



Demonstration and Implementation of Cost-Effective UV-C Technology for California Strawberry Pest Management

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Director of Automation Engineering

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CAL POLY
Strawberry Center





2022

INTEGRATED PEST MANAGEMENT ACHIEVEMENT AWARDS

Leading the way
in sustainable pest
management

**Congratulations,
Cal Poly Strawberry Center**

IPM Achievement Award Winner

for promoting IPM and sustainability in strawberry production
through prolific research and outreach programs

 Achieve@cdpr.ca.gov

 California Department of Pesticide Regulation
Department of



2022 IPM ACHIEVEMENT
AWARD WINNER!

**CONGRATULATIONS CAL
POLY STRAWBERRY CENTER**

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Recent News

Center's first-ever Highlights video

Farm manager Drew Summerfield hosts high school students from Idaho

Congratulations Cal Poly Strawberry Center on being a 2022 IPM Achievement Award winner!

Center graduate Yu-Chen Wang accepts UCCE position

Tune in! DPR's 2022 IPM Achievement Awards virtual ceremony

Congratulations to Center communications assistant

Field Day 2022



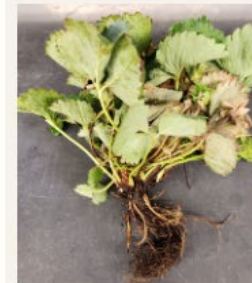
At over 440 attendees, our largest Field Day event yet!

Students



Learn about working at the Center, and more!

Strawberry Disease Info Form



Form available in Español

Follow our Blog



Stay up-to-date with our research activities and findings

Lygus Bug Vacuum



Strawberry Decapper



Plastic Mulch Hole Burner



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USDA ARS/Cornell/UFL

Contributions

- UV Proof of Concept
- Mildew, mites, mold
- Results in lab settings

Important findings

- Dosing matters – too much damages plants, too little does not control pests
- Dark period matters

Challenges

- Dosing requires control of height, time, and intensity
- Variable conditions outdoors
- Treatments done at night
- Persistent treatment, light applied all season long

Fumi Takeda



David Gadoury



Natalia Peres

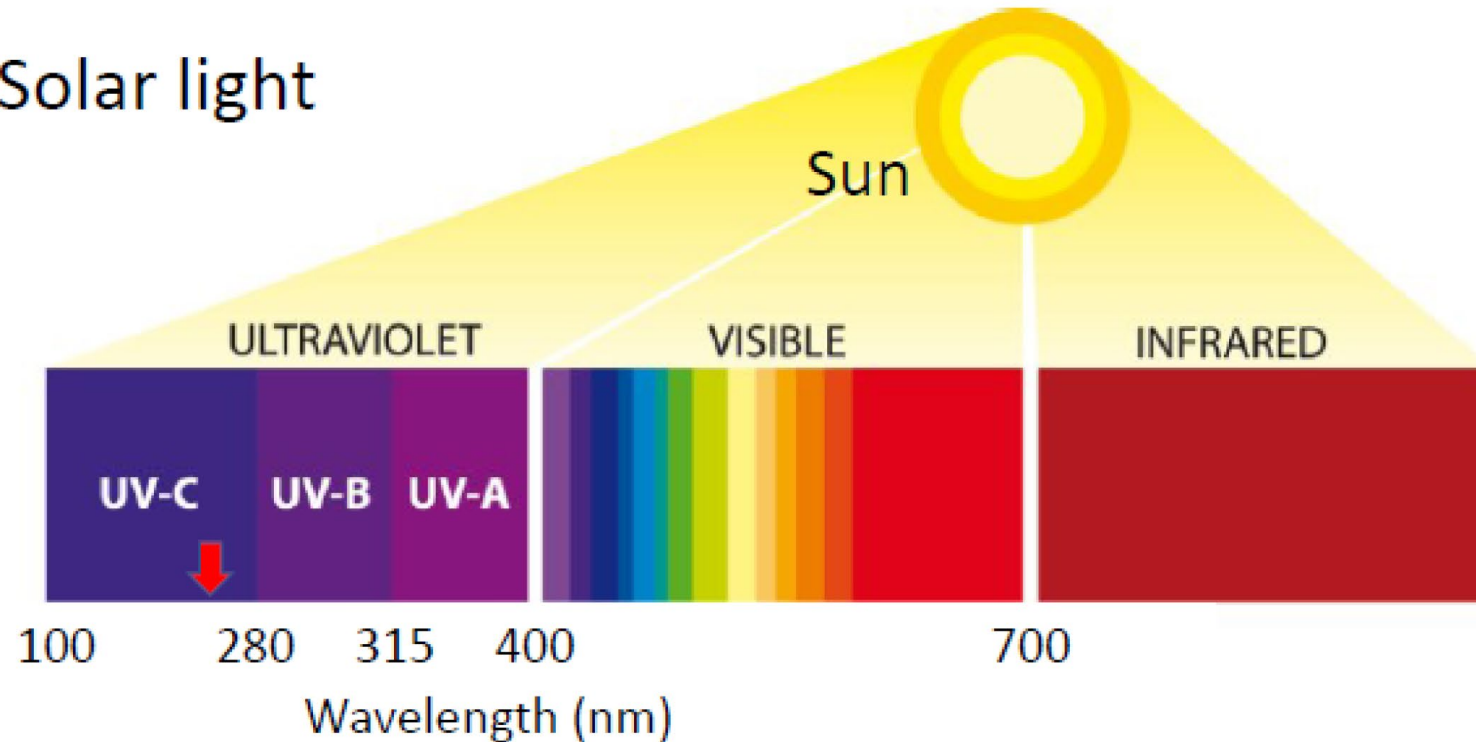


Sriyanka Lahiri

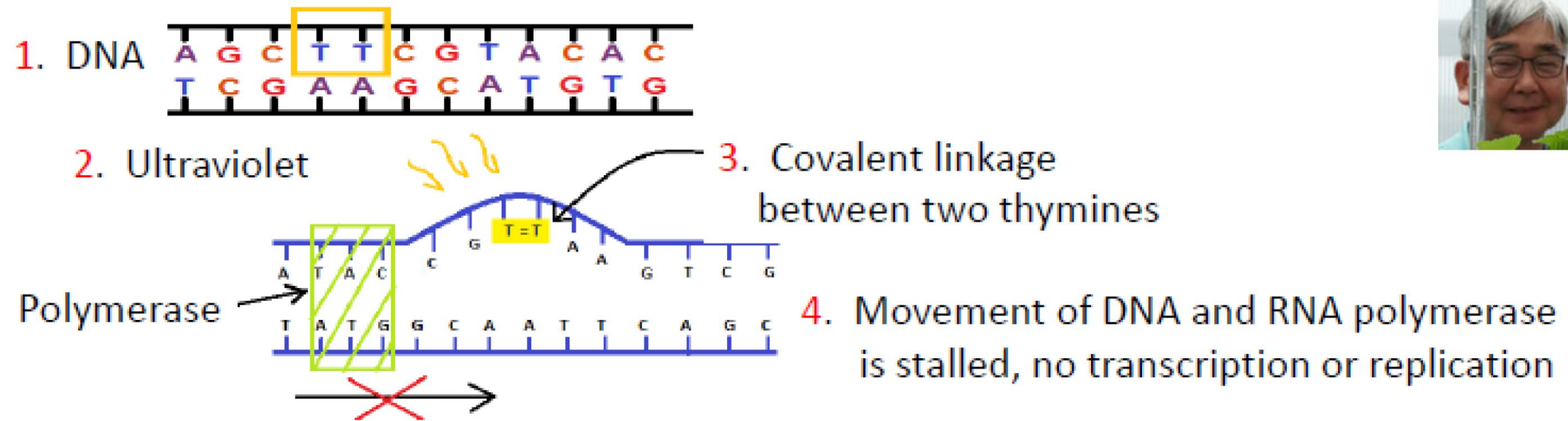




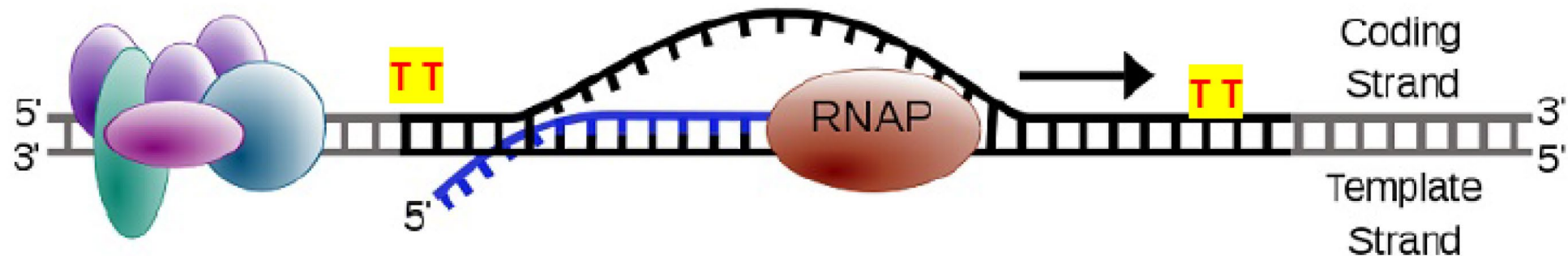
Solar light



- UV-A 315-400 nm Long-wave, not absorbed by ozone layer
- UV-B 280-315 nm Medium-wave, mostly absorbed by the ozone layer
- UV-C 100-280 nm Short-wave, germicidal, completely absorbed by the ozone layer and atmosphere



Microorganisms have the ability to repair UV-caused DNA damage with its own light-activated enzyme called **photolyase**





