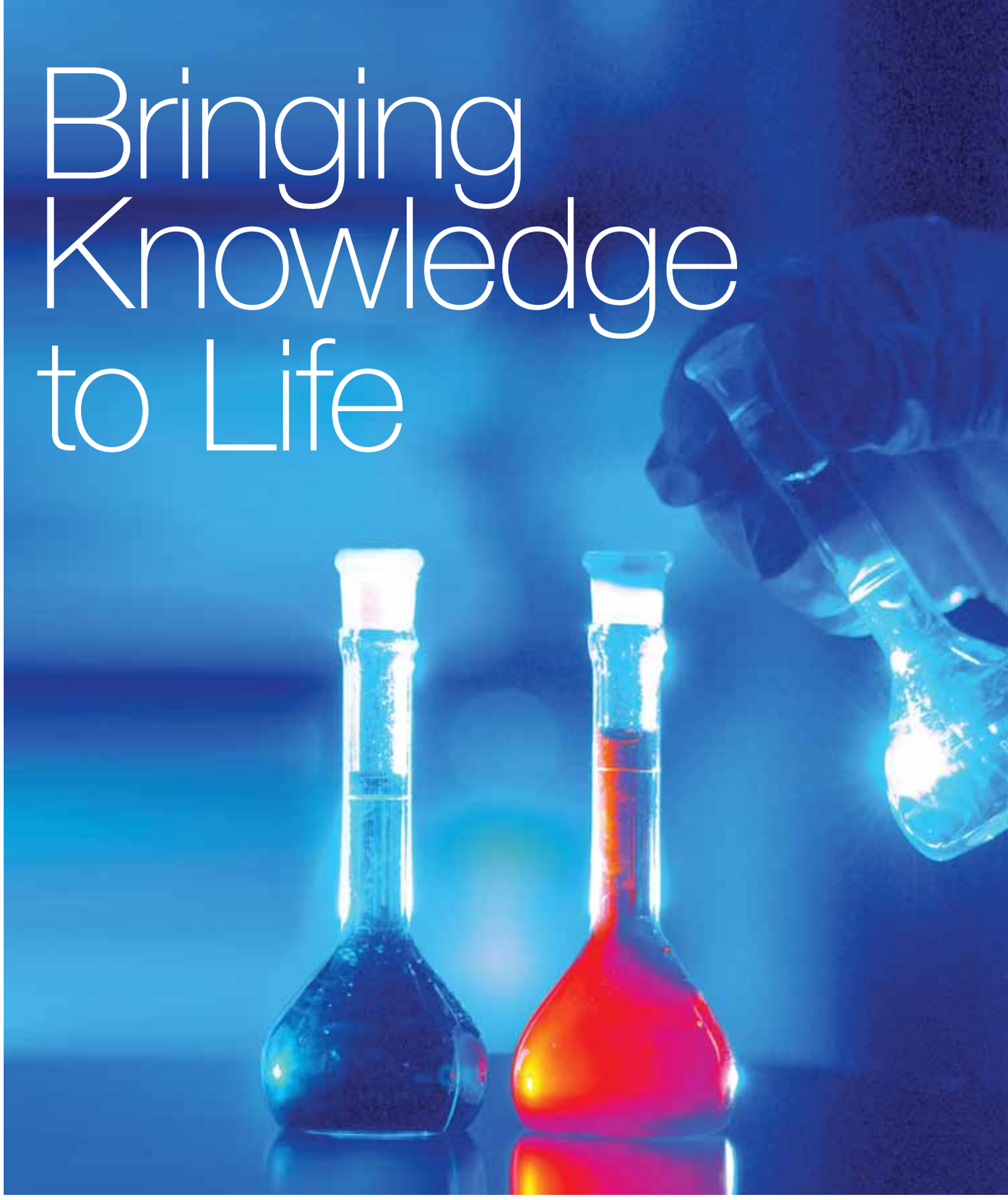







Bringing Knowledge to Life



OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

2011 Annual Report

http://cfaes-impact.ning.com

www.oardc.osu.edu

THE OHIO STATE UNIVERSITY
OARDC

A FLAGSHIP OF RESEARCH, ENTRE

What OARDC's partners say

"Without basic research to better understand bed bug biology and behavior, neither professionals nor ordinary Americans will have access to safe, effective, and affordable tools to combat these bloodsucking insects. The pest management industry is very fortunate for the research leadership The Ohio State University is providing, without which this epidemic will never be solved." — Bob Rosenberg, senior vice president, National Pest Management Association

