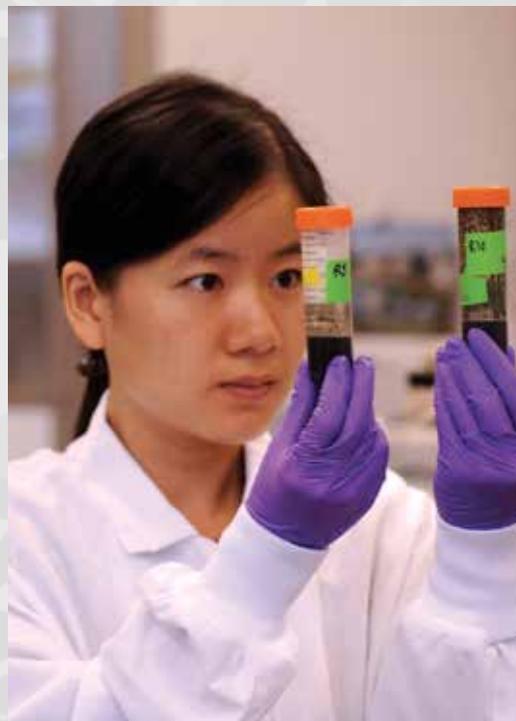


AGBIOSCIENCE: OARDC

Bringing Knowledge *to* Life



2013 Annual Report

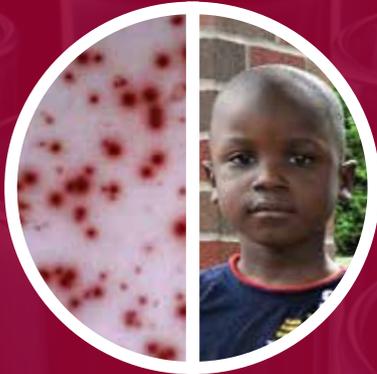


THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,
AND ENVIRONMENTAL SCIENCES

OARDC: A Leader in Agbioscience

ag·bi·o·sci·ence (ăg'bi'ō-sī'ens) *n.* the integration of scientific disciplines to address critical needs of food security, safety and health; environmental sustainability; and biobased energy, fuel and products



Food Security, Production,
and Human Health



Environmental Quality
and Sustainability



Advanced Bioenergy
and Biobased Products

OARDC Leverages State and Federal Dollars

In Fiscal Year 2013, OARDC had an active portfolio of 592 active grants valued at \$170 million. Here are some examples.

From the National Institute of Food and Agriculture:

- \$6.5 million to study bioenergy and biofuels production
- \$2.2 million for developing a universal flu vaccine by a norovirus P particle platform
- \$.75 million to study long-term organic and transitioning farming systems

From the National Science Foundation:

- \$3.7 million for discovery of genes and networks regulating tomato fruit morphology
- \$.9 million to study biodiversity and ecosystems within the urban landscape

From the U.S. Agency for International Development:

- \$24 million for collaborative research and capacity-building of Sokoine University of Agriculture and the Tanzania National Agricultural Research System

From the Natural Resources Conservation Service:

- \$1 million for evaluating and updating the Ohio phosphorus risk index

From the Ohio Division of Wildlife:

- \$1.9 million for a terrestrial wildlife ecology lab

What Our Partners Are Saying About Us

“If you might be part of the problem, you should want to be part of the solution. While we don’t know what’s causing the issue, agriculture needs to understand what we can do to change it. If we are losing nutrients from our fields, we need to make changes so our farms benefit.”

— **Terry McClure, owner of McClure Farms, Paulding County**

“This new grant builds on quasar’s continuing collaboration with Dr. Yebo Li and The Ohio State University-OARDC. This project demonstrates the role academia can play in envisioning the future of the renewable energy industry.”

— **Clemens Halene, vice president for engineering, quasar energy group**

“Ecosystem restoration will play a large role as we try to reverse the declines in the nation’s water quality. The Olentangy River Wetland Research Park will play a crucial role in the development of predictable, repeatable habitat restoration models that can be implemented across the landscape.”

— **Vince Messerly, professional engineer and president, Ohio Wetlands Foundation**

“Research is paramount to provide the worth, function and relevance of a conservation practice in our ever-changing environment. The work that Andy Ward and other partners have done on two-stage ditches is the backbone and foundation of the effort.”

