Bacterial Disease Update:

- Surchlor Registered and Trialed
- What is Causing the Rot Problems

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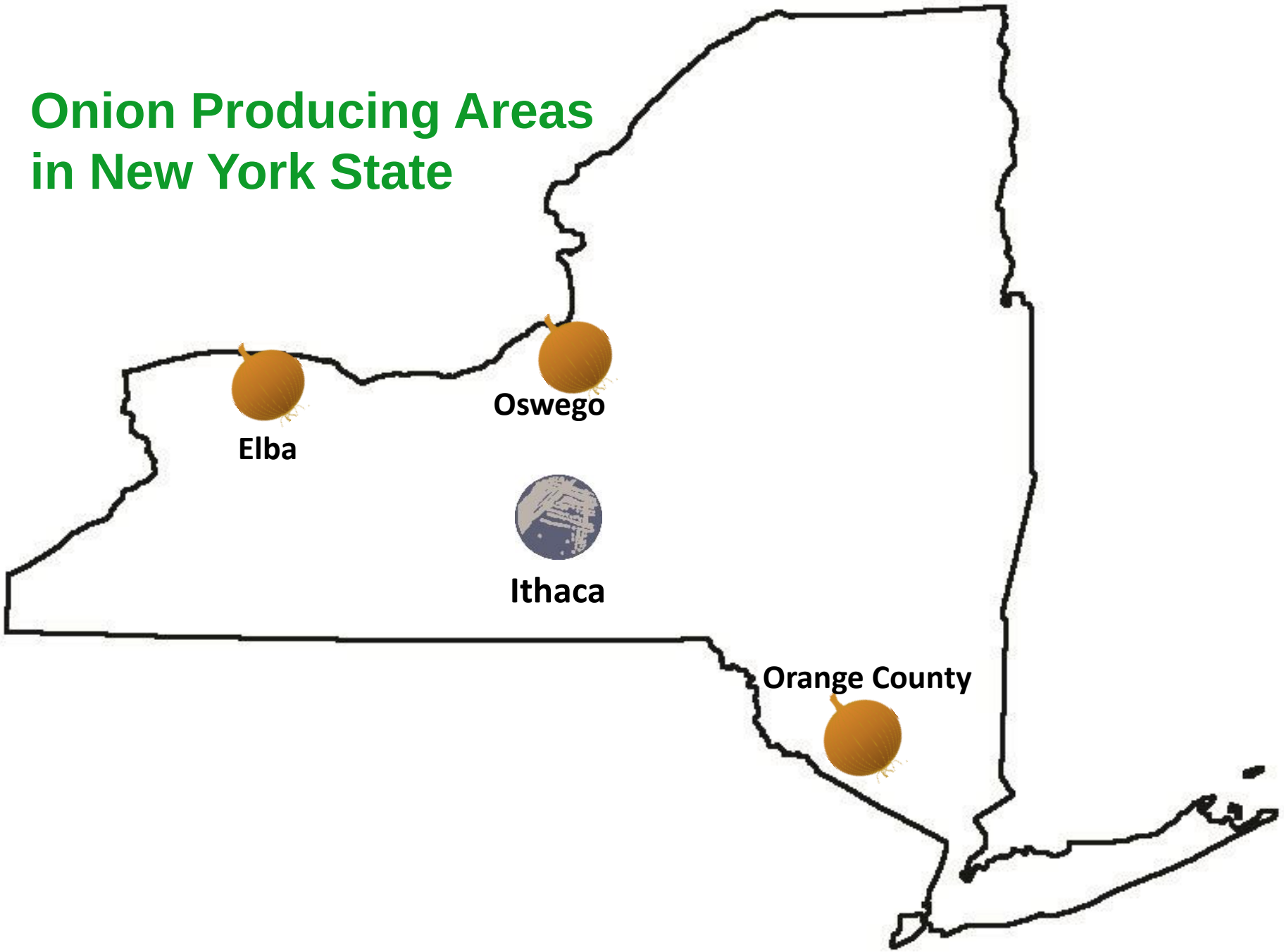
SRC Arena; Onondaga C.C.
Syracuse, NY January 17, 2018

Cornell University

Bacterial Disease Update:

- Bacterial Rot of Onions: Still a major problem!
- New tool, Surchlor, registered to reduce rot
  - Steps and People:
  - 2017 Grower Trials and Problems
- Encountered possibly a new onion pathogen
- Plans for 2018
  - Suggestions for better application of Surchlor
  - Managing of Nitrogen and early signs of rot
- In Appreciation

