



The Use of Heat Treatment for Managing Disease

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Heat Treatment

- ▶ In agriculture, heat is a therapeutic used to treat latent pathogen infection and/or insect infestation
- ▶ Hot water treatment is the most common method of applying heat
- ▶ In strawberry, Buchner (1991) was the first to publish a hot water treatment for managing cyclamen mite
- ▶ Delayed growth, reduced flowering, and the potential for pathogen spread makes HWT less than ideal

Heat Treatment

▶ Aerated steam is a better alternative

▶ Advantages

- Has fewer adverse horticultural effects on plants than HWT
- Effective at reducing a number of pathogens
- Pathogens are not known to develop resistance to heat
- With a properly designed unit, the potential to treat tens of thousands of plants

▶ Disadvantages

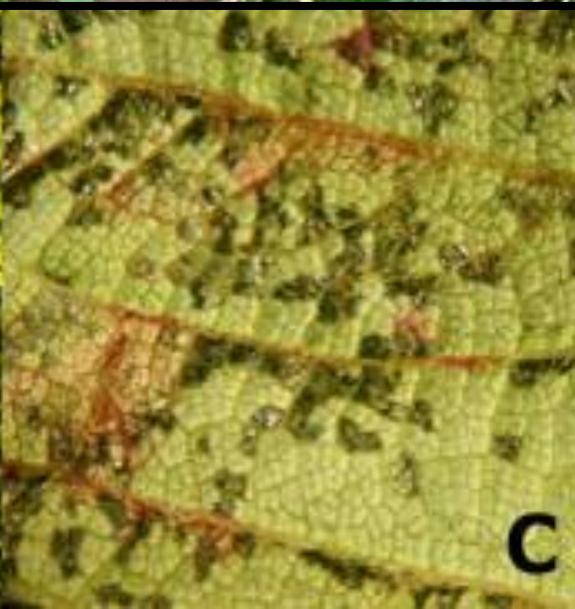
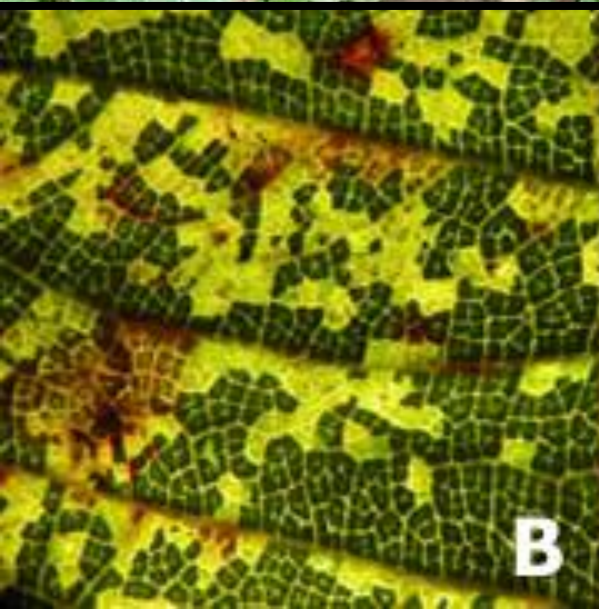
- Treatment times take 6–8 hours
- Treatment application requires specialized units
 - In the planning process...
- Possible adverse affects on the “good” microbes

Angular leaf spot

- ▶ **Caused by a bacterium *Xanthomonas fragariae***
 - Strawberry is the only known host for the bacterium
 - No commercial cultivars are fully resistant to *Xf*
- ▶ **Sources of inoculum**
 - Endo/epiphytically on petioles, leaves & crowns
 - Bacterium resistant to desiccation
 - Systemically infected plants
 - Infected leaf tissue
 - A source of overwintering or oversummering inoculum
 - Bacteria do not survive free in the soil
- ▶ **Nursery plants are the most significant source of inoculum**



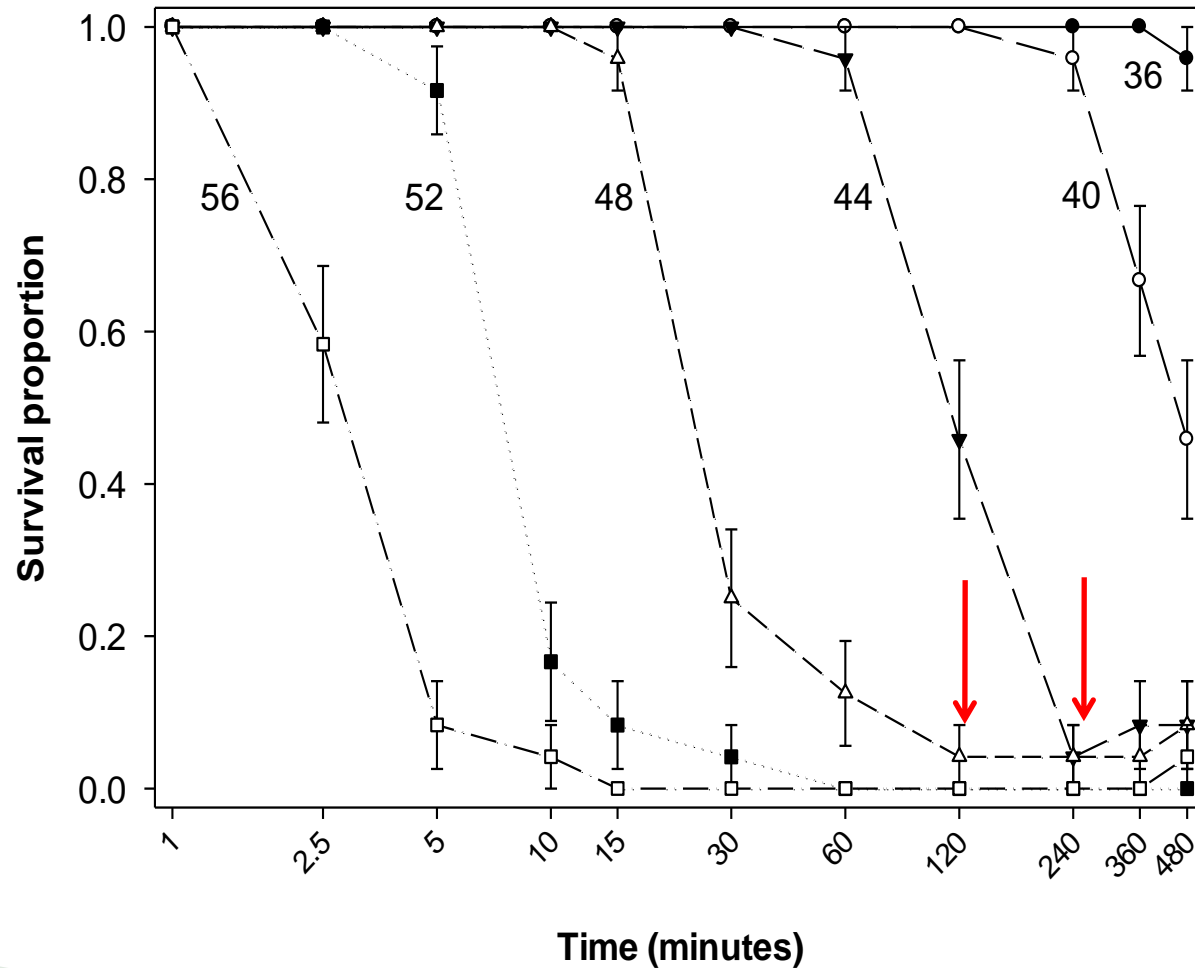
"black cap"