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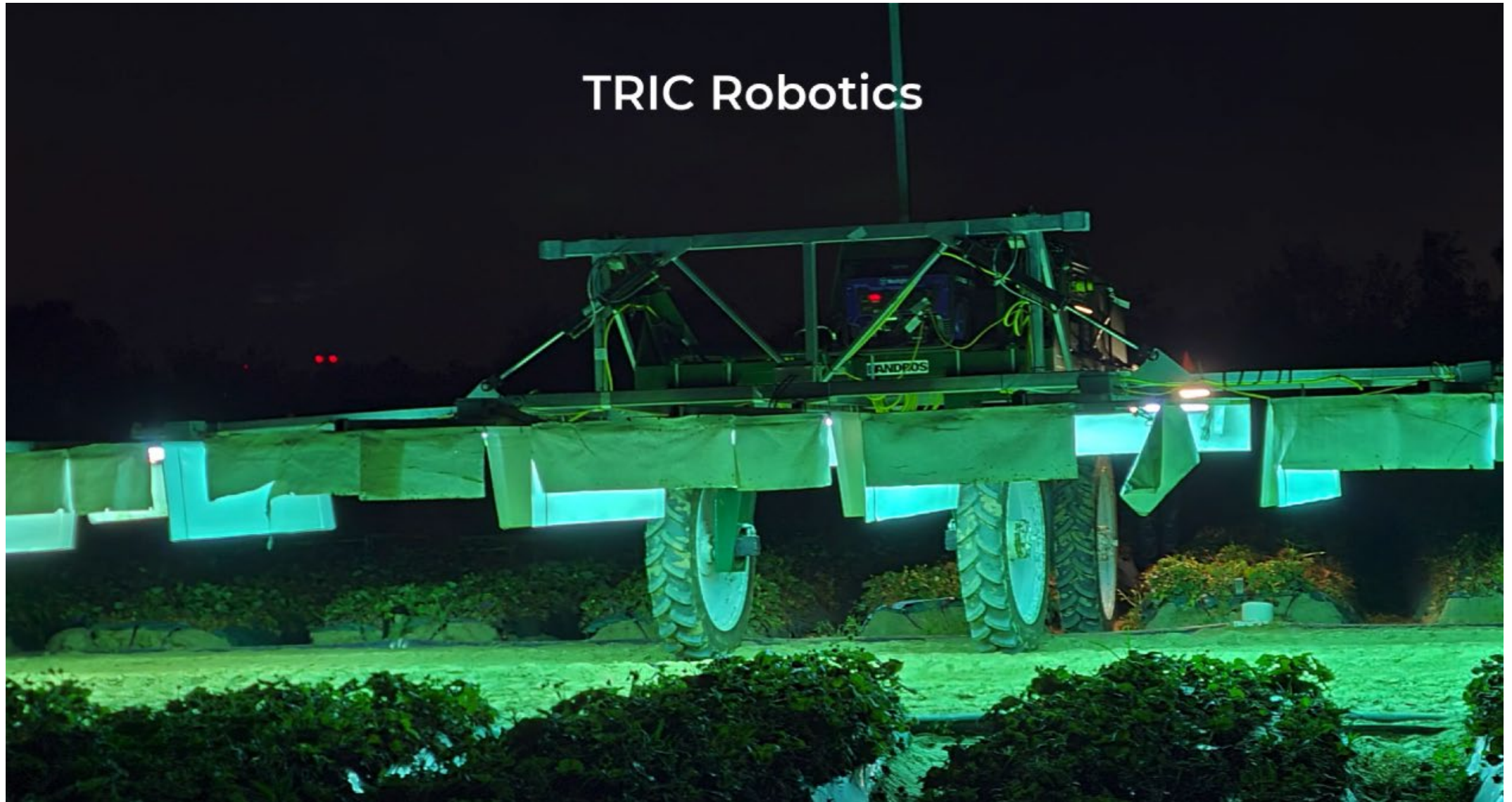






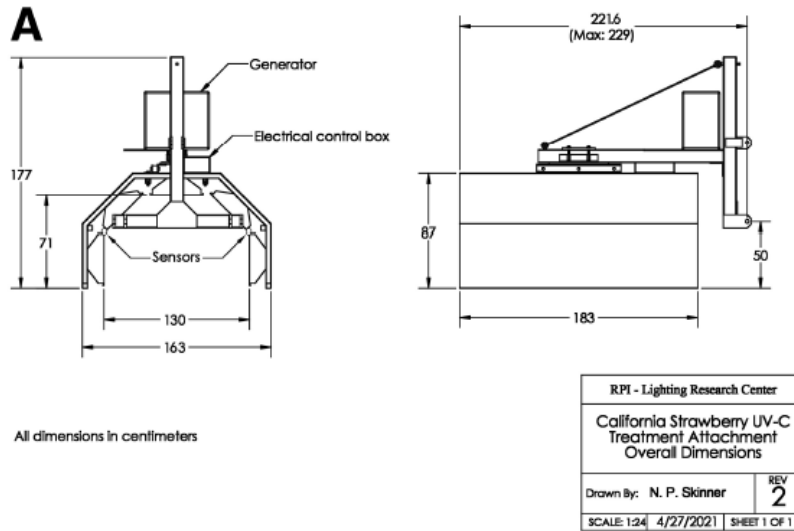


TRIC Robotics

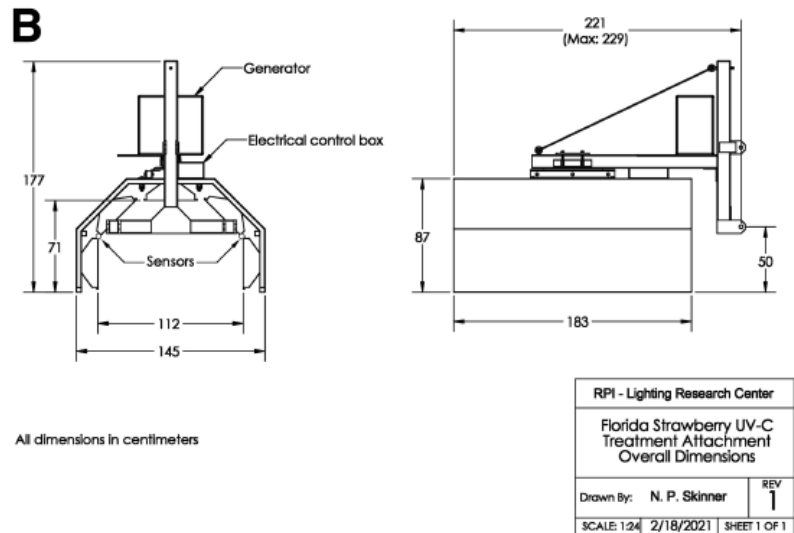


Saga Robotics





All dimensions in centimeters



All dimensions in centimeters

FIGURE 1

Schematic and dimensions of devices used in UV-C applications to strawberry beds at field trial sites in Santa Maria, California (A), and Plant City, Florida (B).

Build Cost = \$8,700/bed
@ 200 J/m² twice weekly
7 beds/30 acres

Paulo P. Mello, Rodrigo B. Onofre, Mark Rea,
Andrew Bierman, David M. Gadoury, Kelly
Ivors, Miranda Ganci, Jenny C. Broome, and
Natalia A. Peres

<https://doi.org/10.1094/PHP-01-22-0002-RS>



[Occupational Safety & Health Standards Board](#) | Petition File No. 596:

Petition File No. 596:






Title 8, General Industry Safety Orders, Section 3441(b)

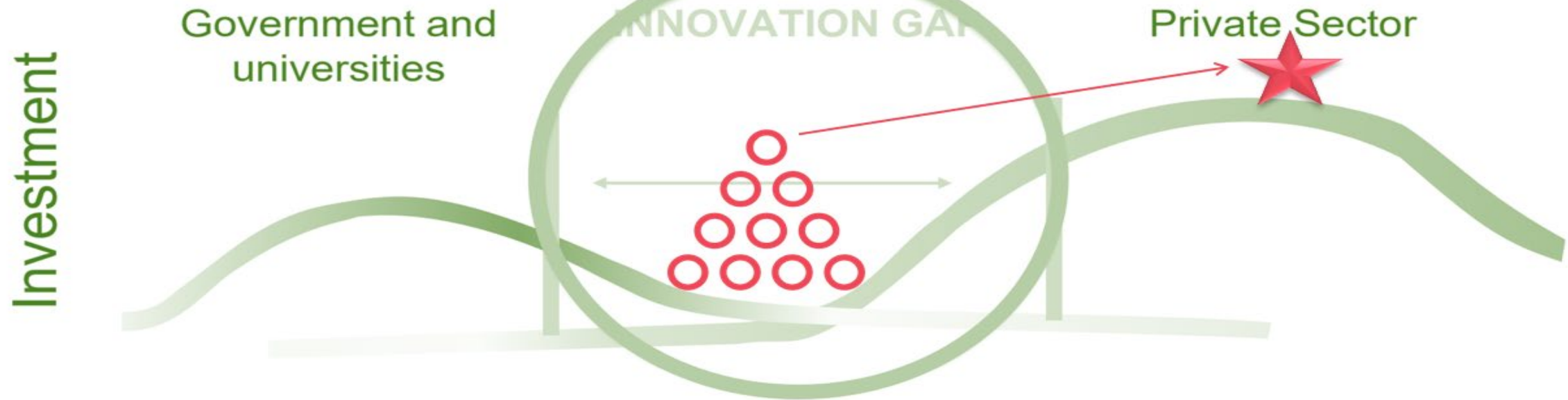
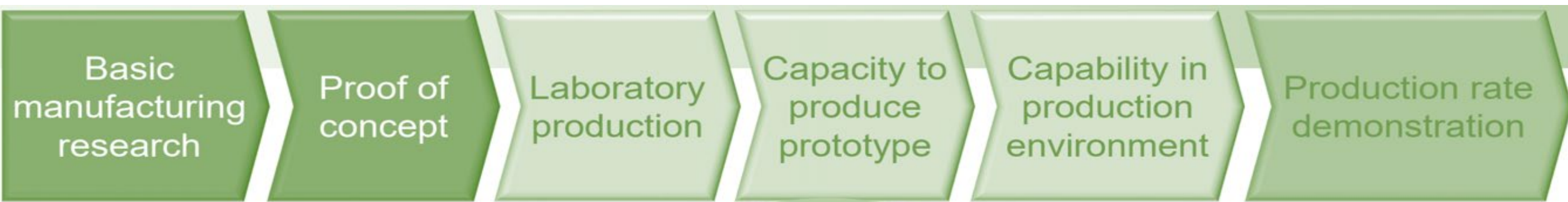
[Petition File No. 596](#)

