Dismantling Disease
A new era in tick research

PURDUE UNIVERSITY COLLEGE OF AGRICULTURE
Feeling the Passion of Our Work

Our world faces many challenges:

• How to make agriculture more efficient and productive so we can produce enough healthy, nutritious food for a rapidly growing world population—all the while adapting to a changing climate and using scarce resources ever more efficiently.

• How to protect the population from deadly diseases spreading from country to country and unlock the secrets of how to eradicate them.

• How to strengthen communities and local economies to help people improve their lives and livelihoods.

• How to make sure our young people acquire the knowledge and skills they will need to lead the world forward—and play their role in addressing challenges like those above.

The list could go on and on.

Ultimately, we must find ways to address these challenges. One of the most exciting things to me about our work in the Purdue College of Agriculture is our shared mission to help solve many of the world’s most pressing problems and create a better future for generations to come.

You will see some of that important work reflected in this issue. The stories you will read are just a small sample of what faculty, staff and students do daily in laboratories, fields, classrooms and in our state and around the world. They are helping to help find solutions to problems and ultimately improve lives and make our planet a better place.

If you keep these thoughts in mind as you read through the articles in this and every issue of Agricultures, I am sure you will feel that sense of passion, dedication, commitment and excellence that radiates from and through our College of Agriculture. I know I do.

Jay Akridge
Glenn W. Sample Dean of Agriculture
Features

Long-Range Forecast
Farm fields sometimes are overwhelmed with water from rain or parched from lack of it. Over the coming decades climate change will mean agriculture must manage water more effectively.

Female Students in Agriculture
Fifty years ago few women studied agriculture in college. Times have changed. Today at Purdue University and nationwide, the majority of students enrolling in agricultural majors are women.

Dismantling Disease
Purdue entomologist Cate Hill is the lead investigator on a team of nearly 100 scientists from around the world who sequenced the tick genome. That signals a new era in research to better understand ticks and the diseases they carry.

Giving Is Ever True to Purdue
Excitement is building through the Purdue College of Agriculture—quite literally—because the generosity of donors is leading to three new buildings and a campaign to add 10 endowed chairs.

New Mindset for Rural Indiana
Purdue Extension and the Purdue Center for Regional Development are a powerhouse team of resources for local leaders who are working to build stronger communities in ways they had not previously imagined.
SPOTLIGHTS

Murdoch given award for PICS bags research

Larry Murdock, distinguished professor of entomology at Purdue University, was honored by the Board for International Food and Agricultural Development for the PICS bagging technology he created to help farmers in Sub-Saharan Africa protect their stored crops from grain-destroying weevils.

In his acceptance speech at a BIFAD meeting at Purdue in October, Murdock spoke of the need to make more food available to a rapidly growing world population. PICS, an acronym for Purdue Improved Crop Storage, enables smallholder farmers in Africa to safely store their crops.

The technology involves wrapping grain such as the staple cowpea, known in the United States as black-eyed pea, airtight in three plastic bags. The hermetically sealed bags kill the relatively small amount of crop-infesting weevils before they can quickly multiply by the hundreds, thousands and even millions and destroy or severely devalue the grain.

Publication gives gardeners tips on proper use of pesticides

A new Purdue Extension publication gives gardeners advice on use of pesticides and how to manage a successful garden and landscape.

The authors of What Gardeners Should Know About Pesticides offer tips on ensuring plant success, managing unwanted critters and choosing the right control methods.

The 64-page publication guides gardeners through the processes of personalized pest management, reducing a pest’s impact on gardens and why a pesticide might not have worked. It gives advice on pesticide classifications and the safe, effective, legal use of pesticides.

“Pesticide use in the lawn, landscape and garden provides many benefits, but there are also risks,” says lead author Fred Whitford, coordinator of Purdue Pesticide Programs. “You must handle pesticides with caution and understanding.”

The publication is available in print for $5.50 or free for download at Purdue Extension’s The Education Store at https://www.edustore.purdue.edu. Search for product code PPP-109.

By Chelsea Clodfelder

Purdue rated best value among ag colleges

The Purdue College of Agriculture was ranked on top in College Values Online’s 30 Best Value Agriculture Colleges for 2015.

Universities were rated based on tuition, percentage of students receiving financial aid and the number of agricultural programs available, among other criteria.

More information on the rankings is available at www.collegevaluesonline.com/rankings/best-value-agriculture-colleges/.
Climate change consensus extends beyond climate scientists

A Purdue University-led survey of nearly 700 scientists from nonclimate disciplines shows that more than 90 percent believe average global temperatures are higher than pre-1800s levels and that human activity has significantly contributed to the rise.

The study is the first to show that consensus on human-caused climate change extends beyond climate scientists to the broader scientific community, said Linda Prokopy, a professor of natural resource social science.

