OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

Agbioscience: OARDC Bringing Knowledge *to* Life
2014 Annual Report

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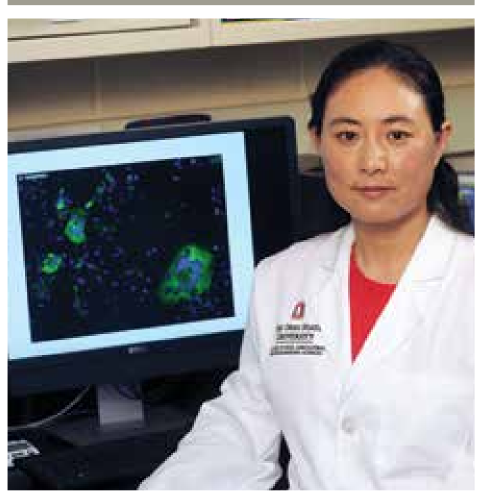

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THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

OARDC: A Leader in Agbioscience

ag•bi•o•sci•ence (ăg’bī’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 2014, OARDC had a portfolio of 582 active grants valued at $166 million. Some examples are listed below.

From the National Institute of Food and Agriculture (NIFA):

- $730,600 to create eLearning in NIFA challenge areas to transform education of controlled-environment animal production (ECEAP) for sustainability
- $1 million to study pathogen inactivation in fresh produce by incorporation of sanitizers into existing operations within the produce chain
- $500,000 to increase aquaculture production and new farmers/ranchers in the region

From the National Science Foundation:

- $750,000 to study co-evolution of upstream human behavior and downstream ecosystem services in a changing climate

From the Ohio Soybean Council:

- $2.8 million to address soybean priority areas

From the Ohio Department of Agriculture:

- $790,000 to target specialty crop research in Ohio

What Our Partners Say About Our Work

"It is increasingly important that we have a high-quality swine research capability in Ohio. We, as swine producers, need this information as soon as possible to help us manage diseases such as PEDv the best we can to limit severe economic losses."

— **Pat Hord,** *owner, Hord Livestock Company, Bucyrus, Ohio*

"Ohio State University research is required to provide information to the Ohio agriculture community, which will allow collaboration between beekeepers and farmers to help each other keep honeybees healthy and safe, and provide the pollination needed to keep crop production sustainable and profitable."

— **Dwight Wells,** *regional director, Ohio State Beekeepers Association*

"The partnership between Ohio State and the ODNR Division of Wildlife, through the Ohio Biodiversity Conservation Partnership, supports the research being conducted by Mazeika (Sullivan) and Kris (Jaeger), and will provide concrete evidence of the benefits of dam removals."

— **John Navarro,** *program administrator, Ohio Department of Natural Resources Division of Wildlife*

"Imed Dami's research has impacted all of Ohio's vineyards, especially in the Grand River Valley, which produces some of the state's finest vinifera wines and has won many prestigious awards. We've used many of Imed's strategies to improve vine health, yields and wine quality."

— **Nick Ferrante,** *owner, Ferrante Winery, Geneva, Ohio*

PROTECTING OUR FOOD SUPPLY AND AGRIBUSINESSES

New swine disease requires swift response

In 2013, a new swine disease showed up in the U.S. Very quickly, porcine epidemic diarrhea virus (PEDv) spread across the country, killing 50–100 percent of piglets at hundreds of farms in at least 30 states, including Ohio. Rapidly mutating, the virus has reduced pork production and threatens to impact the availability of pork products as well as prices. In response, OARDC scientists have developed tests to track the disease and are now working on new vaccines. One project involves growing the virus in cell culture and using this material to develop a "booster" vaccine that can protect pigs previously exposed to PEDv. Down the road, the goal is to develop a stronger vaccine that can also protect swine with zero immunity to the virus.

"PEDv is not likely to just go away. We need to develop vaccines that can protect pigs that have never been exposed to the disease before."
— Qiuhong Wang, virologist, OARDC

More: **go.osu.edu/nkx**

Keeping bees healthy, agriculture profitable

Bees are crucial to agriculture and food security. They pollinate about one-third of the crops we eat, valued at more than $14 billion annually in the U.S. Ohio beekeepers have recently lost 50–80 percent of their honeybees due to diseases, insect pests, loss of habitat and agricultural chemicals. Insecticide-coated corn seeds, for example, can contaminate flowers in nearby fields as the seeds are chipped off in planters. Bees then carry the tainted pollen to their hives, exposing the entire colony. OARDC entomologists are studying the unintended consequences of these insecticides as well as strategies to protect bees. For example, they have tested a lubricant that is applied to seeds to reduce dust, which shows promise in field trials.

More: **u.osu.edu/beelab**

Helping the wine-grape industry recover, thrive

The "polar vortex" winter of 2013–2014 was ruthless to Ohio's wine grapes. Growers lost 97 percent of their profitable vinifera grapes, with total damage to all the state's grape varieties topping $12 million. OARDC experts responded to this catastrophic event by teaching a statewide workshop series on pruning winter-damaged vines, with the goal of returning Ohio grape growers to full production as soon as possible. Scientists are also developing new cold-hardy hybrid varieties that can better withstand severe weather. Ohio's grape and wine industry has a $786 million annual economic impact and supports more than 5,000 full-time jobs.

