

Assessing the potential for production practices to impact dry bulb onion safety



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Summary

In 2020 and 2021, the dry bulb onion industry faced two significant outbreaks when onions were epidemiologically linked to >2,000 cases of salmonellosis. After review of outbreak data and consultation with stakeholders, we identified water application practices that could contribute to large-scale contamination events late in the growing season. We have designed field trials to characterize the risk of using a contaminated water source when applying crop protection sprays (pesticides and/or clay) and during irrigation (overhead vs. drip). Our goal is to demonstrate the risk of these practices and to communicate our findings to relevant stakeholders to reduce the potential for future outbreaks. Our goal is to enable growers to better understand risks and implement changes to minimize the likelihood of crop contamination.

Objectives

1. Quantify *Escherichia coli* contamination rates, die-off, and potential growth in onions due to application of crop protection sprays, including clay application to prevent sunburn.
2. Quantify *E. coli* contamination rates, die-off, and potential growth in onions due to overhead irrigation with contaminated water.

Methods

Field trials (1 acre per year and replicated over 2 years in Washington and Oregon growing regions) will be conducted to evaluate the potential for microbial contamination associated with pre-harvest water applications and field curing. A cocktail of rifampicin-resistant *E. coli*, used in previous field trials and shown to mimic *Salmonella* behavior in the field, will serve as a surrogate for these objectives. The Oregon field trial will evaluate contamination rates and behavior of *E. coli* from late season pesticide and clay applications on red (var. Red Wing) and white (var. Cometa) onions. The Washington field trial will evaluate contamination associated with overhead irrigation in yellow (var. Calibra) onions. *E. coli* levels will be monitored at application and throughout field curing.

Results to Date

Oregon fields were planted on March 22, 2022 (**Image 1**) and Washington fields were planted on April 1, 2022. Onion plants have emerged (**Image 2**) and the fields are currently being actively managed by the experiment stations using standard growing practices. Inoculation events are targeted to dates when 50% of the tops have fallen (estimated between late July to mid-August). Clay application will also be applied between final irrigation and prior to lifting (**Image 3**).

Benefits to the Industry

This project will generate evidence of the risks, or lack thereof, associated with important and unique water applications used in the onion industry. Research outputs will be a quantification of population dynamics of *Salmonella* surrogates in field settings to support development of clear guidelines for water quality for these crop applications. These findings will be translated and disseminated to growers for informing decisions in their operations to support proactive and practical changes to practices, which will minimize the likelihood of another outbreak. Likewise, practices that do not have any significant impact on *Salmonella* survival may be selected based upon the preferences of the grower. We aim to provide science-based evidence to empower growers to make informed risk mitigation decisions.



Image 1.
Field preparation and planting at Oregon State University Malheur County Experiment Station in Ontario, Oregon, on March 22, 2022.



Image 2.
Emergence of white onion plant (var. Cometa) in the field trial at Oregon State University Malheur County Experiment Station in Ontario, Oregon, around April 5, 2022.



Image 3.
White onion after application of kaolin clay. Clay was suspended in water prior to spraying on onions after final irrigation event and before lifting.