Onion Producing Areas in New York State



The Importance of Bacterial Rot

- **Bacterial Rot — A Major Problem**
- **Past grower trials failed to reduce rot in N Y**
  - **Coppers – No published positive reports;**
    - **Recent positive trial results with Kocide reported from Georgia**
  - **Actigard – Extensive grower trials in Orange County**
    - **No significant effects**
  - **OxiDate - Extensive trial of weekly sprays**
    - **No significant effect on rot or yield**

The Importance of Bacterial Rot

- Bacterial Rot — A Major Problem
- Past grower trials failed to reduce rot in N Y
  - Coppers – No published effective trials
  - Actigard – Four extensive grower trials in the Black Dirt region of Orange County
    - No significant effects
  - OxiDate - Extensive trial of weekly sprays
    - No significant effect on rot or yield

In 2015, at EXPO, a NY Grower said, "Steve, how about "Pool Chlorine" to reduce rot?"

Sodium Hypochlorite - NaClO

AKA: Bleach, Laundry Bleach, Clorox®

Pool Chlorine, Etc.

Common Uses: Disinfestation of water, laundry, table tops, root canals in teeth, sewage, irrigation lines, meat and poultry packing and

Harvested Fruit, Harvested Vegetables

BUT, Not Permitted on GROWING Plants!

Test of Pool Chlorine - 2015

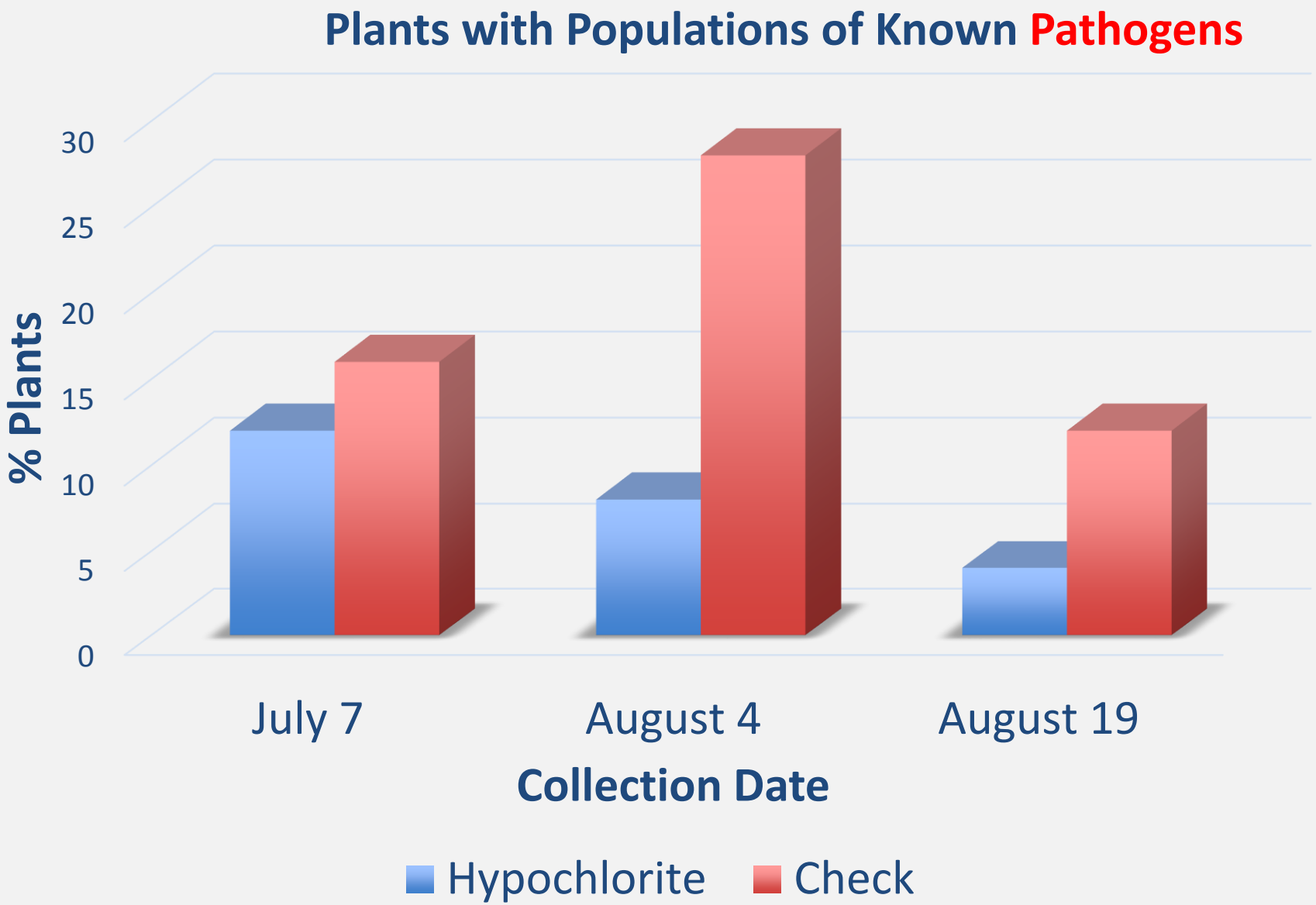
We Arranged a Test with the Questioner:

