

Limitations of Soil-Applied Biologicals for Managing Lettuce Fusarium wilt

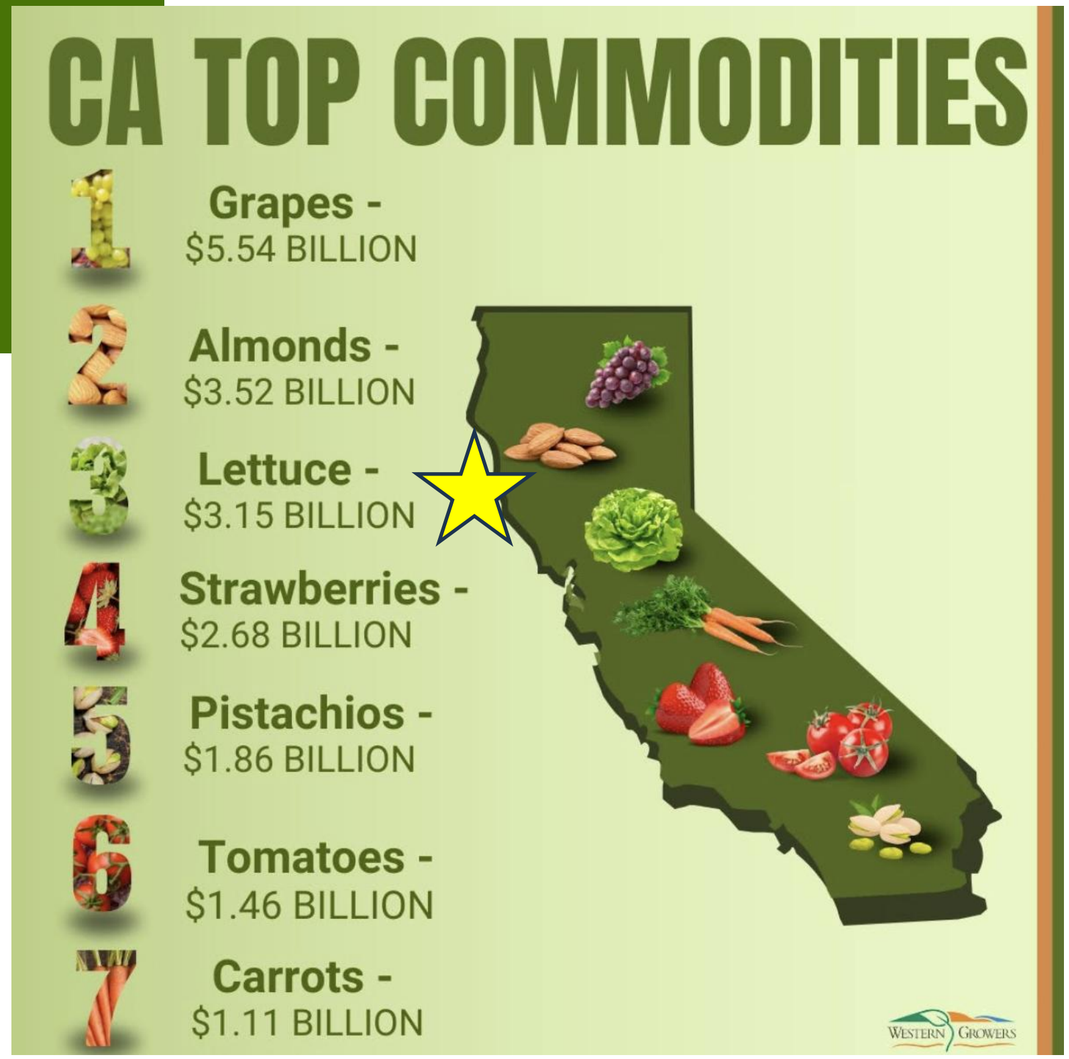
Evan Tamayo

Advisor: **Dr. Shunping Ding**

Department of Plant Sciences

Cal Poly San Luis Obispo

Lettuce (*Lactuca sativa*)









Fusarium wilt: *Fusarium oxysporum* f. sp. *lactucae*









Detection of novel pathogenic variants of *Fusarium oxysporum* f. sp. *lactucae* in California

Santosh Nayak ✉, Kelley L. Richardson ✉, Alexander I. Putman, Nicholas R. LeBlanc, Frank N. Martin, Ningxiao Li, James D. McCreight