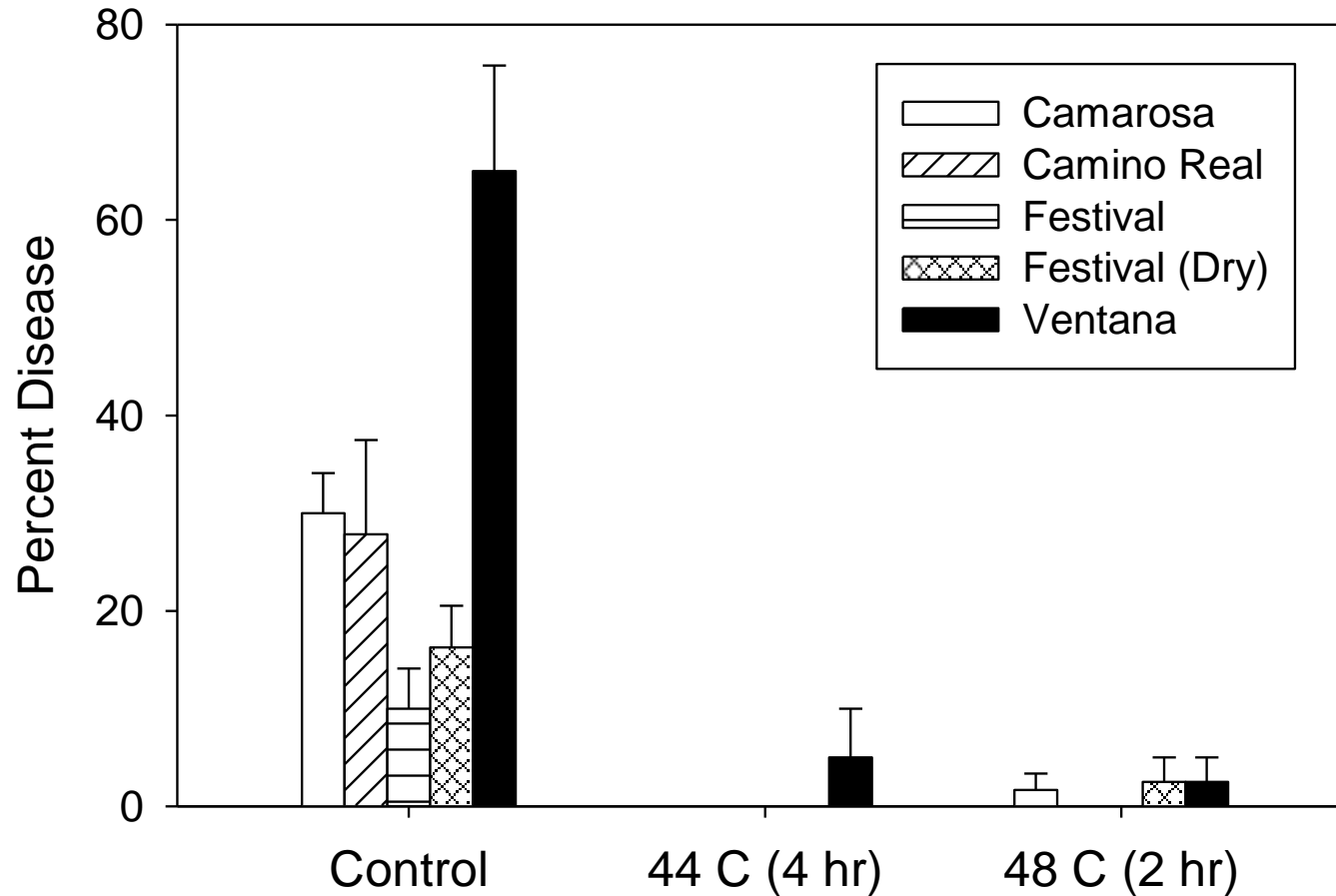
“Bacterial ooze”



Effect of Temperature on Survival of *X. fragariae*



Hot water treatment (field trial)







BC RECYCLING

5484

OPEN

1-800-961-9600

Service area





CRS13-384

WACKER
NEUSON

1 800 HIRE IT CAT Rental

G50
38 HW

3C RECYCLING

5484

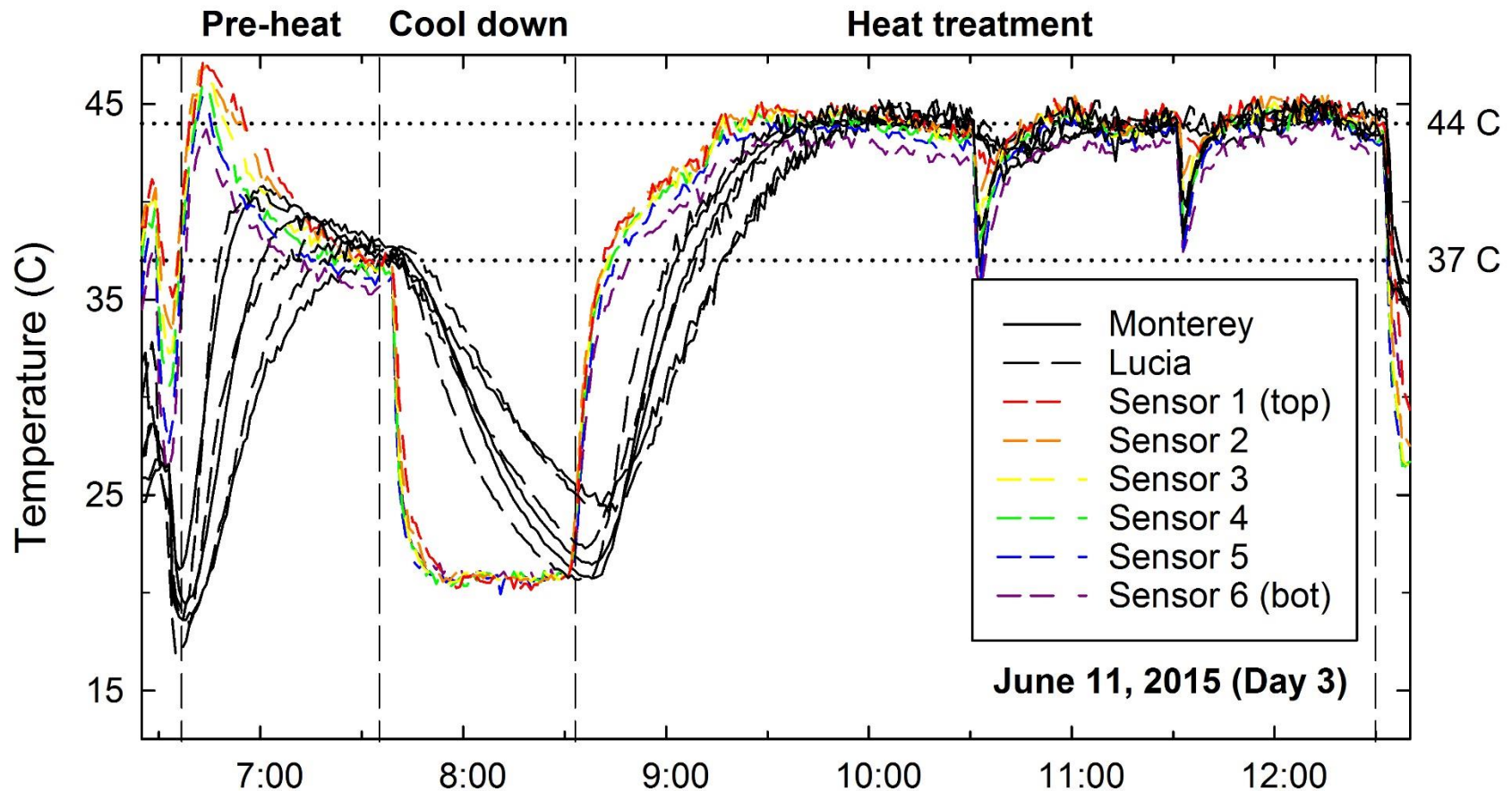
TITAN INDUSTRIAL
8000 High Performance







Plant sauna temperature profile (2015)