“Our survey indicates that an overwhelming majority of scientists across disciplines believe in anthropogenic climate change, are highly certain of these beliefs and find climate science to be credible,” Prokopy said. “Our results also suggest that scientists who are climate-change skeptics are well in the minority.”

Previous studies have shown that about 97 percent of actively publishing climate scientists believe in human-caused climate change, and a review of scientific literature on the existence of climate change indicated that about 97 percent of studies affirm climate change is happening. But no direct surveys had assessed whether the general agreement on the impact of human activities on the Earth’s climate extended to scientists in other disciplines.

Prokopy and fellow researchers conducted a 2014 survey of scientists from more than 10 nonclimate disciplines at Big Ten Conference universities to determine the relative prevalence of belief in, and skepticism of, climate change in the scientific community.

By Natalie van Hoose

“Die and let live” strategy dramatically increases drought resistance

Purdue University researchers found that engineering plants to produce high levels of a protein known as PYL9 dramatically boosted drought tolerance in rice and the model plant Arabidopsis.

Under severe drought conditions, the transgenic plants triggered the death of their old leaves—a process known as senescence—to conserve resources for seeds and buds, a survival strategy some plant scientists refer to as “die and let live.”

The study offers insights into the drought survival mechanisms of plants and presents a possible means of protecting crops from severe drought stress.

“This study shows that controlled senescence is good for plants under drought conditions,” says Yang Zhao, first author of the study and research assistant in the Jian-Kang Zhu lab in the Department of Horticulture. “This combination of death and life is similar to a triage strategy. If old leaves die, then the buds and small leaves might gain life.”

Zhao cautions, however, that the spike in survival rate does not mean the yield of the transgenic plants under drought conditions would equal that of conventional rice varieties under good growing conditions. The study did not test for yield.

“We still can’t really solve the problem of drought,” he says. “But we can make it better. In extreme drought conditions, even a bad yield would be better than nothing in terms of preserving human life.”

By Natalie van Hoose

Yang Zhao found that engineering rice to produce high levels of the protein PYL9 can improve the crop’s drought survival rate by 40 percent.
Web Extra: To see a video about this story, visit ag.purdue.edu/agricultures/water. To learn about how properly managed water on farms can help reduce pollution in our waterways, visit ag.purdue.edu/agricultures/quality.
Keith Cherkauer is an engineer, not a meteorologist. He can’t tell you if it will rain tomorrow. That’s weather. But Cherkauer, an expert in hydrology at the Purdue Climate Change Research Center, thinks he knows what kind of conditions Midwest farmers will be facing in a hundred years.

“A lot like 2015, with wet springs and hot, dry summers,” he says. That’s climate—how conditions develop over a long time.

In 2015, extreme weather events widely attributed to climate change were headline news. Globally, it was the warmest year in history, breaking the record set just the year before. Deadly heat waves were reported in India, Pakistan, Iraq, Iran and throughout Europe; floods in Ghana and Myanmar; droughts in Brazil and California. Unprecedented and unpredictable weather roiled agricultural markets and raised fears of a potential long-term threat to the global food supply.

Back home, Indiana had its wettest two-month period on record in June and July, followed by near-drought conditions in August and September. Fields that were flooded in spring were parched by late summer.

Farmers increasingly are finding that they have either too much water or not enough of it.

“We need to be planning for water use,” Cherkauer says. “The question is, how do we better manage our water resources?”

Weather and Climate
Weather patterns can change noticeably over short periods, especially in years such as 2015 when strong El Niño or La Niña systems add to the atmospheric instability. Climate change happens gradually and almost imperceptibly to untrained observers.

Researchers say the trend is real and unmistakable.

“The climate is already changing,” says Jeffrey Dukes, Purdue professor of forestry, natural resources and biological sciences and director of the Climate

Continued on page 6 ➤
Change Center. “Temperatures have increased quite a bit over the last century or so. Precipitation is changing, too.”

“It isn’t just the amount of precipitation, it’s how—and when—it’s falling. Dukes expects the number of significant precipitation events—more than 2 inches of rain or snow at a time—to double or triple over the next 100 years, mostly in the winter and spring.

Extreme precipitation at planting time is especially problematic.

“With the warmer weather we are expecting, getting a longer growing season should be good,” Cherkauer says. “But a lot of fields last year were left fallow simply because farmers could not get into their fields because of all the rain we had in the spring. If your tractor is sinking up to its axles in mud and you can’t get your crops planted, you can’t use that extra time.”

The biggest deluge in 2015 came when crops should have been in their prime growing season.

On July 7, central Indiana was hit by a storm that drenched the area with 4.43 inches of rain—about equal to the area’s average for the entire month. For the month of July, Indianapolis recorded 13.14 inches of rain, a record and nearly 9 inches above normal.

“We’re looking at more heavy rainfall events and longer droughts,” Dukes says. “In the short term, the next 30-40 years, some crops may actually grow better. But the negatives are likely to start overwhelming the positives as time goes on.”