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Disease Management





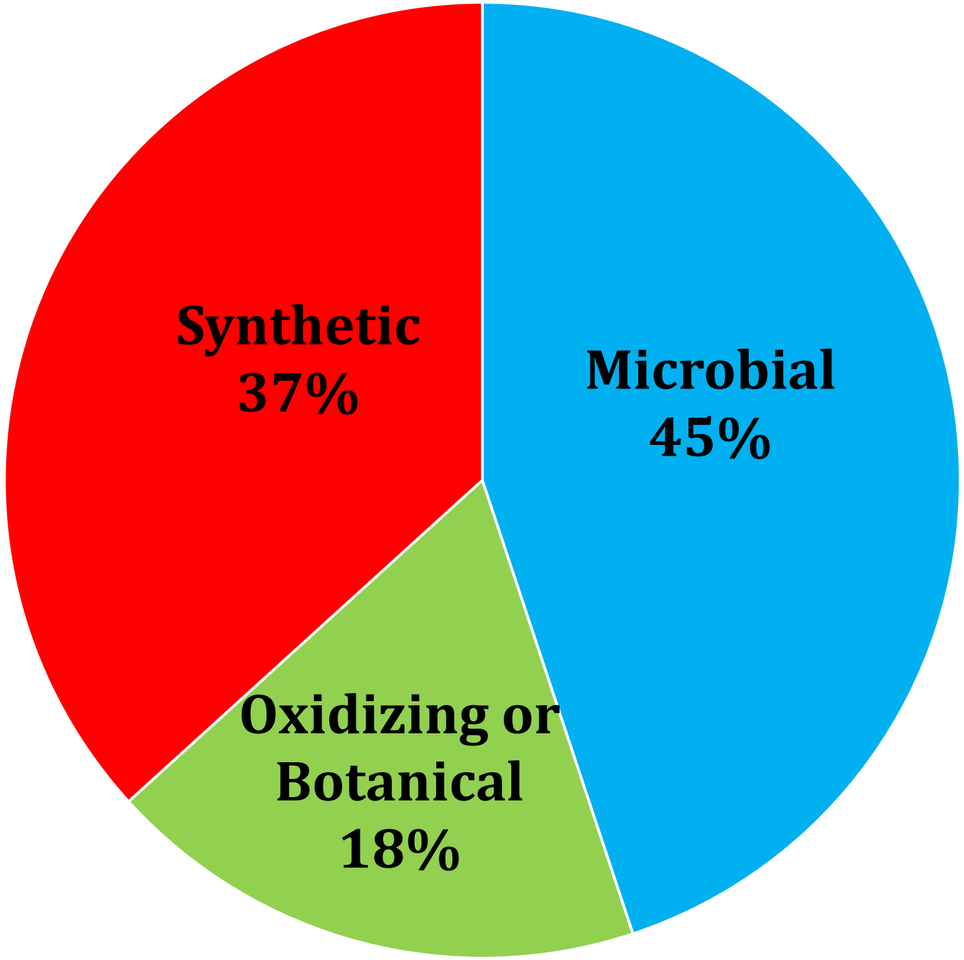
UCANR





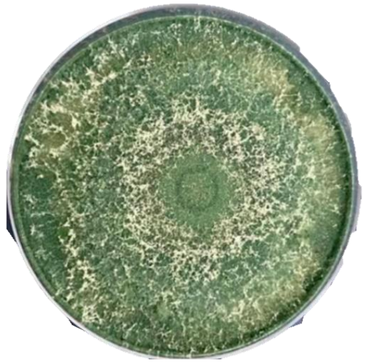
CA Registered Products for Management

- 50 total products (CDMS)
- ~62% certified organic



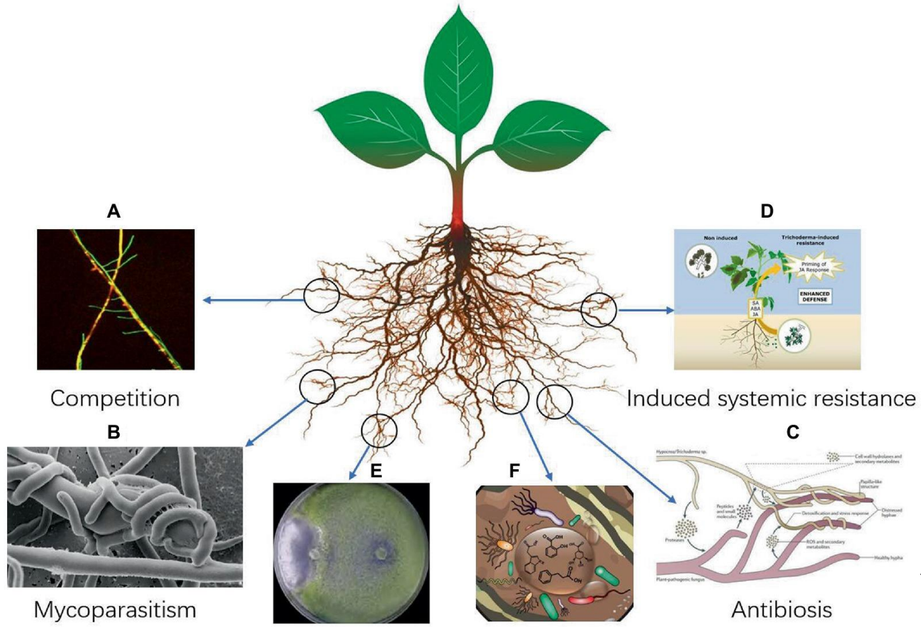
https://www.cdms.net/Label-Database/Advanced-Search#Result-products

Biological Disease Management









Yao et al. 2023


BENEFICIAL
MICROBES
?

Research Components

Greenhouse
Cal Poly Campus



Small Plot
Cal Poly Campus



Production Field
Santa Maria, CA



Research Components

Greenhouse

Cal Poly Campus



Artificial Inoculation

Small Plot

Cal Poly Campus



Artificial Inoculation

Production Field

Santa Maria, CA



Natural Infestation

Research Components

Greenhouse
Cal Poly Campus



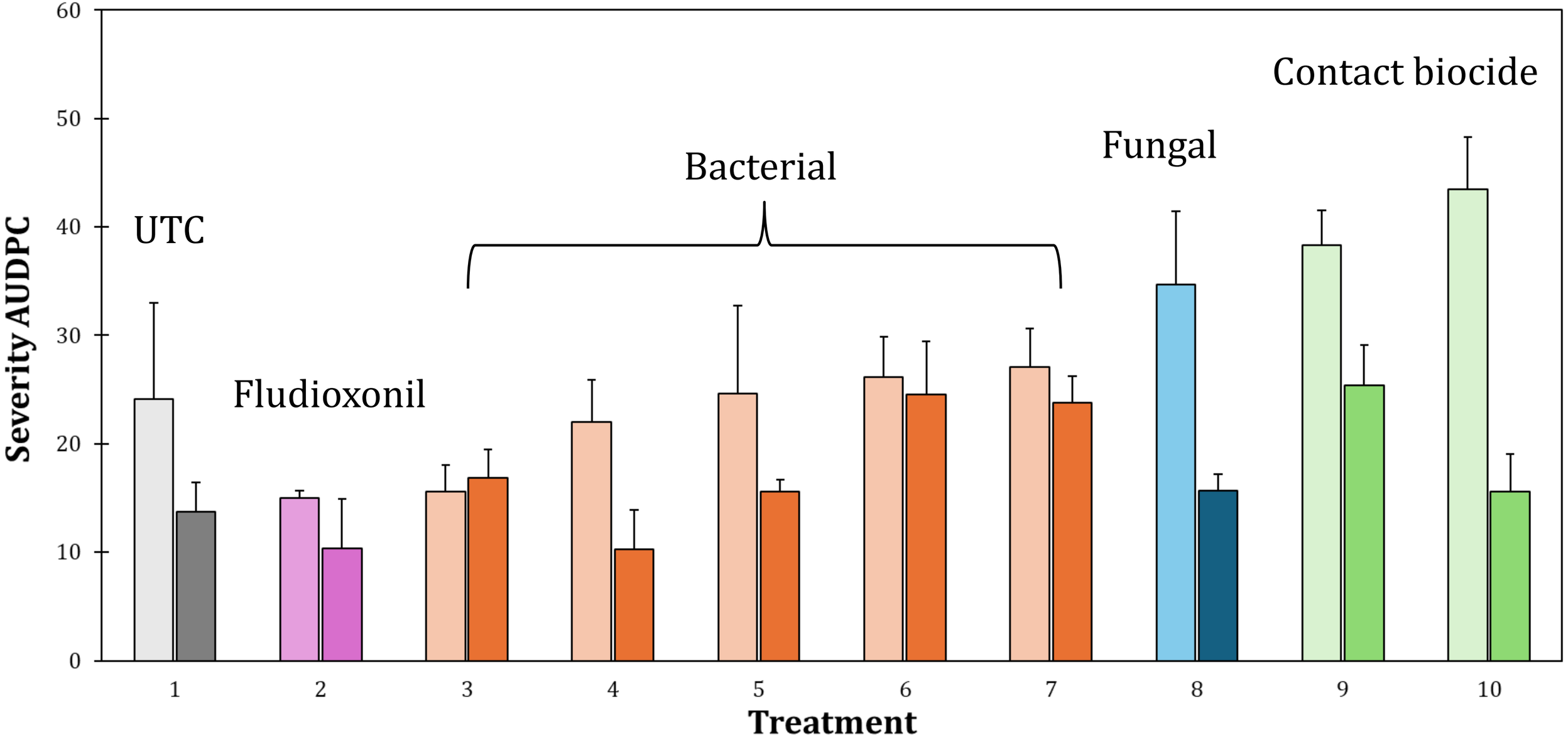
Small Plot
Cal Poly Campus



Production Field
Santa Maria, CA



Greenhouse Trials 1&2: cv. ‘Duran’