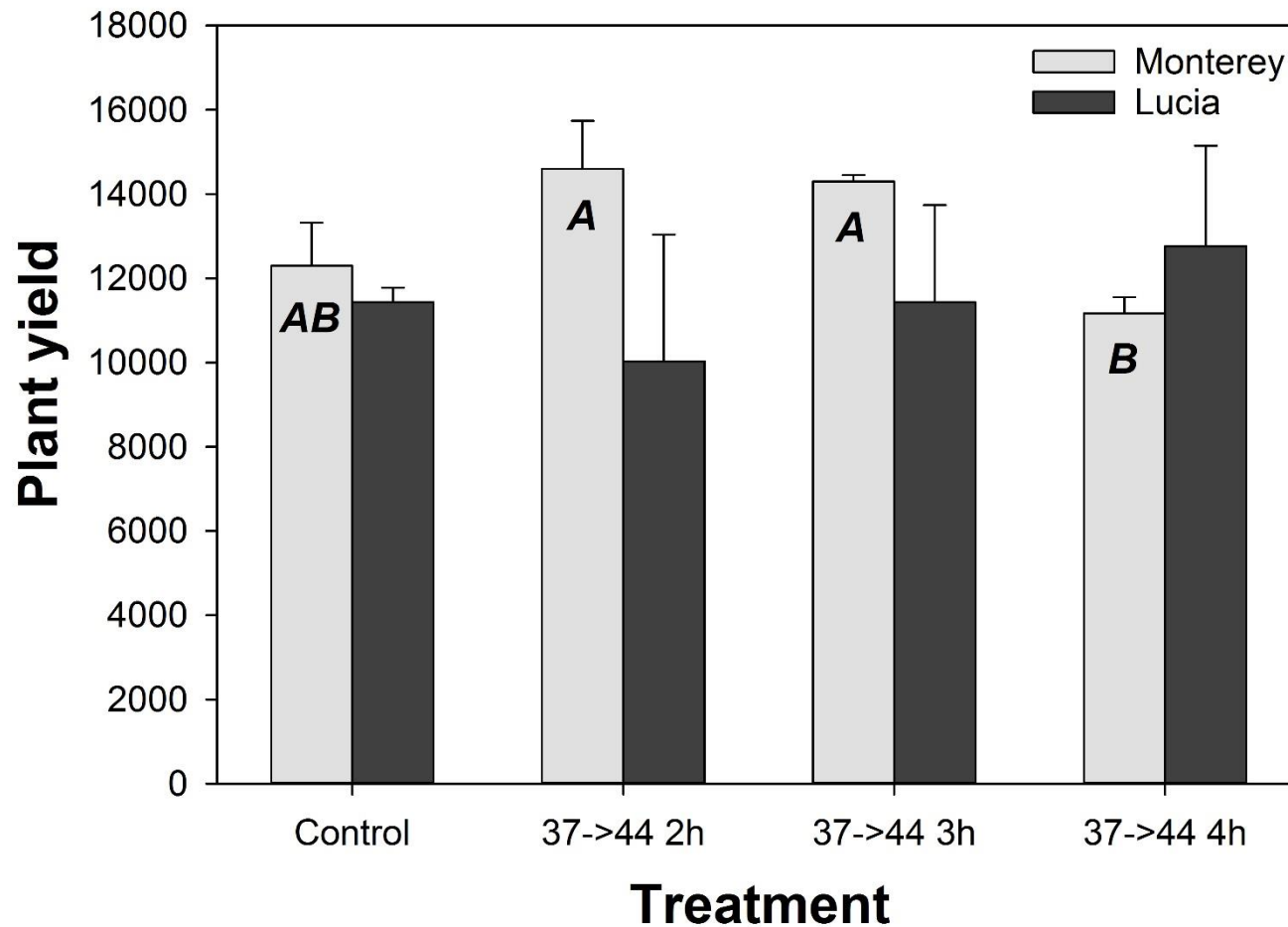
Manteca 2015 (early)



Manteca 2015 (late)



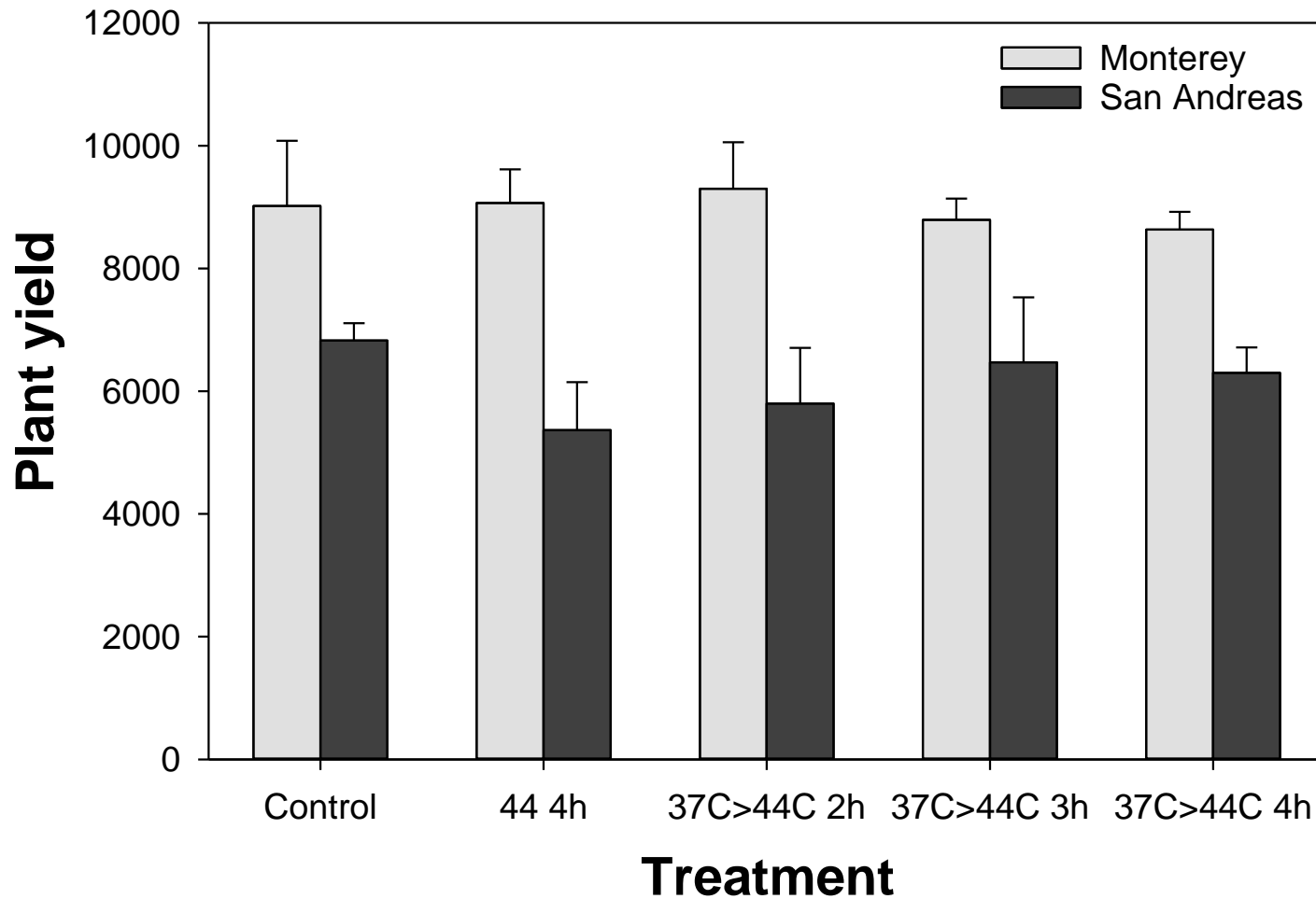
Monterey/Lucia yield (Manteca-2015)