Excess and Deficits

Mark Twain once said everybody talks about the weather, but nobody ever does anything about it. That’s not entirely true. Farmers choose their crops and seed types based on the weather conditions forecast for the growing season. Investors establish market prices anticipating favorable or poor growing conditions.

Agribusiness professionals are accustomed to planning for weather variability from year to year. Now they might have to start dealing with more precipitation in the spring, which is already the wettest time of year, and even drier conditions in summer, when crops’ water needs are highest.

Jane Frankenberger, Purdue professor of agricultural and biological engineering, is leading a five-year, $5 million federally funded project to determine how farmers could store water when they have it to use when they need it.

“Drained lands comprise at least 50 percent of Indiana’s cropland, including some of the most productive lands in the state,” Frankenberger says. “These can experience both water excess and water deficit in the same year, which is what happened last year. Storing drained water within the landscape could increase the sustainability of water for agriculture, particularly as intense rainfall and prolonged summer drought are expected to increase under future climate change.”

Frankenberger and her team are looking at three specific practices: drainage water management to...
keep moisture in the soil longer and thereby maximize its effectiveness; saturated buffers to slow the outflow of water; and water recycling, in which subsurface drainage water is stored in ponds and then irrigated back onto the crops.

“There might come a day when farmers view excess water in the spring not as a waste to be disposed of but as a valuable resource to be saved in order to reduce the risk of water-stressed crops later in the season,” Frankenberger says.

Modeling the Future

For now, it remains difficult to say when that day might come. Researchers rely on climate and crop models to determine what the future will hold, but the recent rash of extreme weather has rendered many existing models obsolete. Scientists are working to develop new models that can account for unprecedented swings in climate.

“None of the current crop models are really good at extremes,” Cherkauer says. “What we need to be working on is a future design that brings in resiliency and flexibility and accounts for what’s happening in soil and streams.”

All of this will have a noticeable impact on crops, Cherkauer believes, but there is no way to tell just yet what that will be.

“We’ll likely see corn yields consistently reduced and soybeans generally higher,” he says. “These might not be huge changes, but it’s more like a 10-day weather forecast. We don’t know the specifics, but our research can provide guidance on what to expect and how to make agriculture more resilient to climate extremes.”

U2U Offers Farmers Online Tools to Plan for Changing Climate Conditions

By Darrin Pack

Agricultural researchers and policymakers use sophisticated satellite imagery and computer models to assess the extent and impact of climate change. The Useful to Usable climate initiative, commonly known as U2U, offers farmers a set of decision-making resources at the click of a computer mouse.

Funded by the U.S. Department of Agriculture, U2U is a Purdue-based partnership among faculty, staff and students from nine Midwest universities, the High Plains Regional Climate Center, the Midwestern Regional Climate Center and the National Drought Mitigation Center. U2U’s suite of online tools helps farmers and agricultural advisers manage increasingly variable weather and climate conditions across the Corn Belt.

U2U provides historical climate data that helps purchasing, marketing and activity planning throughout the growing cycle.

“Our goal is to transform existing climate information into usable knowledge for agricultural decision making,” says Melissa Widhalm, U2U project manager at Purdue. “We want to give farmers resources and training to more effectively manage variable climate conditions.”

Tools available through U2U are:

- **AgClimate View**: Provides easy-to-use historical crop and climate data across the Corn Belt.
- **Corn GDD**: Tracks real-time growing degree day data and provides information on climate risks for corn development.
- **Climate Patterns Viewer**: Connects global climate conditions to local growing conditions.
- **Corn Split N**: Helps producers determine the feasibility and potential profitability of in-season nitrogen application.
- **Irrigation Investment**: Allows producers to calculate the potential costs and benefits of irrigation based on their own field conditions and historical yield data.

Widhalm says the U2U website is regularly updated and expanded based on input from users.

“We are currently working on a crop and climate visualization tool that will help farmers determine how future climate conditions will affect soil conditions, growing degree days, the length of the growing season, grain yields and other important variables,” Widhalm says.

For more information about U2U, or to access the online tools, go to [www.agclimate4u.org](http://www.agclimate4u.org).

Contact Darrin Pack at dpack@purdue.edu
Female Students in Agriculture

Their Increasing Numbers Now the Rule, Not the Exception

By Emma Hopkins

Fifty years ago, you wouldn’t find more than a few women in college studying agriculture. You’d probably find even fewer working in it other than by helping out on the farm as a wife and mother.

Those days are long gone. At Purdue University and nationwide, the majority of students enrolling in agricultural majors are women. Marcos Fernandez, associate dean of Purdue’s College of Agriculture, says the trend has been growing since the 1990s.

“In universities, enrollments have increased in general, and in agriculture the number of women coming in is outpacing men,” Fernandez says.

In the 1970s when he attended college, 95-98 percent of ag students were men. Women now account for nearly 60 percent of agricultural students at Purdue.

