

Arizona Iceberg Lettuce Research Council  
Project Final Report: September 2016 – August 2017

**Project Title**

Collection, Production and Dissemination of Lettuce Disease Research Results for Effective Disease Management

**Principal Investigator**

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Yuma Center of Excellence for Desert Agriculture

**Co-Principal Investigators**

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Dr. Michael Matheron, Extension Plant Pathologist  
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**Locations**

Yuma Agricultural Center, Yuma, AZ, and  
School of Plant Sciences, University of Arizona, Tucson, AZ

**Purpose of the Study:**

The Yuma Center of Excellence for Desert Agriculture (YCEDA) is a public-private partnership funded by growers in the desert agriculture industry who need current knowledge on and solutions to issues affecting desert crop production. These supporting partners and much of the industry look to YCEDA as a resource to address high-priority concerns and provide usable information to enhance productivity and profitability.

The purpose of this project was to design and implement a series of webpages dedicated to Arizona iceberg lettuce diseases and to be posted under the LEARN tab of YCEDA's website, DesertAgSolutions.org. These webpages contain research reports, links to other disease resources, and videos which were produced for the top five diseases identified in the AILRC Iceberg Lettuce Research Survey. Using this as a central location where a collection of relevant information on lettuce diseases has been posted for easy location and utilization by producers will be a valuable tool for Arizona's iceberg lettuce production community.

**Project Objectives:**

The overall goal of this project is to collect and produce current knowledge and relevant information on Arizona iceberg lettuce diseases and to establish an

interactive easy-to-find central location to disseminate that information. Objectives include:

1. Collaborate with Cooperative Extension and other researchers to identify relevant research and important links to other resources relating to lettuce disease management in Arizona.
2. Design and implement a series of web pages within YCEDA's existing DesertAgSolutions.org website dedicated to Arizona's desert lettuce diseases.
3. Create a set of informative videos focusing on five major Arizona lettuce diseases as identified in the AILRC Iceberg Lettuce Survey. The videos will be embedded in the web pages along with links to current research on specific diseases, and will be used to create a YouTube playlist of Arizona iceberg lettuce disease knowledge.
4. Launch an outreach campaign promoting this valuable resource. Information promoting the webpage will be distributed both in print and digitally through the YCEDA and Cooperative Extension outreach networks. Additionally, information will be disseminated through presentations at regional conferences focused on desert agriculture.

## **Results:**

### **Objective 1: Identify Relevant Research**

Efforts to assemble content for webpage development were through discussion with lettuce researchers and Extension Specialists at the University of Arizona and the University of California, Davis, and with members of the lettuce industry for elaboration on impact and critical needs. Through these discussions, it was concluded that the initial web development would be focused on five of the most important and common diseases of lettuce in desert production areas: Fusarium wilt, lettuce drop, powdery mildew of lettuce, downy mildew of lettuce, and gray mold of lettuce. Several other diseases were discussed and it was decided that additional web pages could be developed for these diseases following the successful launch of the initial five lettuce disease web pages covered under this project.

### **Objective 2: Design Web Pages**

Five lettuce disease webpages have been constructed, and each includes a number of sub-pages. The organization of each webpage follows a template format for ease of navigation and includes 1) an introduction of the disease with symptomology and impact; 2) a review of pathogen biology and epidemiology; 3) a summary of current cultural control practices; 4) a summary of current chemical control practices; 4) a summary of current biological control practices; and 5) a review of breeding efforts to develop resistant varieties. Imbedded in each webpage is a video summarizing the above information to enhance content delivery in a different medium. Included in each webpage are high resolution

images of disease symptoms, as well as relevant pathogen structures needed for accurate diagnostics. Also included in each webpage is a selection of some of the graphics and tables from previous studies that help support the interpretation and extension of the summary content delivered.

The content of each webpage was selected and edited to provide a concise overview of each disease and not to provide an exhaustive listing of the entire body of knowledge. This selection was specific so as to provide a grower with the most immediately applicable information needed for successful lettuce production in Arizona. However, we recognize that many growers will want to access additional critical data generated by the research upon which the contents of these webpages are based. Convenient access to this information is important for growers as they develop their own innovative techniques and technologies for improvements in disease management. For this reason, we have included with each webpage the critical research publications relating to each disease in PDF format for easy viewing and/or downloading, which are then available for each grower's interests and use in research/development activities.