Manteca 2016 (late)



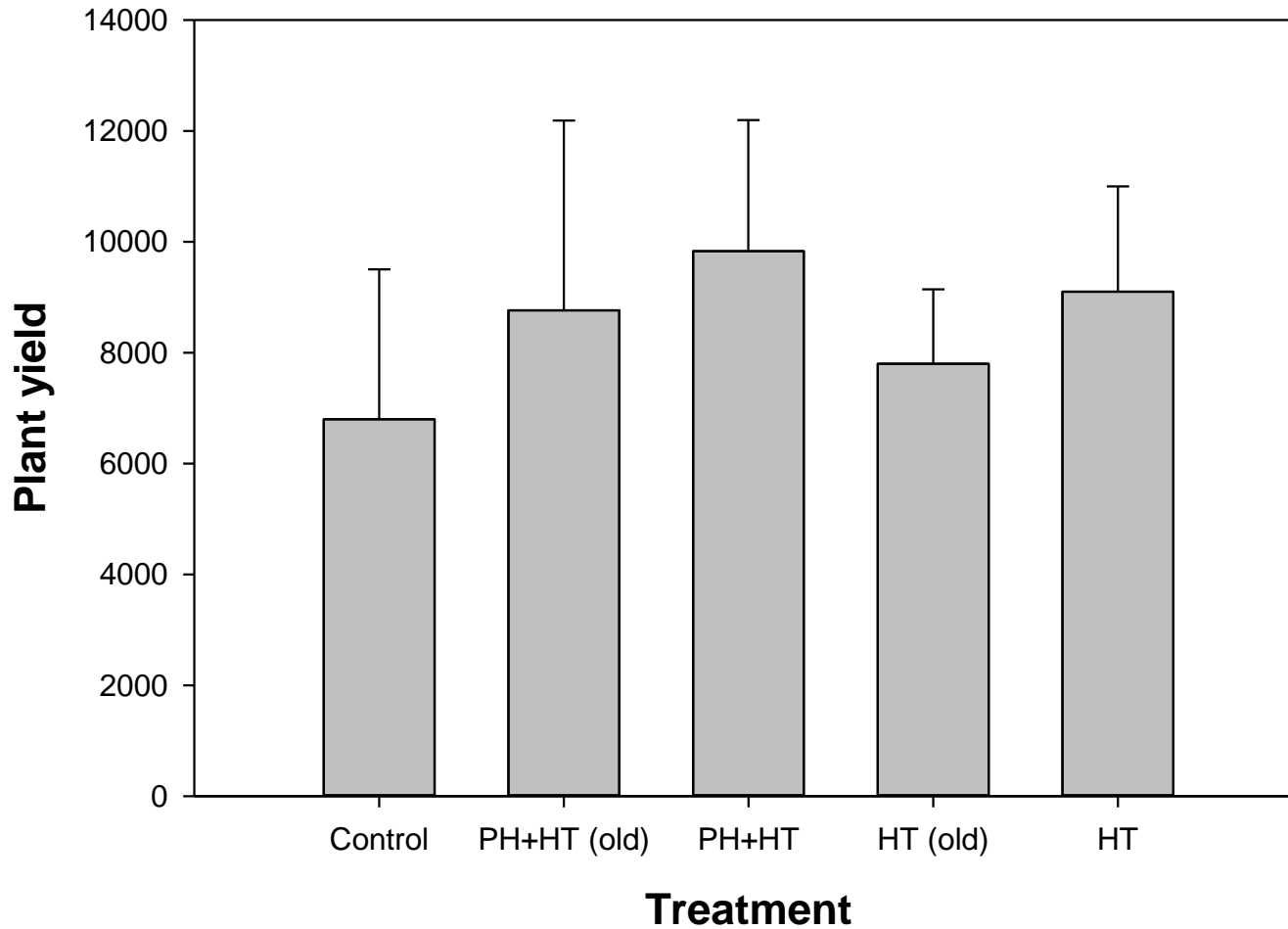
Monterey/San Andreas yield (Manteca-2016)