Becoming Leaders

And the women are succeeding, says Amy Jones, plant sciences recruitment and outreach coordinator and a member of the Purdue Extension Women in Agriculture team.

“We have had companies mention our women students are interviewing better and, in some cases, obtaining more jobs than the men,” Jones says.

That is not surprising because more women at Purdue seem to be stepping into leadership roles in clubs.

Marissa Lorenz, a junior in animal sciences, has noticed that women hold many leadership roles in the College of Agriculture. In her time at Purdue, Lorenz has served as an animal sciences ambassador and has been secretary of the Ag Council, vice president of Block and Bridle and a member of the Collegiate Farm Bureau.

“It is women who are leading in these organizations, so I think this poses a challenge to men to step up and lead with us, and it is great when they do,” she says.

This is a stark contrast to what Fernandez remembers about attitudes toward women in agriculture.

Web Extra: To read about what attracted some female faculty members in the College of Agriculture to their chosen professions, visit ag.purdue.edu/agricultures/faculty.
To read about the growing popularity of jobs in the dairy industry among women, visit ag.purdue.edu/agricultures/dairy.
**Seizing Opportunities**

“In my master’s program in the 1980s, I remember the adviser of a close friend of mine told her animal science was no place for women,” Fernandez says. “I think that women now are embracing the opportunities, and some of the perceived ‘don’t pursue this’ kind of attitude has been lifted.”

Shelby Swain, a senior in agricultural economics concentrating in quantitative analysis, also feels that women have broken through in agriculture. She participates in five agricultural clubs.

“I didn’t really feel intimidated going into the ag programs here at Purdue, and I think it’s because role models I had were already doing such a great job leading the way,” Swain says.

While male students still dominate in agronomy, ag systems management and ag engineering at Purdue, enrollments of women are especially increasing in animal science, agricultural communications and food science.

A national survey by the U.S. Department of Agriculture shows trends of female students obtaining baccalaureate degrees by academic area. From 2004 to 2012, the number of environmental sciences degrees women obtained increased by 128 percent and food science degrees by 98 percent.

Jones says such numbers may reflect the influence women working in agriculture have had on young girls.

**Learning from Mentors**

Swain says having role models has made all the difference for her. “I have so many women role models in ag who have all done big things,” she says. “My motivation going into ag was I wanted to be like them.”

Role models abounded at a mentorship-building forum, organized by the Women in Agriculture Team at Purdue in February, for high school girls.

Lorenz says girls who think agriculture might hold potential for them should “go for it.”

“Get involved in 4-H, FFA and those things that can help you find your true passion within agriculture,” she says.

---

Contact Emma Hopkins at
agricultures.magazine@purdue.edu

[ag.purdue.edu/agricultures](ag.purdue.edu/agricultures)
By Natalie van Hoose

DISEASE

Purdue Researchers UnravelTicks’ Impacts on Human Health

Ticks are powerful vectors of disease. Armed with barbed mouthparts and sophisticated spit, they employ strategies that have served them for millions of years—stealthily hitching onto a host, slicing through its skin to feed on blood, and regurgitating and secreting salvia potentially spiked with pathogens.

Ticks transmit a wider variety of bacteria, viruses and parasites than any other arthropod, but they’re often underappreciated as vectors. The pathogens ticks pass to humans and animals can cause severely debilitating and sometimes deadly illnesses, and infection is hardly rare. Lyme disease is the most common vector-borne disease in North America, affecting an estimated 300,000 people annually, and potentially lethal diseases caused by ticks include Rocky Mountain spotted fever, Powassan virus and flaviviruses.

But tick research has long lagged behind that of other vectors such as mosquitoes.

Purdue University medical entomologist Cate Hill is changing that. In February, an international team of nearly 100 scientists led by Hill unleashed seven papers on tick genetics, including the complete genome sequence of the deer tick, the species that transmits Lyme disease. The publications are the culmination of a

Web Extra: Jacqueline Duncan shares her story and Cate Hill discusses tick-borne diseases in a video at ag.purdue.edu/agricultures/ticks.

Continued on page 12
Jacqueline Duncan (foreground), whose life has changed because of health problems caused by ticks, with vector entomologist Cate Hill.
decadelong effort to equip scientists with desperately needed tools to advance the study of ticks and tick-borne diseases.

“The genome provides a foundation for a whole new era in tick research,” says Hill, principal investigator of the genome team and Showalter Faculty Scholar.

With the code behind fundamental tick biology, researchers can begin to investigate two crucial questions: What makes ticks such successful parasites, and why are they so adept at vectoring a mind-boggling array of pathogens?

“No we’ve got the script to help us work out what proteins the tick is making, what they do and how we can exploit them to control ticks and tick-borne diseases,” Hill says.

**Ticks Can Change Your Life**

Few people understand ticks’ ability to hijack human health better than southern Indiana resident Jacqueline Duncan.

