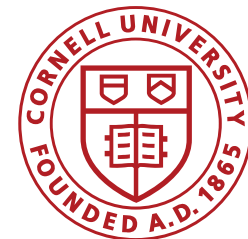


Cornell Cooperative Extension
Cornell Vegetable Program



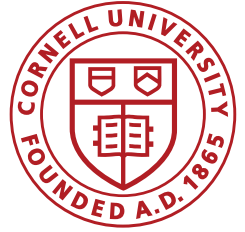
Putting It All Together: Improved SLB Fungicide Program – Effective, Affordable and with Best Management Practices

Christy Hoepting, CCE Cornell Vegetable Program

Frank Hay and Kerik Cox, Dept. of Plant Pathology, NYSAES

2018 Empire Expo – Onion SLB Fungicide Resistance Workshop,
Syracuse, NY: January 17, 2018

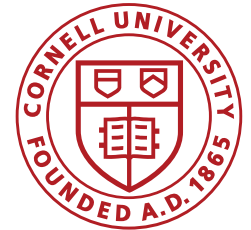
SLB Fungicide Program Affordability



- 2017 SLB Fungicide Program Trial



Sample SLB Program #1 (Cadillac) ~ \$380/A



+ \$60 DM
= \$440

38% FRAC 3; 75% FRAC 9

SLB (63% FRAC 7)

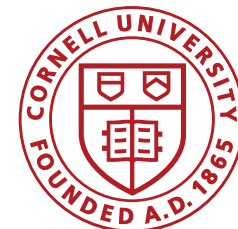
| | | | | | | |
|--------|---------------------------|---|----|------|------|---------|
| Week 1 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 2 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 3 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |
| Week 4 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 5 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 6 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |
| Week 7 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 8 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |

*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|----------|------------|----------|------------|
| BLB, DM: | protection | medicore | No control |
|----------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

Sample SLB Program #2 (QT alt. LT) ~ \$325/A



50% FRAC 3; 50% FRAC 9

SLB (38% FRAC 7)

+ \$100 BLB/DM
= \$425

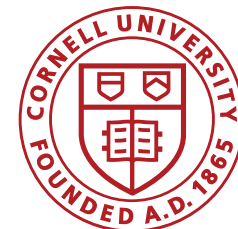
| | | | | | | |
|--------|----------------------------------|---|----|------|------|------|
| Week 1 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 2 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM | \$15 |
| Week 3 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 4 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM | \$15 |
| Week 5 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 6 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM | \$15 |
| Week 7 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 8 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM | \$15 |

*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | mediocre | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

Sample SLB Program #2 (QT alt. LT) ~ \$325/A



SLB (50% FRAC 7)

| | | | | | |
|--------|---------------------------|---|----|------|------|
| Week 1 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM |
| Week 2 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** |
| Week 3 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM |
| Week 4 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** |
| Week 5 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM |
| Week 6 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** |
| Week 7 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM |
| Week 8 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** |

Violation! Luna Tranquility exceeds allowable limit

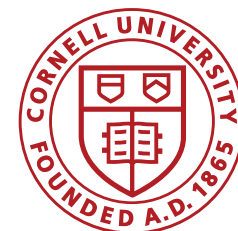
*Add
Rovral 1.5 pt
for BLB

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | mediocre | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb or
phosphorous
acid for DM

Sample SLB Program #3

(IS x2 alt. Mer x2) ~ \$375/A



+ \$60 DM
= \$435

50% FRAC 3; 63% FRAC 9 SLB (50% FRAC 7)

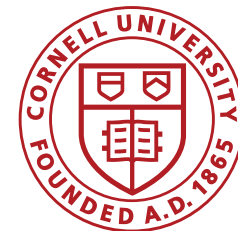
| Week | Medication | 3 | 9 | 7 | DM | Price |
|--------|---------------------------|---|----|------|------|---------|
| Week 1 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 2 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 3 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |
| Week 4 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |
| Week 5 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 6 | Inspire Super 20 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 7 | Merivon 9 fl oz | 7 | 11 | BLB | DM | \$10-25 |
| Week 8 | Luna Tranquility 16 fl oz | 7 | 9 | BLB | DM** | \$10 |

*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicare | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

Sample SLB Program #4 (Start Scala Rovral) ~ \$345/A



+ \$50 DM
= \$395

13% FRAC 3; 63% FRAC 9

SLB (37% FRAC 7)

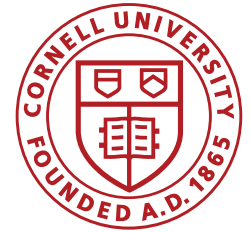
| | | | | | | |
|--------|-----------------------------|---|----|------|------|---------|
| Week 1 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 2 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 3 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 4 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 5 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |
| Week 6 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |
| Week 7 | Inspire Super 16 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 8 | Merivon 9 fl oz | 7 | 11 | BLB | DM | |

*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicare | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

Economical SLB Program #1 (Low Rate Cadillac) ~ \$275/A



13% FRAC 3; 63% FRAC 9

SLB (63% FRAC 7)