Praveen Penmetsa

Jake Winters

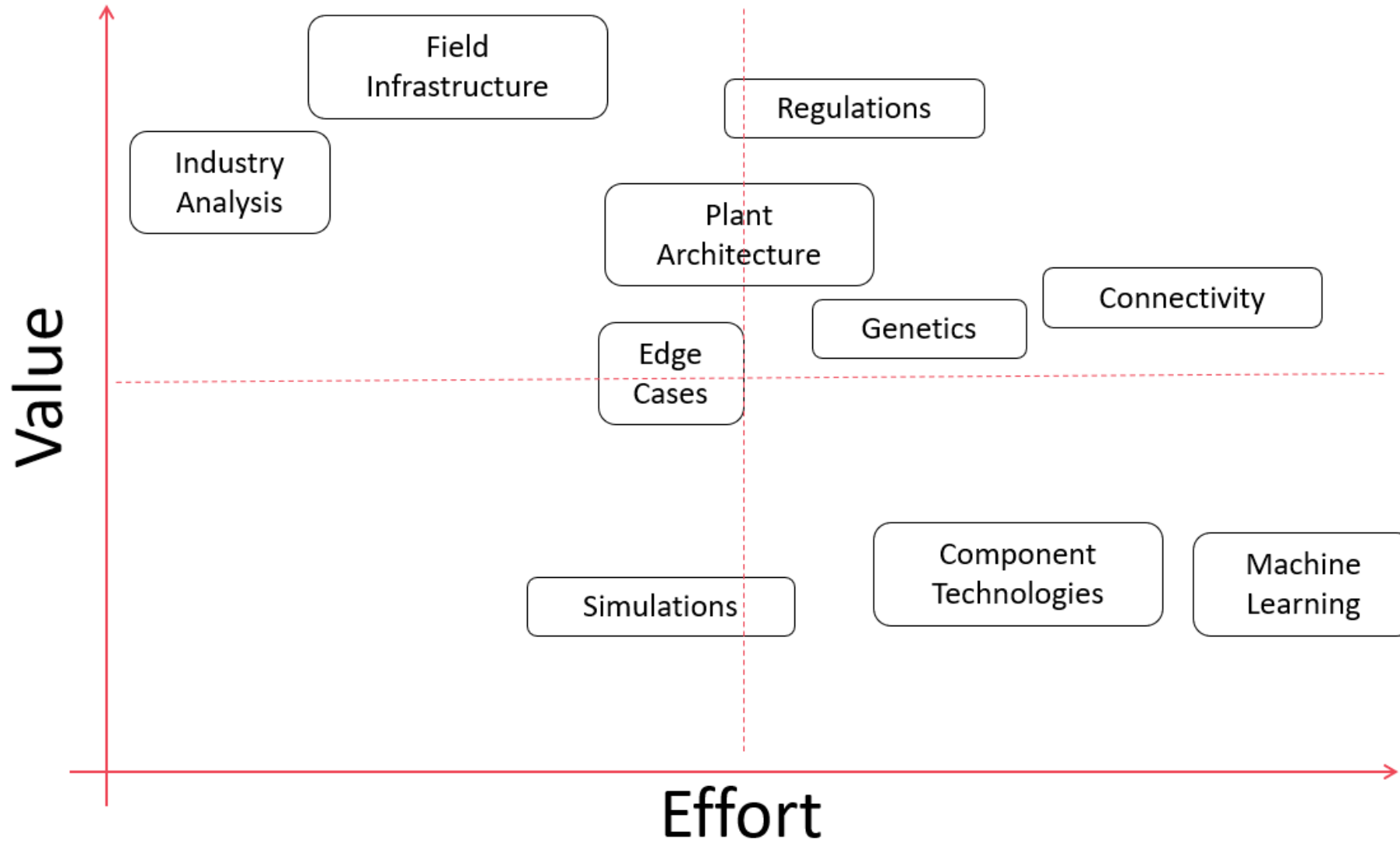
To amend Section 3441(b) to permit the use of highly automated and autonomous agricultural equipment. The proposed amendment would allow for the use of driver optional tractors without a human operator stationed at the vehicular controls within a strict set of safety guidelines.

- [Petition 596](#) 
- [Proposed decision](#) 
- [Staff evaluation](#) 
- [Cal/OSHA evaluation](#) 
- [Adopted decision](#) 

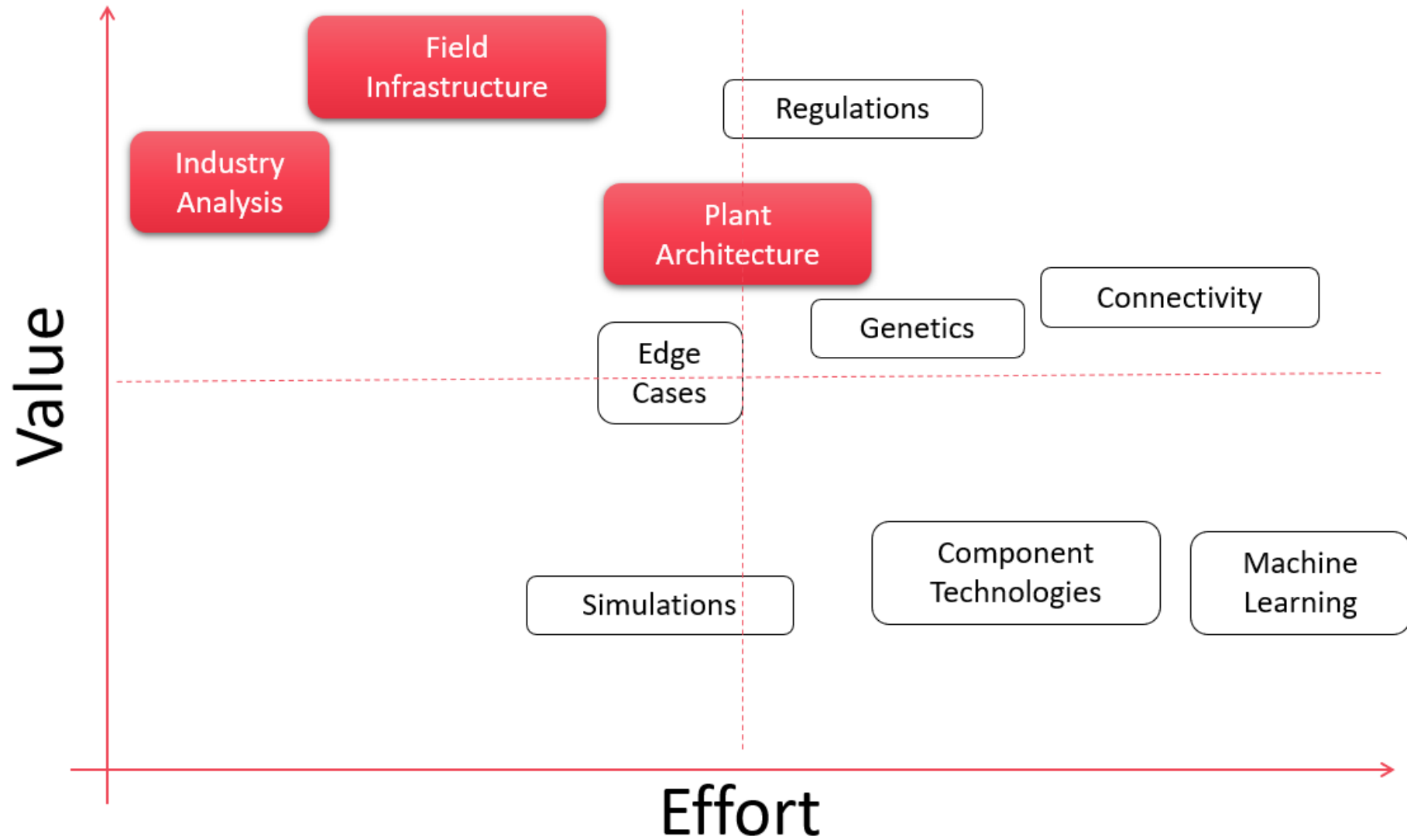


HOW TO FILL THE INNOVATION GAP FOR UV-C PEST & DISEASE MANAGEMENT?