Duncan, a 46-year-old insurance agent in Rockport, began to suffer mysterious fainting spells in the spring of 2015, but doctors brushed off the symptoms as dehydration from an earlier surgery. She bumped up her intake of liquids, but her condition worsened. One night, after returning from the emergency room full of hydrating fluids, she slumped helplessly to her hallway floor. She couldn’t stay conscious.

Duncan’s physician, Susan Martin, ran extensive tests and took “a truckload of blood,” but everything came back normal.

It wasn’t adding up.

Then Duncan mentioned the ticks. She often came off the golf course or her woodland property with dozens of tiny ticks studding her ankles, and she distinctly remembered the large lone star tick she plucked off her abdomen in April and the wound it left behind—itchy and slow to heal.

Martin started her on a regimen of antibiotics and ordered a full tick panel. Duncan tested positive for Rocky Mountain spotted fever, Lyme disease and a Lyme-related heart arrhythmia.

Antibodies curbed RMSF and Lyme, but her bouts of unconsciousness persisted.

When further tests indicated she had developed allergies to beef, pork and cow’s milk, Martin had Duncan’s blood tested for alpha-gal allergy, a newly described disease with a suspected link to the lone star tick. The blood sample showed soaring levels of antibodies to the carbohydrate alpha-gal, more than 220 times the normal level.

**A Hair-Trigger in the Body**

While alpha-gal allergy is still poorly understood, some researchers think the condition arises when your body mounts an immune response to alpha-gal, transmitted to your bloodstream via a tick bite. The cocktail of compounds in tick saliva could play a role in priming the body to attack alpha-gal if it appears again.

The hitch is that alpha-gal is a naturally occurring carbohydrate in red meat and products that contain...
mammal-derived ingredients. Once your body has produced high levels of antibodies to alpha-gal, the simple act of eating a cheeseburger, drinking a cappuccino or swallowing a Tylenol capsule could spring anaphylactic shock.

No treatment for the allergy exists. The only recourse is to strictly avoid foods and products with ingredients that could trip the delicate wires of the body’s immunology.

For Duncan, this means sticking to a diet of fresh produce, poultry and seafood, eschewing dairy products and skipping soft drinks. But the fear of accidentally ingesting alpha-gal follows her everywhere. The disease has also made her hypervigilant about protecting herself and her loved ones from ticks.

“I gave everybody bug spray for Christmas,” she says.

Reports of the peculiar allergy are popping up all over southern Indiana and western Kentucky, the heart of lone star tick territory.

Duncan reached out to Hill in January, hoping to further awareness of the allergy.

“I would feel so much better knowing Purdue is working on this,” she wrote. “Is there any way to get something going?”

Hill was struck by her story.

“Jacqui’s case really highlights the breadth of things ticks can do and the scope of their impact,” she says. “Lyme and Rocky Mountain are serious diseases. Jacqui tested positive for both and has also developed an allergy that could be tick-related. It’s really stunning and scary.”

**New Institute to Tackle Dimensions of Disease**

For Hill, Duncan’s condition represents the type of multifaceted problems targeted by a new research consortium, the Purdue Institute for Inflammation, Immunology and Infectious Diseases, or PI4D.

Research has evolved a far more comprehensive approach to the biological dimensions of disease over the past decade, and the launch of PI4D reflects this paradigm shift. The institute will unite scientists from multiple fields to work on disease issues, making links between disease agents and the body’s complex response.

“We’re realizing that there is much more to be learned about the interconnections between infection, the health of the immune system and the body’s allergic and inflammatory responses,” says Hill, a member of PI4D. “In order to better understand the complexities of human disease, we need to be studying these disease states collectively.”

Understanding the interplay between tick saliva and tick-borne pathogens and how they together manipulate the immune response requires a diverse expertise.

“Talking with Jacqui highlights for me the need for a team of researchers to address these kinds of health issues: an infectious disease specialist, a vector biologist and an immunologist,” she says. “That’s exactly what PI4D will bring.”

Richard Kuhn, director of PI4D and co-author of the tick genome study, says the institute will not only study how diseases make us sick but will also develop tools to identify diseases faster so that patients like Duncan can be treated as quickly as possible.

“PI4D will bring together faculty who are pursuing new drug therapies and potential protective measures such as vaccines,” says Kuhn, professor and head of the Department of Biological Sciences.

“This combination of basic and applied research should translate into practical solutions to current and future disease challenges.”

In the meantime, Duncan’s story has Hill itching to take up her tick-flushing nets and head south. Rockport lies in an area of the state that could be home to multiple species of medically important ticks, and it’s crucial that residents and doctors alike be able to identify them and watch for symptoms of disease and allergies.

“Jacqui is really fortunate that her doctor was able to connect the dots between her condition and the tick bites and then conduct the appropriate diagnostic tests,” Hill says. “In turn, it’s vital that scientists are sampling tick populations around the country to better understand the distribution of tick species and which pathogens they may be carrying. We at Purdue have an important role to play in communicating this information to the public and to health specialists so they can develop region-specific health care recommendations.”