+ \$60 DM
= \$335

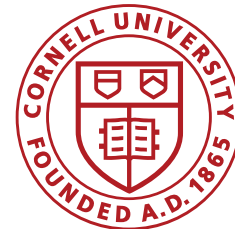
| | | | | | | |
|--------|---------------------------|---|----|------|------|---------|
| Week 1 | Inspire Super 16 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 2 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 3 | Merivon 5.5 fl oz | 7 | 11 | BLB | DM | |
| Week 4 | Inspire Super 16 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 5 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 6 | Merivon 5.5 fl oz | 7 | 11 | BLB | DM | |
| Week 7 | Inspire Super 16 fl oz | 3 | 9 | BLB* | DM** | \$10-25 |
| Week 8 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |

*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | medicore | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

Economical SLB Program #2 (Tilt/Low LT) ~ \$165/A



+ \$85 DM/BLB
= \$250

63% FRAC 3; 38% FRAC 9 SLB (38% FRAC 7)

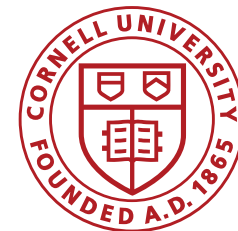
| | | | | | | |
|--------|---------------------------|---|----|------|------|---------|
| Week 1 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 2 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 3 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 4 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 5 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 6 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 7 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 8 | Quadris Top 14 fl oz | 3 | 11 | BLB* | DM | \$15 |

*Add
Rovral 1.5 pt
for BLB (\$15)

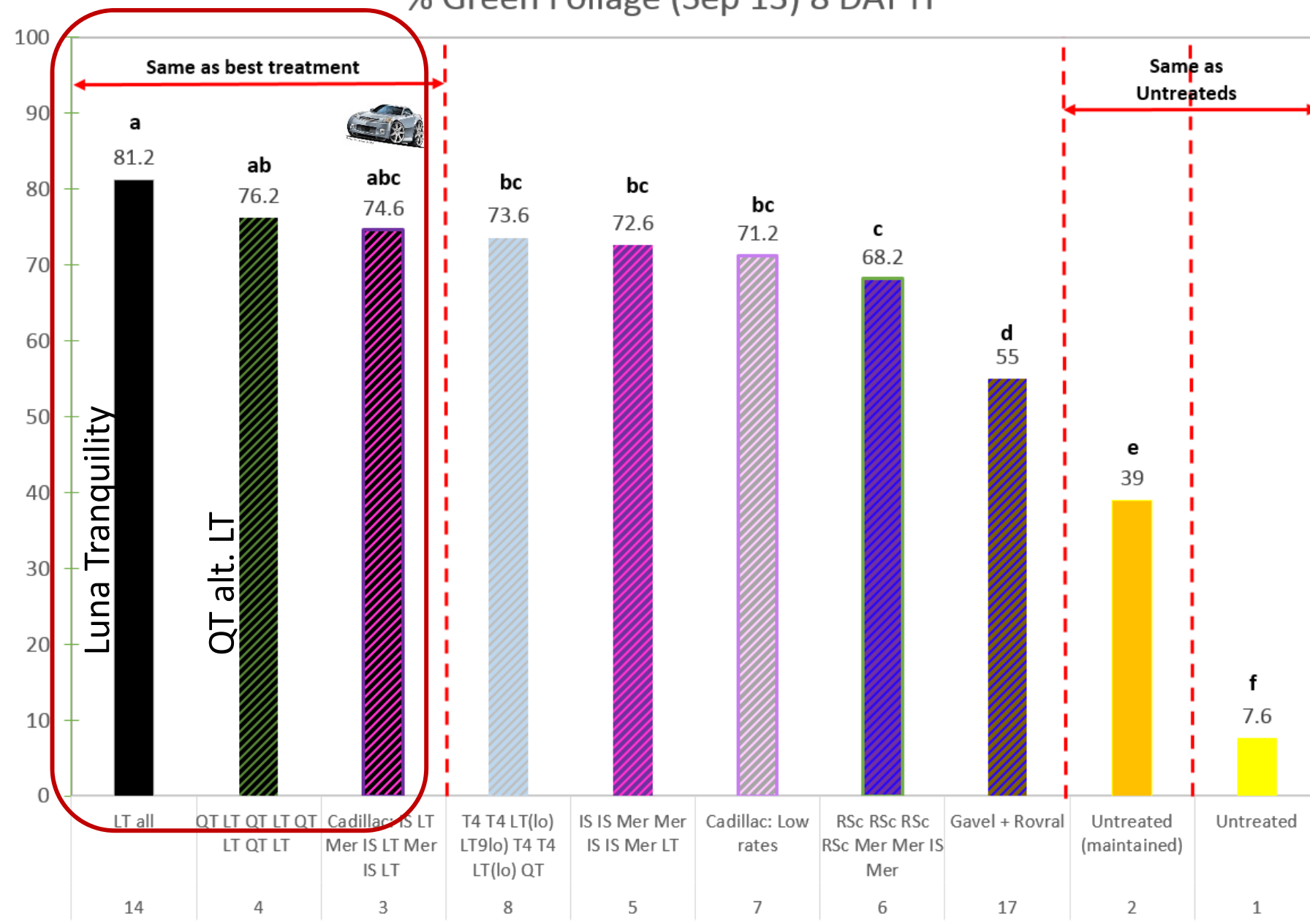
| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicore | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