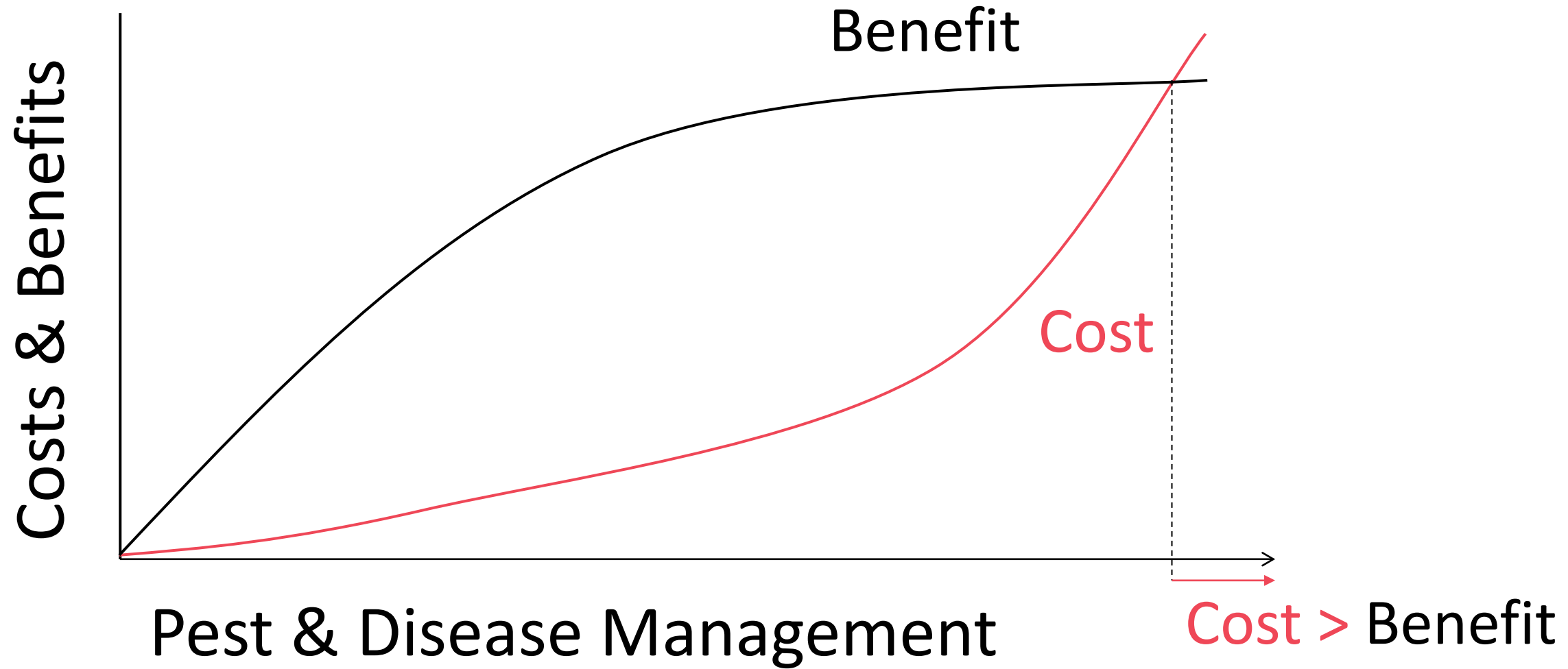
Priority Matrix



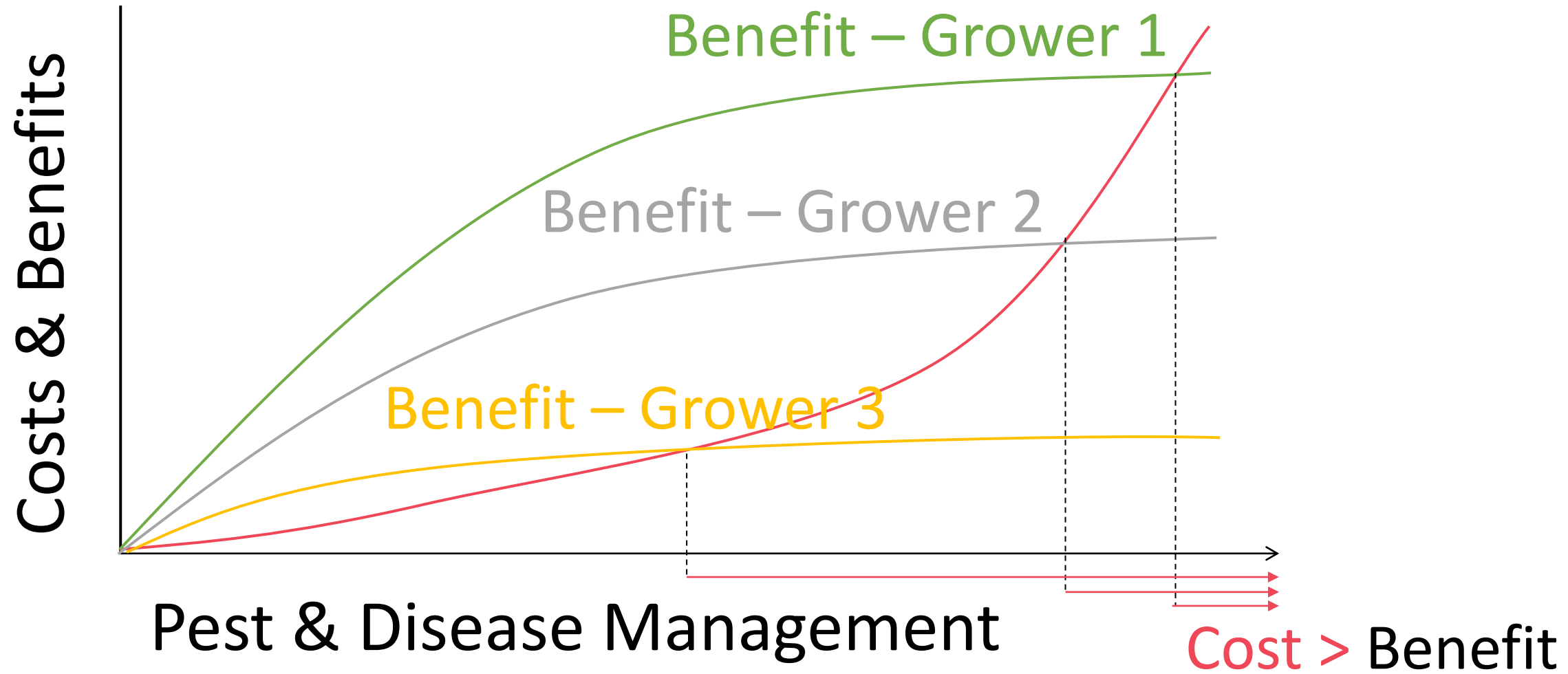
Priority Matrix



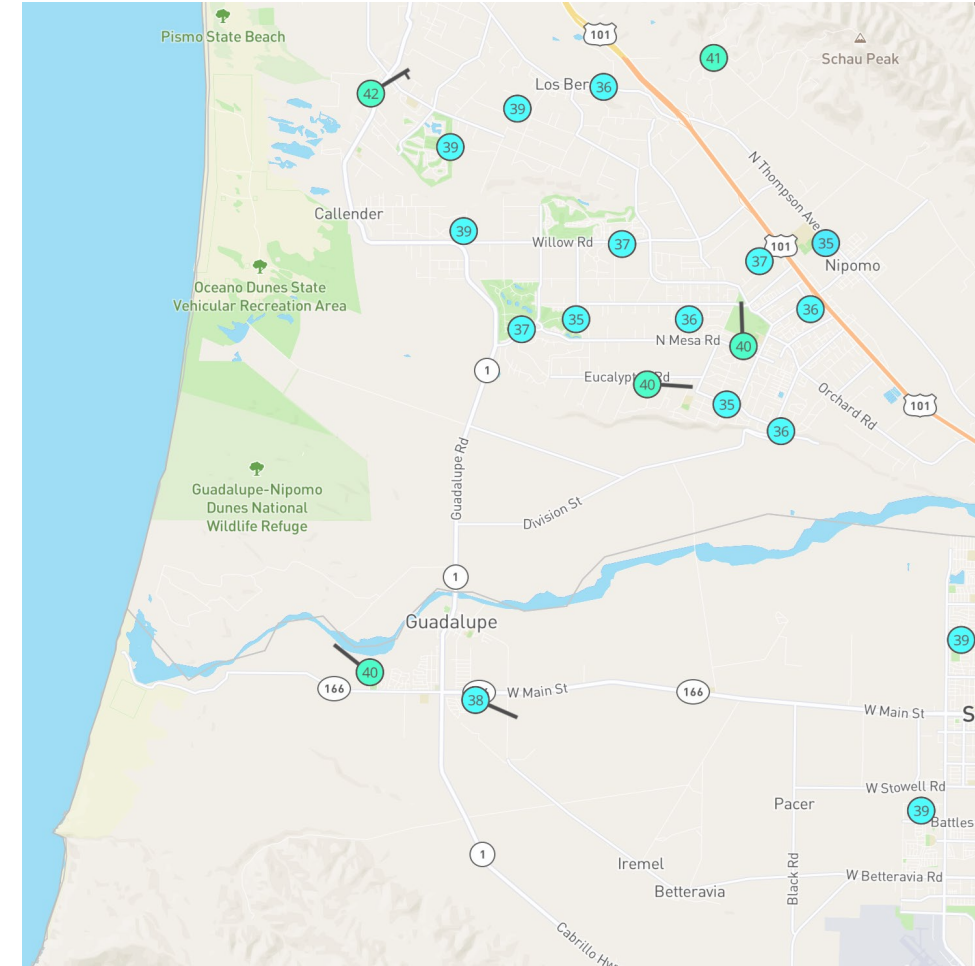
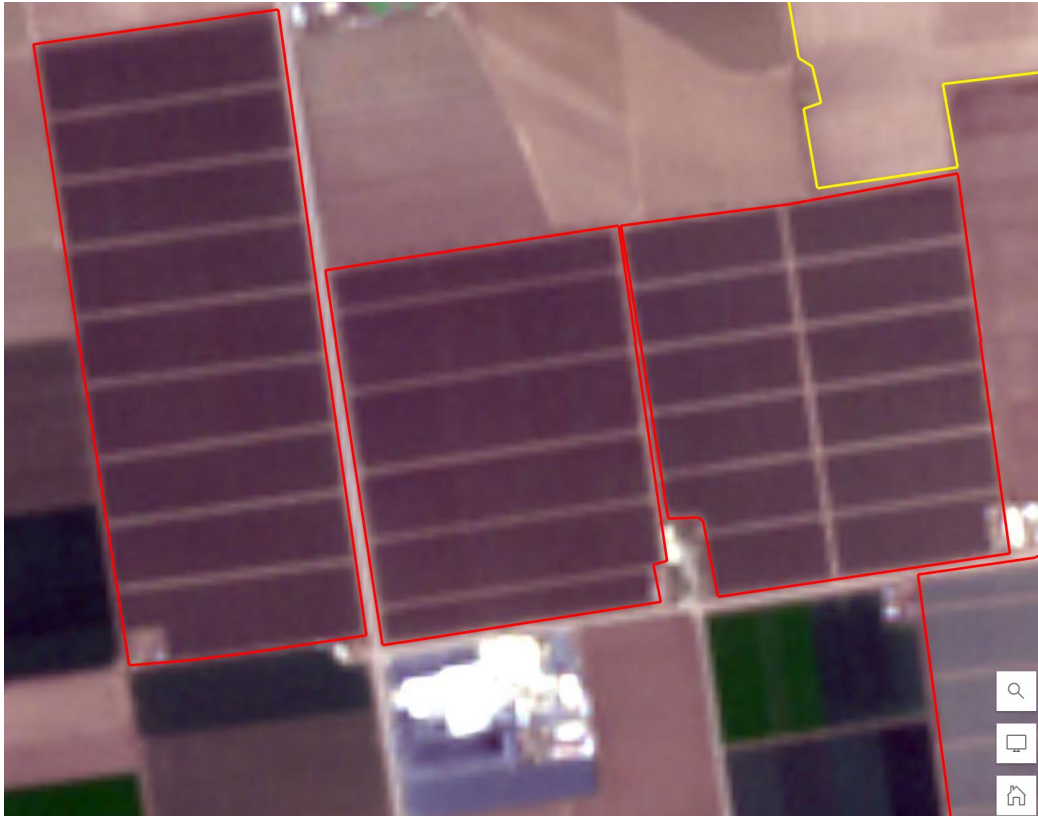
Industry Analysis