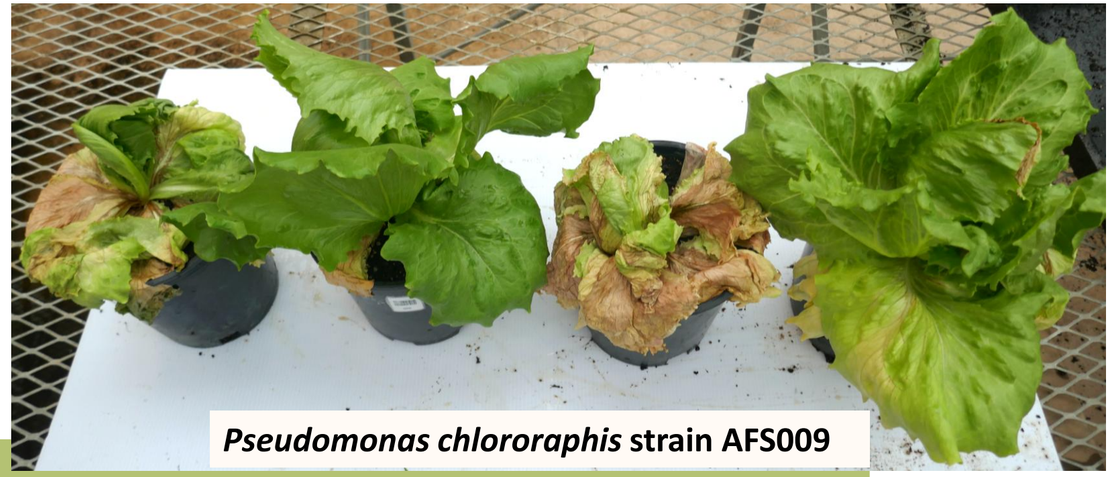




Control: Untreated Uninoculated

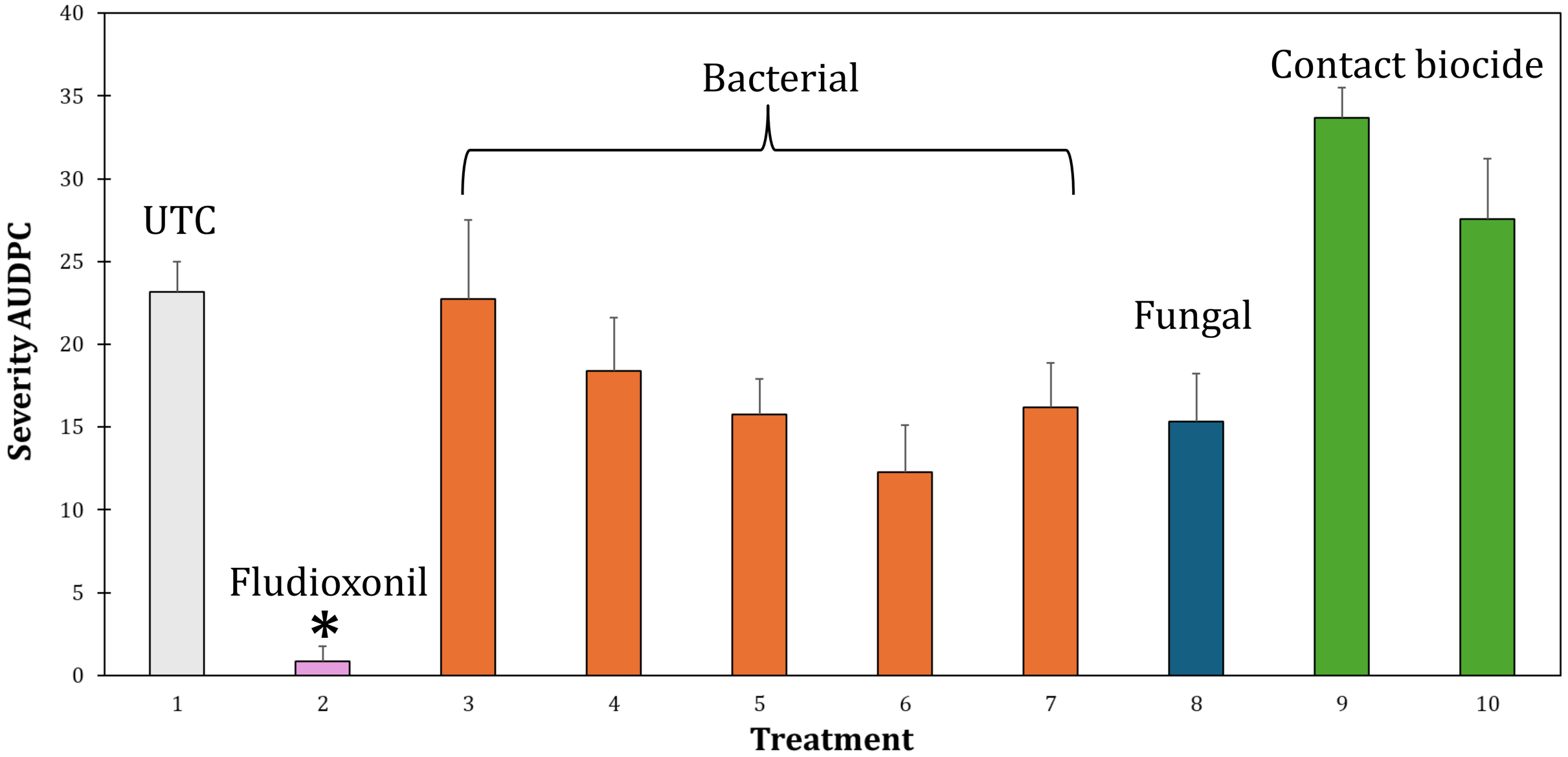


Control: Untreated Inoculated



Pseudomonas chlororaphis **strain AFS009**

Greenhouse Trial 3: cv. ‘Journey’