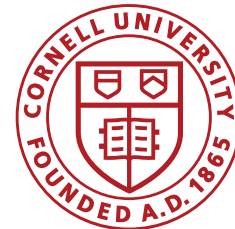
2017 SLB Fungicide Program Trial



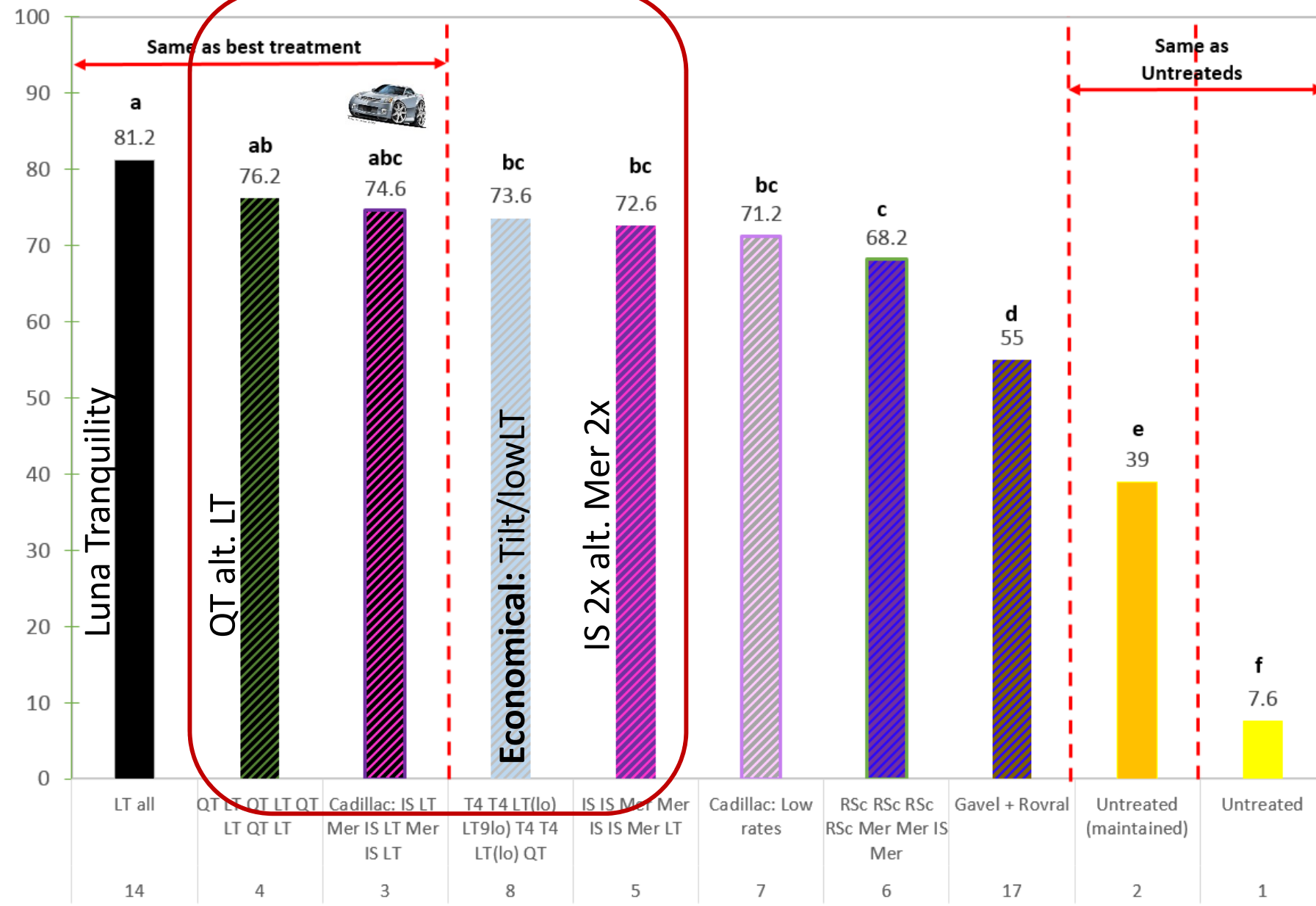
% Green Foliage (Sep 13) 8 DAT H



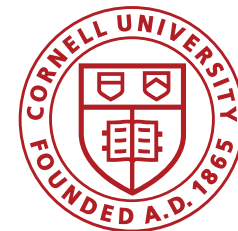