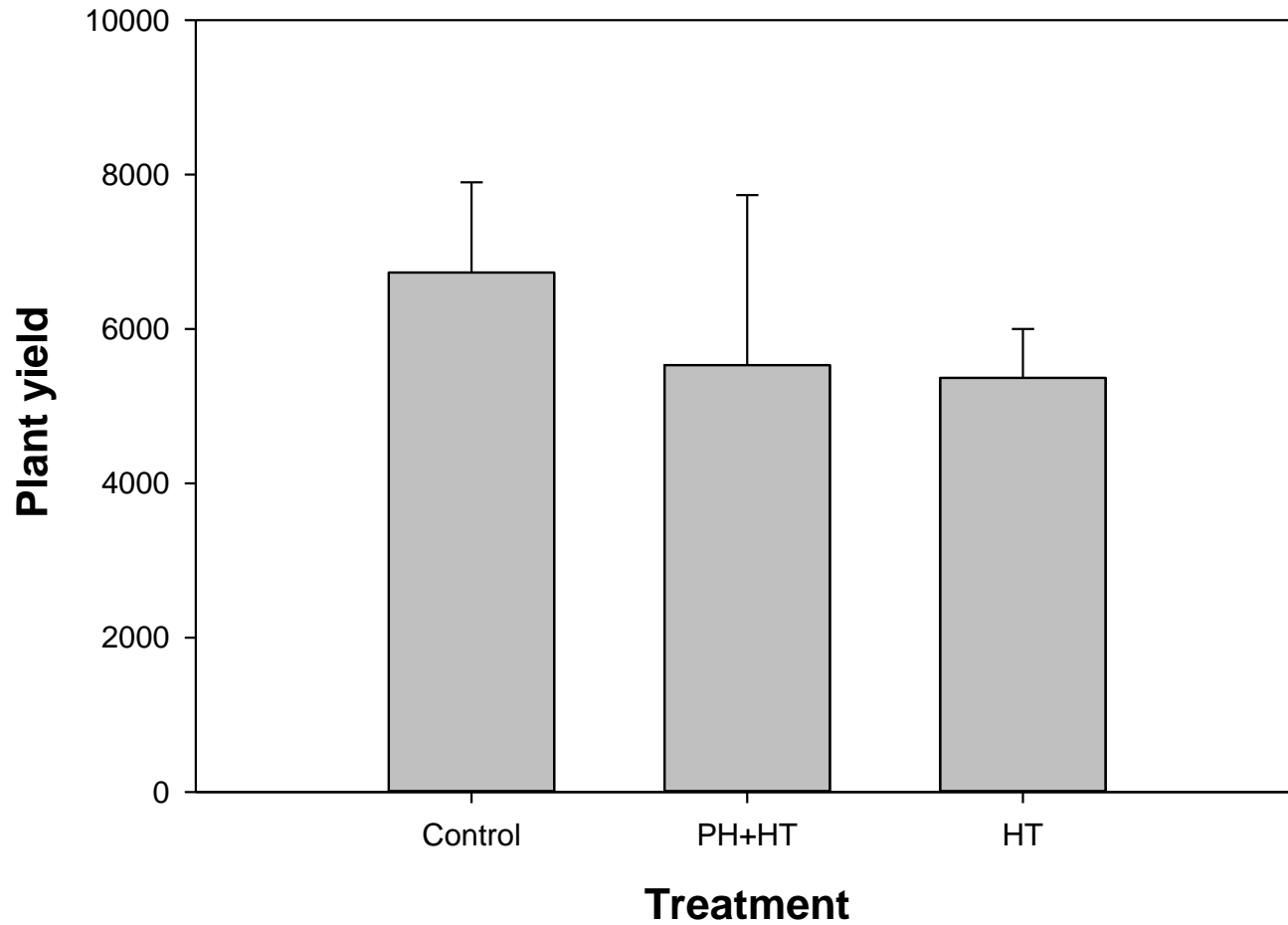
Macdoel 2016



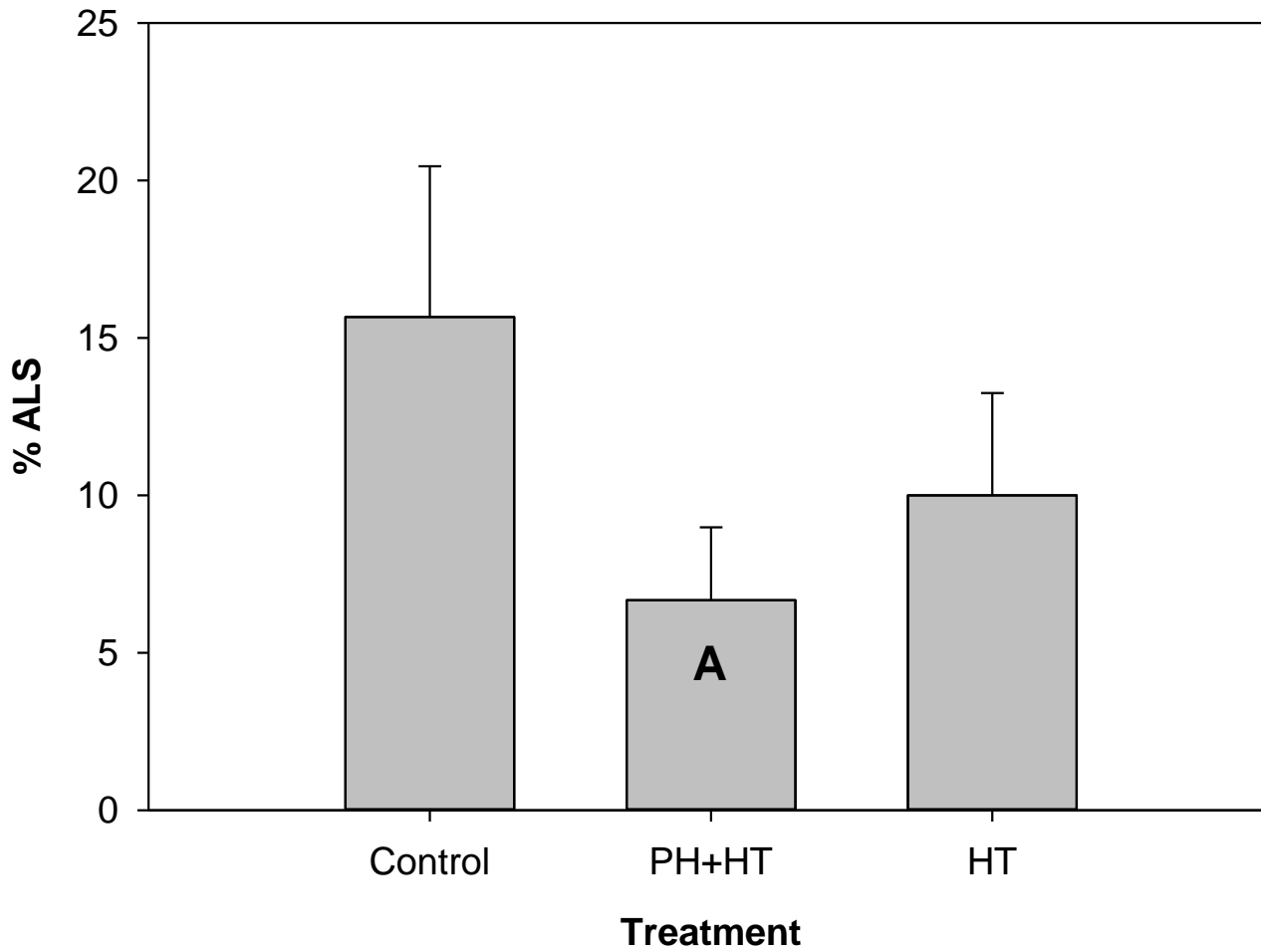
Monterey yield (Macdoel)



San Andreas yield (Macdoel)



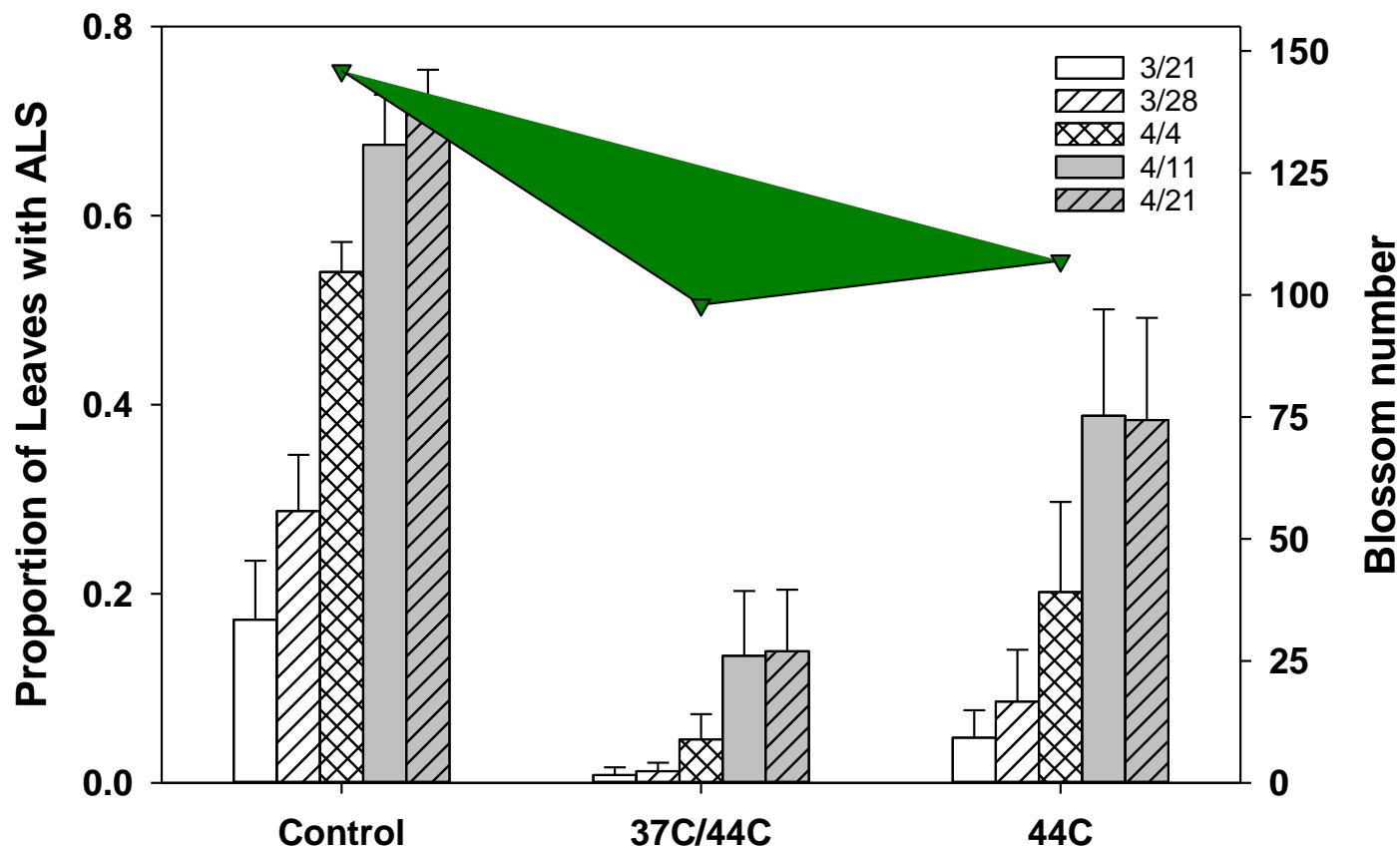
San Andreas ALS (Macdoel)