"Dr. Saif's work on the potential links between vitamin A and the effectiveness of the rotavirus vaccine is vital because if such a link is established, supplementation of existing rotavirus vaccines with vitamin A will provide an immediate and cost-effective strategy to increase the effectiveness of the rotavirus vaccine in the world's most vulnerable populations." — Doug Watson, research scientist, Center for Advanced Drug Research, SRI International, Silicon Valley

"Dr. Michel and OARDC have brought to our team expertise we didn't have on the chemistry of ethanol and the challenges of cellulosic ethanol production; very sophisticated lab capabilities, equipment, and staff; testing procedures that are crucial for the success of this project; and the credibility that comes from having an unbiased academic perspective." — Fred Clarke, executive vice president, Arisdyne Systems Inc.

"Everyone knows that a new sanitizing technology is necessary. This research will benefit growers of leafy greens nationwide — but the fact that this work is being done in Ohio gives us a competitive advantage." — Bobby Jones, The Chef's Garden, Huron

"We don't know what our next bug will be, but we'll be ready and prepared having [Dan Herms and team's] research covering our flank. This is critical to Ohio and the United States, as we'll have more potential invasive pests with the global economy." —Dave Bienemann, municipal arborist, City of Bowling Green

OARDC Leverages State and Federal Dollars

Advanced Bioenergy and Biobased Products

- $3 million for commercialization of biobased and nano-tailored composites for industrial applications from the Ohio Department of Development in partnership with Natural Fiber Composites Corporation and VinylTech International LLC
- $1 million for accelerating commercialization of anaerobic digestion for bioenergy production from the Ohio Department of Development
- $7.5 million in private equity funding, leveraging $1 million Third Frontier grant for cavitation research which increases production yield at ethanol plants. Funding partners include Columbus-based Reservoir Venture Partners, Cincinnati-based Queen City Angels, Cleveland-based Early State Partners, California-based Chevron Technology Ventures and Georgia-based Cordova Ventures.

Environmental Quality and Sustainability

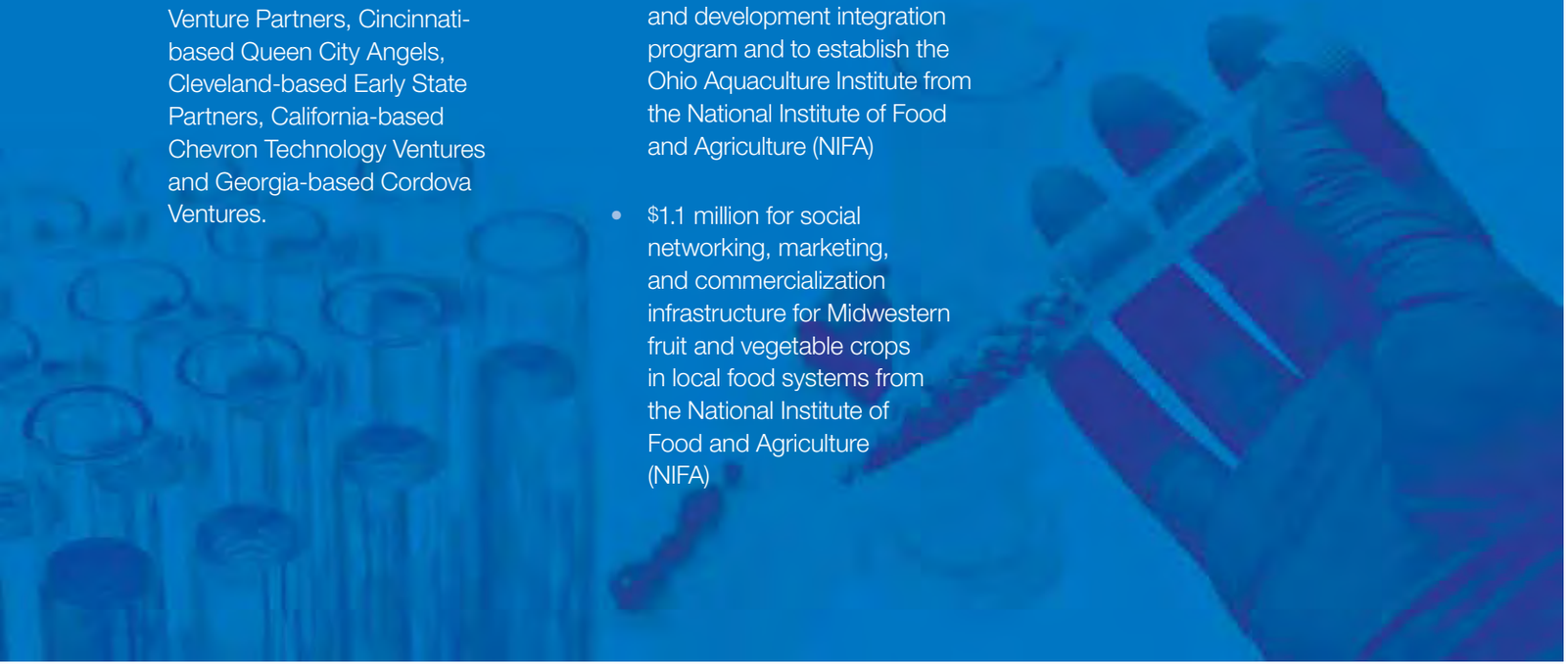
- $1.4 million for a terrestrial wildlife ecology lab from the Ohio Division of Wildlife
- $1.1 million for climate change, mitigation, and adaptation in corn-based cropping systems from the National Institute of Food and Agriculture (NIFA)