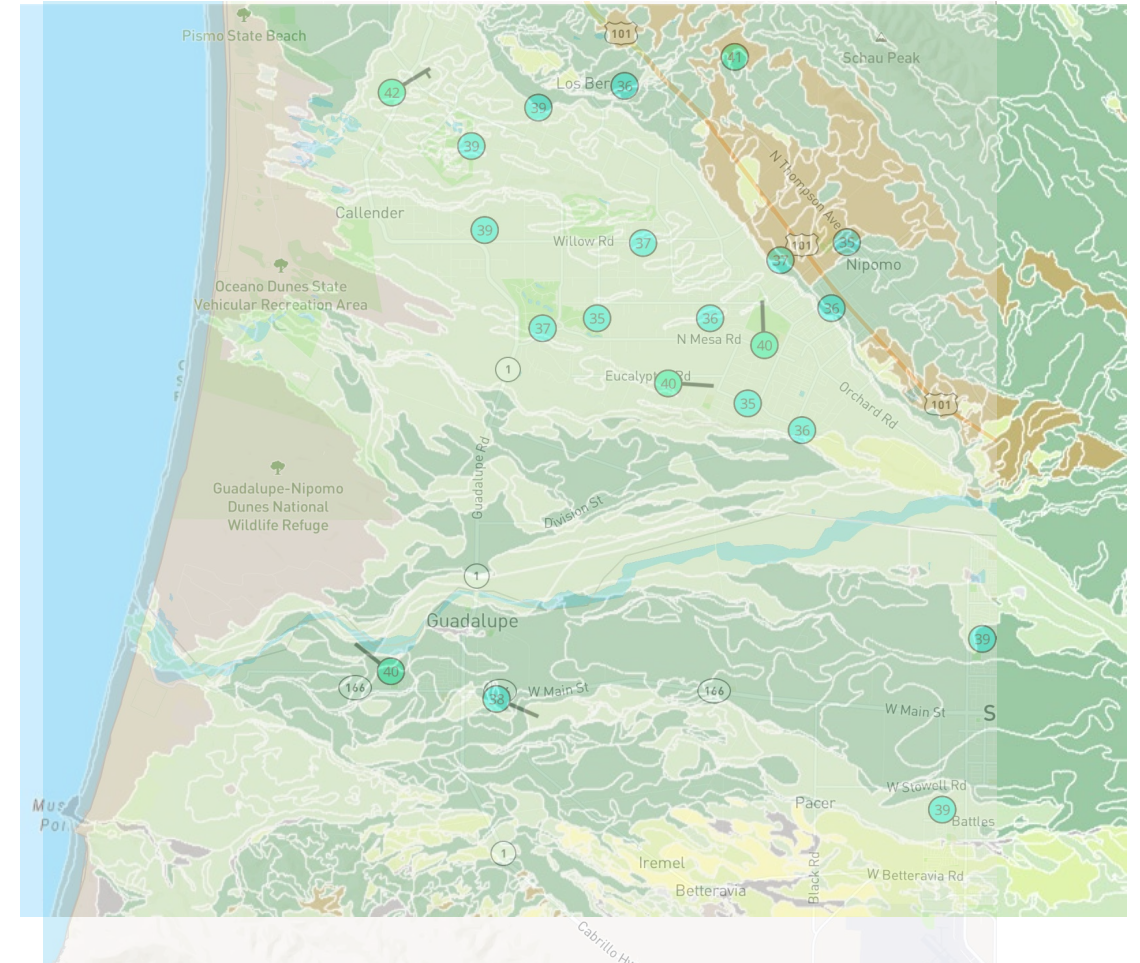
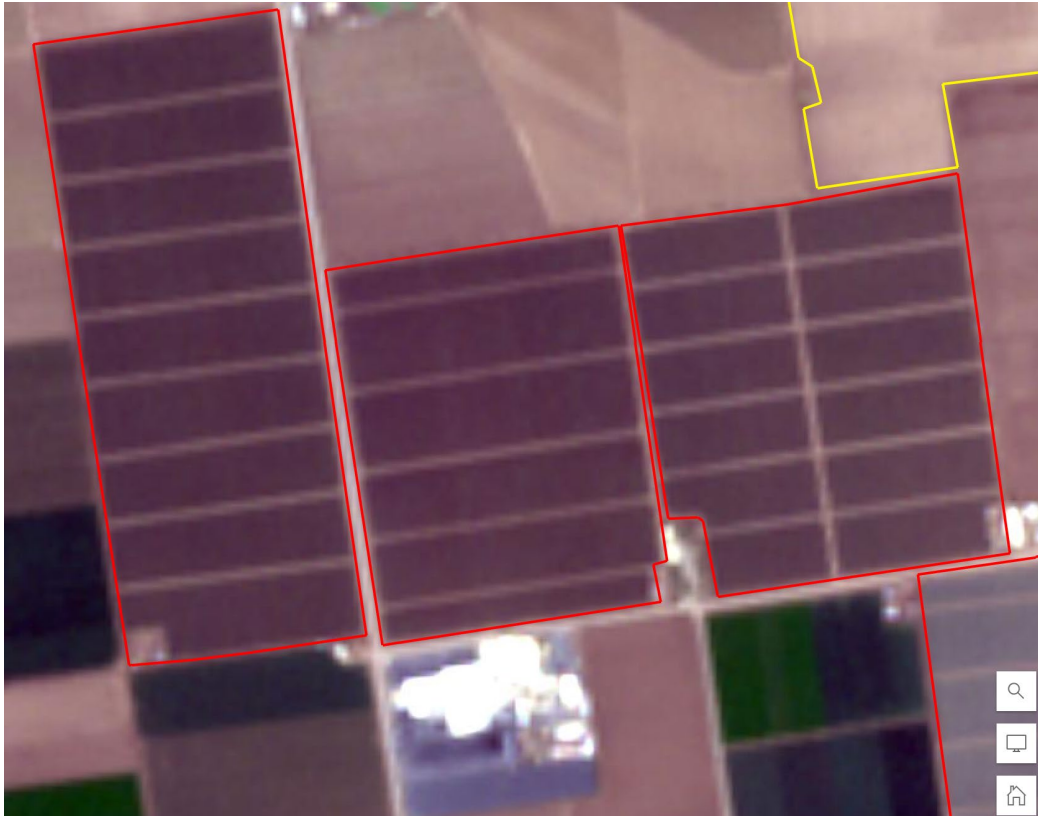
Industry Analysis