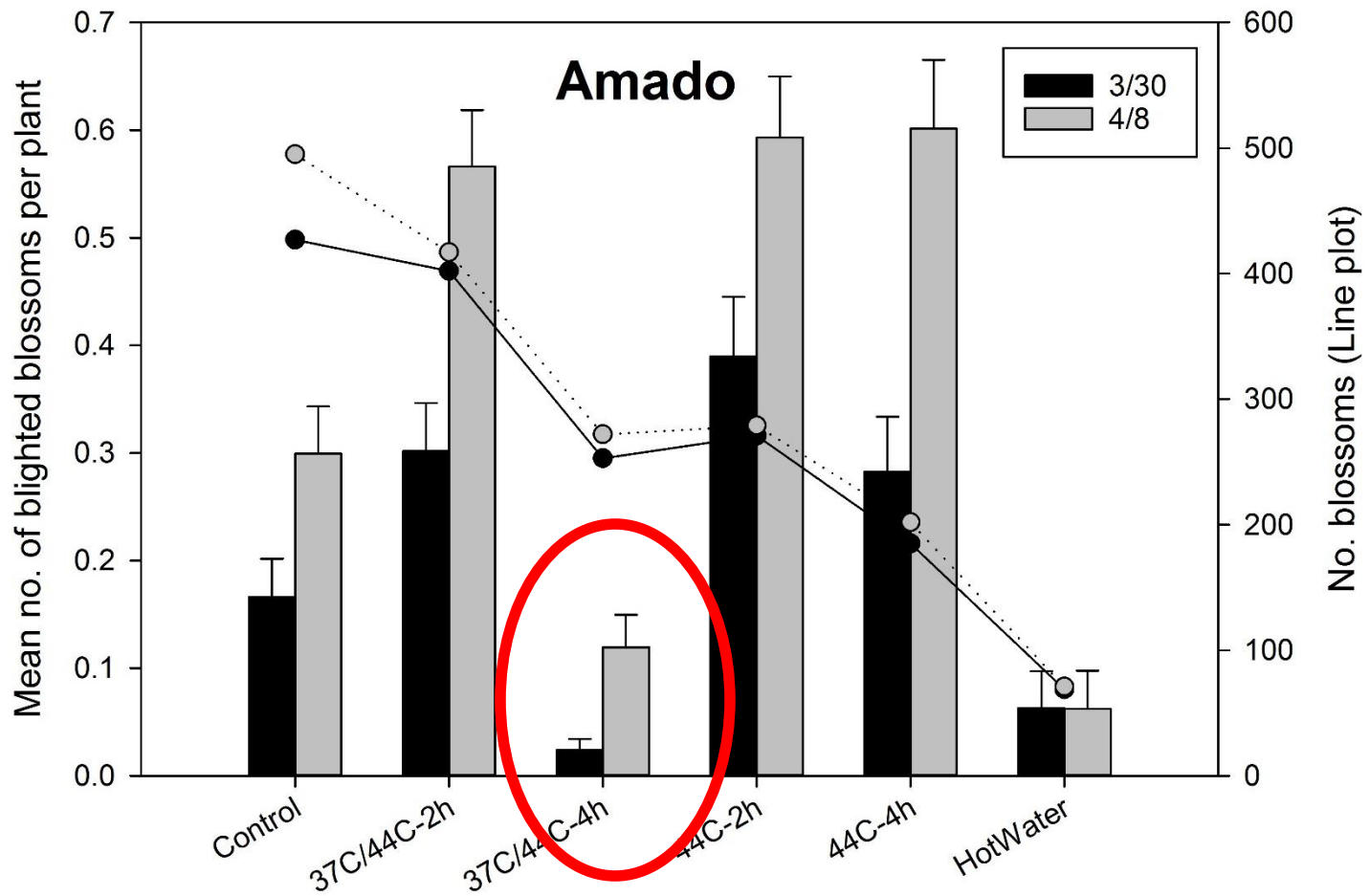
Fort Pierce (2016)



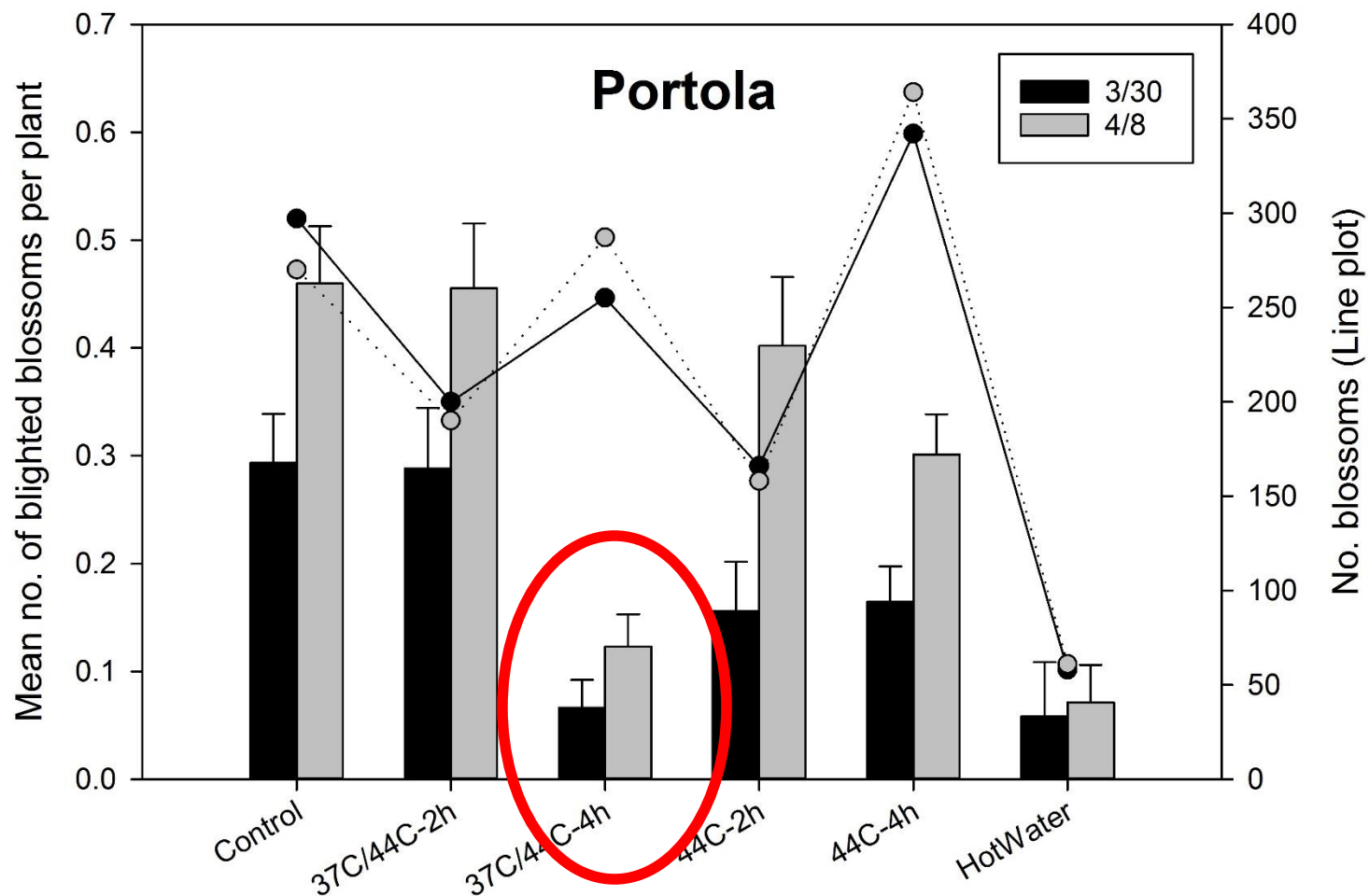
Portola ALS ratings (Fort Pierce, 2016)



