



THE UNIVERSITY OF ARIZONA

Yuma Center of Excellence
for Desert Agriculture



Fusarium Wilt of Lettuce Update, 2021

Introduction:

Developing management methods for Fusarium wilt of lettuce is a high priority for the Yuma Center of Excellence for Desert Agriculture (YCEDA) as the disease continues to spread in the desert growing region. A greater number of acres have become infested with the pathogen, *Fusarium oxysporum* f.sp. *lactucae*, and the disease is appearing in cooler parts of the season when the disease has not historically been a problem.

Developing effective management methods for Fusarium wilt is challenging. Plant protection products that can control the disease in lettuce are not currently available. Cultural methods such as improving soil health, biofumigation, anaerobic soil disinfestation, solarization or flooding may reduce pathogen loads, but economical and effective methods must first be developed. The most effective method currently available for growing lettuce in the presence of the Fusarium wilt pathogen is to plant resistant cultivars.

YCEDA's current strategy to help control Fusarium wilt is to prioritize the delivery of new resistant varieties to the industry while still supporting the development of cultural and chemical controls of the disease. This has been reflected in our field trials objectives, both past and present. Field trial results can be found at:

<https://desertagsolutions.org/resource/fusarium-wilt-lettuce>.

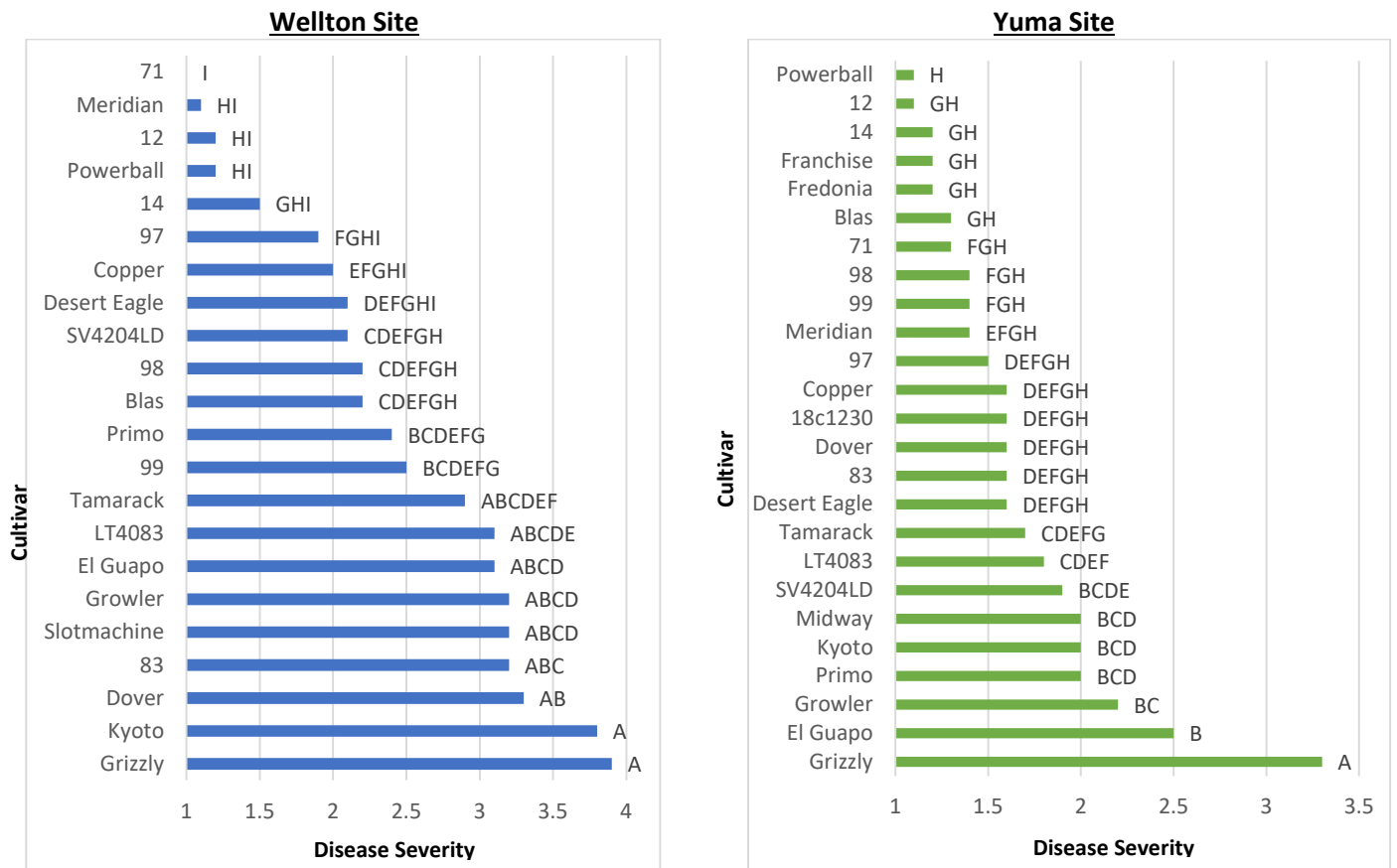
2020 Field Trials

In 2020, trials were conducted to support the development of resistant varieties including trials to evaluate wild lettuce populations for new sources of resistance, to evaluate breeding lines for resistance, and to evaluate cultivars in late stages of development. These trials were planted in Wellton and Yuma, Arizona on September 14 and 24 in fields naturally infested with *F. oxysporum* f.sp. *lactucae*. Plant material was received from both private and commercial breeding programs and the U.S. National Plant Germplasm System. Data from the wildtype trial will be published upon completion of the project. All other data was provided to the owner of the plant material. We expect that the data generated from these trials will speed the process towards breeding material and cultivar release.

Trials evaluating commercial varieties were also planted at the Wellton and Yuma trial sites. The purpose of these trials was to evaluate cultivars reported to have Fusarium wilt resistance as well as newer cultivars of unknown levels of resistance. Susceptible cultivars were grown as controls to confirm disease pressure. These trials evaluated twenty-five iceberg cultivars. Symptoms, including plant stunting and chlorotic leaves, were first observed at thinning at the Wellton location and approximately one-month post-thinning at the Yuma location. Disease severity was recorded at crop maturity. Considering the cultivars present in both trials, the disease severity of Fusarium wilt at the Wellton site was significantly higher than at the Yuma site.

2020 Field Trial Results