2017 SLB Fungicide Program Trial



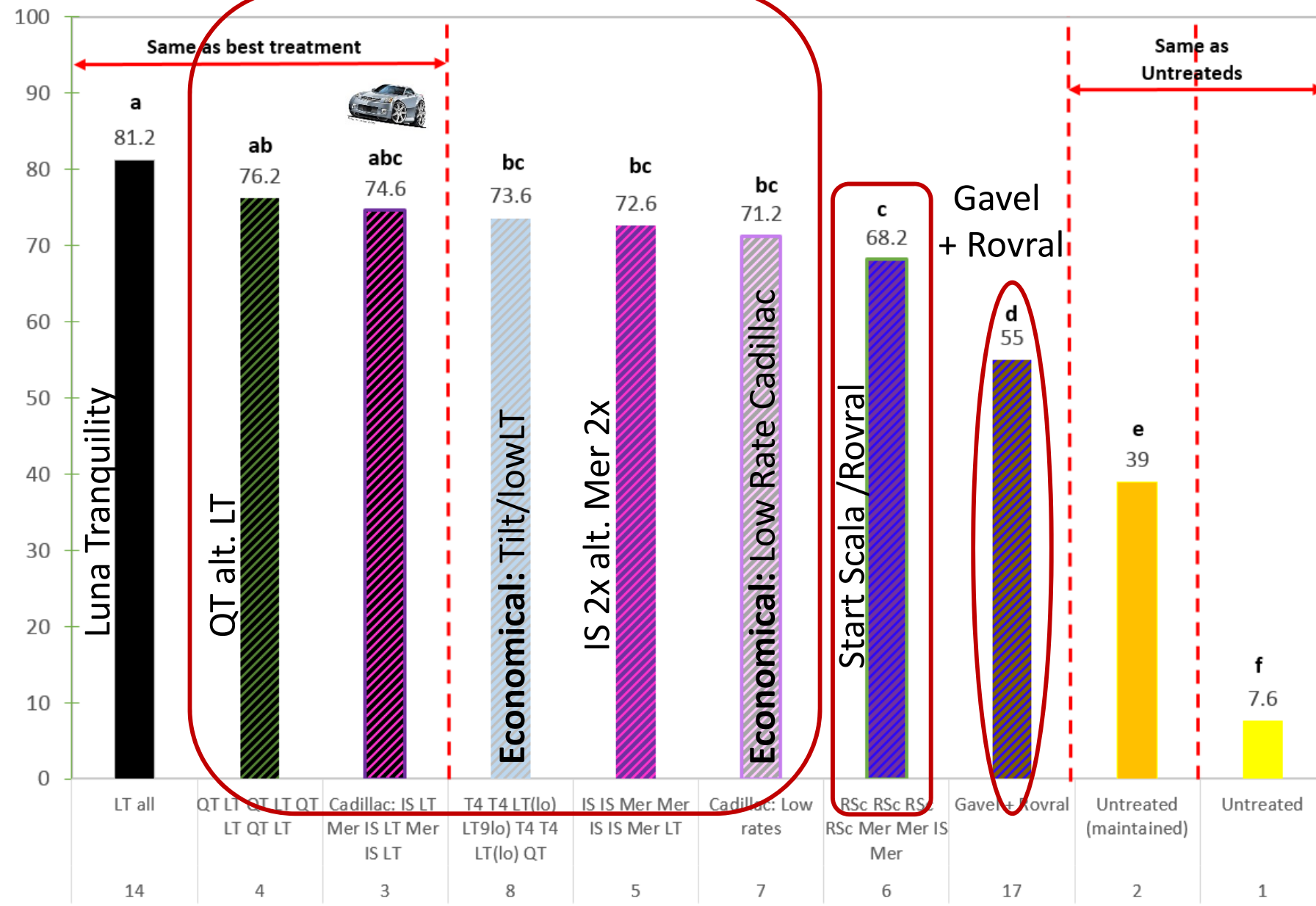
% Green Foliage (Sep 13) 8 DAT H



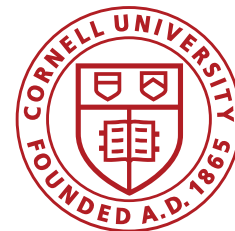
2017 SLB Fungicide Program Trial



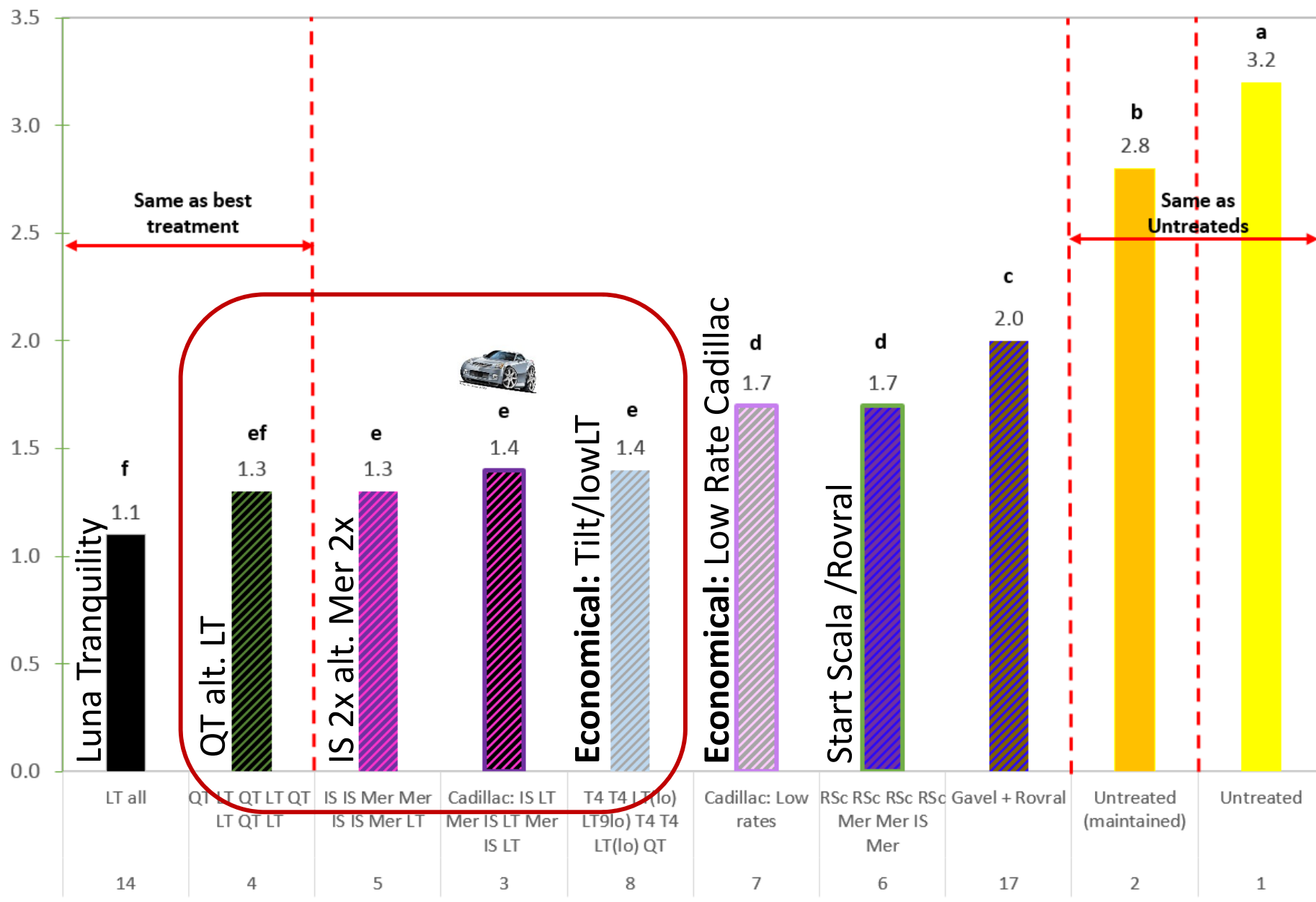
