A close-up, low-angle shot of a microscope's objective lenses and eyepiece, set against a bright, slightly blurred background. The lighting is soft and blue-toned, creating a scientific and professional atmosphere.

2012
Annual Report

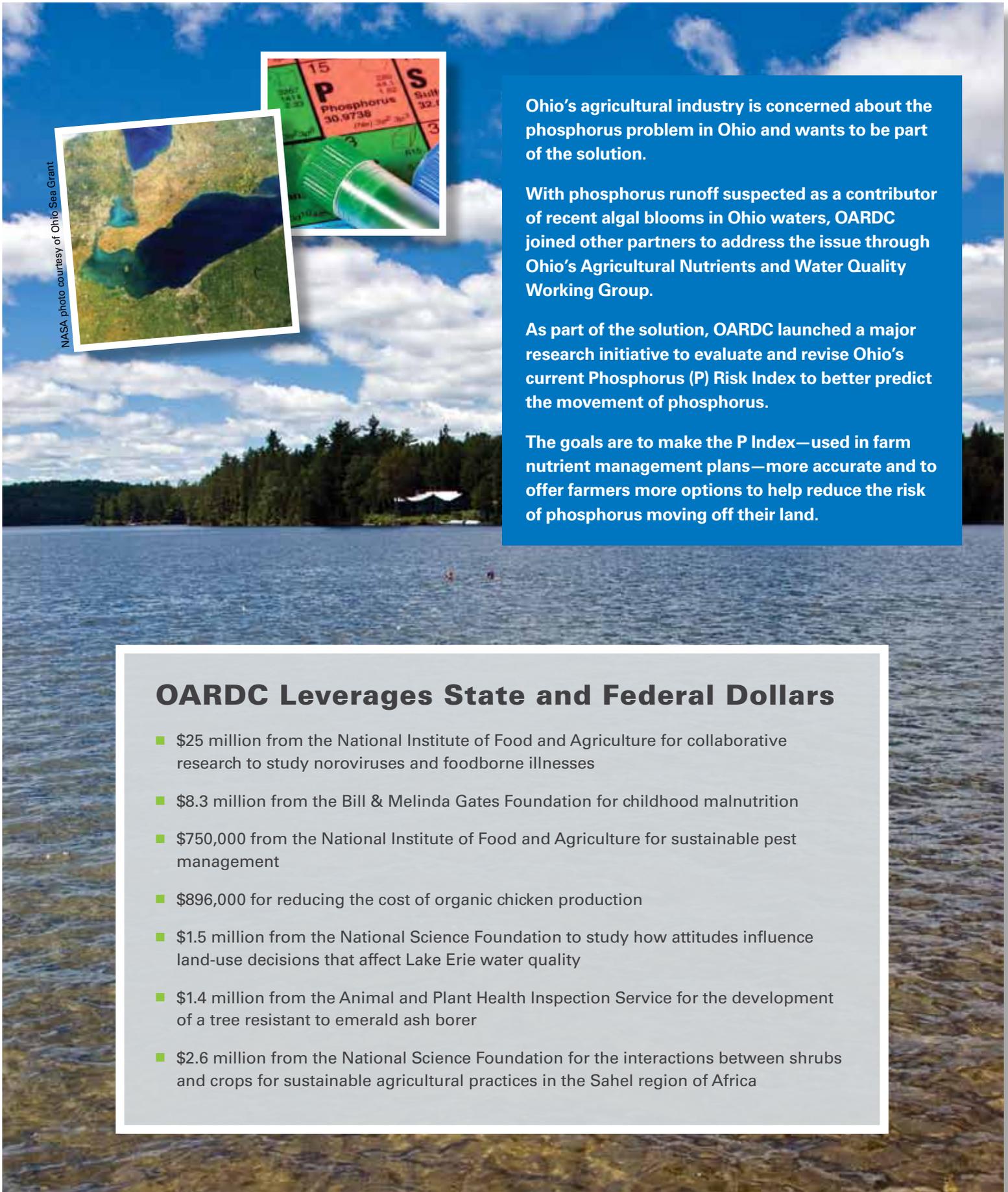
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OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

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Collaboration: Working with Governor's Team to Solve Phosphorus Issue



NASA photo courtesy of Ohio Sea Grant



Ohio's agricultural industry is concerned about the phosphorus problem in Ohio and wants to be part of the solution.

With phosphorus runoff suspected as a contributor of recent algal blooms in Ohio waters, OARDC joined other partners to address the issue through Ohio's Agricultural Nutrients and Water Quality Working Group.

As part of the solution, OARDC launched a major research initiative to evaluate and revise Ohio's current Phosphorus (P) Risk Index to better predict the movement of phosphorus.

The goals are to make the P Index—used in farm nutrient management plans—more accurate and to offer farmers more options to help reduce the risk of phosphorus moving off their land.