### **Objective 3: Produce Videos**

Five videos were produced to summarize the current state of knowledge of the most common lettuce diseases in desert production. Each video is focused on a single disease and is approximately 5 minutes in length. The videos include an introduction of YCEDA and this project's objectives by YCEDA director Paul Brierley, followed by a narrative of the focus disease and its management by either of two project pathologists, Dr. Barry Pryor or Dr. Mike Matheron. The narratives include basic diagnostic symptoms of each disease, a brief review of pathogen biology and disease epidemiology, and then a discussion of the most important disease management practices. Finally, the narrative finishes with a point-by-point review of current research efforts in disease management and how these efforts will advance improvements in crop production. The videos are professionally produced with contemporary background thematic music and voice-over. All videos are currently posted for public viewing on the YCEDA YouTube channel. Discussions are underway regarding the next generation of informational videos to complement the current postings.

### **Objective 4: Outreach Campaign**

As the development of content for individual pages progressed, efforts were initiated to to advertise the product in advance of its final release. Moreover, parts of the content were delivered and made available to the community as they were completed, specifically the video content. These efforts were focused over the last few months of the funding cycle. Listed below are some of the types of outreach and extension efforts conducted:

- All five Lettuce Disease Videos have been shared on social media and are posted on YCEDA's YouTube channel.

- 1,000 post cards were printed to promote the new webpages and distributed at the following events/presentations/meetings:
  - a. 2017 Southwest Ag Summit
  - b. Yuma Rotary Club
  - c. CALS Poster Forum
  - d. WRRRC Annual Water Conference
  - e. Center of Excellence Seminar Series Presentations
  - f. Ag 100 Meeting
  - g. Western Grower's LGMA training & Food Safety Science & Technology Committee Meeting
  - h. Good Morning Yuma Community Breakfast
  - i. YCEDA Salinas Stakeholders meetings
  - j. YCEDA 2017 Annual Donor Update Luncheon
  - k. YCEDA 2017 Research Symposium



Participants at the 2017 YCEDA Research Symposium discuss the AILRC-funded postcard promoting the lettuce disease web pages and videos.

- Web Page Templates were showcased in the following ways:
  - a. Via YCEDA and Cooperative Extension social media networks
  - b. Via traditional media (a local newspaper reporter was in attendance at the 2017 YCEDA Research Symposium)
  - c. Via promotion in YCEDA's Insider's Scoop e-Newsletter, 2017 Annual Report, and other outreach mediums



Dr. Barry Pryor promotes the lettuce drop web page at the 2017 YCEDA Research Symposium.

### **Problems encountered:**

There were no problems encountered in the actual construction of the webpages as proposed. There were challenges in the project timeline, due in part to the required outsourcing of web template development, the completion of which was partially out of our control. Additionally, once the web page templates were completed, which was later in the project than anticipated, creating blocks of time for content construction in the limited remaining time was increasingly difficult due to overlap in timelines of competing projects. The drafts of all pages are complete and will be made live by the end of the year, following editorial review.

### **Future Perspectives:**

This current educational/outreach project represents an opening effort to bring together the most important and immediately applicable information on several of the most commonly encountered diseases of lettuce in the southwest desert. It is by no means meant to represent an exhaustive list of diseases or all information available on such diseases. Disease management is a dynamic process and the state of the knowledge on the control of plant disease is constantly changing. New research projects are ongoing and the development of new techniques for disease management is a continuous process.

The currently developed webpages represent a concise summary of five of the most common diseases. It is anticipated that these pages will be updated annually as new research emerges and new management strategies are implemented. Additionally, during each period of web update, the site will be assessed in regard to its coverage of the most important diseases. If the addition of new diseases is deemed necessary, then effort will be put forward to develop additional content to cover such diseases. Importantly, we will periodically consult with industry regarding the content of these pages to insure they are comprehensive and relevant. If it is determined that additional pages or content are necessary, then funds for such expansion will be solicited.