More: **go.osu.edu/GrowingGrapes**

RESTORING ECOSYSTEMS AND CITIES

Removing dams leads to healthier rivers, cleaner water

There's a growing trend toward removing dams to restore rivers, but studies documenting the rivers' responses and the benefits are limited. To fill this gap, OARDC scientists are studying the impacts of dam removals at two former dams in Columbus: one on the Olentangy River on The Ohio State University's Columbus campus, and another close by on the Scioto River. The scientists are documenting the exact changes seen in the rivers' flow, biology and water quality. Benefits to removing dams include improved water flow, which eliminates the build up of sediments full of accumulated toxins — including health threats such as polychlorinated biphenyls (PCBs).

Removing two obsolete dams on the Cuyahoga River helped Northeast Ohio officials save $5 million to $7 million in updates to meet water quality standards.

More: **go.osu.edu/RiverRestoration**

From urban blight to enhanced ecosystems

Decades of population losses have left the city of Cleveland with 3,600 acres of vacant land, while some 1,000 homes are demolished every year. What to do with all this land? Currently, Cleveland plants turfgrass on empty lots, but it's expensive to maintain and offers few benefits. OARDC researchers are engaging in a never-before-attempted project that studies the impact of eight different landscape treatments on the biodiversity and ecosystem function of empty lots in eight Cleveland neighborhoods. The goal is to work with city officials and neighbors to find the right combination of plants that can turn urban vacant land from an eyesore to a community development asset. Researchers are also working to evaluate the benefits of rain gardens and teach residents how to grow fresh food on empty lots.

Community members and city leaders are partners in this project, providing input about their landscape treatment preferences.

More: **ale.cfaes.ohio-state.edu/home**

IMPROVING HUMAN HEALTH THROUGH TECHNOLOGY

Food dyes that fight cancer

Compounds in produce can help fight diseases, and if garnered, they can also generate business opportunities. OARDC food scientists have developed and patented technology to economically produce pure anthocyanins — powerful antioxidants that give color to most red, orange, purple and blue fruits and vegetables. These antioxidants are hot commodities because of their potential as cancer-fighters and natural food dyes. This unique process slashes the cost of producing anthocyanins 10- to 20-fold and will be commercialized by a new startup company, Anthocyantific LLC.

More: **go.osu.edu/colorcodes**

At the forefront of scientific discoveries

OARDC researchers are highly recognized in the scientific community. Plant geneticist Esther van der Knaap's discovery of a gene that controls fruit size was published in the September 2013 "Proceedings of the National Academy of Sciences." And in April 2014, the prestigious journal "Science" reported on its cover the sequencing of the tsetse fly genome, a groundbreaking project to which entomologist David Denlinger and his lab contributed.

