

**'Stop the Rot' Onion Bacterial Team Meeting**  
**Mount Vernon, WA**  
**5-7 March 2024**



# *Stop the Rot*

## *Objective B4: Effects of Late Season Cultural Practices on Onion Bacterial Diseases*

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<https://alliumnet.com/projects/stop-the-rot/>

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United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture

# Stop the Rot

## Objective B4: Effects of cultural practices

### Washington: Trials inoculated with *B. gladioli* & *P. agglomerans*

- Effects of rolling onion tops or not (2020, 2021, 2022)
- Effects of timing undercutting of bulbs or not (2020, 2021, 2022)
- Effects of timing of topping onion bulbs (2020, 2021, 2022, **2023**)
- 2021, 2022, 2023: Earlier initiation of treatments than 2020

### Georgia: Natural infection

- Manual vs. mechanical harvest (2020, 2021, 2022)
- Two different mechanical harvesters (2020, 2021, 2022)
- Length of necks with manual topping (2021, 2022, 2023)

### New York: Natural infection

- Rolling tops that died 'standing up' (2020, 2021, 2022)
- Outdoor curing vs. indoor curing (2020, 2021, 2022, 2023)



# Stop the Rot: Washington State Season 3 Field Trials

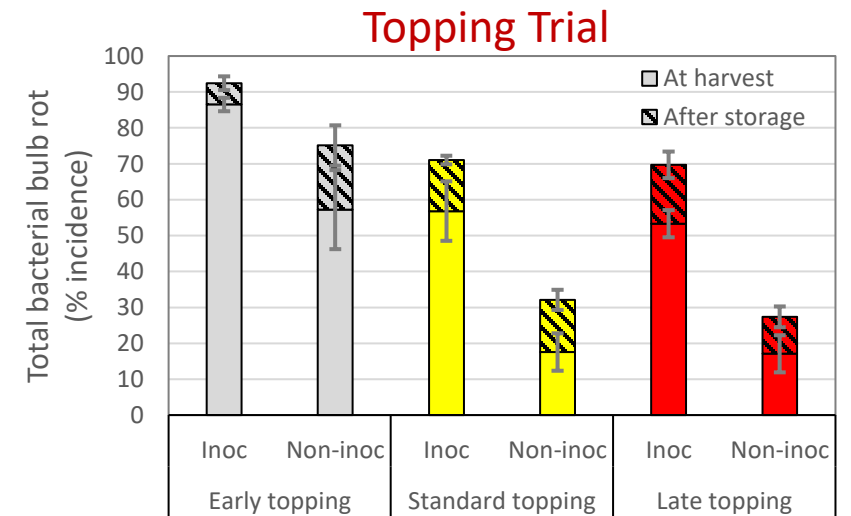
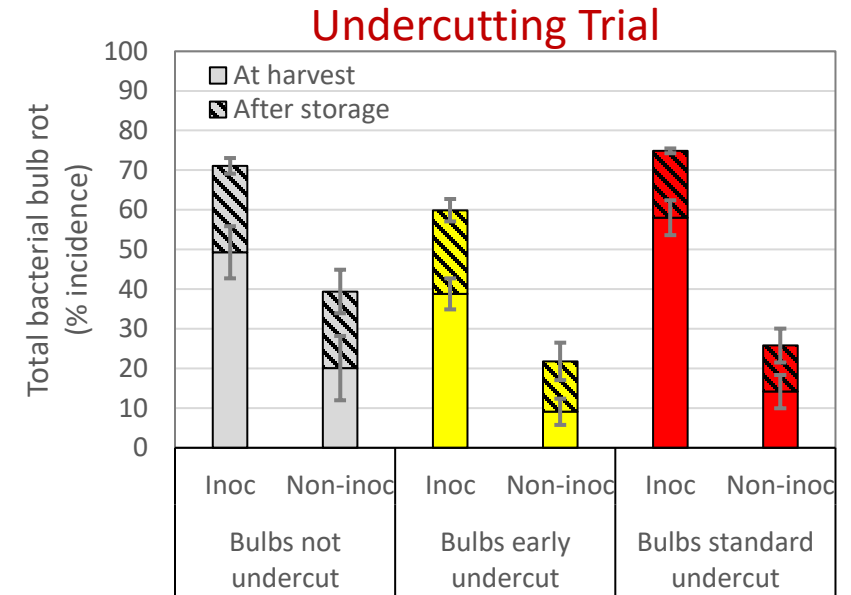
## Objective B4: Cultural practice trials for management of onion bacterial diseases