Test the Effect of Pool Chlorine Applied to Growing Onions on Bacterial Rot at Harvest, as Compared to CHECK Onions with NO Pool Chlorine

Basic Test Procedure

- Sodium Hypochlorite (12.5%) added to spray tank (1:1000) with whatever insecticides and/or fungicides
- Test under a special NYS DEC permit through Cornell University for non-registered pesticides
- Sprays applied to a strip of onions on a weekly schedule, starting just after bulbing
- CHECK strip treated with same pesticides, but without “pool chlorine”
- Bacteria assessed inside bulbs during the season
- Assessed rot in replicated plots by cutting 200 bulbs per treatment at harvest time.

“Pool Chlorine” Test - 2015



“Pool Chlorine” Test – 2015

Bacterial Rot Summary:

No Hypochlorite Check: 11.3 % ROT

With Sodium Hypochlorite: 6.8% ROT

(40% Reduction from Check)

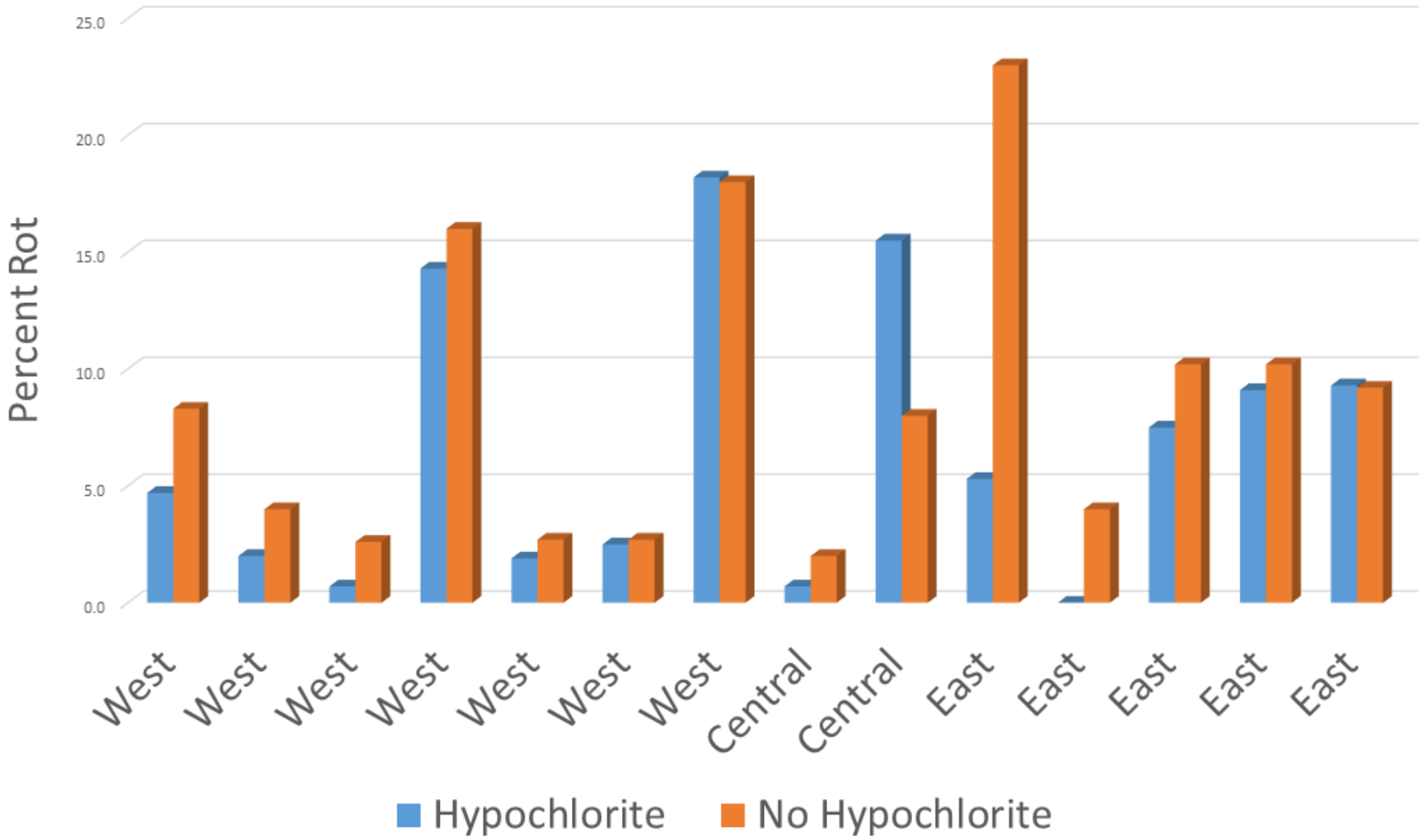
These Results Called for More Testing !