Contact Natalie van Hoose at nvanhoos@purdue.edu
Excitement is building through the Purdue University College of Agriculture—quite literally.

The college has broken ground for two buildings that will equip faculty, staff and students with the latest technology to help them meet increasing need for innovation in animal sciences research and education. And construction of an automated plant phenotyping facility is nearly complete.

Animal Sciences
Site preparation began early this year for the Hobart and Russell Creighton (Creighton Brothers) Hall of Animal Sciences and the Land O’Lakes Center for Experiential Learning at the corner of Russell and Harrison streets on the West Lafayette campus. The buildings, to open next year, are being named in recognition of gifts of $5 million from each company.

Purdue President Mitch Daniels, addressing an audience during a groundbreaking ceremony in November, said the Purdue Board of Trustees and state legislators scrutinized the proposal to make sure the buildings will meet the university’s long-term needs. He said the cause of helping agriculture find ways to provide more healthy, nutritious food for a rapidly growing world population made the rationale for the buildings “absolutely clear-cut.”

He said it was exciting to look ahead to the students who will learn in the buildings and to “the great research and the many breakthroughs that generations worldwide will benefit from.”

Jay Akridge, Glenn W. Sample Dean of Purdue Agriculture, said the buildings will provide “world-class space to do the world-class work that our students need as they take positions of leadership in the animal industries.” He noted that the Department of Animal Sciences has the largest undergraduate program in the college, with more than 700 students, 96 percent of whom find placement after graduation.

Plant Phenotyping
The university celebrated the support of the Indiana Soybean Alliance and the Indiana Corn Marketing Council at an event at the Purdue Agronomy Center for Research and Education, where the automated plant phenotyping facility will be dedicated this summer.

Daniels called the support of the two groups “an enormous step forward” to providing a better future for a rapidly growing world that faces pressing need for innovations to make agriculture more productive and efficient.

The facility—where plant characteristics will be identified and measured—is a component of Purdue Moves, a series of university initiatives Daniels announced in 2013 to broaden Purdue’s global impact and enhance educational opportunities for its students.

The Indiana Soybean Alliance is providing $1 million in soybean checkoff funds to buy equipment for the facility, and the Indiana Corn Marketing Council is providing the same amount in corn checkoff funds to support construction. An additional $1 million from each organization is being placed into two endowments to fund corn and soybean research related to plant phenotyping and technology innovation in perpetuity.

Akridge said the building “will bring together people from not only our college but across campus and around the world to work in this very, very important area.”

Contact Keith Robinson at robins89@purdue.edu
Purdue University entomologist Michael Scharf gets into the guts of his work. He conducts research into enzymes that termites use to digest wood they eat. Gaining a better understanding of what goes on in the guts of termites, long despised because of their destructiveness to homes, might yield a benefit not commonly associated with the pests: It could lead to new and better ways to produce biofuels. One challenge in producing biofuels is developing methods to efficiently break down the biomass of plants so it can be converted into energy. The enzymes in termite guts could be an answer.

That is only one part of Scharf’s work as a professor and the O. Wayne Rollins/Orkin Chair in Molecular Physiology and Urban Entomology. He leads many other research projects, among them tracking cockroach resistance to commercial baits to help the pest control industry produce more effective insecticides.

Creating Opportunities

“The O.W. Rollins/Orkin Endowment has been tremendously helpful to my research program by not only supporting existing research but also for supporting students at all levels,” Scharf says. “It also has opened the door to new research opportunities that would typically not be competitive for conventional funding.”

Scharf’s expertise and prestige as an endowed chair has enabled him to attract more than $2.3 million in research funding from sources such as the U.S. Departments of Energy and Housing and Urban Development, the National Science Foundation, Dow AgroSciences and DuPont since arriving at Purdue in 2010. He is the first endowed chair in the Department of Entomology.

The O.W. Rollins/Orkin Chair is among the college’s current 14 endowed chairs, or named professorships, which enable the faculty members to develop more research, educational and programming opportunities.

The College of Agriculture has begun a campaign in which it is asking supporters to create 10 new endowed chairs as part of “Ever True: The Campaign for Purdue University,” the largest fundraising effort in the university’s history. The college received a gift from an anonymous donor in the amount of $10 million, which will be used to help fund new endowed chairs. The college is seeking matching donations of $1 million for each of the 10 chairs in the drive called the Endowed Chair Challenge.

Supporting, Honoring

“Endowed chairs are a way for our donors to help us provide additional support for some of our most outstanding faculty members,” says Jay Akridge, Glenn W. Sample Dean of Purdue Agriculture. “These prestigious chairs help to honor the accomplishments of Purdue Agriculture faculty and, more important, support their research, teaching and Extension programs, positioning them for leadership at the state, national and international levels.”