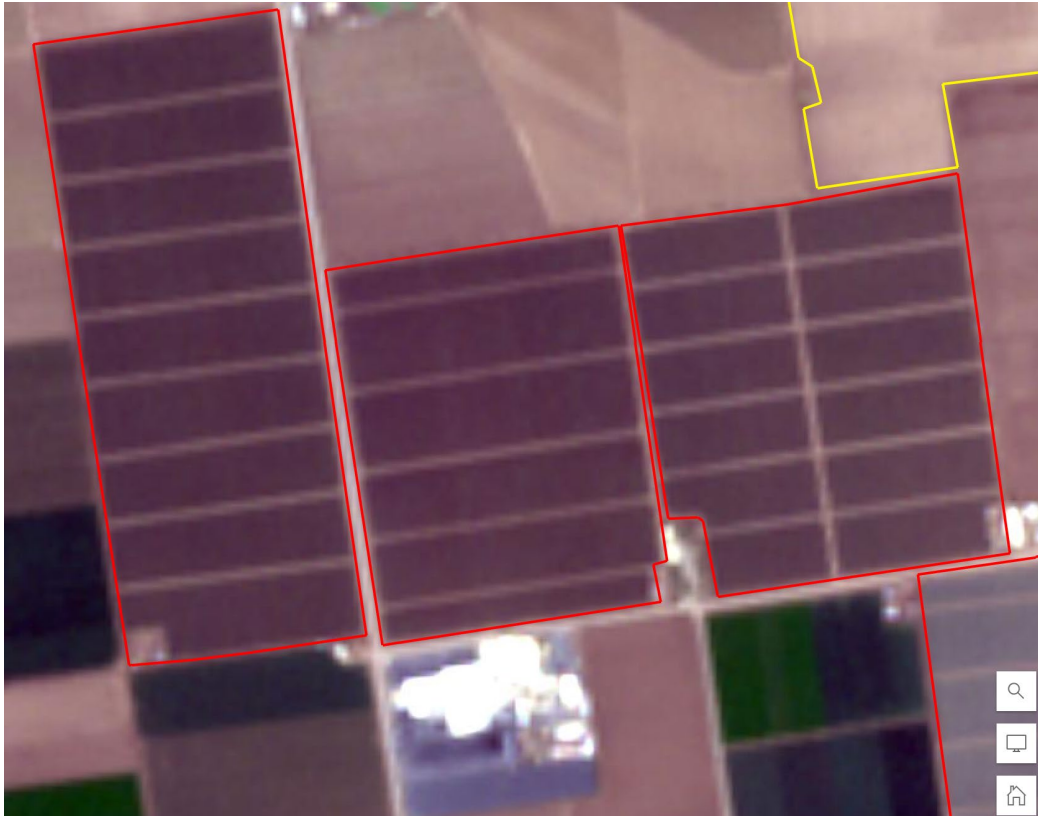
Field Infrastructure – Microclimate



Field Infrastructure – Soil Type



Field Infrastructure – Inclination



Field Infrastructure



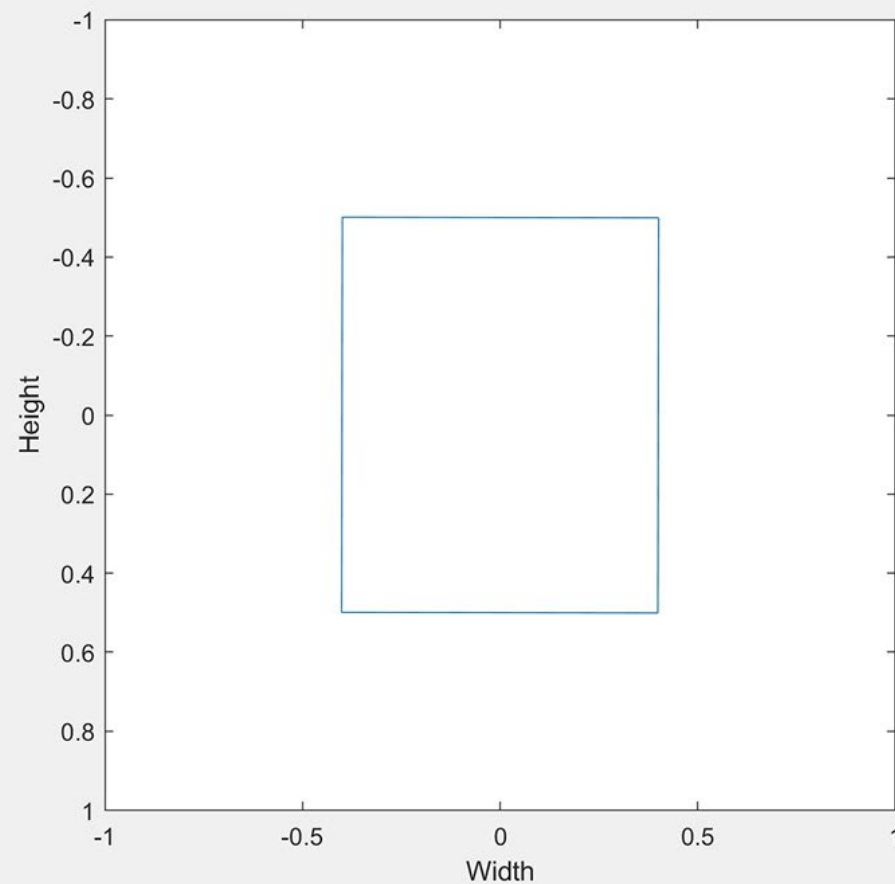
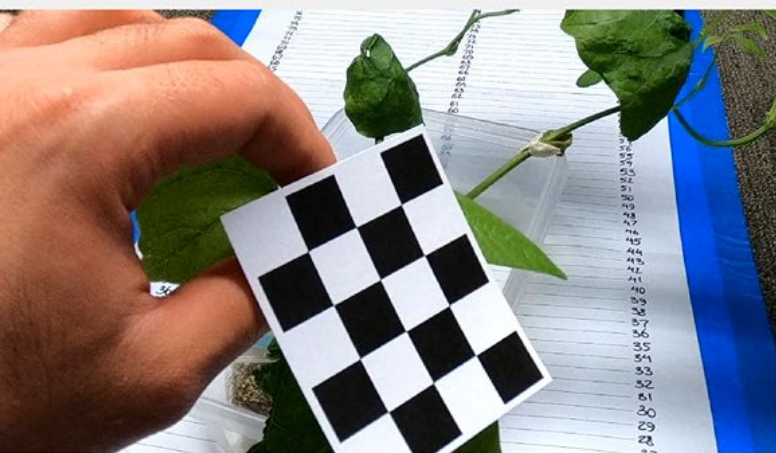
**Challenges: Tall rows, sprinklers,
drainage ditches**



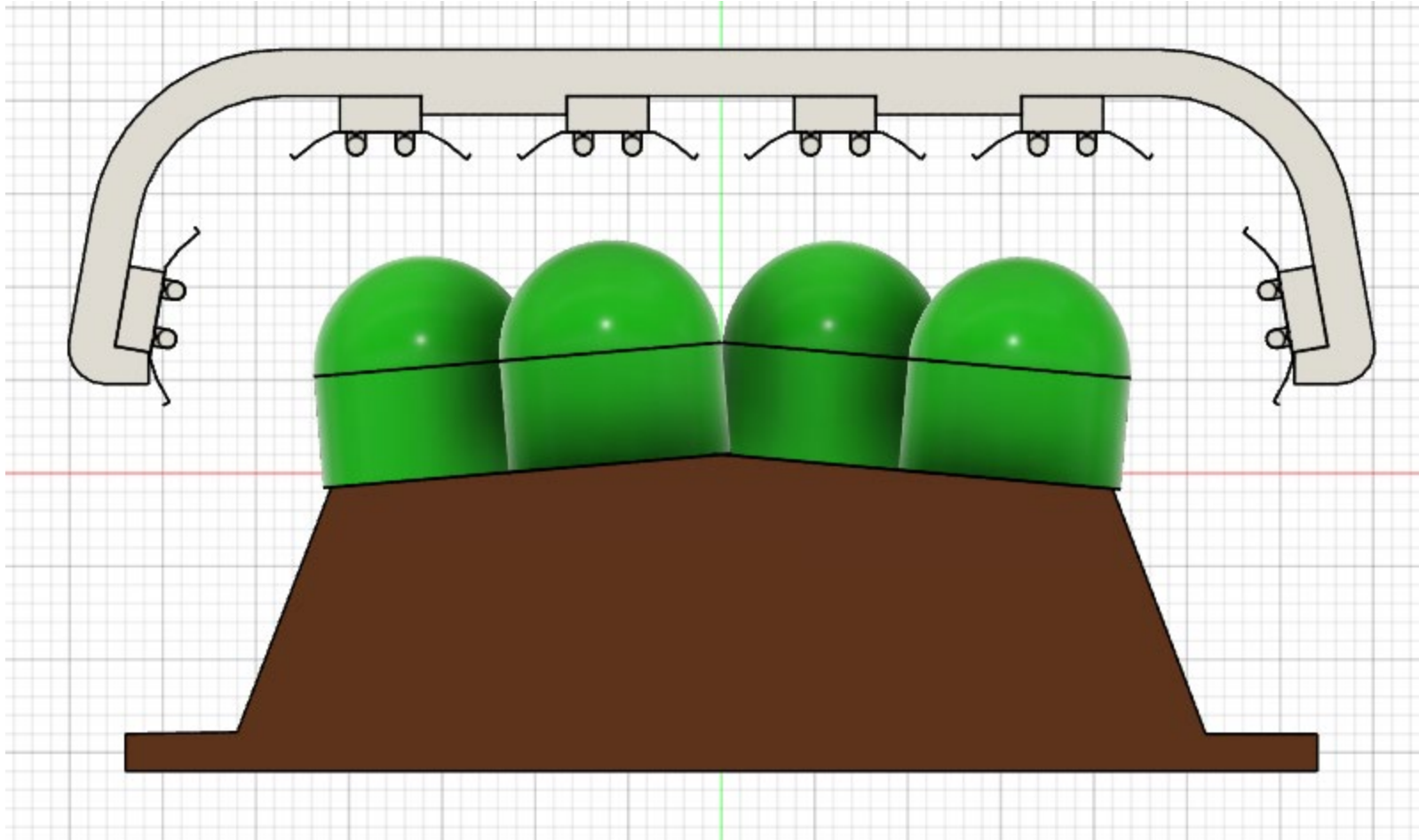
**Challenges: Steep hill, security,
drainage ditches**



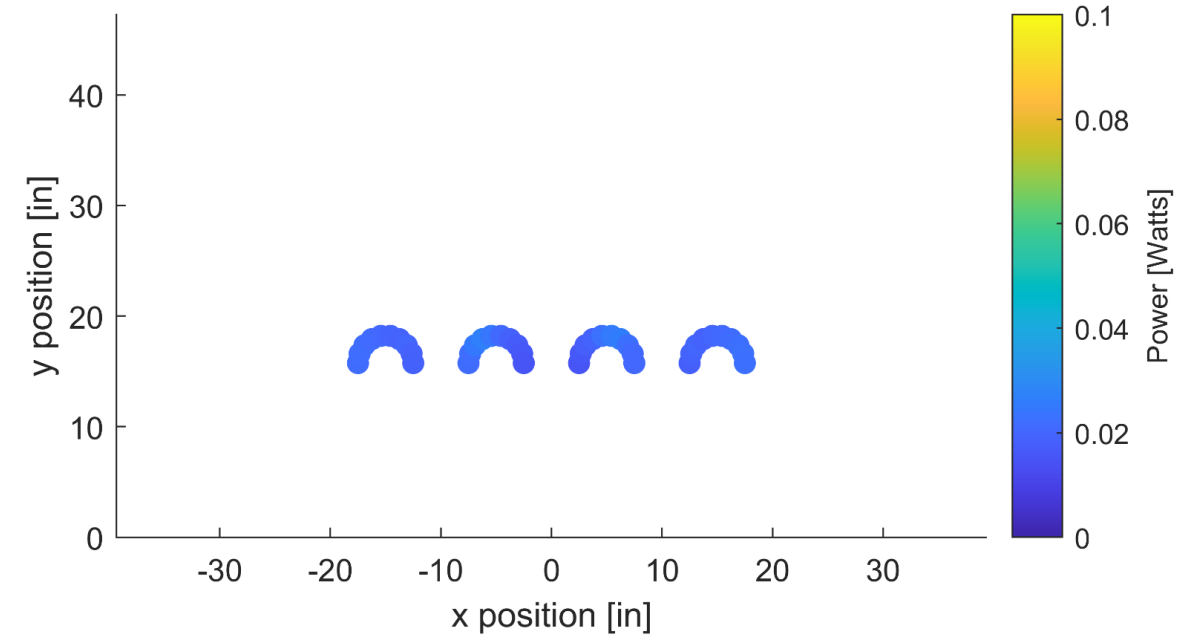
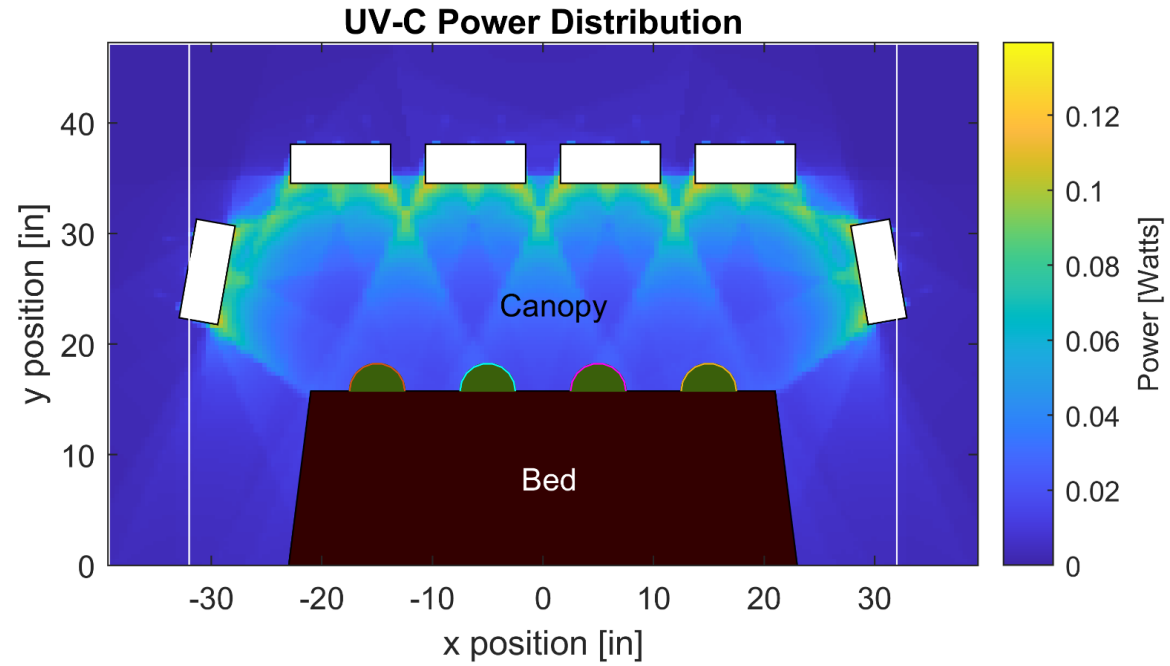
Plant Architecture