Fusarium Wilt of Lettuce Cultivar Trial-Disease Severity



Disease Severity (DS) was recorded by evaluating on a 1-4 disease severity scale: 1 = symptomless plants; 2 = mild stunting and chlorosis; 3 = severe stunting, chlorosis, and no head formation; and 4 = a dead plant. Intermediate ratings, such as 1.5 or 2.5 were used where appropriate. Mean DS was calculated by averaging 40 plants from each of the four replicates.

Analysis of variance (ANOVA) ($P \leq 0.05$) was performed followed by Post Hoc analysis using Tukey's honest significance difference (HSD) test. **Mean DS scores with the same letter are not significantly different** as determined by Tukey's HSD test ($P \leq 0.05$).

Future Trials

Field trials similar to past years will be conducted in 2021. Future planned trials will include the continuation of studies evaluating cultural methods for suppressing the Fusarium wilt pathogen in the soil. YCEDA has evaluated cultural methods in past trials, but these methods require several years of study to provide adequate methods for growers. We are increasing our research output by collaborating with Robert Masson from the UArizona Yuma County Cooperative Extension and researchers from other universities with expertise in biosolarization.

Managing soil health is a promising method for disease suppression. We are putting significant effort into getting studies funded investigating the question of how to improve soil health in desert soils, including how increasing and diversifying the microbial communities may impact disease severity.

Other Fusarium Wilt of Lettuce Projects

Learning more about the pathogen population is essential as the disease trends are changing (e.g, disease developing in the cooler part of the growing season). A study funded by the Arizona Iceberg Lettuce Research Council is currently in

progress to evaluate the Arizona population for variation that can impact disease management. This includes changes in pathogenicity and the introduction of new pathogen races.

Samples were collected in the 2020-2021 growing season and sampling will continue through 2021. This study was complemented by a study funded by the California Leafy Greens Research Council and managed by Dr. Alex Putman from the University of California, Riverside, which will allow for samples to be collected in California desert growing regions, including Bard and Winterhaven. Those interested in participating in these projects may contact Stephanie Slinski at sslinski@arizona.edu.

2021 Field Trials Commercial Cultivar Trial Entries

Planning for our 2021 field trials is underway. If there is a lettuce cultivar that you would like to see evaluated in our trials, use the link or QR code below to enter your recommendation. We will be evaluating both iceberg and romaine cultivars and cultivars from any planting slot due to the disease now developing in later planting slots.

https://uarizona.co1.qualtrics.com/jfe/form/SV_e8lzAkJeLva2PZ4



For more information on YCEDA Fusarium Wilt of Lettuce efforts, contact Stephanie Slinski sslinski@arizona.edu or visit <https://desertagsolutions.org/resource/fusarium-wilt-lettuce>.