More: **go.osu.edu/s2X**

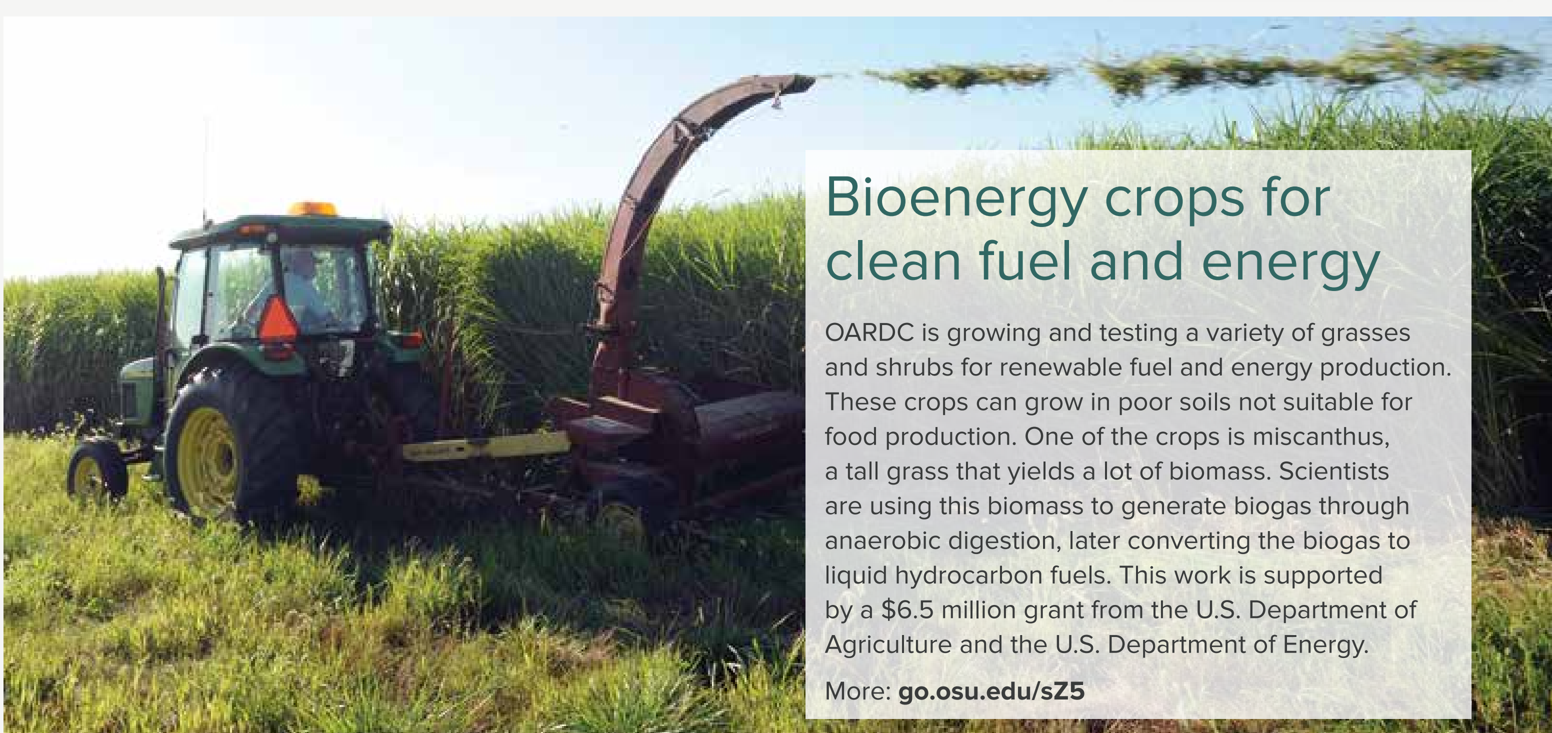
DEVELOPING BIOENERGY AND BIOBASED PRODUCTS

New products combat latex allergies

Millions of Americans, including 8–17 percent of healthcare workers, are allergic to latex. Medical professionals prefer latex gloves because they perform better and offer more protection, but the risk of allergies has made synthetic gloves increasingly common. To address this problem, OARDC researchers have developed new patent-pending materials that are safe for both Type I and Type IV latex allergy sufferers. Some of these materials are made from guayule, a U.S. desert shrub that produces high-quality latex that is naturally Type I-hypoallergenic. The scientists also created a new process that gets rid of the residues on latex products that cause Type IV allergy. In addition to gloves, these materials can be used to make many other healthcare and consumer products such as catheters, dental dams, orthodontic rubber bands and condoms. A startup company — EnergyEne Inc., headquartered in Wooster — has been established to lead the development and commercialization of products made from these new materials.

Guayule is one of many new bioenergy and bioproduct crops that OARDC is evaluating. The Ohio State University is conducting guayule trials in southern Ohio with the aim of developing new agricultural industries and economic opportunities in the region. In addition to rubber and latex, guayule produces a diesel-like fuel that can be extracted easily and cheaply.

More: **go.osu.edu/nk3**



Bioenergy crops for clean fuel and energy

OARDC is growing and testing a variety of grasses and shrubs for renewable fuel and energy production. These crops can grow in poor soils not suitable for food production. One of the crops is miscanthus, a tall grass that yields a lot of biomass. Scientists are using this biomass to generate biogas through anaerobic digestion, later converting the biogas to liquid hydrocarbon fuels. This work is supported by a $6.5 million grant from the U.S. Department of Agriculture and the U.S. Department of Energy.

More: **go.osu.edu/sZ5**

College of Food, Agricultural, and Environmental Sciences

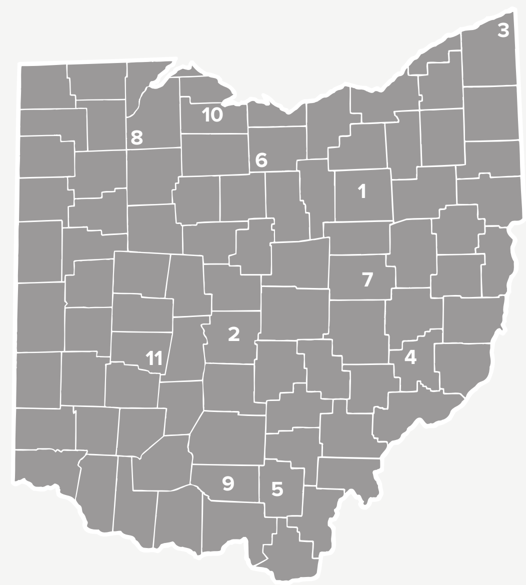
The Ohio State University College of Food, Agricultural, and Environmental Sciences is a large, diverse college supporting 10 academic units, the Ohio Agricultural Research and Development Center, Ohio State University Extension, and two-year degree programs offered by the Agricultural Technical Institute. The college has campuses in Columbus and Wooster, and has a presence in all 88 Ohio counties. It serves as the home for 330 faculty members, more than 3,700 undergraduate and graduate students, and 1,230 staff members.

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



OARDC Administration

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

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