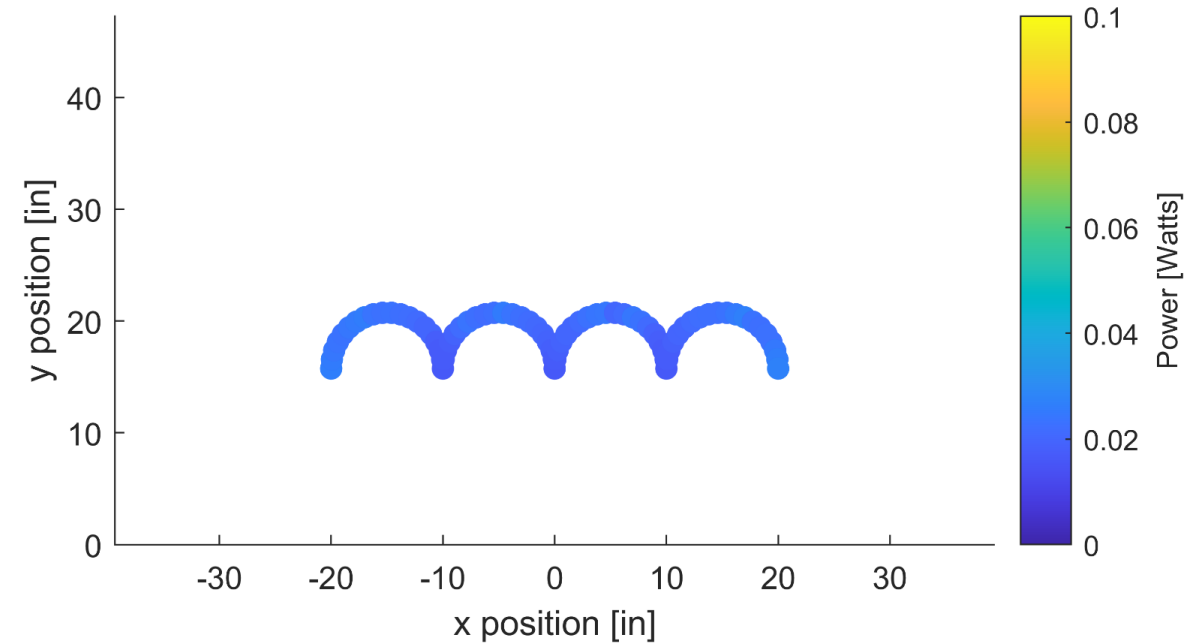
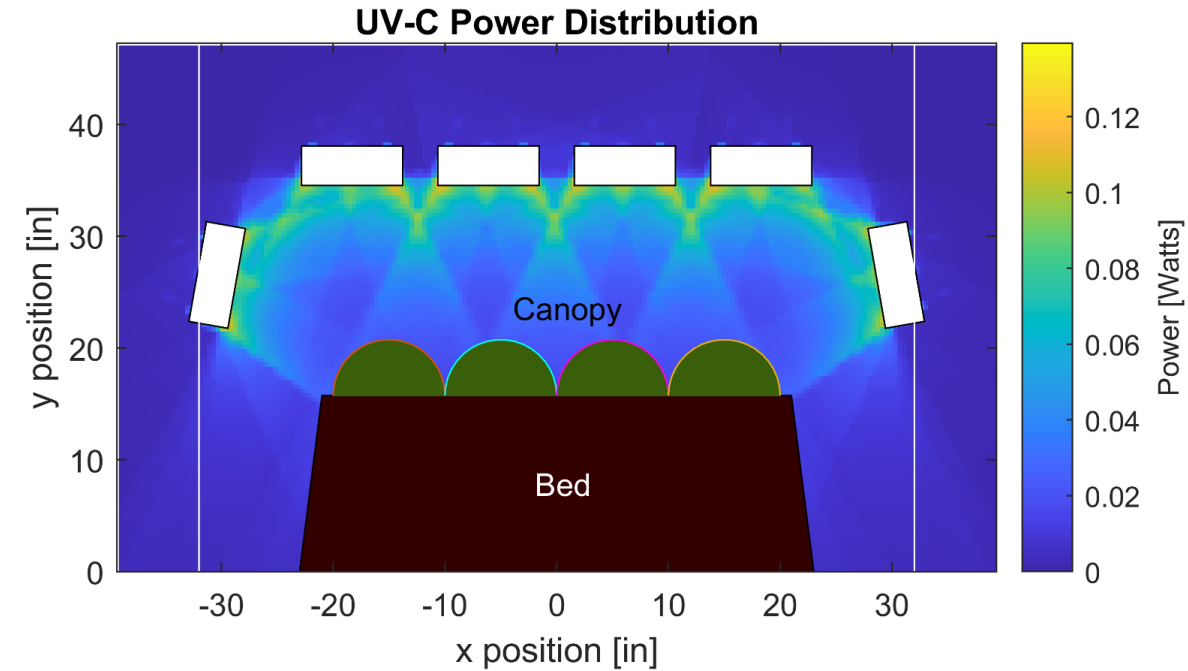
Plant Architecture



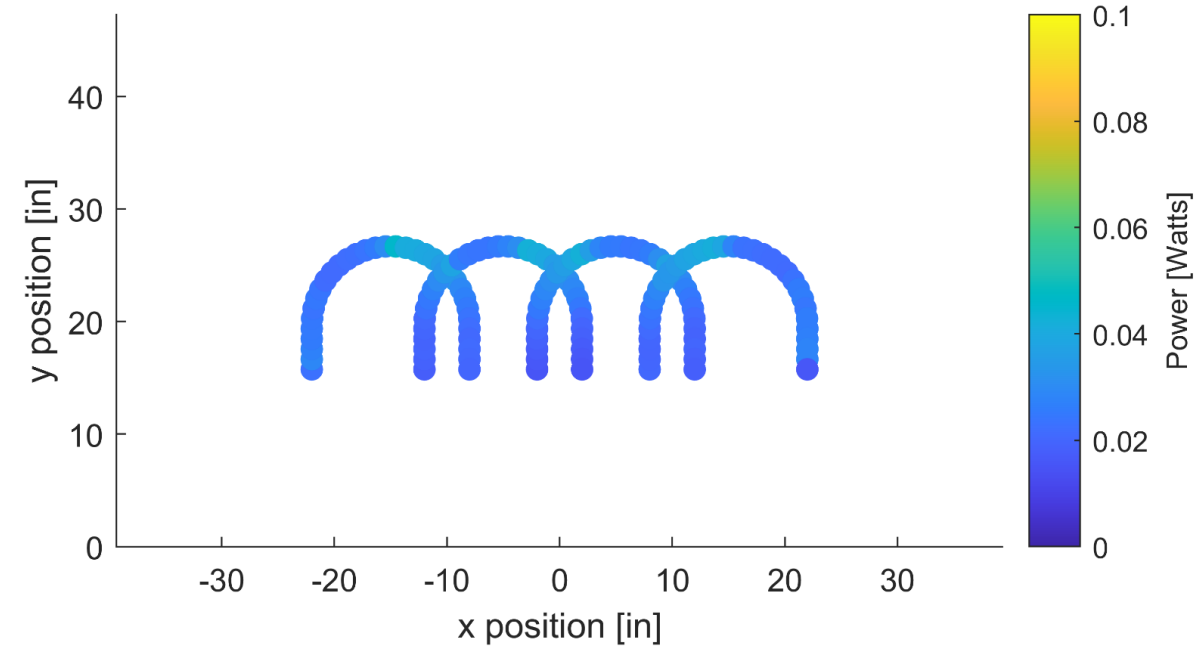
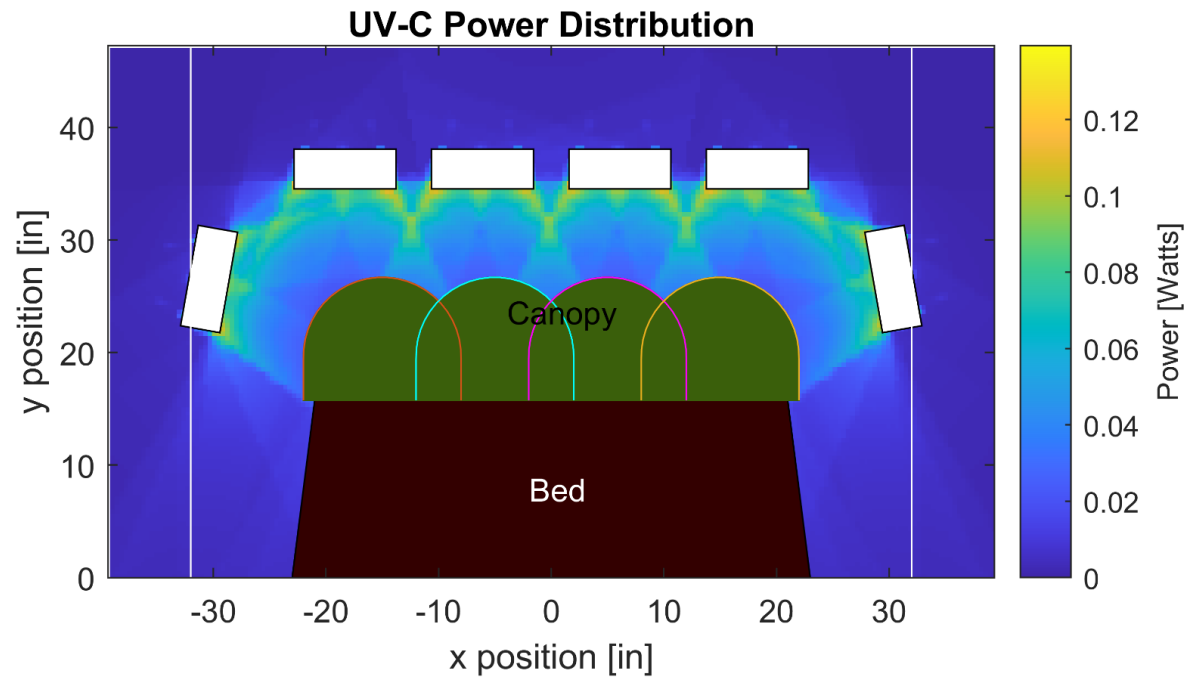
Plant Architecture