Assessing Bacterial Bulb Rot - 2016


09/15/2016 13:05

Yellow Onions Also Studied

2016 Hypochlorite Field Trials



Possibility of Registering Hypochlorite for Use by Growers

1. Producer of Potassium Hypochlorite suggested we contact an EPA registration specialist, Mr. Elliot Harrison Esq. in DC.
2. Mr. Harrison generously volunteered to guide us through the registration process.
3. He supplied a long list of hypochlorite producers.
4. We contacted three New York producers of sodium hypochlorite.
5. Surpass Chemical, in Albany, agreed to pursue registration for Surchlor, its sodium hypochlorite product.
6. We provided NYS DEC with our information and test data on hypochlorite.
7. Surpass Chemical and we interacted a lot with NYS DEC; before long - - - -

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Voila!

Surchlor Registered for Use on Growing Onions To Reduce Bacterial Decay

FIFRA Section 24(c) Special Local Need Label

For Distribution and Use Only Within New York State

Use on Growing Onions to Control Bacterial Decay

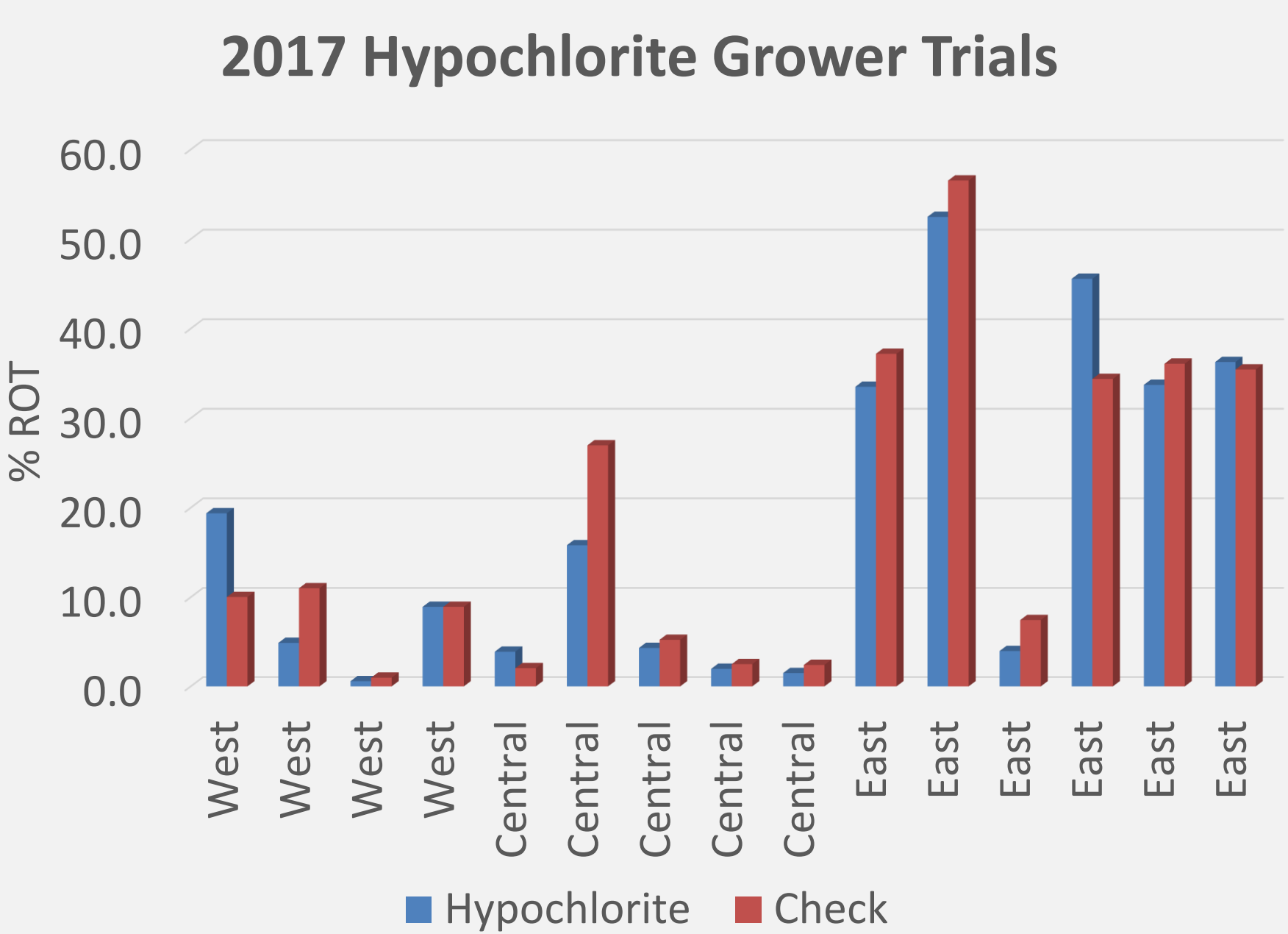
SURCHLOR SODIUM HYPOCHLORITE SOLUTION 12.5%