Some donors choose to name a chair to honor a family member or other important person in their life. Sample’s family in 2005 established an endowment that named the College of Agriculture deanship after the pioneer in agriculture who received his bachelor’s degree from Purdue in 1935 and an honorary doctorate in 1972.

For information on how to support the Endowed Chair Challenge or any initiative of the College of Agriculture, contact Eric Putman by email at eaputman@prfo.org or by telephone at 765-494-8672.

To learn more about Ever True, visit www.purdue.edu/EverTrue, or connect with #PurdueEverTrue on social media.
Rural communities needing a lift have at least three things going for them:

With Purdue Extension’s local connections in Indiana’s 92 counties, its expertise in economic and community development and the research work of the Purdue Center for Regional Development, the university is a powerhouse of resources for local leaders.

“Indiana is dotted throughout with many small cities and towns, and we at Purdue have the resources, strong ties with the counties and the commitment needed to help strengthen the long-term vitality of these communities,” says Lionel J. “Bo” Beaulieu, director of PCRD and Extension’s community development program leader.

**Purdue Noted for Its Leadership**

PCRD and Extension have played a leading role in the successful start of the state’s Hometown Collaboration Initiative, designed to improve the economy and way of life of small communities. The initiative of the Indiana Office of Community and Rural Affairs began in 2014 as a pilot in which six communities—each with a population of less than 25,000—were selected to receive help with community improvement projects. PCRD and Extension are partners in HCI along with Ball State University.

Geoff Schomacker, OCRA’s deputy director, says Purdue was the right fit.

“When we needed a strong partner to take the lead in designing a program as intensive as what would become the Hometown Collaboration Initiative, the team at Purdue was ready and eager for the challenge,” Schomacker says.

With PCRD, Purdue Extension and Ball State’s Indiana Communities Institute, he says HCI “represents the best in collaboration between state government and universities in our efforts to provide communities with the world-class community economic development tools needed to compete in the 21st century.”

Continued on page 18
Eva Bates North (left), Corydon town council president, Sean Davis, member of the hometown collaboration initiative and Catherine Turcotte, director of Main Street Corydon, hope to turn this parking lot and a vacant lot into a city park in Corydon, Indiana's first state capital.
The Depth of PCRD’s Work

Some examples of projects the Purdue Center for Regional Development is undertaking:

- Playing a key role in a U.S. Department of Agriculture initiative called Stronger Economies Together by providing leadership to a state team overseeing efforts of two groups of Indiana counties developing regional approaches to growing businesses and creating jobs.
- Working with the Military Family Research Institute at Purdue in a USDA program to develop a comprehensive database to test indicators that best reflect the military friendliness of local areas.
- Partnering in a universitywide effort, funded by Lilly Endowment, to help accelerate Indiana’s capacity to attract and expand high-technology jobs.
- Developing data-driven tools to help civic leaders in Indiana and the Great Lakes region in a U.S. Economic Development Administration initiative to start programs that build on regional assets and opportunities for regional collaboration and innovation networks.
- Co-leading a U.S. Defense Department program with Purdue’s Manufacturing Extension Partnership to stabilize and strengthen defense-dependent communities and the defense manufacturing sector in Indiana, in partnership with the University of Michigan and Ohio State University, by expanding nondefense-related job opportunities.

Building More History

The town of Corydon, about 25 miles north of the Ohio River in southern Indiana’s Harrison County, wanted to do something special for Indiana’s bicentennial this year because Corydon was the state’s first capital. (The first Statehouse is still there.) Local leaders had the idea of creating a Bicentennial Park. They applied to HCI, and the town’s proposal was accepted.

The project itself is historic because it will result in the town’s first municipal park. It will take up a full block, replacing what Catherine Turcotte, executive director of Main Street Corydon, describes as a poorly designed municipal parking lot, an abandoned laundromat and a place where a building burned about 10 years ago. The park is to open by Statehood Day—Dec. 11.

Turcotte says the organization applied to HCI for the opportunity to learn from leaders from Purdue, Ball State and OCRA about the importance of “placemaking”—creating a high-quality place for residents, businesses and visitors.

She says Purdue staff in Extension’s Enhancing the Value of Public Spaces program made sure the project stayed on course by helping to organize community forums with elected officials, leaders of banks and nonprofit groups, pastors and others, and assisting in community surveys to analyze the community’s assets. The program helps Indiana communities improve public spaces such as parks and town centers.

“The Purdue people have been here for the whole process, every meeting from the beginning,” Turcotte says. “They helped us through the process, but we made our own decisions. It has been a wonderful experience for our community.”

Some Purdue staff, Turcotte notes, drove more than three hours from the university’s West Lafayette campus to attend meetings.

“They were so dedicated,” she says.

For the Duration and Beyond

While many Extension specialists from the main campus routinely travel the state as part of their work, Purdue brings even more firepower to communities through its county and regional Extension educators.

“One thing we made clear when we started in HCI is that our commitment will not be short-term,” Beaulieu says. “We will continue coaching local community development leaders; we have that on-the-ground presence, and we know we aren’t going away.”

