



The influence of rootstock genotype on peach fruit quality

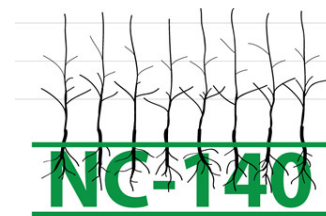
Jeff Pieper

Research Associate & Graduate Student, HLA
Advisor: Dr. Ioannis Minas, HLA



HORTICULTURE AND
LANDSCAPE ARCHITECTURE
COLORADO STATE UNIVERSITY

2009 NC-140 Redhaven Rootstock Trial



Cultivar: 'Redhaven'

Training system: Open-Vase

Rootstocks: 17 total

Selected 5 in 2019

Vigorous: 'Bright's Hybrid-5',
'Atlas'

Standard: 'Lovell',
'Krymsk®86'

Dwarfing: 'Krymsk®1'

Data Collected: 2015 - 2019

Yield – 5-year avg. (kg / tree, fruit size and fruit weight)

Vigor – TCSA, Canopy volume

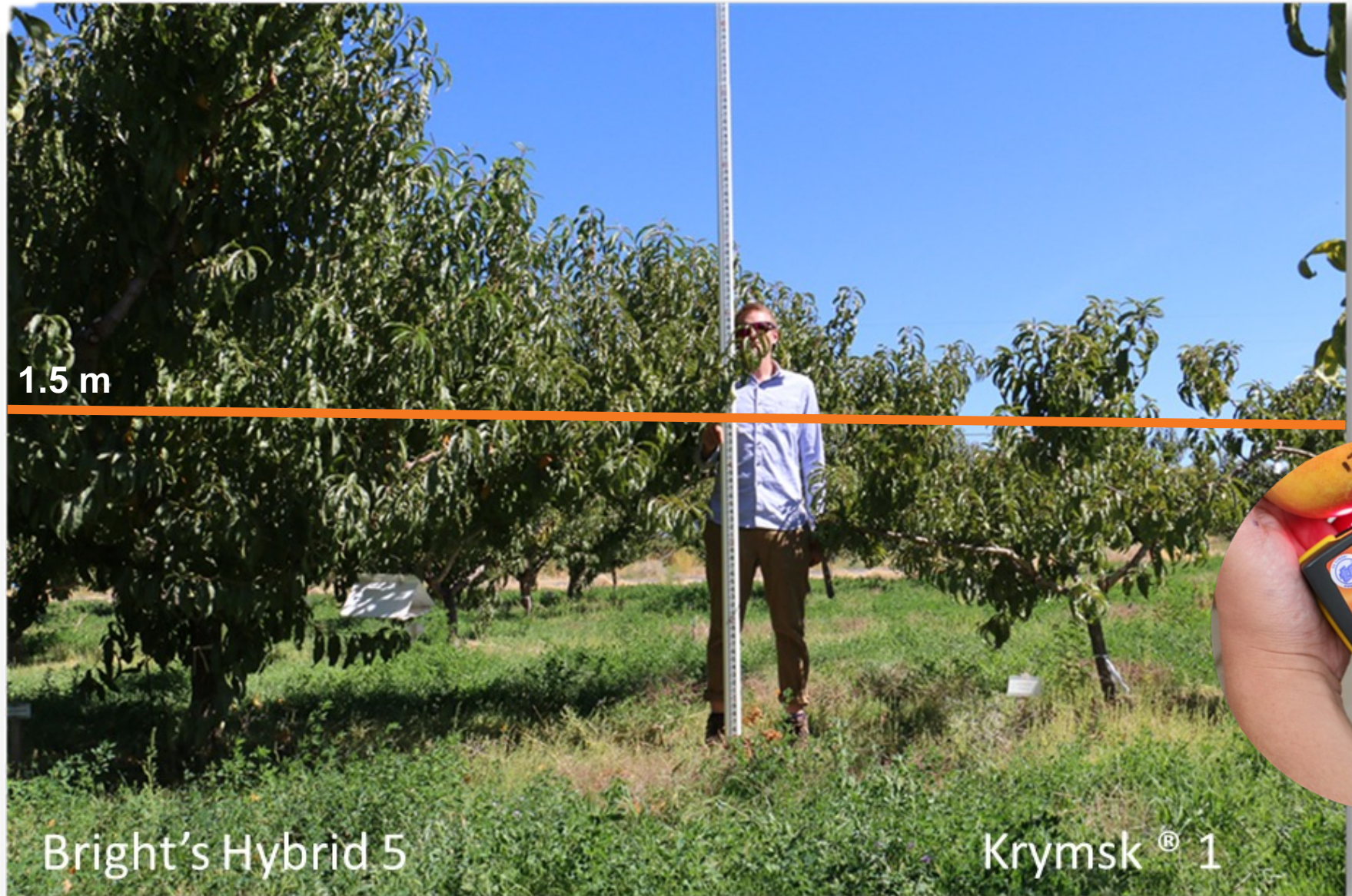
Light availability

Fruit quality analysis



'Redhaven'