OARDC Leverages State and Federal Dollars

- \$25 million from the National Institute of Food and Agriculture for collaborative research to study noroviruses and foodborne illnesses
- \$8.3 million from the Bill & Melinda Gates Foundation for childhood malnutrition
- \$750,000 from the National Institute of Food and Agriculture for sustainable pest management
- \$896,000 for reducing the cost of organic chicken production
- \$1.5 million from the National Science Foundation to study how attitudes influence land-use decisions that affect Lake Erie water quality
- \$1.4 million from the Animal and Plant Health Inspection Service for the development of a tree resistant to emerald ash borer
- \$2.6 million from the National Science Foundation for the interactions between shrubs and crops for sustainable agricultural practices in the Sahel region of Africa

What Our Partners Are Saying About Us

“This technology will allow quasar to accept and process a wider range of high-solids feedstocks, including high-volume off-spec and major market recall material—expanding our business to offer customers a full-service solution to their waste management challenges. The partnership with OARDC applies research to improving the way we do business.”

—Mel Kurtz, president, quasar energy group



“Many of the trees that the Asian longhorned beetle and thousand cankers disease affect are staple landscape trees in our area. If we lose them, it will devastate Ohio’s nursery and landscape industry. The research that Dan Herms and his colleagues are doing is paramount in preventing another loss like that of the ash tree.”

—Wm. Kyle Natorp, president and CEO, Natorp’s Inc. and Wm. A. Natorp Company, Mason, Ohio

“Water quality is a top concern in Ohio, and farmers want to be part of the solution. Ohio State’s research to validate and update the Phosphorus Risk Index will help us determine what the next best management practices are when it comes to phosphorus use on the farm.”

—Tom Fontana, director, New Use Development, Ohio Soybean Council



Advanced Bioenergy and Biobased Products

Partnering with industry, OARDC researchers develop renewable fuels, energy, and products from agricultural products and wastes.

Bio100 Technologies in Mansfield, Ohio, is commercializing a renewable source of polyurethane foam based on a system developed and patented through OARDC research. The foam gets its start as crop residue and low-value glycerin.

This foam, made from biopolyol, is used to create soft and hard foam products such as home insulation, automobile seat cushions, and packaging materials, as well as hard plastics. It is 5–10 percent less expensive than petroleum-based or natural oil-based foams.

With a major automobile interior manufacturer interested in the product, Bio100 is now gearing up for commercial-scale production, with 60 new jobs anticipated in Mansfield within the next five years.



- Natural rubber made from Buckeye Gold, a relative of common dandelion, and guayule, a shrub native to the southwestern United States, is being tested at a pilot plant at OARDC's Wooster location.

Gloves, tires, and other latex and rubber products are being made from the materials, and both Buckeye Gold and guayule are being grown in Ohio.

Project industry partners include Bridgestone, Cooper Tire & Rubber, Veyance Technologies, and Ford Motor Company.

- Because algae need only one-tenth of the land required by soybeans to produce the same amount of oil, OARDC has partnered with Touchstone Research Laboratory to grow it in ponds for production of biofuels.

Funded by nearly \$7 million in U.S. Department of Energy grants, pilot ponds have been built in Wooster to capture carbon dioxide and recycle liquid waste from anaerobic digesters, both of which help fertilize algae. The goal is to perfect the technology in order to grow a competitive algal industry.

- OARDC is testing the use of compressed natural gas (CNG)—produced by BioHio Research Park partner quasar energy group—within its fleet of cars.

CNG costs 25 percent less than regular gasoline and reduces greenhouse gas emissions by 30–40 percent, including 25 percent less carbon dioxide, 65 percent less nitrogen oxide, and 90 percent less carbon monoxide.

biopolyol = **60 new jobs**

compressed natural gas =
30–40% reduction
in greenhouse gas emissions



Environmental Quality and Sustainability

As OARDC researchers develop solutions to global problems, they do so with an eye toward the conservation of natural resources and long-term sustainability.

Ohio's natural resources are constantly besieged by new and evolving threats. Invasive species and new pests are attacking our forests and landscape trees, and our lakes are plagued with algal blooms.

OARDC researchers are discovering solutions. They have found that a byproduct of scrubbing air emissions from Ohio's coal-fired power plants—synthetic gypsum—works wonders in soil. Not only does it cut phosphorus runoff—a major cause of lake algal blooms—from crop fields by 40–70 percent, it also cost-effectively increases yields, and with it, farm income.



Ohio Sea Grant and Stone Lab



- The emerald ash borer (EAB) was followed too quickly by the Asian longhorned beetle and the hemlock woolly adelgid, with potentially staggering impacts in Ohio.

The Asian longhorned beetle, now in southwest Ohio, attacks and kills many tree species including maples, poplars, and buckeyes. If the hemlock woolly adelgid spreads from southern Ohio, every hemlock tree in the state could die.