DANGER

EPA Registration No. 9359-02

SLN No. NY-170004

THIS LABEL IS VALID UNTIL DECEMBER 31, 2022 UNLESS OTHERWISE AMENDED, WITHDRAWN, CANCELED OR SUSPENDED


2017 Hypochlorite Grower Trials
% ROT
60.0
50.0
40.0
30.0
20.0
10.0
0.0
West
West
West
West
Central
Central
Central
Central
Central
East
East
East
East
East
East
Hypochlorite
Check

2017 Test Problems

1. Delay in getting Surchlor to growers
2. pH differences in spray tanks; some too low
3. Problems with Cl testing strip readings -- coloration by Manzate, Dithane
4. Active Chlorine dissipates over time
5. Spray tank content may lack active hypochlorite
6. Generally low rot in checks, in some plots
7. Lack of complete grower info on sprays
8. Variation in number of sprays

Nevertheless, we feel that Surchlor should be evaluated further by growers in New York.

Grower Encounters A New Problem

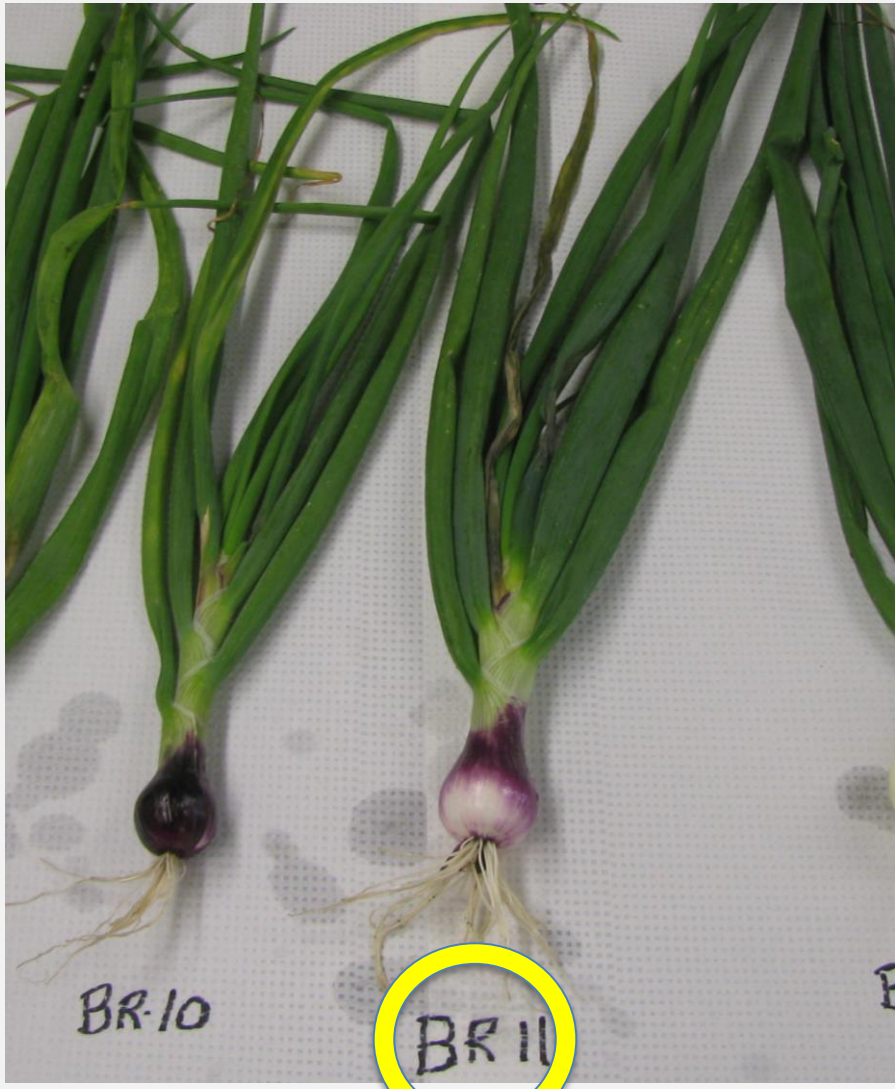
Grower Estimates 15% to 20% of Plants Affected