Food Security, Production, and Human Health

- $621,000 for Ohio aquaculture research and development integration program from the National Institute of Food and Agriculture (NIFA)
- $1.16 million in two grants for Ohio aquaculture research and development integration program and to establish the Ohio Aquaculture Institute from the National Institute of Food and Agriculture (NIFA)
- $1.1 million for social networking, marketing, and commercialization infrastructure for Midwestern fruit and vegetable crops in local food systems from the National Institute of Food and Agriculture (NIFA)
- $1.4 million for high-throughput discovery of chemicals that induce ‘kidney’ failure in the malarial vector *Anopheles gambiae* from the Foundation for the National Institutes of Health

International

- $25 million for collaborative research and capacity building of Sokoine University of Agriculture, Tanzania, and the national agricultural research system from the U.S. Agency for International Development
- $540,000 for a regional Integrated Pest Management Program for East Africa: Kenya, Tanzania and Uganda from U.S. Agency for International Development



Advanced Bioenergy and Biobased Products

Partnering with industry, OARDC researchers help develop renewable biobased energy and bioproducts such as fuels, fiber, and polymers.

OARDC researchers are perfecting the growing and extracting techniques for a rubber-producing plant that can be commercially produced in Ohio: Russian dandelion. OARDC will establish a pilot-scale processing plant in 2012 for solid rubber, latex, and film products. Russian dandelion plantings have been significantly expanded to supply the processing plants.

250 jobs by 2014

http://go.osu.edu/DRZ

OARDC and the Ohio BioProducts Innovation Center (OBIC) are working with Columbus-based Natural Fiber Composites Corporation (NFCC), which manufactures biobased composite materials for construction, vehicles, and packaging reinforced with plant fibers instead of fiberglass. OARDC engineers helped the company perfect its feedstock and processing technology so it could reach production levels.

12 jobs and $3 million in revenue by end of 2012

http://go.osu.edu/composites

Work between Cleveland-based Arisdyne Systems Inc. and OARDC is showing that new technology, called controlled-flow cavitation, can increase ethanol yields by 3%.

$500 million, the increase in revenue if all U.S. ethanol plants used the new technology

http://go.osu.edu/GQ7

Environmental Quality and Sustainability

At the core of this effort is the realization that sustaining population and economic growth must be balanced with the preservation of natural resources and environmental assets — in other words, long-term sustainability.