% Green Foliage (Sep 13) 8 DAT H



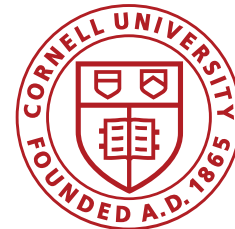
2017 SLB Fungicide Program Trial



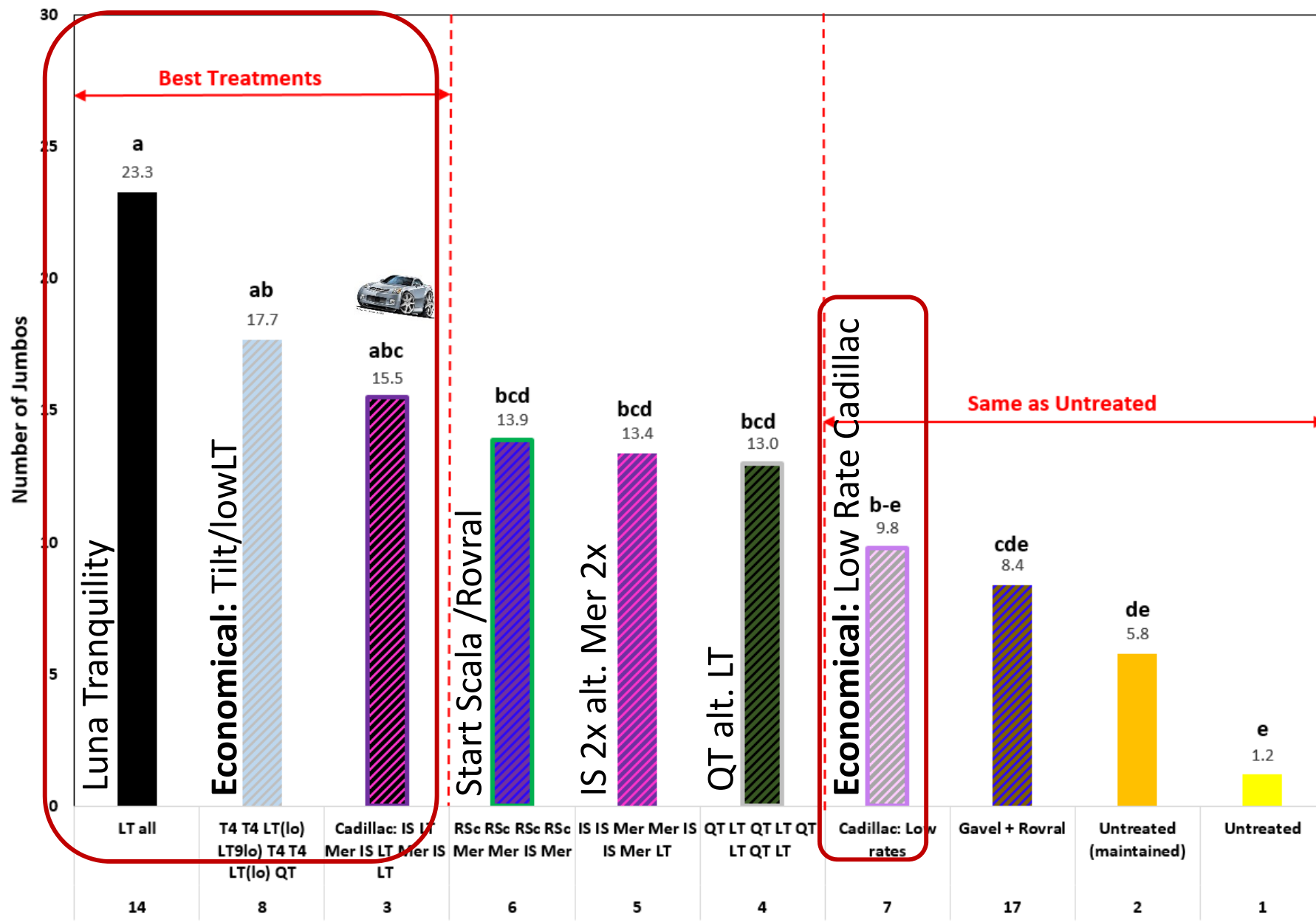
SLB Severity (scale: 0-6)