Amado anthracnose ratings (Fort Pierce, 2016)



Portola anthracnose ratings (Fort Pierce, 2016)



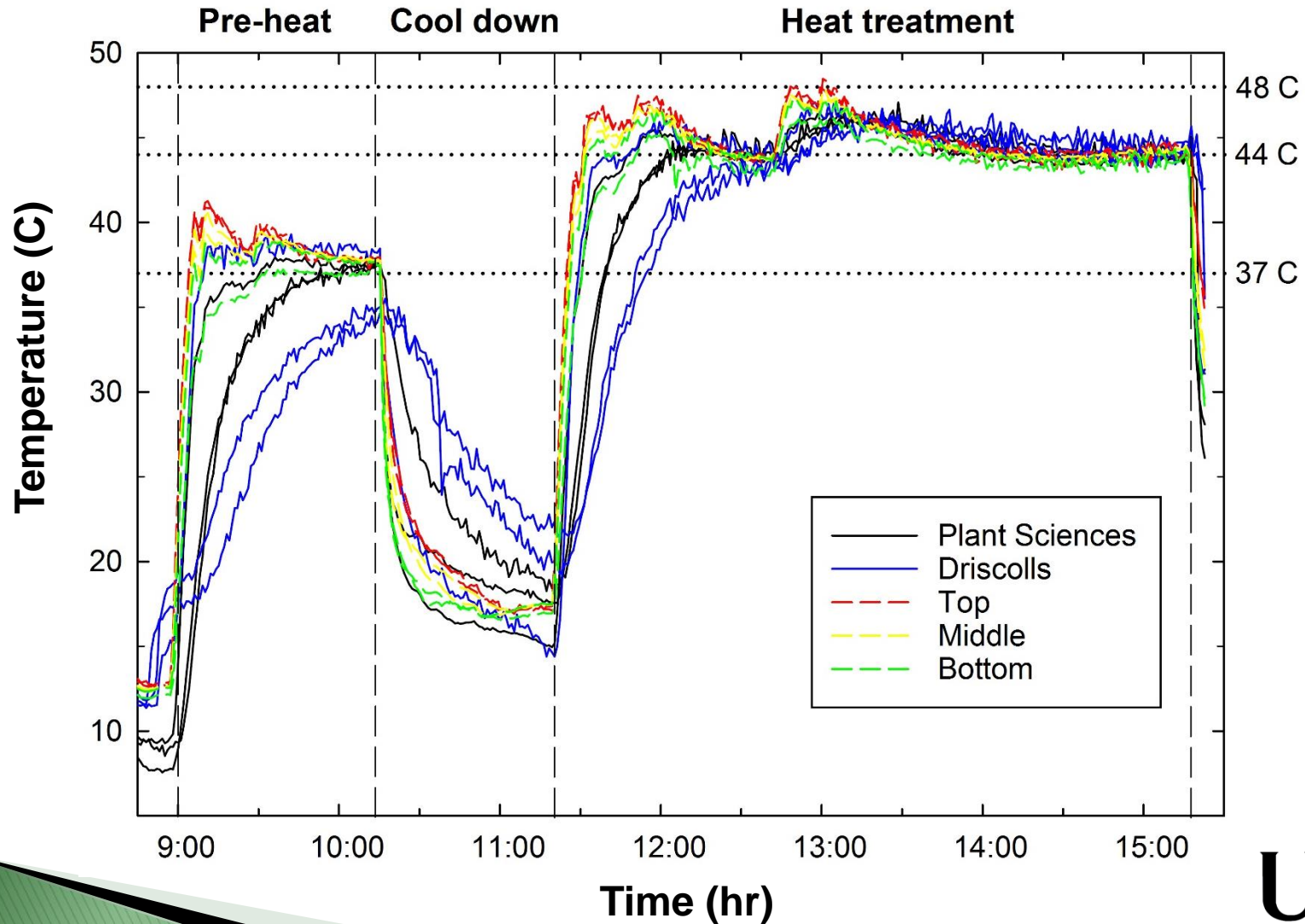
Driscoll's/Sierra Cascade/Plant Sciences (Macdoel, May 2017)



Driscoll's/Sierra Cascade/Plant Sciences (Macdoel, May 2017)



Driscoll's/Sierra Cascade/Plant Sciences (Macdoel, May 2017)



Plant Sciences – Chincholo Ranch

(July, 2017)

Variety=PE-7.2059



Plant Sciences–Chinchiolo Ranch

(November, 2017)

Variety=PE-7.2059

Plant Science's Harvest Data (February 2018)

Rep	Treatment	Count	Avg	StdErr
1	HWD	7000		
2	HWD	7500		
3	HWD	8000	<i>7500</i>	288.7
1	Switch	7000		
2	Switch	7400		
3	Switch	8300	<i>7567</i>	333.3
1	Sauna	7000		
2	Sauna	7000		
3	Sauna	8000	<i>7333</i>	384.4

Driscoll's/Sierra Cascade Trial (July, 2017)



Variety=Amado

Driscoll's/Sierra Cascade Trial (Nov, 2017)



Variety=Amado

Driscoll's/Sierra Cascade Trial (Nov, 2017)



Variety=Amado

Driscoll's/Sierra Cascade Trial (Nov, 2018)