$250 to $1,250 = what a hotel operator spends per room to get rid of bed bugs

The national bed bug epidemic is costing homeowners and businesses billions of dollars every year. Fortunately, thanks to OARDC, Ohio is a leader in fighting the pest. Researchers are evaluating how well bed bug insecticides, detectors, and other products work and have also recently reported the first detailed study of bed bugs' genetic makeup. Their work shows how these insects become resistant to common pesticides. Knowing this could lead to novel methods of control that are more effective and economic.

http://go.osu.edu/GRK

$22,500 = per acre savings over the next most economical method for treating lead in soil

Lead in soil in cities can make kids sick and the land unfit for gardens. Now, an OARDC scientist has developed a low-cost way to treat that lead. His method is just a quarter the cost of the next-cheapest option — a big help for cash-strapped communities. Another researcher is pioneering the use of flue-gas desulfurization (FGD) gypsum, a byproduct from Ohio's coal-fired power plants, to keep phosphorus in the soil, where we need it, and out of Lake Erie, where we don't. The work has the triple benefit of putting a waste to good use, improving the soil for crops, and cleaning up the lake.

http://go.osu.edu/GQg

http://go.osu.edu/GQh

$9–15 billion = value of honey bee pollination

Ohio's honey bee population has crashed, and OARDC scientists want to know why. At stake is every third bite of food we eat, which is how much of our food supply needs bees for pollination. In the United States total, it's a service worth about $9–15 billion. Entomologists are investigating whether pesticide exposure is a culprit and, if so, where it's coming from. Their goal is to determine the risk within a honey bee's "pasture" — the area in which the bee forages for pollen. It's a first step to understanding the problem, developing science-based recommendations to cut the risk, and helping bees to recover.

http://go.osu.edu/GQn

http://beehealthy.osu.edu

$1 billion = cost of lost standing timber due to emerald ash borer

Invasive tree-killing insects, such as the emerald ash borer, Asian longhorned beetle, and hemlock woolly adelgid, are costing Ohio's economy big. So OARDC scientists are working to detect new invaders, track their spread, test ways to limit or eradicate them, and recommend steps to homeowners, businesses, and communities. In the case of EAB, they are also developing improved varieties of trees that can stave off attack, leading to stronger replacements for what's been destroyed and potential new products for Ohio's $4 billion nursery and landscape industry.

http://go.osu.edu/GQa

http://go.osu.edu/GQb

A Unique Asset to Fight Infectious Diseases, Protect Economy and Health

The Ohio Agricultural Research and Development Center reached a key milestone in 2011, with the unveiling of the state's first highly secure bio-containment building aimed at protecting crops and livestock from infectious diseases. The $22.2 million Plant and Animal Agrosecurity Research (PAAR) Facility is the first in Ohio (and one of only two nationally) with capacity for both plant and large-animal research at the BSL-3 (biosafety level 3) and BSL-3 Agriculture safety levels. "There are many concerns now about where we are going with our food supply, our ability to feed a growing population. That's why it's so important to have institutions like OARDC to make our land more productive and our food safe. It's great to finally have this PAAR Facility to make our lives safer," said Ralph Regula, former U.S. Representative, Ohio's 16th District, who helped secure funding for PAAR. The facility is expected to significantly boost research on a number of disease organisms and pests capable of causing billions of dollars in losses to crops, trees, and livestock — including soybean rust, which threatens Ohio's $1 billion a year soybean industry; and avian influenza, which could devastate the state's $93 million turkey industry. Research in the facility will lead to the development of diagnostic tests, vaccines, resistant varieties, and other strategies for ensuring the continuity and profitability of Ohio's diverse agricultural industries. All of this work will be done in accordance with federal regulations to guarantee the safety of workers and the surrounding environment. The airtight building is physically isolated and constantly monitored, access to the area is limited and tightly controlled, and all outgoing air is filtered to trap microorganisms. More information: **http://oardc.osu.edu/paar**.

Food Security, Production, and Human Health

OARDC focuses on improving agricultural production; enhancing the quality of food and feed; ensuring an adequate, affordable, and safe food supply; and maintaining agrosecurity to ensure food security and the basics of nutritional health for a growing global population.

Foodborne illness kills about 3,000 Americans and costs the United States $152 billion annually. Raw leafy greens are among the riskiest foods because their porosity makes it easy for pathogens to get inside the vegetables.