1. Rolling the tops of onion bulbs
2. Timing of undercutting onion bulbs
3. Timing of topping onion bulbs
  - Pasco, WA (Columbia Basin)
  - Each trial was a split plot RCBD, 5 replications
    - Main plots: Inoculated (*B. gladioli* & *P. agglomerans*) or not
    - Split plots:
      1. Tops rolled (3 Aug.) or not rolled
      2. Undercut early (10 Aug.), normal (24 Aug.), or not
      3. Topping early (10 Aug.), “normal” (7 Sep., intended 24 Aug.), or late (13 Sep.)
  - Inoculation at early tops down & 2 weeks later
  - Trials under center pivot irrigation



# Objective B4, Season 3 (2022-23): Washington Cultural Practice Trials

- In all three trials, inoculation significantly:
  - Increased incidence & severity of bacterial leaf blight
  - Decreased marketable bulb yield at harvest (by 7 to 14 tons/acre)
  - Increased % bulbs culled at harvest from bacterial rot (by 18-20%)
  - Incidence of bacterial bulb rot at harvest & in storage (by 27-40%)
- **Rolling tops trial:**
  - Rolling tops at the onset of tops down did not affect bacterial leaf blight, marketable bulb yield, or bulb rot at harvest & in storage
- **Undercutting trial:**
  - Early undercutting (50% tops down) increased marketable bulb yield and reduced bacterial bulb rot at harvest & in storage compared to undercutting at 100% tops down or not undercutting
- **Timing of topping trial:**
  - Early topping (at ~50% tops down) reduced marketable bulb yield by 54%, and increased bacterial bulb rot (harvest + storage): 84% of bulbs vs. 49-52% for late topping in inoculated plots



# Objective B4, Season 4 (2023-24): WA Topping Trial

- Repeated timing of topping trial:
  - Necks topped early (11 Aug.), intermediate (25 Aug.), or late (12 Sep.)
  - Measured moisture content in 2-cm length of neck of ~50 bulbs at each topping
  - Photographed necks
  - Bulbs rated in storage in February 2024, data analysis in progress



Early topping 11 August 2023



Late topping 12 September 2023

# Stop the Rot

## Objective B4: 2020, 2021, & 2022 GA trials on onion harvest methods

### Incidence (%) of bulbs with internal bacterial rot

Method of digging onion bulbs	2020	2021	2022
Chain digger (TopAir)	3.5 b	9.0 b	1.3 b
Straight-blade undercutter (TopAir)	10.2 a	20.5 a	10.7 a
<i>P</i> value	<0.001	<0.001	<0.0001

Dutta, B., and Tyson, C. 2020. Plant Disease Management Reports 15:V025.

Mechanical vs. manual harvest	2020	2021	2022
Mechanical harvest (TopAir)	2.2 b	4.5 b	3.0 b
Manual harvest	10.5 a	14.5 a	12.5 a
<i>P</i> -value	0.024	0.031	<0.0001

Dutta, B., and Tyson, C. 2020. Plant Disease Management Reports 15:V026.

# Objective B4: 2021, 2022, & 2023 GA trials on neck length after topping

2021 trial on length of neck after topping manually	Internal bacterial bulb rot incidence (%)
5 inches	4.5 y
3 inches	4.0 y
1 inch	19.0 z

Neck length after topping	2022	2023
3 inches	10.0 b	8.5 b
2 inches	11.5 b	10.2 b
1 inch	18.0 a	21.5 a
0 inches	19.5 a	24.8 a

# Objective B4: New York trials evaluating rolling of onion tops

## Onions “Dying Standing Up”



- Excessive leaf dieback caused by foliar disease(s) and/or onion thrips results in foliage that does not have enough weight to lodge properly.