Community leaders in southern Indiana’s Perry County along the Ohio River also have felt that sense of commitment. Purdue staff helped them determine, through HCI, that what the county needed was to bring people together and also do a better job of marketing the community.

They decided to develop a centralized website of the local development corporation, chamber of commerce, and convention and visitors bureau. It will enable not only residents but also visitors and potential businesses to find information about the county,
The Purdue Center for Regional Development has mounds of U.S. census and other data on every county in the state to help local leaders better understand the strengths and weaknesses of their communities.

PCRD has data on population, racial composition, ages of residents, education, income, poverty, industries and occupations, and much more—pretty much anything they would need as they plan their community’s future.

The center is putting such information in the hands of community development Purdue Extension county educators “so local leaders can see us as a go-to source for good data to guide their local decision-making,” says Lionel “Bo” Beaulieu, director of the center.

In Perry County, along the Ohio River in southern Indiana, the center’s data show that 35 percent of all businesses have one employee and 56 percent have 2-9.

“Economic drivers there are the small businesses,” Beaulieu notes. “So the question is what are they doing as a community to help these businesses?”

If data for a community suggest that the number of young people is declining, as is the case in many rural communities, Beaulieu says local leaders might need a strategy to reverse that trend. Or having an older population could create opportunities to bring in specific health care services.

“There is an economic development positive to all of this.”

But Beaulieu says local leaders also need to look beyond their county lines for regional trends in the data to help their communities.

“Economic development is not likely to rest solely within the community. Its economy is very much influenced by what is going on outside that community or county.”
Mentoring Program

Puts Students on Path to Success

By Brian Wallheimer

Kenda Resler-Friend, external communications and media relations leader at Dow AgroSciences in Indianapolis, remembers looking out from West Lafayette as a student and wondering about opportunities.

Back then, she notes, it wasn’t so easy to find people who could answer her questions or help guide her during her early professional years. Google was still a ways off when she obtained her master’s degree from Purdue University in 1991.

“I really didn't have anybody back when I was in college,” she says. “I didn't know what the options were. I was a granddaughter of farmers and the daughter of teachers. I didn't know what existed. I don't think I knew how to pursue someone in industry.”

It’s About Giving Back

Today, as part of the Purdue Ag Alumni Mentoring Program, she enjoys showing today’s students the world that’s out there.

“It’s like being able to tell your younger self things you wish someone would have told you. It’s a way for me to give back, and it’s not really that big of a time investment.”

Donya Lester, executive director of Purdue’s Agricultural Alumni Association, says the program is simple—pairing students with alumni who can give advice and become a foundational part of student networks—but provides significant benefit to both sides.

“The thing that adds value for alumni is when they feel like they've made a difference for a student. All of us identify with that. We all remember people who helped us,” Lester says.

The informality of the program allows paired students and alumni to make the relationship their own, based on their connection. The only real rule for mentors: Be available.

That means different things to different people. Some mentors can visit campus often or host students at their place of business. But most often it involves frequent emails, some phone calls or a Skype session.

“That just means that no matter where you are, you can be a mentor,” Lester says.

Boost to Confidence

Mindy Boyer, a senior from Kirklin, Indiana, majoring in agricultural communications and applied agricultural economics, has received advice from her mentors on time management, campus clubs that can help her gain valuable experience, and career path options she might have not considered. But just as important as all that has been the comfort of knowing that others have been in her shoes and that she’s doing well for herself.

“I’ve been able to build my confidence,” Boyer says. “Seeing their paths and following in their footsteps reassured me that I’m doing this Purdue thing the right way.”

Zach Frazier, a senior from Butler, Pennsylvania, majoring in animal sciences and agricultural economics, says his mentors helped reset his career path. He had been intent on finding a career in policy in Washington, D.C., out of school but took an internship in industry based on their advice.

He encourages friends and peers to join the mentorship program.

“Do it because of the intangible benefits,” Frazier says. “You can learn something about yourself, learn something about the world. Things will happen you don’t expect.”

An expanded version of this story is available at https://ag.purdue.edu/connections.
EDUCATION is about more than sitting in a classroom.

Sometimes it’s about sitting in an ice cream parlor.

Purdue Agriculture students can get expert guidance on their careers from caring professionals. Learn more about the Purdue Agricultural Alumni Association’s Mentoring Program at www.ag.purdue.edu/agalumni

www.purdue.edu/experience

Read about Purdue Agriculture online

Research, Extension & teaching highlights ag.purdue.edu/agricultures

Keeping ag alumni in touch www.agriculture.purdue.edu/connections

By and about our students www.ag.purdue.edu/destination
Increasing Need for Crop Water Management

Climatic changes sometimes result in too much water in farm fields or not enough of it. These situations likely will continue in coming decades. Purdue researchers are looking into ways to help farmers manage excess water so they have it when they need it most.

See Page 4