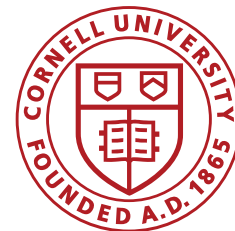
2017 SLB Fungicide Program Trial



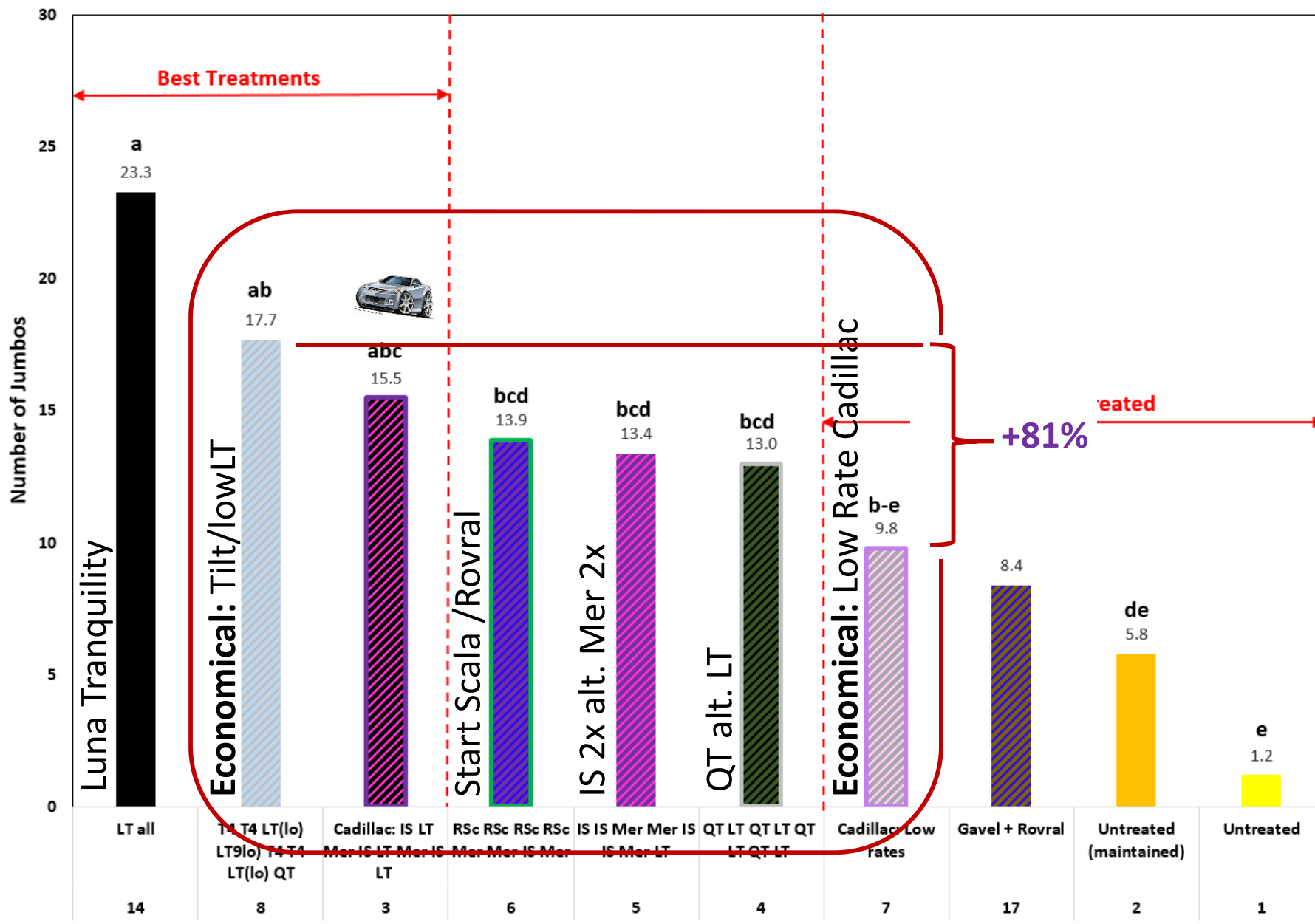
% Jumbos



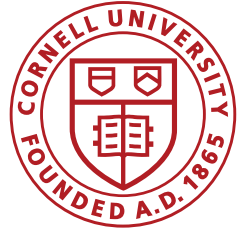
2017 SLB Fungicide Program Trial



% Jumbos



2017 SLB Fungicide Program Trial



SEP 13, 2017

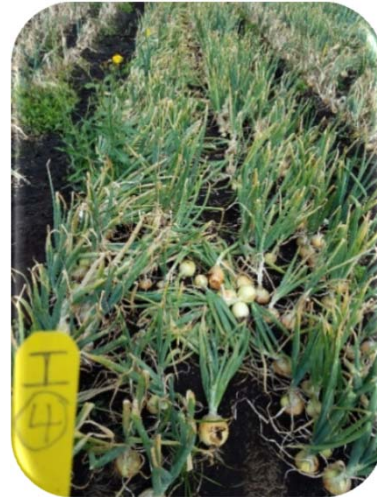
QT alt. LT



IS 2x alt. Mer 2x



Luna
Tranquility
16 fl oz



Start Rov Scala
Finish Mer/IS

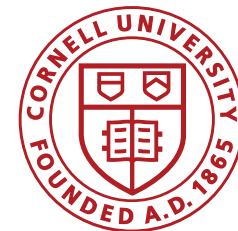


Economical
Low Cadillac



Economical
Tilt/low LT

2017 SLB Fungicide Program Trial Show Me the Money!



SEP 13, 2017

QT alt. LT



IS 2x alt. Mer 2x



Luna
Tranquility
16 fl oz



Start Rov Scala
Finish Mer/IS

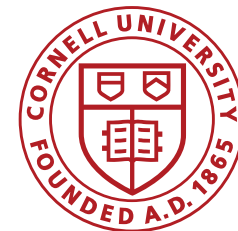


Economical
Low Cadillac



Economical
Tilt/low LT

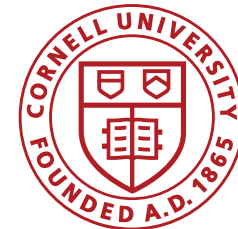
SLB Fungicide Program Affordability



- Using low rates of Luna Tranquility and Merivon can reduce application costs by 20-60% per application
 - Luna Tranquility 12 fl oz (\$40) vs. 16 fl oz (\$50)
 - Merivon 5.5 fl oz (\$35) vs. 9 fl oz (\$60)
- Tilt 4 fl oz (\$3.50) to 8 fl oz (\$7) when used as part of a program with high-performing fungicides like Luna Tranquility may reduce cost of fungicide program by 50% or more.

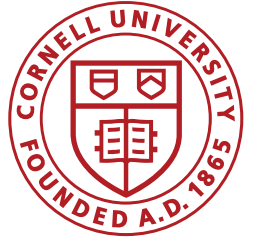
SLB Fungicide Program

Best Practices for Resistance Management



- Ideally, use fungicides from four fungicide classes:
 - FRACs 2, 3, 7 and 9
 - Nothing else has activity on SLB
- **Ideally, use no more than three applications per season from a single FRAC group**
- Timing: Start SLB fungicide program:
 - 1" bulb
 - Mid to late-July