— **Kent Wamsley, project manager, Wabash River Initiative, The Nature Conservancy**



Terry McClure



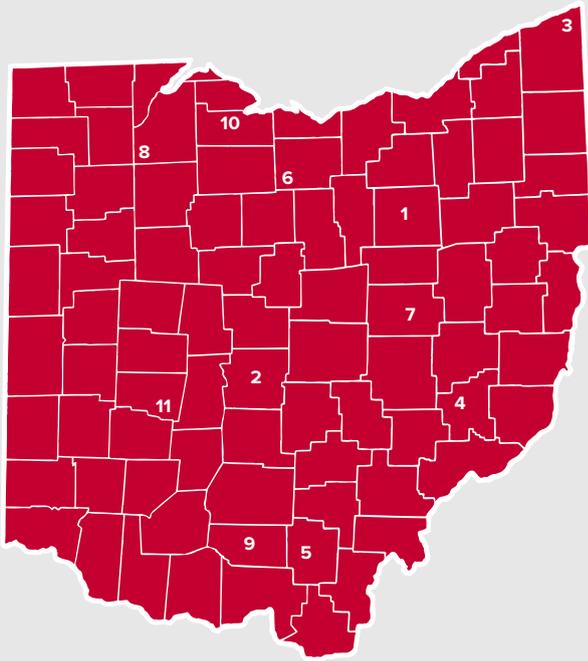
Clemens Halene



Vince Messerly



Kent Wamsley



OARDC Locations in Ohio

1. Wooster
2. Columbus

Outlying Agricultural Research Stations

3. Ashtabula
4. Eastern
5. Jackson
6. Muck Crops
7. North Appalachian Experimental Watershed and Pomerene Lab
8. Northwest
9. OSU South Centers
10. North Central
11. Western

College of Food, Agricultural, and Environmental Sciences

The Ohio State University College of Food, Agricultural, and Environmental Sciences is a large and diverse college supporting 10 academic units, a two-year degree program called the Agricultural Technical Institute, the Ohio Agricultural Research and Development Center and Ohio State University Extension. The college has campuses in Columbus and Wooster. Along with its presence in all 88 Ohio counties, it serves as the home for 330 faculty members, 1,230 staff members and more than 3,500 undergraduate and graduate students.

Contact Us

Steven Slack, Associate Vice President for Agricultural Administration, The Ohio State University College of Food, Agricultural, and Environmental Sciences, and Director, OARDC

1680 Madison Avenue, Wooster, Ohio 44691-4096
330-263-3701

2120 Fyffe Road, Columbus, Ohio 43210-1066
614-292-3897

E-mail: oardc@osu.edu

Twitter: @DirSteveSlack

go.osu.edu/oardcfacebook

oardc.osu.edu

The Ohio Agricultural Research and Development Center (OARDC) embraces human diversity and is committed to ensuring that all research and related educational programs are available to clientele on a nondiscriminatory basis without regard to age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, sexual orientation, or veteran status. This statement is in accordance with United States Civil Rights Laws and the USDA.

Steve Slack, Ph.D., Associate Vice President for Agricultural Administration and Director, OARDC

For Deaf and Hard of Hearing, please contact the Ohio Agricultural Research and Development Center (OARDC) using your preferred communication (e-mail, relay services, or video relay services). Phone 1-800-750-0750 between 8 a.m. and 5 p.m. EST Monday through Friday. Inform the operator to dial 614-292-3897 (Columbus) or 330-263-3700 (Wooster).



THE OHIO STATE UNIVERSITY

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Keeping People and Animals Healthy



Vaccine technology launches new company

OARDC researchers have developed and are working to commercialize a new technology for making vaccines and diagnostic tests that combat serious poultry and livestock diseases. The initial focus has been on infectious bursal disease (IBDV), a highly contagious disease that threatens Ohio's \$700 million poultry industry. The new vaccine can be produced at a reduced cost compared to conventional vaccines, and represents a \$17 million-a-year market opportunity. This research has led to the creation of a startup company, LARAD Inc., which will be part of the BioHio Research Park on OARDC's Wooster campus. LARAD will commercialize the technology, which can have a wide range of applications including viral diseases of poultry, swine, cattle, fish, horses, cats and dogs.

More: go.osu.edu/UpH

Mosquito discovery fights deadly diseases

Mosquitoes are more than annoying pests that cause itching and swollen bumps. They can also carry deadly diseases, from malaria to dengue to West Nile virus, which together kill millions every year. That's why OARDC research into how mosquitoes' "kidneys" work is so important. When mosquitoes bite, they can ingest the equivalent of their body mass in blood, which means they need to immediately get rid of excess water and salt consumed. They do that by urinating on their host — while still feeding. OARDC scientists have found a chemical that interferes with a mosquito's ability to excrete urine, which leaves them unable to fly and severely bloated. Funded by a grant from the Foundation for the National Institutes of Health's New Insecticides for Malaria Control program (which is supported by the Bill & Melinda Gates Foundation), the research is expected to pave the way for the development of new insecticides.

More: go.osu.edu/U8z





Ensuring an Adequate, Affordable, Safe Food Supply

Ohio aquaculture industry perched for growth

The U.S. imports 91 percent of its seafood, thereby creating a \$10 billion deficit. Now, OARDC research could take a bite out of that deficit in Ohio. Its experimental yellow perch grow 30 percent faster than unimproved perch, and reach market size in 12–13 months instead of 18. They also need less feed. These factors would boost farm income for Ohio's \$50 million aquaculture industry. OARDC scientists are also looking into soybean meal as an alternative feed for perch. It costs only one-fourth as much as conventional feed made from ocean fish. Because feed costs make up half to three-quarters of a fish farm's total production costs, cheaper feed would increase profits significantly.