* P <0.0001

Greenhouse
Cal Poly Campus



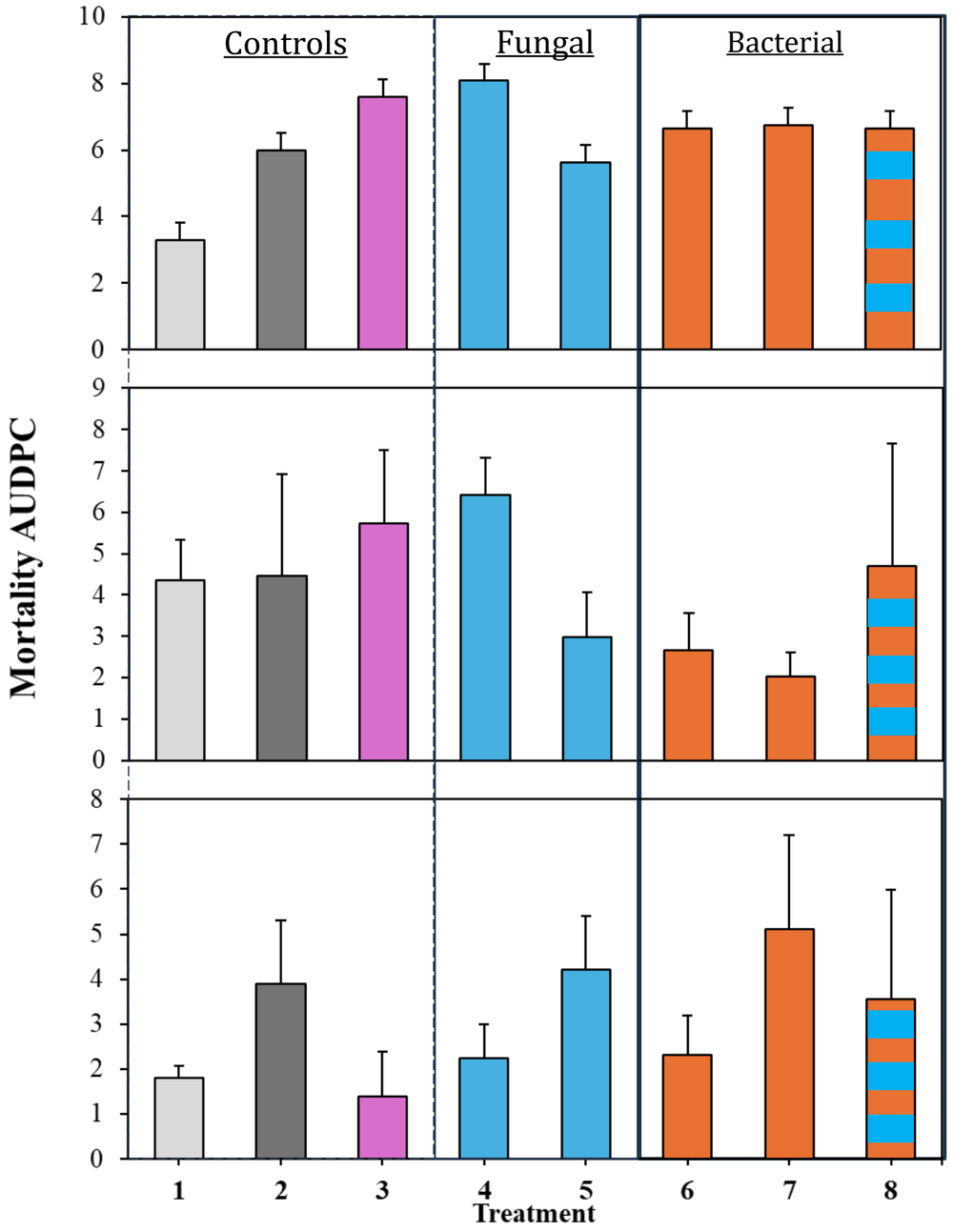
Small Plot
Cal Poly Campus



Production Field
Santa Maria, CA



Results



Spring
P = 0.19

Summer
P = 0.53

Fall
P = 0.31







Greenhouse
Cal Poly Campus

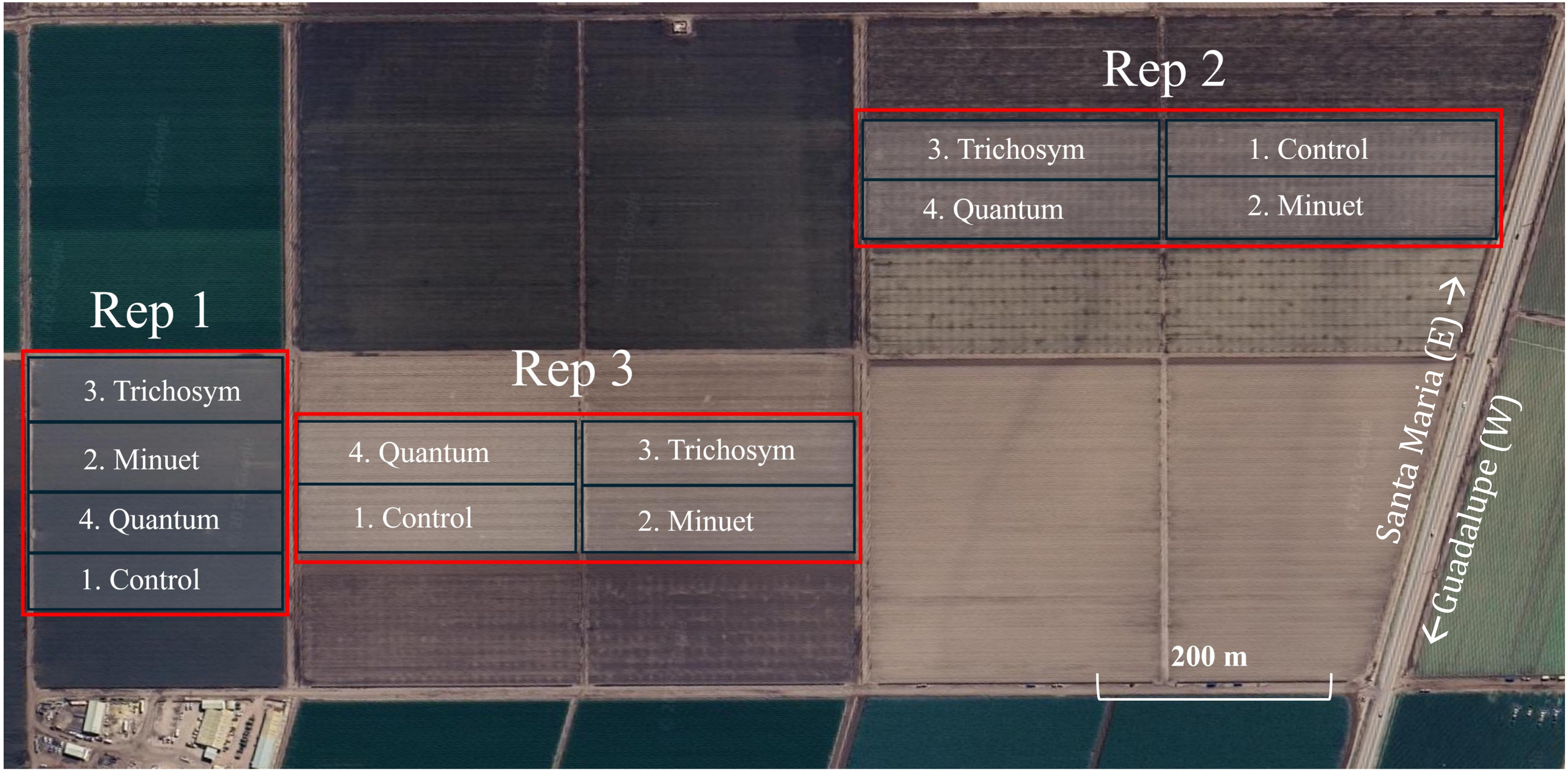


Small Plot