Onion thrips



Stemphylium leaf blight



Downy mildew



IYSV

Photos: C. Hoeping

Onions that die ‘standing up’ can develop more bulb rot

## Objective B4: 2022-23 New York trials evaluating rolling of onion tops

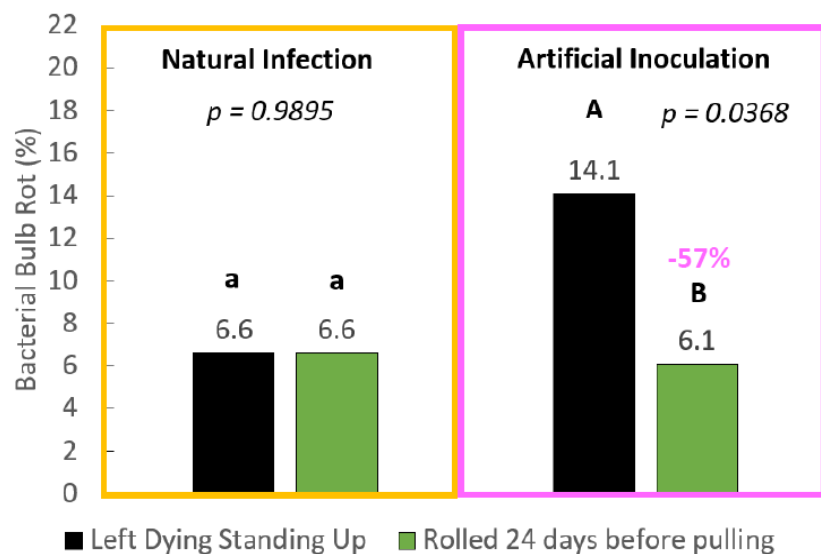
- 1. For onion tops that die ‘standing up’:** Effects on bacterial rot of rolling tops ~2 weeks earlier than standard practice (vs. 2021-22 trial with onion tops rolled when dry and ‘standing’):
  - a. Rolled tops vs. not rolled
  - b. Inoculated after rolling vs. not inoculated
- 2. Onion crop damaged by hail:** Effect on bacterial rot of rolling tops & harvesting bulbs ~2 weeks early:
  - a. Onions tops rolled or not rolled (left ‘standing’)
  - b. Bulbs pulled early or at standard timing



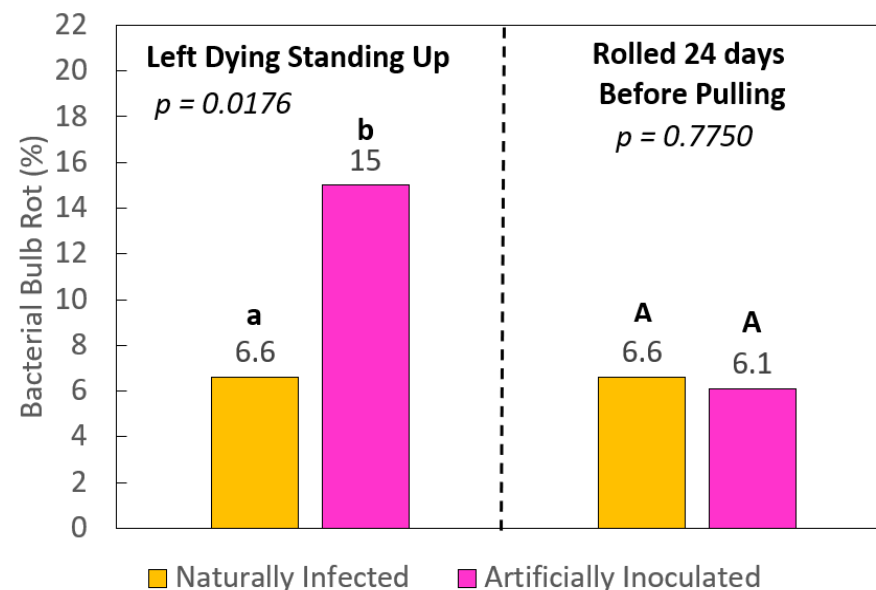
# Objective B4: 2022-23 New York trials evaluating rolling of onion tops



## 2022 Rolling Trial: Results



- Significant Cultural Practice x Inoculation Type interaction ( $p = 0.0158$ ).
- **When onions were artificially inoculated, Rolling reduced bulb rot by 57%.**
- With natural infection, there were no significant differences. (No new infections).



- Roll onions that are dying standing up when 30-50% leaf dieback, within 2-3 weeks of 'pulling' from field
- ~\$1,000 to build a roller, \$10/acre to roll, 5 acres rolled/h
- Rolling decreased bulb rot 35-57% in NY
- For every \$1 invested in rolling, ROI = \$12-\$105!



# Objective B4: Effects of late-season cultural practices

## 2024-25 Plans

### Washington:

- 2023-24 trial: Finish analysis for topping trial, with % moisture at each topping, submit PDMR in May
- Publish journal article with 3-4 seasons of cultural practice trials

### Georgia:

- Publish PDMRs on 2023 trial

### New York:

- 2022-23 trial: Publish PDMR

**Economic analysis of cultural practices evaluated (Greg Colson, UGA)**

**Joint publication with all late-season cultural practices tested**

**Onion World, Alliumnet FAQs, other outreach**

**SAP questions & feedback**



*Stop the Rot: Combating onion bacterial diseases with pathogenomic tools and enhanced management strategies*