



THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES

Yuma Center of Excellence for Desert Agriculture 2017 ANNUAL REPORT

*Applying Technology
to Agriculture*



*Maximizing
Yields Using Big
Data Decision
Tools*

*Over \$1M
in Research
Grants
Received*



*Plant Disease
Mitigation*



*High-Tech Irrigation
& Soil Salinity Management*

*Connecting
Transdisciplinary
Researchers with
Industry*



FROM THE EXECUTIVE DIRECTOR



Our center has been going for 3 years now, and boy do we have a lot to report!

Our model has been to leverage donor money to bring in research grant funding, partner with key researchers, and find solutions to the pressing problems of desert agriculture. As of October 2017, we had obtained over a million dollars of research grants, focused on priority issues identified by our industry stakeholders.

Our 1st priority was mitigating plant diseases like Fusarium wilt of lettuce. To date we have brought in over \$175,000 of research grants focused on Fusarium wilt and other lettuce diseases. Work in this area has included an international symposium, 3 years of field trials focused on Fusarium wilt, and utilization of DNA and spectral methods to predict and detect disease pressure.

Closely tied to disease mitigation is our collaboration with the Big Data Analytics company Earth Knowledge and the National Lab on Ag and the Environment. Together with our growers, we are developing a Decision Tool for growers based on historical data, remote sensing, and predictive analytics. Tying together soil health, climate predictions, and research in additional areas, this tool will help growers avoid disease and maximize production.

Another focus has been irrigation and soil salinity management. We have obtained over \$630,000 of research funding for this effort. Working with growers and researchers from U of A, the USDA Arid Lands Research Center, and even NASA's Jet Propulsion Laboratory, we are measuring water use and soil salinity characteristics that will lead to a better understanding of annual water needs for desert crops and cropping systems. This should lead to improved irrigation management to exactly meet crop and soil health needs.

While these are our main areas of focus, we are also impacting many other topics, including safe and healthy melon production, heavy metals analysis, bird and wildlife deterrence, and Durum wheat sustainability. Looking to the future, we will be adding research on Downey Mildew, unmanned aerial vehicle and remote sensing applications, date production, pathogen detection and much more. To meet these challenges, we will soon hire a Director of Research to advance our burgeoning portfolio of collaborative research projects.

Thanks to the gracious support of our donors and other stakeholders, the Yuma Center of Excellence for Desert Agriculture is at the forefront of desert agricultural research. Please visit DesertAgSolutions.org for leading-edge information, such as trial results, research documents, and video presentations.

Paul E. Brierley
Executive Director



2017 OUTREACH HIGHLIGHTS

Contributing member of:

- *Western Growers Food Safety, Science & Technology Committee*
- *AZ Department of Agriculture (ADA) Food & Ag Policy Council*
- *ADA Strategic Planning Committee*
- *Arizona Forward Water Subcommittee*
- *Arizona District Export Council (AZDEC) of the US Commerce Department*
- *Greater Yuma Economic Development Corporation (GYEDC)*
- *Aerospace Arizona Association Advisory Board*

Educating on issues critical to agriculture:

- *Center of Excellence Seminar Series:*
 - *New Developments in Advancing Management of Fusarium Wilt of Lettuce*
 - *Soil Genetic Testing to Assess Disease Pressure*
- *Guest Speaker at Southwest Ag Summit and UA Water Resource Research Center (WRRC)*
- *Panelist at 2017 UA Visionaries Presidential Panel Series*
- *Panelist at Colorado State University's Lower Colorado River Basin agricultural, urban and environmental stakeholders workshop on Alternatives to Permanent Fallowing of Agricultural Land*
- *Organized and cohosted AZDEC Cross-Border Ag Trade Seminar*
- *Presented at Arizona UAS Summit & Expo*