More: southcenters.osu.edu/aqua/

Apples take a bite out of bad cholesterol

Eating an apple a day might in fact help keep the cardiologist away, new OARDC research suggests. In a study of healthy, middle-aged adults, consumption of one apple a day for four weeks lowered by 40 percent blood levels of a substance linked to hardening of the arteries. The study found that the apples lowered blood levels of oxidized low-density lipoprotein (LDL), the "bad" cholesterol. When LDL cholesterol interacts with free radicals to become oxidized, the cholesterol is more likely to promote inflammation and can cause tissue damage.

More: go.osu.edu/applecholesterol



Food safety starts on farm

About one in six Americans suffers from a foodborne illness annually. Three thousand die, and increasingly, fresh produce is the culprit. From 1996 to 2010, 131 produce-related outbreaks occurred, resulting in 14,132 illnesses, 1,360 hospitalizations and 27 deaths. OARDC research surrounding specific farm management practices is helping shape national food safety rules. In Ohio, the information is changing the way some produce is harvested. In the Amish community, for example, horses are restricted to paths, minimizing the proximity between animals and produce. And farmers know to ensure hands are washed before produce is picked. How important is safe food to consumers? According to research conducted by OARDC agricultural economists, Americans altogether would pay \$305 million in the aggregate for a 10 percent reduction in the likelihood that hamburger from the grocery store is contaminated with *E. coli*.

More: go.osu.edu/producesafety



Finding Sustainable Solutions to Environmental Problems

Effort keeps phosphorus on land, out of lakes

Phosphorus is most often implicated in algal blooms and the degradation of Ohio's surface water. Keeping more phosphorus on farm fields would not only help major waterways such as Grand Lake St. Marys and the Western Lake Erie Basin, but it would also make farms more profitable. OARDC researchers are in the midst of a three-year project to improve the Ohio Phosphorus (P) Risk Index to be more precise in predicting the risk of phosphorus movement. They are also finding new management options and tools for farmers to estimate and avoid the potential for phosphorus runoff. The research is supported by a \$1 million U.S. Department of Agriculture Conservation Innovation Grant and matching donations from Ohio agribusinesses and agricultural groups.

More: agcrops.osu.edu/

New ditch design benefits farms, water

Today, there's a better way to dig a ditch, thanks to OARDC scientists. While drainage ditches are a must to grow crops in much of Ohio, they can be costly to maintain and can carry nutrients and soil sediment into rivers and lakes. Now, OARDC research has led to the innovative "two-stage" ditch design, which benefits not just farms but water quality. When compared to conventional ditches, the new ditch design drains water better, reduces flooding, reduces erosion, helps take nutrients out of the water and needs little maintenance. Two-stage ditches can take 50–2,000 pounds of farm nitrogen runoff out of the water per mile per year, depending on several factors including their age. (They work better as they get older.) This is of great help considering nitrogen in farm runoff can pollute drinking water and is the main cause of "dead zones" in lakes and in the Gulf of Mexico. To date, farmers and agencies have installed 40–50 miles of ditches using the new design.

More: go.osu.edu/twostageditch



Wetlands key to cleaner water

Cleaner water for Ohioans could spring from 52 acres in Columbus. The Ohio State University's Wilma H. Schiermeier Olentangy River Wetland Research Park, now in its 23rd year, conducts globally known, locally relevant studies on wetlands and how to protect, build and use them to improve water quality. Recognized as a Wetland of International Importance, the park provides an opportunity for researchers to explore how to use wetlands to address some of the most pressing water pollution problems of our day. Here are some examples of studies conducted at the park: how land cover and land use affects food webs and contaminants in water; how rivers, wetlands and ecosystems respond to the removal of dams; and how Lake Erie coastal wetlands can be restored to clean, filtered lake water.

More: go.osu.edu/olentangywetland

Developing Renewable Bioenergy and Biobased Products



Waste, crops produce new generation of fuels

Researchers and industry partners are working together to test and expand an OARDC technology that can produce renewable fuel from organic waste and bioenergy crops. The project seeks to enhance the integrated anaerobic digestion system (*iADs*), a patent-pending technology developed by OARDC research and operated by quasar energy group, a Cleveland-based renewable energy company. The system can produce biogas from organic materials containing up to 85 percent solids content, compared to the 14 percent solids content maximum that standard liquid biodigesters can handle. Researchers are testing biogas production from yard waste, corn stover and giant miscanthus, a perennial warm-season grass from Asia that is garnering attention as a potential bioenergy crop. The ultimate goal is to develop a technology for converting all this biogas to liquid transportation fuels, increasing energy independence, and supporting Ohio's growing renewable energy sector. The research is funded by a \$6.5 million grant from the U.S. Department of Agriculture and the U.S. Department of Energy. OARDC's Wooster campus is a pioneer in Ohio in the use of biogas. Thirty percent of the campus' electricity now comes from this renewable resource, while several of OARDC's fleet vehicles have been converted to run on compressed natural gas.

More: go.osu.edu/QCe