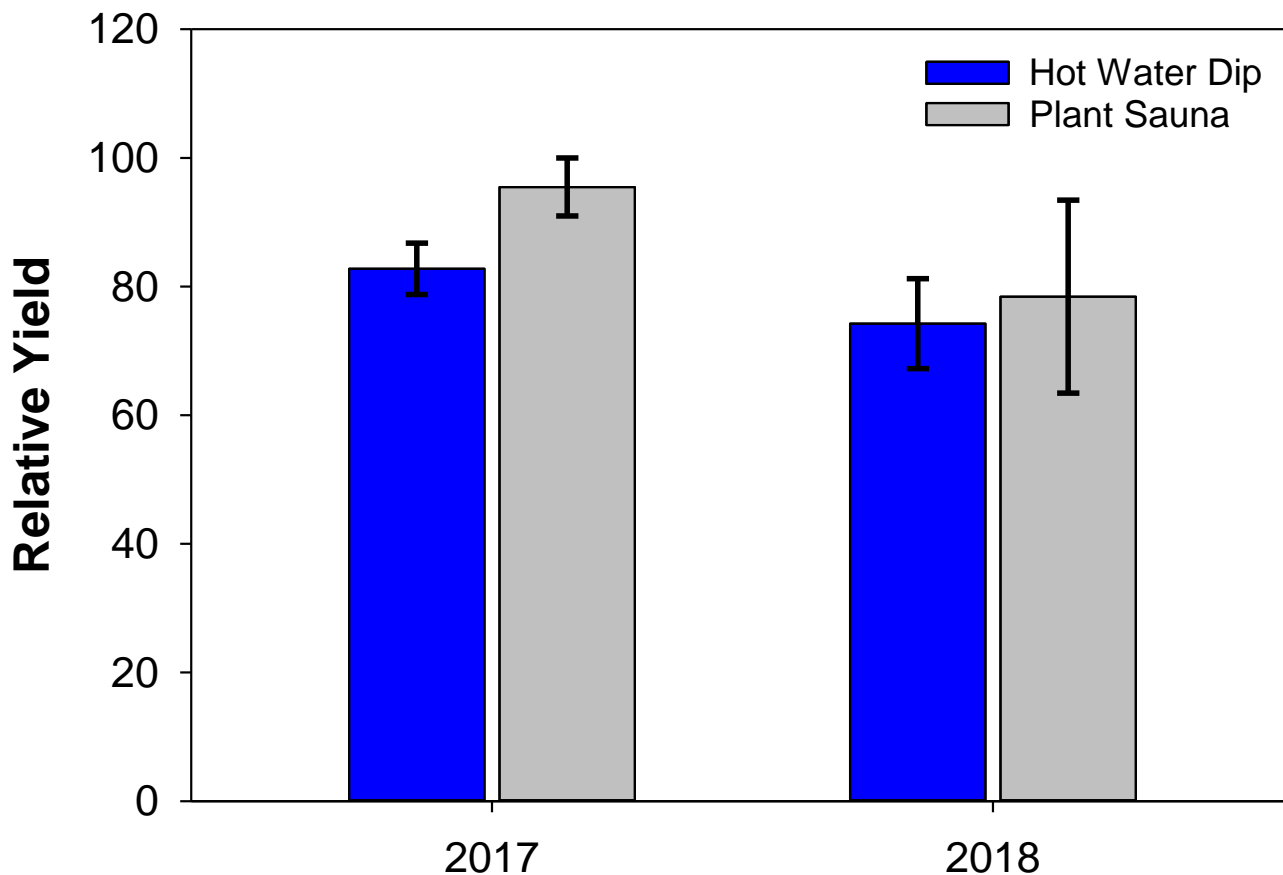


Field: Balboa S
Variety: Amado
Pre-planting Treatment
Trial
11th 7/21/18 Sauna

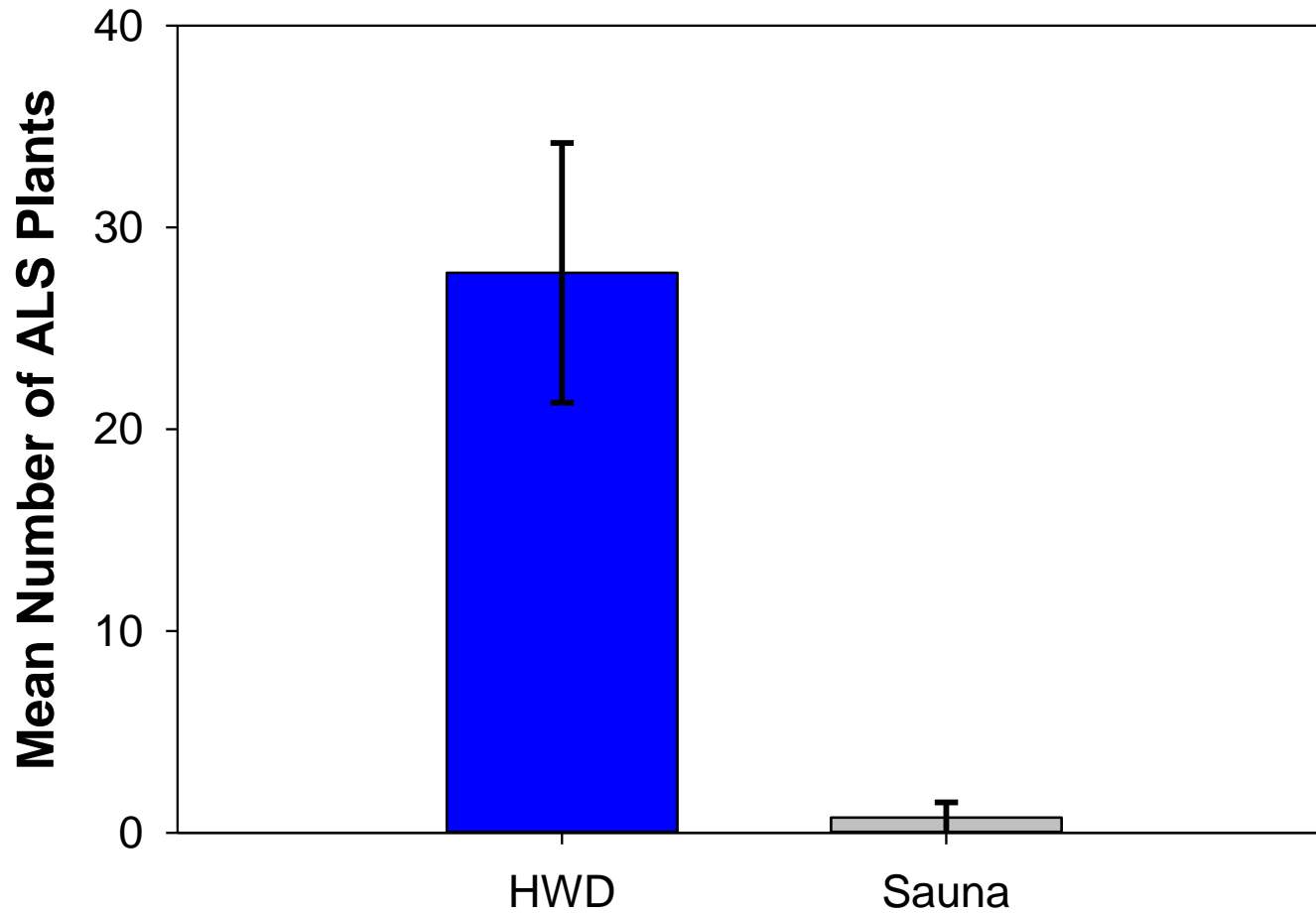


Variety=Amado

Driscoll's/SCN Harvest Data (2017 & 2018)



Driscoll's/SCN Harvest ALS Data (2018)



Plant Sauna Designs

▶ Large Units

- Two designs are currently being developed/built
- Negative pressure/vacuum–assisted movement of steam
- Suitable for large nurseries and/or those interested in treating plants in boxes
- UNTESTED

▶ Small Units

- For example, the current unit
- Unpack and layer plants → vacuum NOT necessary
- Suitable for use on–site smaller nurseries or growers
- TESTED

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