their* chief information source. At the time, a team led by Wendy Wintersteen, dean of the ISU College of Agriculture and Life Sciences, was already developing a public-private

partnership program to help Iowa farmers, and the findings validated the group's plan. Instead of working primarily with farmers as they had done traditionally, ISU Extension agronomists would "focus on trying to serve our farmers better by serving their service providers [the CCAs] better," says Clarke McGrath, an extension field agronomist and CCA who helped shape the new program from the beginning. In other words, ISU's Corn and Soybean Initiative would "train the trainers," and it officially launched in December 2004 with Tylka at the helm.

McGrath, who spent nine years in ag retail before joining ISU in 2000, confirms that during those years, he and his fellow CCAs had an "arm's length" relationship with ISU: The university was merely an occasional provider of continuing education credits, rather than a place to seek ongoing advice. In working to change

this, the Corn and Soybean Initiative first identified and then reached out to the farm co-ops, grain elevators, and other agribusinesses with which it wanted deeper ties—eventually some 400 in all—along with commodity groups, such as the Iowa Soybean Association (ISA). McGrath, who became the initiative's program manager, then coached extension field agronomists on building stronger relationships with the crop advisers at these companies.

"As a retailer, I had on speed dial the top 10 people I could rely on if I had questions, needed help with troubleshooting, wanted someone to come speak at a meeting, and so on," McGrath says. "So, I laid down the challenge to our field agronomists to get on the speed dial lists of the agribusiness people in their areas."

Tylka, in the meantime, sought money for the initiative's research programs and extension publications.



After ISU and ISA produced a series of wildly popular field guides for soybean farmers, for instance, the initiative realized it needed a companion guide for corn. So Tylka approached Monsanto, which eventually gave \$60,000 toward printing and distributing the *ISU Corn Field Guide*. What the company got in return was its name on the publication and the legitimacy of being associated with ISU. At the same time, the guides have “been so good for [farmers],” McGrath says, “and for the relevance and overall image of Iowa State University.”

The Corn and Soybean Initiative also captured large sums of private research money, mainly because Tylka and others from ISU were willing to sit down with the participating agribusinesses to learn about their ideas and needs. One project that emerged was a 2007 study, led by extension professor and ASA, CSSA, and SSSA member Antonio Mallarino, which examined the within-field variation in crop response to potassium and the effects on corn and soybean diseases and pests. After seeding the project with \$35,000 in internal funds, the initiative went on to secure \$3,000 each from seven agribusinesses, along with in-kind contributions of seed, fertilizer, and herbicides. The businesses and their CCAs also helped ISU get its experimental plots on real, working farms—further increasing ISU’s visibility with farmers, Tylka says.

In his last year leading the initiative, Tylka says it used its \$140,000 annual budget from the dean’s office to obtain four times that amount in private money, or \$600,000. “And I don’t feel we were significantly tapping into the potential funding that was out there,” he adds. CCAs have also embraced the program, McGrath

says, because it has given them “a voice with Iowa State that they never had before.”

Still, building and maintaining the initiative wasn’t easy. Some extension faculty and field staff didn’t accept the new extension model with its emphasis on CCAs as the primary stakeholders and audience, Tylka

says, continuing instead to work only with farmers. Tylka also ran himself ragged managing the program while carrying out his regular faculty extension and research duties. Because staffing was limited, he took care of most of the invoicing and billing, for example, as well as communications, account management, and many other tasks. Although he did receive



Photo by Mississippi State University Ag Communications/Scott Corey

help from other college staff, he says, this was a very inefficient way to get things done. In September 2010, Tylka stepped away from the initiative to focus again on his extension and research duties. A new leader has yet to be found.

John Lawrence, an ISU associate dean, says the program is now transitioning, and will launch again in the future with a new name and a renewed emphasis on on-farm research that will be conducted jointly by ISU Extension and CCAs to address applied questions of regional importance. Ohio State University and University of Nebraska, meanwhile, have expressed interest in the model, and Tylka remains convinced it's a great approach that could indeed work at other institutions. Still, he cautions, people shouldn't underestimate the challenges.

"It is really tough to redefine a giant part of what the university does in this realm," he says, "in terms of serving growers no longer through county extension offices but through strategic partnerships with industry."

Working Together to Prepare the Next Generation

Today's problems are difficult enough, but what has Cardwell most concerned are tomorrow's agricultural challenges and who exactly will meet them. Declining federal and state dollars for agricultural research have an inevitable domino effect: Faculty and staff positions topple first, and then student enrollment in agronomy degree programs follow. In the meantime, Cardwell says, all the major companies are saying they can't find qualified agronomy graduates

at either the bachelor's or graduate levels, even as the demand for crop advisers is growing. Large farms, especially, are on the rise—less than 20% of U.S. farms now produce 80% of the country's food, feed, and fiber—and they're hungry for information.

"Those 20% are people who want good advice, want technology that will enhance their productivity, and they're the ones who pay for crop consultants and crop advisers," Cardwell says. "So the question is: How do we prepare that next generation?"

To help address this question, Cardwell has started an ASA Community called "Enhancing Agronomy via Public-Private Collaboration," which focuses on education issues. Online degree programs at places like ISU and Purdue University are also now helping meet the demand by giving people already in the workplace a

Photo courtesy of Colorado State University



chance to earn their master's degree in agronomy. Students take classes online and complete their projects from a distance, allowing them to attend school while staying in their jobs and without relocating their families.

But Cardwell's focus is really the undergraduate level: the place from which everyone in the agricultural workforce flows. He'd like to see companies sponsor more scholarships and internships for agronomy undergraduates, for example—something they have not traditionally done. Industry could even help universities recruit talented youngsters to agricultural majors in the first place, he adds, by exposing high school and younger students to agronomy careers through mentoring programs.

Education may in fact be the most critical place where the public and private sectors need to collaborate because without the bachelor's, master's, and Ph.D. graduates to fill its positions, agribusiness also won't survive the current cuts to land grant institutions. And possibly humanity won't either. Cardwell analyzed the number of Ph.D. students who graduated with agronomy degrees from 1986 to 2010 and then used the analysis to predict numbers of future graduates.

"The regression slope says that we'll graduate our last Ph.D. in an agronomy field in about 2050," Cardwell said at the Annual Meetings last fall—the same year the world population is expected to reach 9 billion.

M. Fisher, lead writer for CSA News magazine

Interested in this topic? Check out the ASA Community "Advancing Agronomy via Public-Private Collaboration" and other Communities online at www.agronomy.org/membership/communities



Photo by Purdue Agricultural Communication Photo/Tom Campbell