Plant Architecture

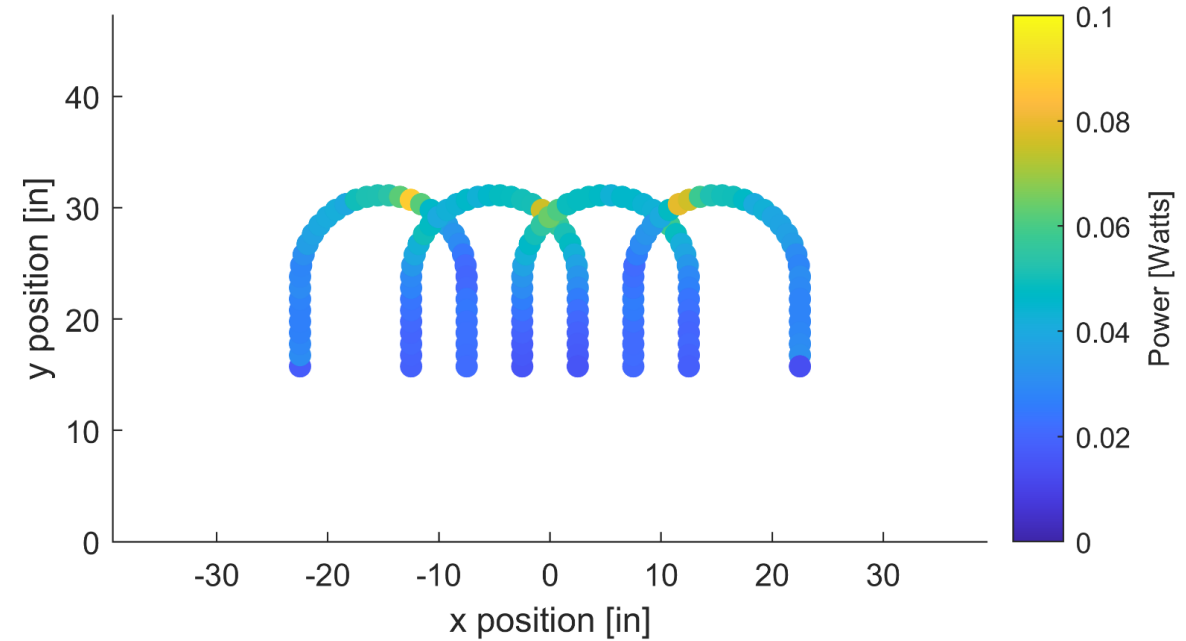
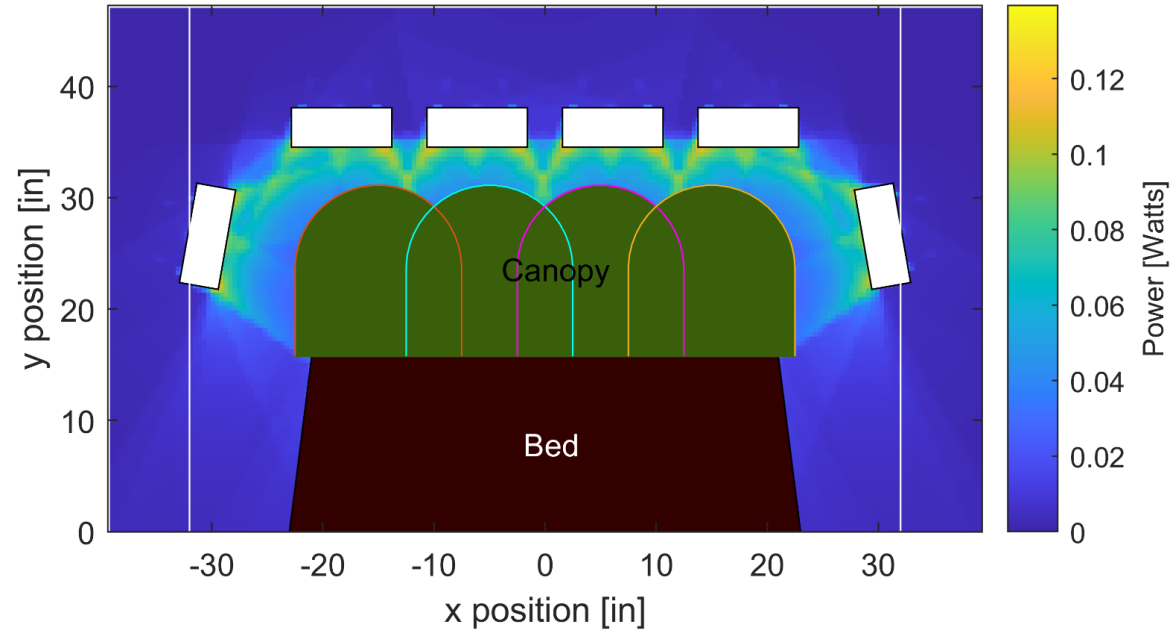


Plant Architecture

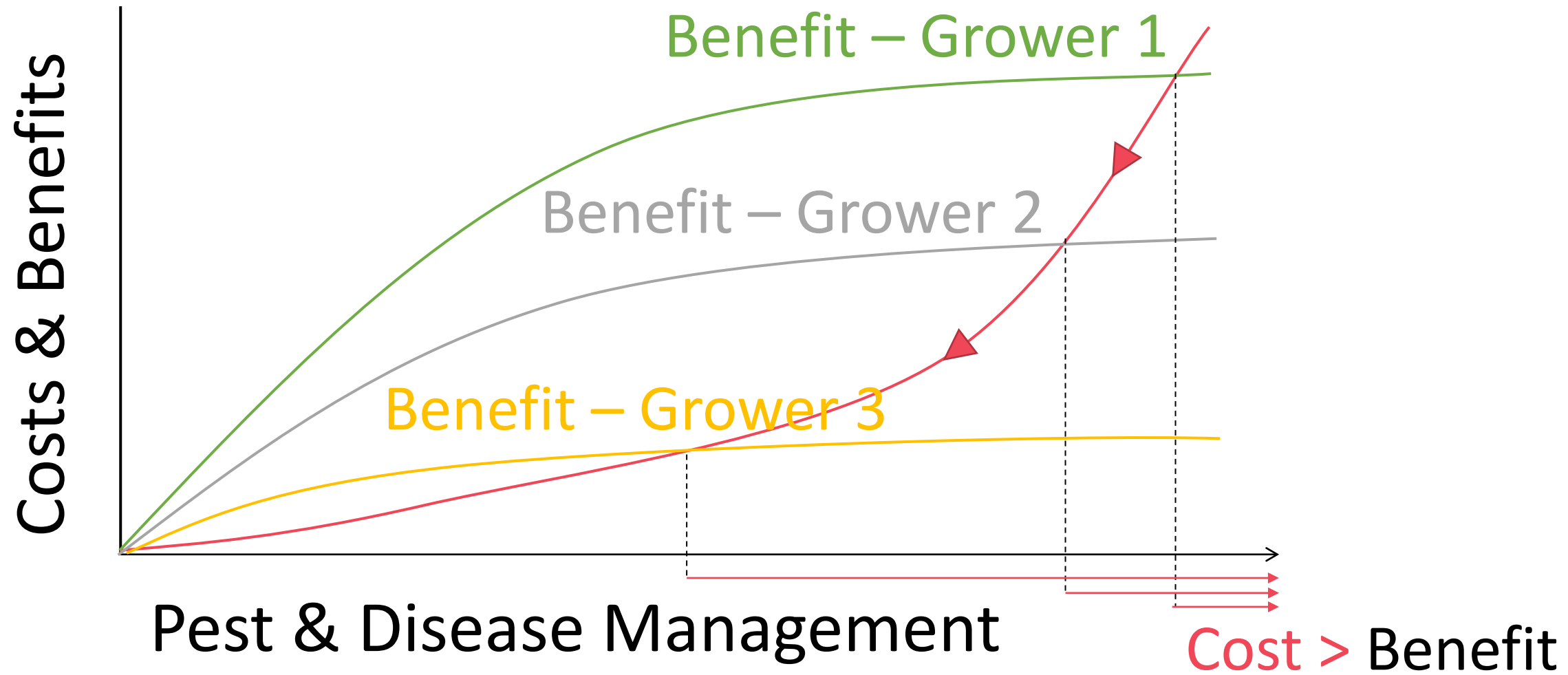


Plant Architecture

UV-C Power Distribution



Economies Of Scale





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