- It is okay to use low rates of Luna Tranquility (12 fl oz) and Merivon (5.5 fl oz)
- Try to avoid using FRAC 11 (SLB-resistant)
- Jury still out on 1 vs. 2 week product rotation

Presenting...

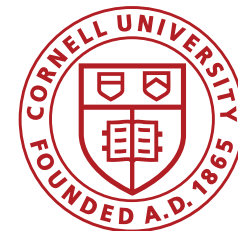


New & Improved 2018 SLB Fungicide Recommendations:

- ✓ **Effective**
- ✓ **Affordable**
- ✓ **Follows Best Practices for
Fungicide Resistance Management**

2018 SLB Fungicide Recommendation

Best of Everything ~\$195/A



+ \$70 DM
= \$265

38% FRAC 3; 50% FRAC 9 SLB (38% FRAC 7)

| | | | | | | |
|--------|-----------------------------|---|----|------|------|---------|
| Week 1 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 2 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 3 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 4 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 5 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 6 | Merivon 5.5 fl oz | 7 | 11 | BLB | DM | |
| Week 7 | Tilt 8 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 8 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |

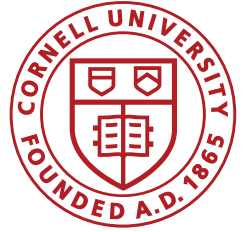
*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicore | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

2018 SLB Fungicide Recommendation

Best of Everything ~\$195/A

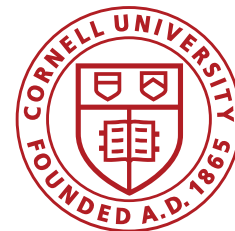


- Start Scala + Rovral (BLB & SLB)
- Lower rates of Luna Tranquility or Merivon for affordability of most effective fungicides
- Cadillac rotation (3 alt. LT alt. Mer)
- Affordability of Tilt (\$3.50 - \$7/A)

20

Th

- Using four FRAC groups.
- No more than **three apps per FRAC**
 - Except FRAC 9, but...



