

# Detecting Onion Pathogenic Gut Bacteria in Utah Thrips

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## Introduction

The number of onions consumed per person has risen drastically over the last twenty years, from 12 pounds to 20 pounds<sup>1</sup>. This 70% increase places onions as the fourth most consumed vegetable in the United States. As such, increased pressure is put on farmers and growers to keep their losses due to damage and rot to a minimum. Each year the onion industry in the USA loses over \$60 million as a result of damage and rot.<sup>2</sup> Providing information about bacterial pathogens and their management to Utah onion growers is important. One major cause of onion damage is through bacteria transferred by thrips. Thrips are insects that damage economical crops by feeding on leaves. Their feces contain bacteria that are washed by water droplets into wounds created by feeding. The bacteria can travel down to the bulb, and cause bulb rot. Thrips thrive in the warm and dry environment of Utah, causing significant damage to entire fields. The purpose of this project is to determine whether Utah thrips carry onion pathogenic gut bacteria.



Figure 1. An onion field in northern Utah

## Objectives

- Isolate and identify gut bacteria from thrips collected in Utah onion fields, with particular attention to the *Pantoea* genus.
- Determine pathogenicity of isolate gut bacteria on onions and their ability to cause a bulb rot

## Methods

- Thrips were collected from five different onion fields in northern Utah from June to September 2021. Individual thrips were crushed in sterile water and plated on nutrient agar.
- Resulting bacterial colonies were cultured and identified using PCR and 16S region primers.
- The samples were visualized in a 1% agarose gel using gel electrophoresis. Bands of expected size were cut, and Qiagen gel extraction kits were used to resuspend the DNA from the gel.
- Recovered DNA was sent to Eton Bioscience, San Diego, CA for sequencing. Obtained sequences were blasted using NCI GenBank to identify bacteria to genus and species level.
- Isolates were tested for pathogenicity using the onion scale test.



Figure 2. An onion infected with *Pantoea* sp.

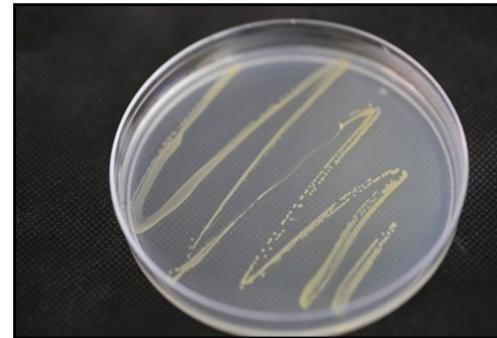


Figure 3. *Pantoea* sp. on a nutrient agar plate

## Results

- At present, we have found 100 thrips and 135 bacterial isolates from thrips.
- Of the 40 samples tested for pathogenicity, none have tested positive. However, this experiment is still underway, and 95 samples still need to be tested.
- Lesions on an onion scale confirm an isolate's pathogenicity

## Conclusion

Bacterial genera identified from thrips to date have been found in rotten bulbs, indicating that Utah thrips could contribute to storage rot of onions.

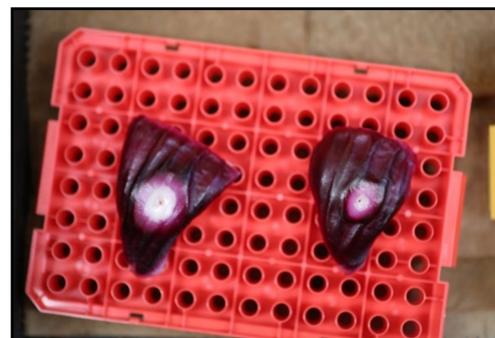


Figure 4. A positive control with lesions on an onion scale test.



Figure 5. Thrips<sup>3</sup>

## References

1. Anonymous. 1 Dec. 2019. Consumption. National Onion Association. [www.onions-usa.org/all-about-onions/consumption/](http://www.onions-usa.org/all-about-onions/consumption/).
2. Pelter. 2001. Stop the Rot. <https://alliumnet.com/projects/stop-the-rot/>
3. Alton N. Sparks Jr., University of Georgia Bugwood.org

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