07/18/2017 11:09


07/18/2017 11:11

Early Symptoms

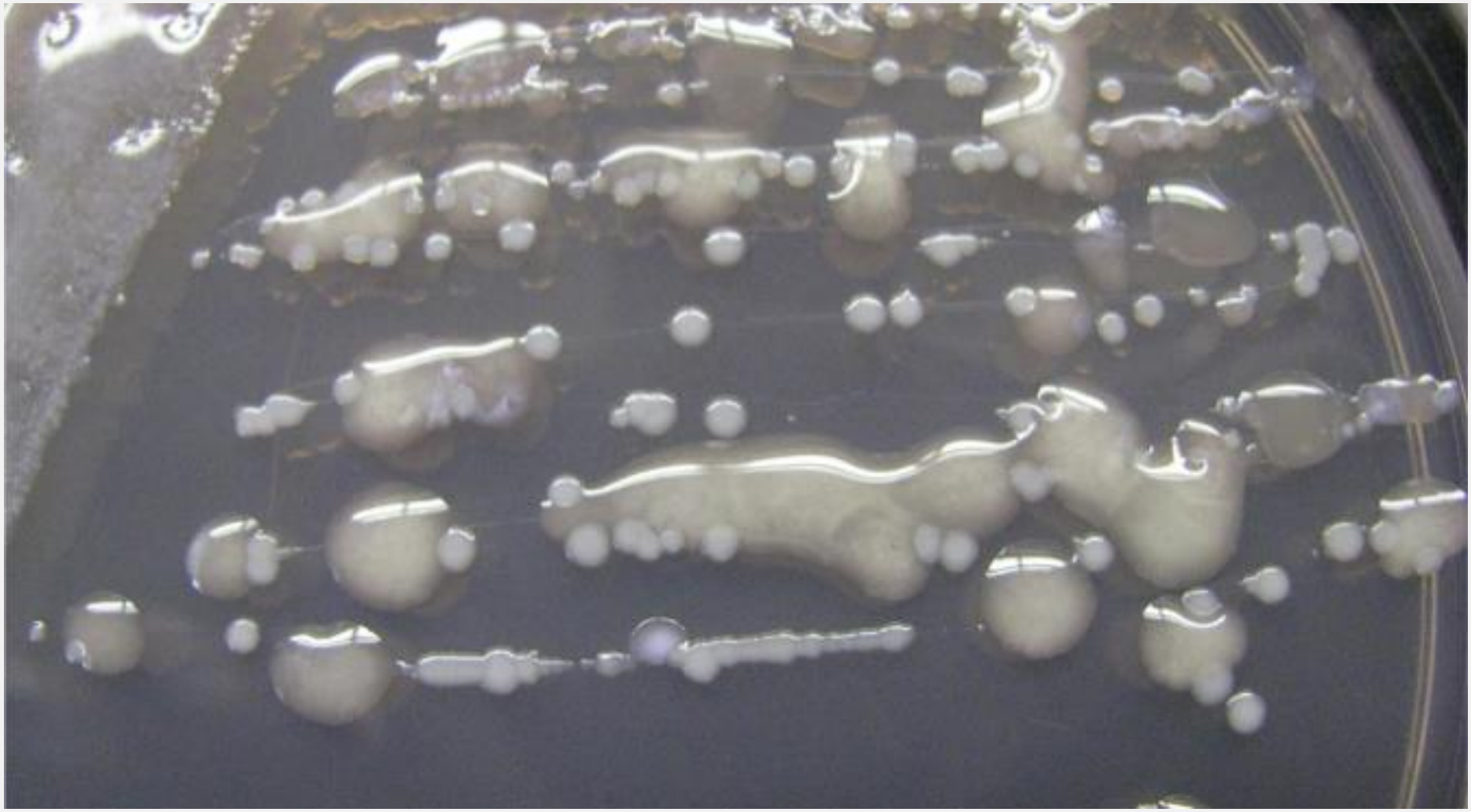

BR-2
BR-3
BR-4
BR-5
7-18-17


BR-10
BR 11


BR3


BR11

Mixture of Bacterial Colonies Growing in a Petri Plate on OEM



Isolation and Identification of Bacteria from Symptomatic Plants

Lot	#		Test Plan and reasoning	Pan	Bcep	Elud	Kcow	Rahnella	ID
BR	3	a	shiny orange/yellow --> Pan or Kcow	-	ND	ND	+	ND	*Kosakonia cowanii* by PCR
BR	3	b	shiny cream --> KB Bcep or Elud or Rahnella **F-**	ND	-	+	ND	ND	*Enterobacter ludwigii* by PCR
BR	3	c	shiny cream --> KB ~~Bcep or Elud or Rahnella~~ **F+**	ND	ND	ND	ND	ND	*Pseudomonas protegens* by rpoD and gltA Sequence
BR	3	d	shiny orange/yellow --> Pan or Kcow	-	ND	ND	-	ND	*Pantoea agglomerans* by gyrB sequence
BR	3	e	shiny orange/yellow --> Pan or Kcow	-	ND	ND	-	ND	*Pantoea agglomerans* by gyrB sequence
BR	3	f	shiny cream --> KB Bcep or Elud or Rahnella **F-**	ND	-	+	ND	ND	*Enterobacter ludwigii* by PCR
BR	3	g	shiny cream --> Elud or Rahnella	ND	ND	ND	ND	-	*Pseudomonas koreensis* by 16S
BR	4	-	cream --> KB Bcep **F-**	ND	+	ND	ND	ND	*Burkholderia cepacia* by PCR
BR	5	-	cream --> KB Bcep **F-**	ND	-	-	ND	-	*Tatumella citrea* by 16S Sequence
BR	6	a	shiny orange/yellow --> Pan or Kcow	-	ND	ND	-	ND	*Pantoea agglomerans* by gyrB sequence
BR	6	b	cream --> KB Bcep **F-**	ND	-	+	ND	ND	*Enterobacter ludwigii* by PCR
BR	6	c	cream --> KB Bcep **F-**	ND	+	ND	ND	ND	*Burkholderia cepacia* by PCR