+ \$70 DM
= \$265

| | | | | | | | |
|--------|---------------------------|---------------------------|---|----|------|------|---------|
| Week 1 | Scala 9 fl oz | 4 apps FRAC 9 (1 a.i.) | 9 | 2 | BLB | DM** | \$10 |
| Week 2 | Tilt 4 fl oz | | 3 | | BLB | DM** | \$10-25 |
| Week 3 | Scala 9 fl oz | 3 apps FRAC 3 (1 a.i.) | 9 | 2 | BLB | DM** | \$10 |
| Week 4 | Tilt 4 fl oz | | 3 | | BLB* | DM** | \$10-25 |
| Week 5 | Luna Tranquility 12 fl oz | | 7 | 9 | BLB | DM** | \$10 |
| Week 6 | Merivon | 3 apps FRAC 7 (2 a.i.) | 7 | 11 | | | |
| Week 7 | Tilt 8 fl oz | | 3 | | BLB* | DM** | \$10-25 |
| Week 8 | Luna Tranquility 12 fl oz | | 7 | 9 | BLB | DM** | \$10 |

2 apps FRAC 2
(1 a.i.)

Only 1 app with
FRAC 11 drag

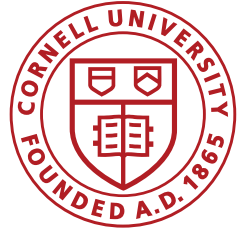
*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicare | No control |
|-----------------|------------|----------|------------|

**Add
Mancozeb
(\$10) or FRAC
33 for DM

2018 SLB Fungicide Recommendation

Best of Everything ~\$195/A



38% FRAC 3; 43% FRAC 9 SLB (38% FRAC 7)

+ \$70 DM
= \$265

| | | | | | | |
|-------------------|--|--------------|--------------|----------------|-----------------|-----------------|
| Week 1 | Scout 0.5 fl oz + Rovral 1.5 pt | 3 | 7 | BLB | DM** | \$10 |
| Week 2 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 3 | Scout 0.5 fl oz + Rovral 1.5 pt | 3 | 7 | BLB | DM** | \$10 |
| Week 4 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 5 | | | | | | \$10 |
| Week 6 | | | | | | |
| Week 7 | | | | | | \$10-25 |
| Week 8 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |

If any one of these sprays are not needed:
In a < 8 week spray program, FRAC 3 = 3 apps or less

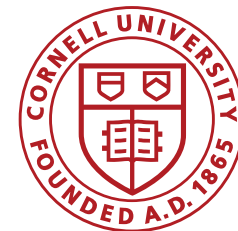
*Add Rovral 1.5 pt for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicore | No control |
|-----------------|------------|----------|------------|

**Add Mancozeb (\$10) or FRAC 33 for DM

2018 SLB Fungicide Recommendation

Best of Everything ~\$195/A



+ \$70 DM
= \$265

38% FRAC 3; 50% FRAC 9 SLB (38% FRAC 7)

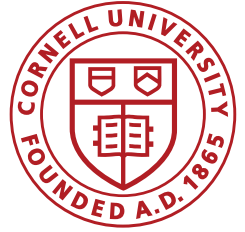
| | | | | | | |
|--------|-----------------------------|---|----|------|------|---------|
| Week 1 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 2 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 3 | Scala 9 fl oz + Rovral 1 pt | 9 | 2 | BLB | DM** | \$10 |
| Week 4 | Tilt 4 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 5 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |
| Week 6 | Merivon 5.5 fl oz | 7 | 11 | BLB | DM | |
| Week 7 | Tilt 8 fl oz | 3 | | BLB* | DM** | \$10-25 |
| Week 8 | Luna Tranquility 12 fl oz | 7 | 9 | BLB | DM** | \$10 |

*Add
Rovral 1.5 pt
for BLB (\$15)

| | | | |
|-----------------|------------|----------|------------|
| BLB, DM: | protection | Medicore | No control |
|-----------------|------------|----------|------------|

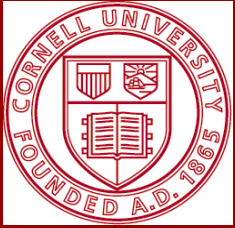
**Add
Mancozeb
(\$10) or FRAC
33 for DM

Congratulations New York Onion Growers!



2017 Onion Research Scouting Program

- 15 muck onion farms in Elba, Wayne & Oswego
- 20 onion fields
- 174 individual fungicide applications
- **99% followed fungicide resistance management practices (as outlined on fungicide labels)**
 - Rotation restrictions
 - Maximum seasonal use rates
- Extremely high adoption of fungicide resistance management



Questions?



2017 marked my 20th season working in onions