Cal Poly Campus



Production Field
Santa Maria, CA



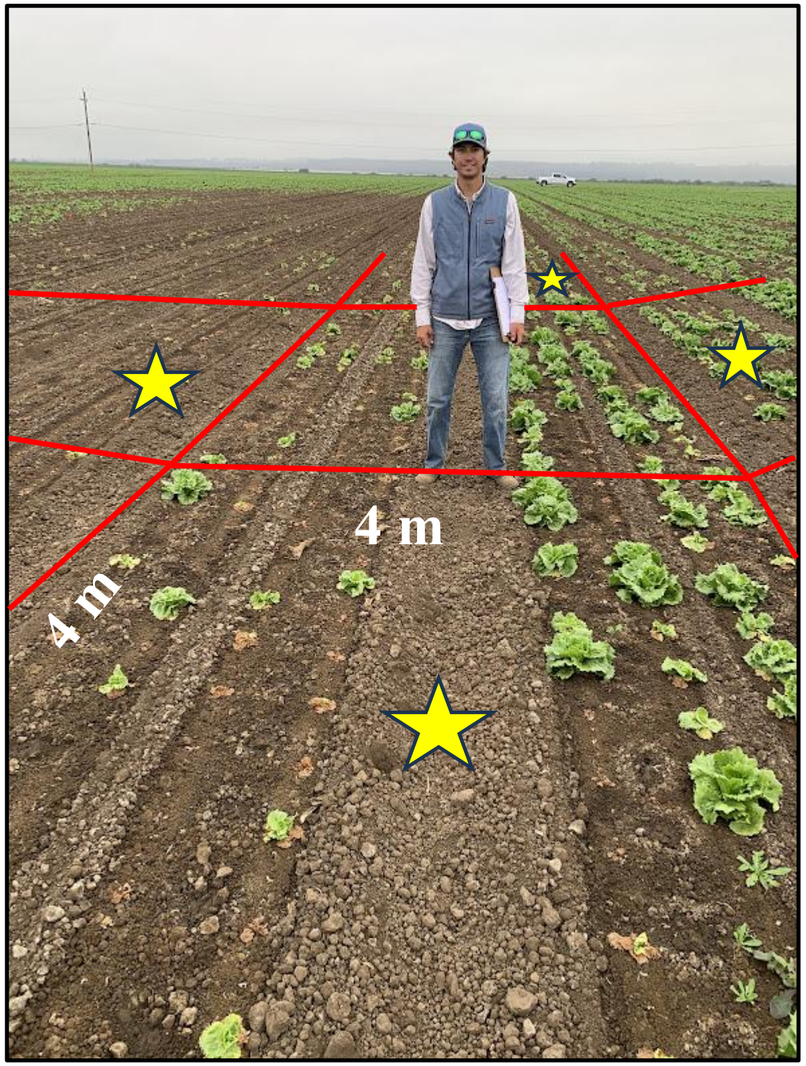

Rep 2
3. Trichosym
1. Control
4. Quantum
2. Minuet
Rep 1
3. Trichosym
2. Minuet
4. Quantum
1. Control
Rep 3
4. Quantum
3. Trichosym
1. Control
2. Minuet
Santa Maria (E) →
←Guadalupe (W)
200 m