BR	6	d	shiny cream --> KB ~~Bcep or Elud or Rahnella~~ **F+**	ND	ND	ND	ND	-	*Pseudomonas protegens* by rpoD and gltA Sequence
BR	7	a	shiny cream --> Bcep or Elud or Rahnella	ND	-	+	ND	ND	*Enterobacter ludwigii* by PCR
BR	7	b	Bcep	ND	-	-	ND	-	*Acinetobacter oleivorans* by 16S
BR	8	a	shiny cream --> Bcep or Elud or Rahnella	ND	-	+	ND	ND	*Enterobacter ludwigii* by PCR
BR	8	b	shiny cream --> Bcep or Elud or Rahnella	ND	-	-	ND	-	*Pseudomonas koreensis* by 16S
BR	8	c	shiny orange/yellow --> Pan or Kcow	-	ND	ND	+	ND	*Kosakonia cowanii* by PCR
BR	9	a	cream --> KB Bcep **F-**	ND	+	ND	ND	ND	*Burkholderia cepacia* by PCR
BR	9	b	shiny orange/yellow --> Pan or Kcow	-	ND	ND	+	ND	*Kosakonia cowanii* by PCR
BR	10	a	shiny orange/yellow --> Pan or Kcow	-	ND	ND	+	ND	*Kosakonia cowanii* by PCR
BR	10	b	shiny cream --> KB ~~Bcep or Elud or Rahnella~~ **F+**	ND	ND	ND	ND	ND	*Pseudomonas protegens* by rpoD and gltA Sequence
BR	10	c	cream --> KB Bcep	ND	-	-	ND	-	Pseudomonas species by gyrB sequence
BR	11	a	cream --> KB Bcep	ND	+	ND	ND	ND	*Burkholderia cepacia* by PCR
BR	11	b	shiny cream --> KB ~~Bcep or Elud or Rahnella~~ **F+**	ND	ND	ND	ND	ND	*Pseudomonas protegens* by gyrB sequence
BR	11	c	shiny cream --> KB ~~Bcep or Elud or Rahnella~~ **F+**	ND	ND	ND	ND	ND	*Pseudomonas protegens* by rpoD and gltA Sequence
BR	11	d	shiny cream --> KB Bcep or Elud or Rahnella **F-**	ND	-	-	ND	-	*Novosphingobium species* by 16S sequence