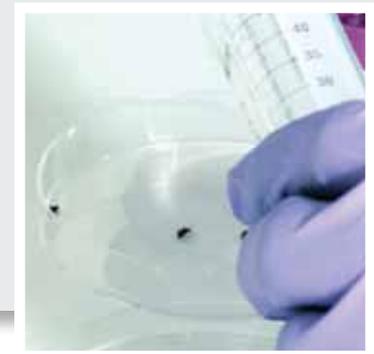
OARDC researchers are tracking and trying to control these pests. In fact, researchers are currently developing EAB-resistant ash trees.

- Children under age six in Cleveland have the highest lead poisoning rate in the United States—nearly 1 in 10, which is six times the national average.

OARDC researchers have developed a low-cost way to treat contaminated soils in our cities. Using compost and similar materials, the treatment costs 75 percent less than the next most affordable remedy.

- OARDC researchers continue their work in detailing bed bug genetic makeup.

Their work shows how insects become resistant to common pesticides, which could lead to novel methods of effective and economic control.



synthetic gypsum =
40–70% reduction
in phosphorus runoff



Keeping the World Healthy

Severe malnutrition is not caused simply by a lack of food. Scientists now believe it involves a breakdown in the way that microbes in the human gut process various components of the diet.

Thanks to an \$8.3 million grant from the Bill & Melinda Gates Foundation, an international team is working to find answers to this malnourishment question, especially in children. Malnourished children may not have acquired important gut microbes that help process nutrients. Special germ-free piglets raised by OARDC allow scientists to research this and see how supplements might promote a healthy gut.

- Researchers in The Ohio State University Center for Advanced Functional Foods Research and Entrepreneurship are examining plant components that promote health, then breeding plants with boosted phytonutrient content.

Researchers are then creating and testing products in the lab, and then testing the products with clinical patients to determine their effectiveness. So far, they have created a soy-tomato drink, a soy bread, and a raspberry confection.

- OARDC researchers are tackling rotavirus, which causes more than 800,000 deaths in the world each year.

Among the studies is work to increase the effectiveness of vaccines against rotavirus, which is the leading cause of childhood diarrhea.



**effective rotavirus vaccine =
800,000+ lives saved
annually worldwide**



Food Security, Production, and Human Health

OARDC works to provide enough safe, affordable, healthy food for a growing world population.

Rice blast, a devastating disease to the world's largest crop, is estimated to cost \$66 billion in annual losses worldwide. Wheat blast, caused by a related fungus, has now been found as close as Kentucky. Both plant diseases pose threats to crop production around the world. OARDC researchers are using molecular genetics and genomics to provide keys to the ways in which the fungal pathogen manipulates the host plant's defenses and causes disease. This knowledge could be applied to controlling other fungal diseases as well.



- OARDC researchers are finding ways to turn vacant, blighted, and decayed parking lots into lush, productive green spaces in the middle of cities.

Not only does the effort provide fresh produce for city dwellers, it turns lots once thought unusable into useful and productive land.



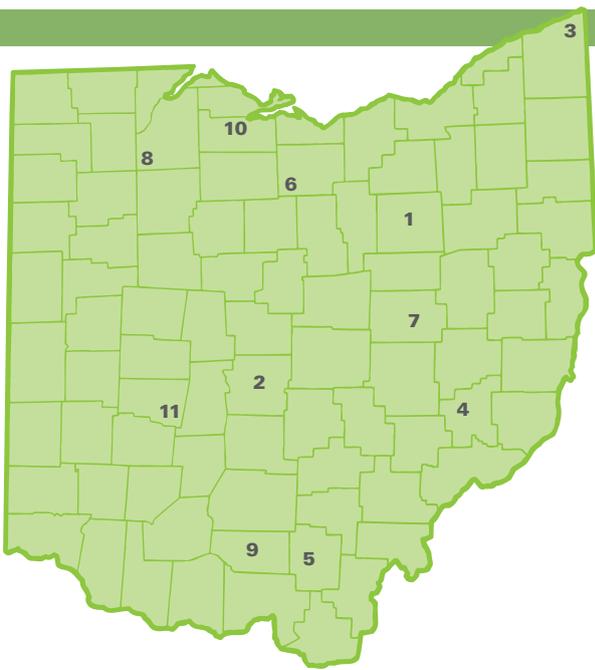
- OARDC plant breeders, in collaboration with others, developed a new genotyping tool for tomato. Following commercialization, this led to an industry standard for hybrid identity testing.

OARDC scientists have used the discovery to identify resistance to diseases such as bacterial spot, which costs the Ohio tomato industry an estimated \$10 million in yield losses annually.

- Food safety grants totaling \$2.3 million from the U.S. Department of Agriculture are helping OARDC researchers determine the role that birds and other wildlife play in the transmission of bacteria and viruses among food-producing animals, which eventually sicken humans.

They have found, for example, that European starlings play an important role in transmitting diseases.

molecular genetics =
\$66 billion saved
in rice crop losses annually worldwide



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: 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 (ex: turning waste into fuel; analyzing federal policy for profitable farming; creating foods for better health; adjusting phosphorus recommendations for cleaner water; making plastics from renewable resources; discovering local sources for rubber)



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

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