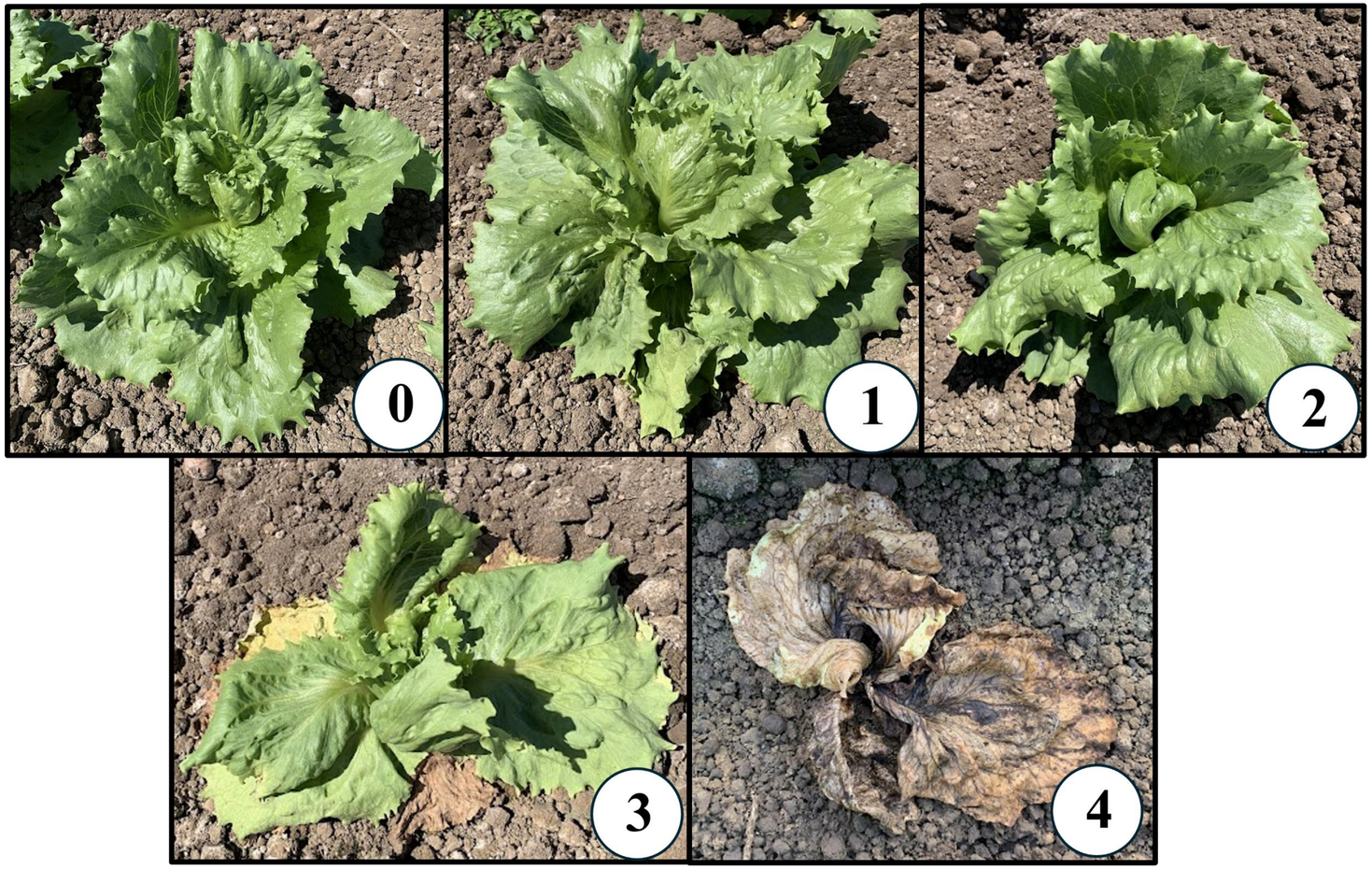
Application Method



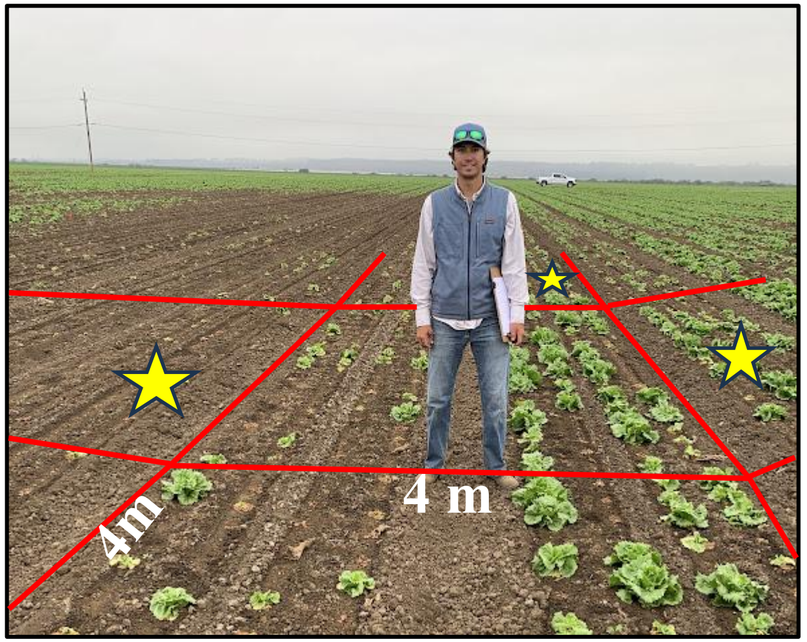


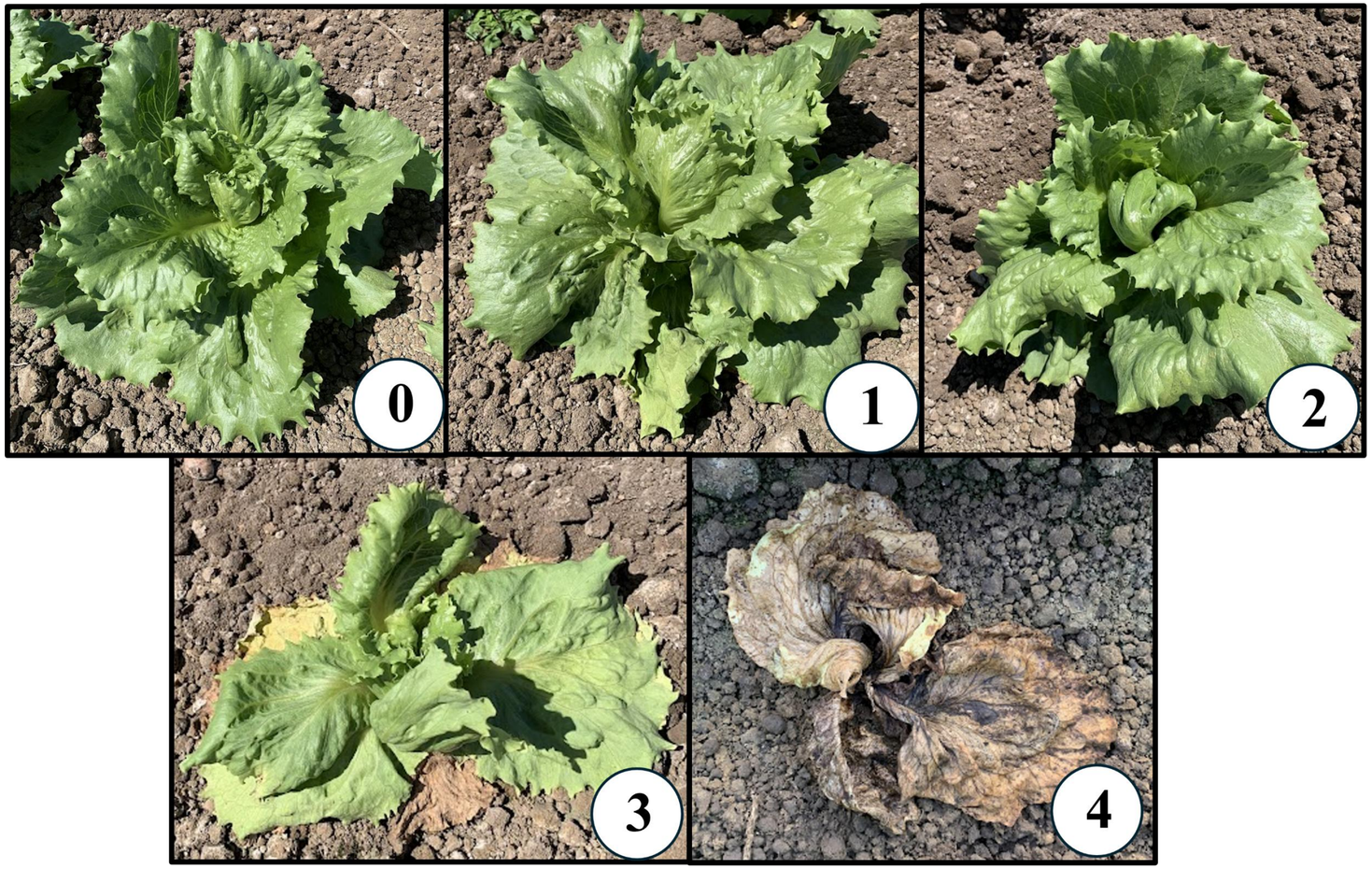
Disease Assessments: Severity Index





Disease Assessments: Severity Index





Disease Severity

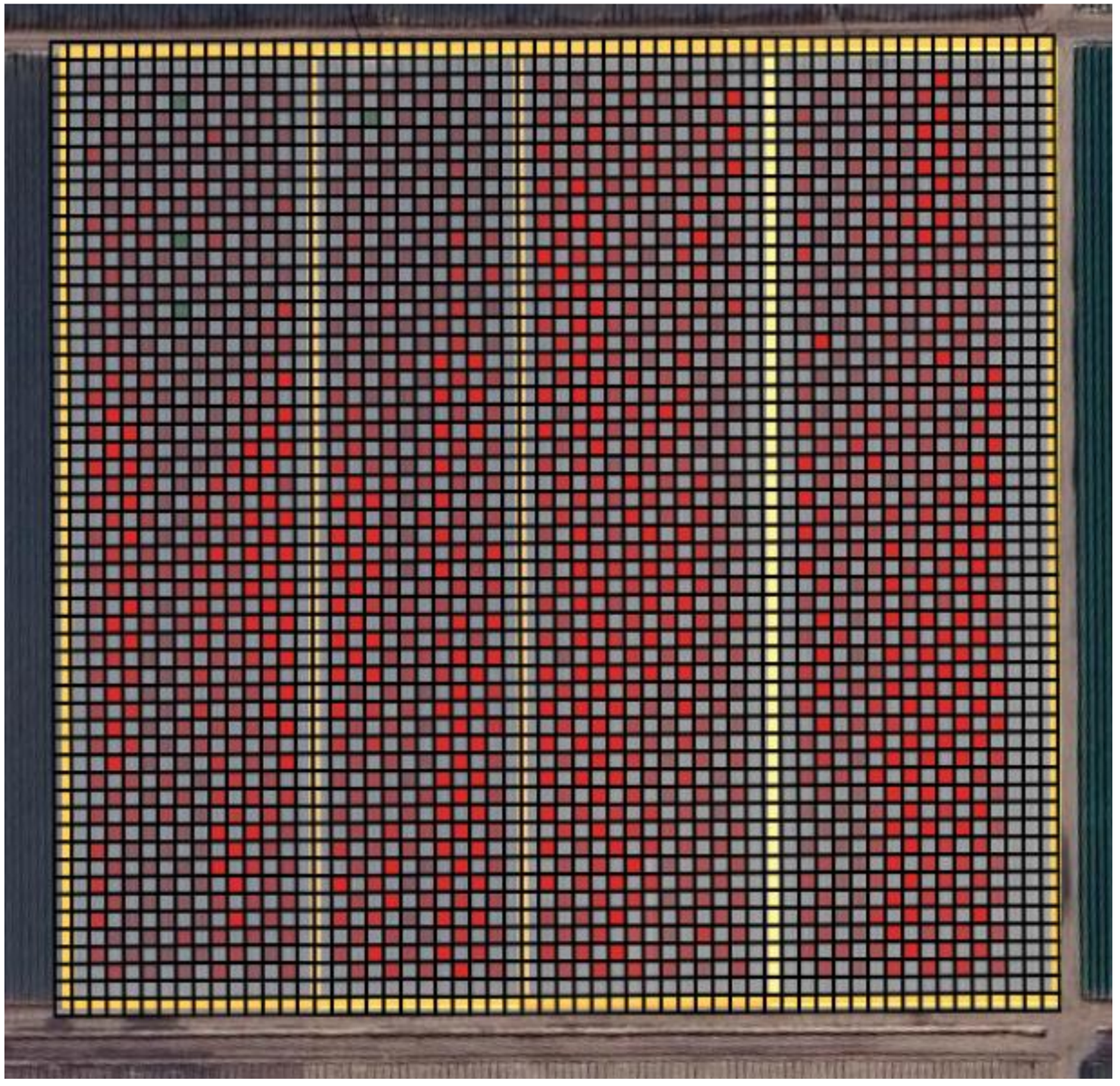
0%

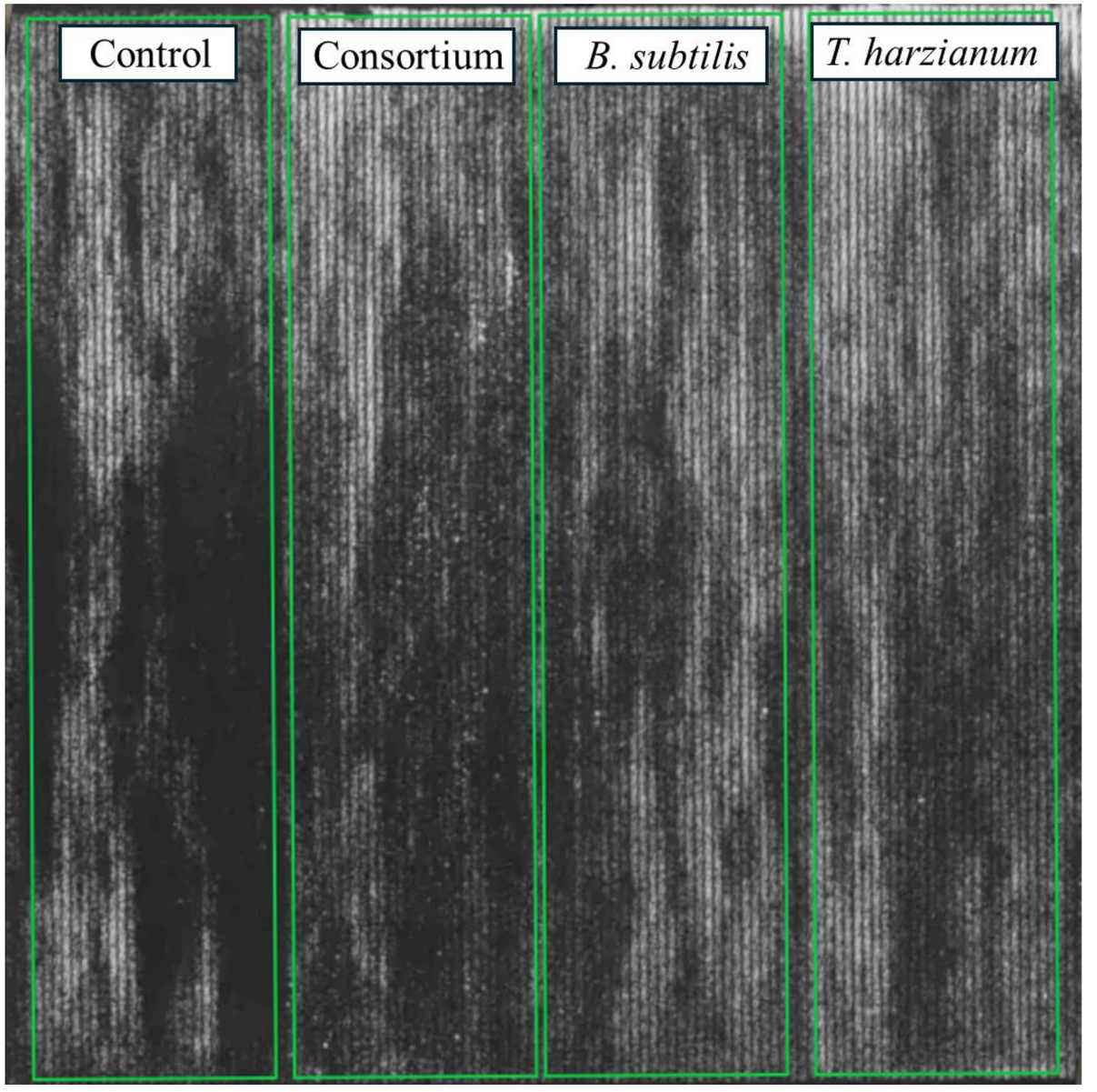
1-25%

25-50%

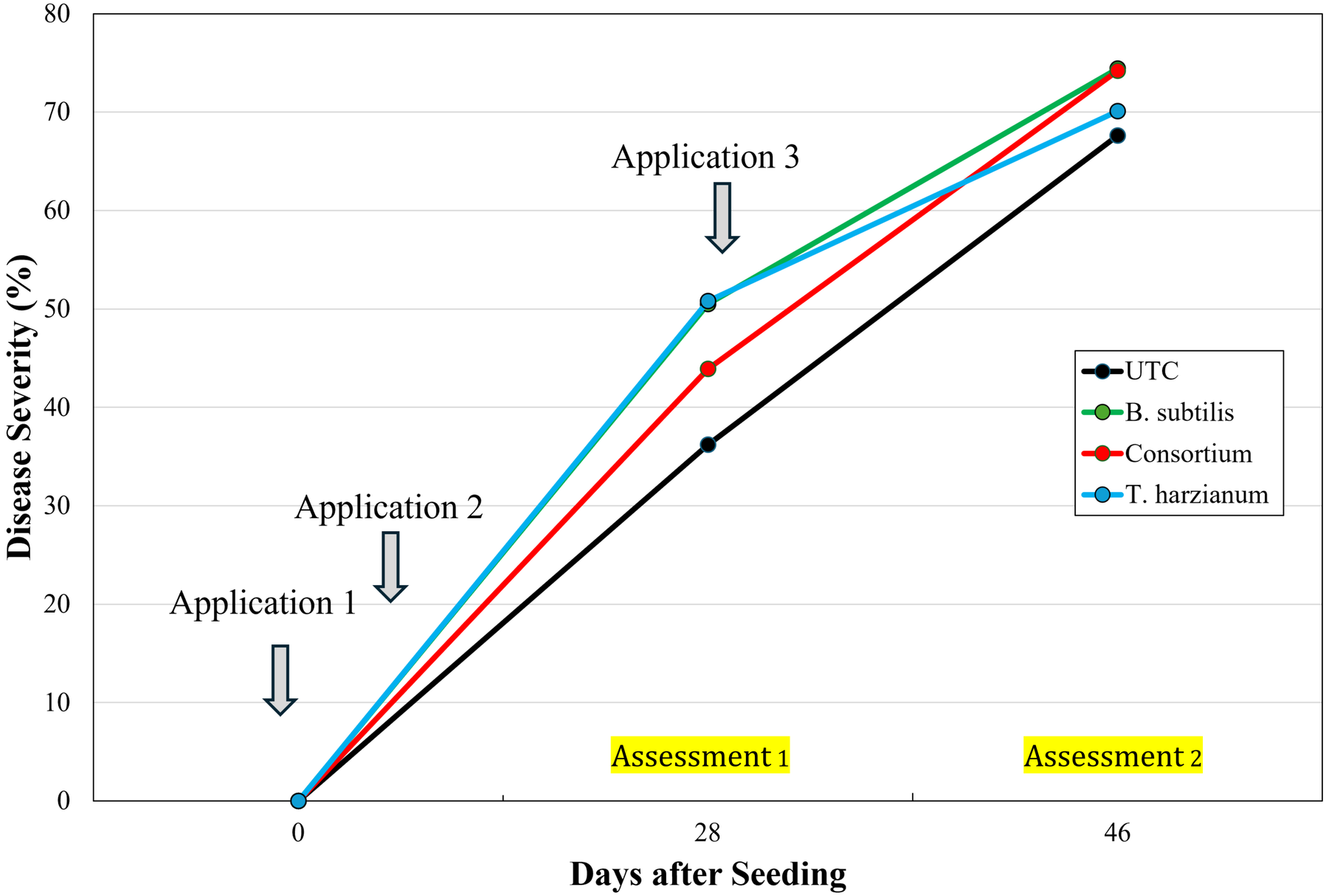
50-75%

75-100%




Control
Consortium
B. subtilis
T. harzianum

Results


80
70
60
50
40
30
20
10
0
Disease Severity (%)
Application 3
Application 2
Application 1
Assessment 1
Assessment 2
UTC
B. subtilis
Consortium
T. harzianum
0
28
46
Days after Seeding

- Early termination → 100% Yield Loss





Discussion

- Overall lack of efficacy
- Context dependence
- Practical considerations for growers



Cultivar resistance

Acknowledgements

Committee

- Dr. Suraj Kar
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- Dr. Shunping Ding

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- Kaitlin Rim - Aerialplot
- Richard Volpe

Lab Fellows

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- Abraham Ahumada
- Arlo Grieshop
- Jenna Keller
- Skye Reading

Cal Poly Farm Management Team

Project #GW25-008.

Grimm Family Center for Organic Production and Research