Pathogenicity of Isolated Strains in Inoculated Onion Leaves

Pseudomonas protegens

Conclusion:

Pseudomonas protegens **may be a "new" pathogen of onions.**

Artificial inoculation with *P. protegens* certainly resulted in rapid and severe leaf symptoms, reminiscent of symptoms seen in the field.

This is an unusual capability!

Plans for 2018

1. **Improved use of Surchlor**
   To address problems encountered in 2017:
   We will develop future suggestions for use shortly.

2. Determine if onion foliar reflectivity can be used to assess Nitrogen status
   A. Related to rot susceptibility
   B. Detect early development of bacterial rot

3. Multiple Levels of Study
   A. Lab growth chamber studies
   B. Field studies
   C. Drone-based studies

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Malheur's DAY OF THE DRONES

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Plans for 2018

1. Improved use of Surchlor
   - To address problems encountered in 2017
   - Future suggestions for use to be developed shortly

2. Can onion Foliage Reflectivity be used to assess nitrogen status? **WHY?**
   - A. Nitrogen status is related to rot susceptibility
   - B. Can reflectivity sense early development of bacterial rot?

3. Plan Multiple Levels of Study
   - A. Lab growth chamber studies
   - B. Field studies
   - C. Drone-based studies

Our Immediate Goals

- Determine relationship between foliar nitrogen and light reflectivity
  - Check relation between reflectivity and foliar nitrogen content, as determined by chemical analyses
- Q and E to determine need for side-dressing with nitrogen
- Determine if reflectivity changes indicate early symptoms of bacterial infection
  - Mobilize means to address control strategies
- System might be adapted to other crop problems
- In Summary: Carry out the basic studies necessary to develop Drone-based analyses

IN APPRECIATION

Contributing Personnel

Cornell Cooperative Extension Educators

Christy Hoepting and
and Assistants

Ethan Grundberg
and Assistants

Undergraduate Assistants

Sarah Betts
Sue Cho
William Freeman
Rebecca Hunter
Maddie Pielmeier
Mahmudur Rahman
Anahita Verahrami

Critical Personnel

Jean Bonasera
Jo Ann Asselin

Cooperating Grower - Cooperators

Concern	Location	People
CY Farms	Elba	Chuck Barie & Emma Long
G. Mortellaro and Sons	Elba	Matt Mortellaro
Star Growers	Elba	Lou Starowitz Jr.
Triple G Farms	Elba	Guy Smith
Bastek Farms	Orange Co.	James Bastek
Jados Farms	Orange Co.	Lou Jados
John Ruszkiewicz Farm	Orange Co.	Paul Ruszkiewicz
Minkus Family Farms	Orange Co.	Rick Minkus
Gianetto Farms	Oswego Co.	Nick Gianetto
Joseph DiSalvo Farms	Oswego Co.	Joe DiSalvo Sr. & Joe DiSalvo Jr.
Johnson Potato Farms	Wayne Co.	Mark, Jack & Eric Johnson

Providers of Essential Funding

- NYS Farm Viability Institute **APPLIED FOR 2018**
- NYS Onion Research and Development Program
  - **WILL APPLY FOR IN 2018**
- Cornell Research Foundation (Royalties from past Inventions) **OK**
- Cornell University Agricultural Experiment Station (W2008 NIFA)
- CPS: Donated Surchlor for Trial Use

YOUR QUESTIONS?

YOUR SUGGESTIONS

Bacterial Disease Update:

- Surchlor Registered and Trialed
- What is Causing the Rot Problems

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