$152 billion: annual cost of food-borne illness

The liquid sanitizers that processors typically use are not always effective because air pockets can prevent the liquid from covering the leaf surface. OARDC is testing gaseous sanitizers and when best to use them. The result: a safer produce supply.

http://go.osu.edu/leafy

$385 million in health care costs from rotavirus

Rotavirus causes more than a half-million deaths each year in children younger than 5 across the globe; in the U.S. alone, direct medical costs are estimated at up to $385 million annually. In addition, norovirus causes more than 21 million U.S. cases of acute gastroenteritis each year. Multiple research projects at OARDC are addressing the problem, including efforts on a vaccine against norovirus and studies to determine how to increase the effectiveness of rotavirus vaccines.

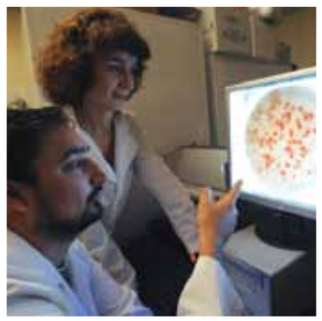
http://go.osu.edu/GVB

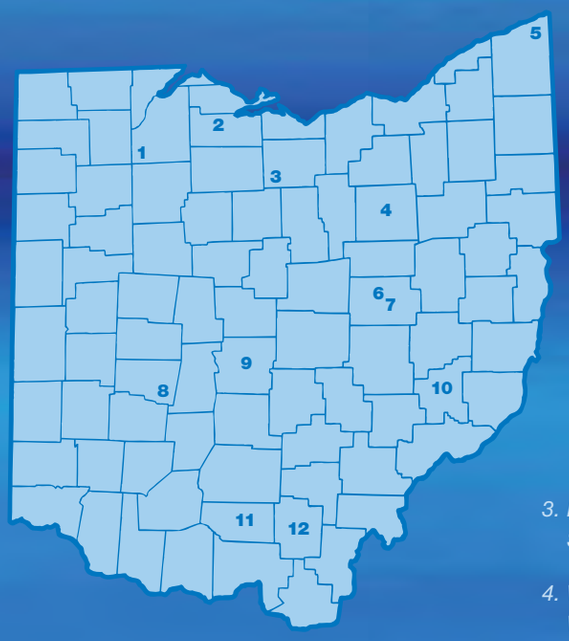
http://go.osu.edu/virusgrant

Thanks in big part to OARDC's soybean breeding program, Ohio grows more non-GMO (GMO stands for genetically modified organism) soybeans than any other state. Non-GMO soybeans are demanded by many of Ohio's export markets. About 15 percent of Ohio's 4.5 million acres of soybeans are non-GMO types, which are often grown for human food and bring a premium of $1–2 a bushel. OARDC's latest new non-GMO variety called Summit, specially suited to northern Ohio, yields 2.4 bushels more per acre than a similar predecessor. Based on an example yield of 48 bushels an acre, non-GMO soybeans bring an extra $32–64 million every year to Ohio farmers' wallets and the state's economy.

$32 million = value of non-GMO soybeans to Ohio

http://go.osu.edu/GQ3





OARDC Locations in Ohio

OARDC's Outlying Agricultural Research Stations are vital to the success of the state's ongoing agbioscience research. While the laboratory is fundamental to any research program, the true test of Ohio's agricultural research takes place in the field. The Outlying Agricultural Research Stations provide facilities for scientists to conduct field experiments under the state's numerous climatic conditions. Soil type, terrain characteristics, climate, water supply, marketing opportunities, and human and natural resources are integrated to make this site-specific research responsive to the distinct needs of every part of our diverse state.

1. *Northwest Agricultural Research Station, Wood County*
2. *North Central Agricultural Research Station, Sandusky County*
3. *Muck Crops Agricultural Research Station, Huron County*
4. *Wooster Campus, OARDC, Wayne County*
5. *Ashtabula Agricultural Research Station, Ashtabula County*
6. *North Appalachian Experimental Watershed, Coshocton County*
7. *Pomerene Forest Laboratory Coshocton County*
8. *Western Agricultural Research Station, Clark County*
9. *Columbus Campus, OARDC and The Ohio State University, Franklin County*
10. *Eastern Agricultural Research Station, Noble County*
11. *Ohio State University South Centers, Pike County*
12. *Jackson Agricultural Research Station, Jackson County*

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