FIGHTING PLANT DISEASE

Soilborne Disease Research

Fusarium wilt of lettuce continues to be a top concern identified by YCEDA stakeholders, and together we are making progress in the fight against this plaguing problem. Year 3 of expanded field trials focusing on both commercial and experimental lettuce cultivars, chemical and biological crop protection products, cultural practices, management strategies, and laboratory analysis of diseased soil is underway with Dr. Mike Matheron (UA). Research on DNA and spectral disease detection is ongoing by Dr. Barry Pryor (UA), with results expected in early 2018. Additionally, YCEDA has partnered with Dr. Pryor and Trace Genomics, a company that focuses on microbial analysis of soil, to conduct research that will provide

fundamental data on the soil population levels and distribution patterns of soil pathogens in AZ soils and lay the ground work for utilization of genetic soil testing methods that may allow producers to predict disease pressure prior to making planting decisions.

Lettuce Disease Resources

We have developed a collection of information dedicated to desert lettuce diseases. Check out the new LEARN TAB on DesertAgSolutions.org to learn about lettuce disease management for five major diseases affecting lettuce production. These easily-accessible, centrally located web pages contain informative videos, relevant research, and current knowledge to help the desert Ag industry manage challenging diseases.



IRRIGATION/SALINITY MANAGEMENT

Multiyear High-Tech Irrigation & Soil Salinity Management Research

Irrigation and soil salinity management are of paramount importance to agricultural sustainability in desert agriculture. Because irrigation water and shallow ground water that fluxes up through the soil have salts, some level of excess irrigation (beyond crop consumptive use) must be applied to leach salts below the crop root zone. The various irrigation systems utilized, and the management of these systems, can have a profound impact on water delivered, leaching achieved, and resulting salt distribution.

YCEDA is coordinating a large multi-institution, cross-disciplinary project with Dr. Charles Sanchez (UA) and Dr. Andrew French (USDA-ARS), as well as collaborators from the NASA Jet Propulsion Laboratory, to quantitatively track water use and salt balance across typical crop production systems and rotations.

From these studies, opportunities for more efficient water and salt management outcomes will be identified. User-friendly management tools, such as mobile APP's will be developed to assist growers to make an already efficient system even more efficient and sustainable.



APPLYING TECHNOLOGY TO AGRICULTURE

Developing Decision Tools with Big Data Analytics

According to our growers, the most pressing need affecting specialty crop productivity is disease mitigation. YCEDA has partnered with Earth Knowledge, an accomplished data analytics company, the USDA National Lab on Ag & the Environment and our growers to develop a predictive decision tool to assist growers with decisions to improve soil health and avoid disease triggers. Work is underway to collect and analyze historical data from impacted fields in all major growing areas of Arizona and California. With cutting-edge sensors and predictive analytics, growers will receive guidance on planting decisions, soil preparation, irrigation management, pesticide treatments, yield

estimation, harvest timing and other production decisions that will maximize productivity and profits.

Drones and Remote Sensing

YCEDA is bringing UAS solutions to address industry needs. This year we collaborated on a UA senior engineering project using drones for date pollination and expanded our team to include Rosa Bevington, an FAA certified drone operator. Future plans include using drones to augment our ongoing irrigation and soil salinity research through a ground truthing project with NASA satellites, remote collection of date production data, and partnering with researchers and the UAS industry to find groundbreaking uses of drones and remote sensing.





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SOLUTIONS TO DESERT AG'S PRESSING PROBLEMS

The Yuma Center of Excellence for Desert Agriculture (YCEDA) is an innovative public-private partnership, connecting Arizona's top animal, plant, engineering, and environmental scientists to the desert agricultural industry. Together we put science to work, developing solutions to the challenges of arid-land crop production through systems-based problem solving and collaboration.

Our work focuses on priority issues identified by our industry stakeholders, including increasing production efficiencies through disease and water management, crop yield maximization, and technology utilization. Donor support enables us to forge alliances, initiate projects, and secure grant funding to maximize the impact of our work.



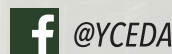
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