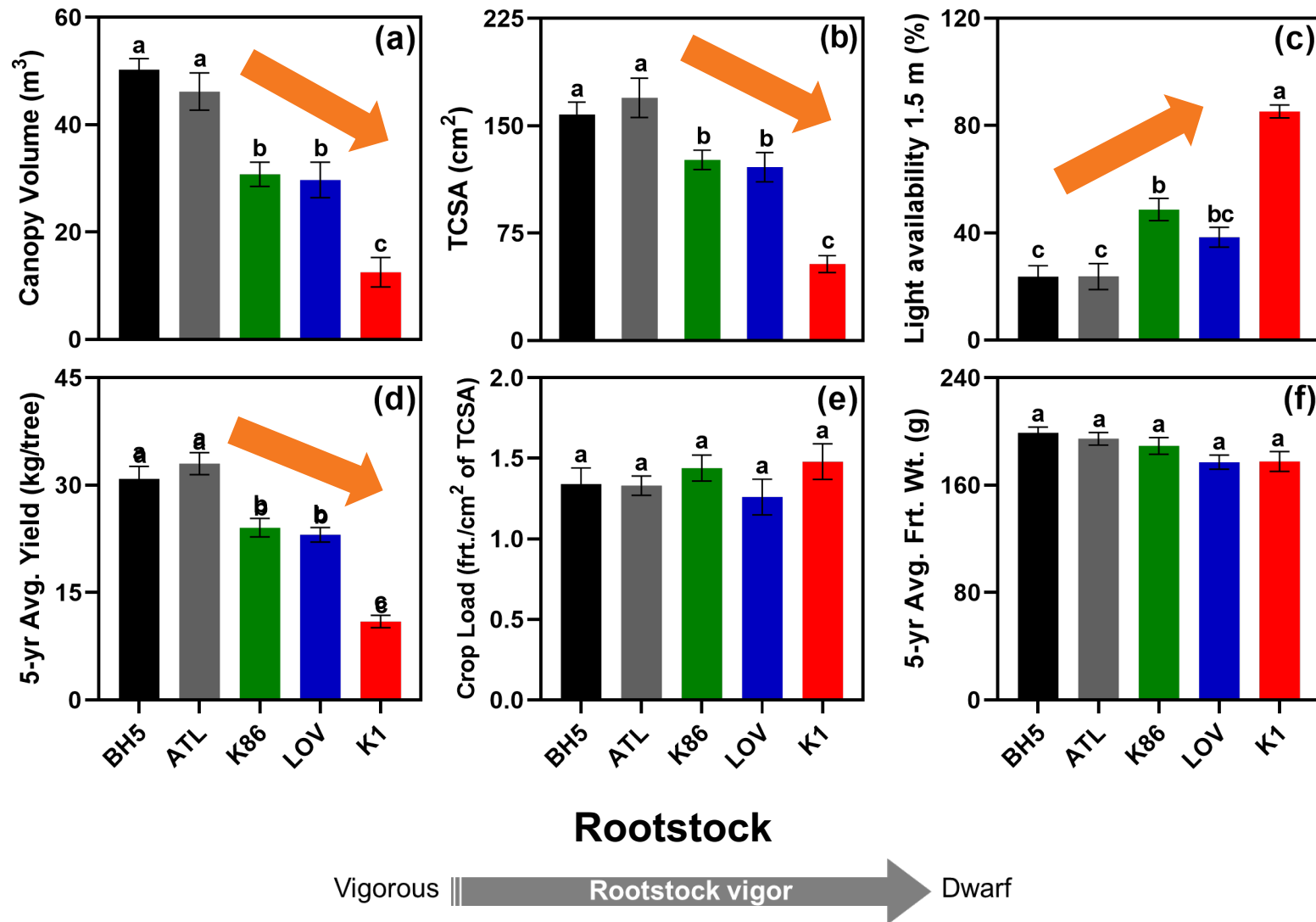
2009 NC-140 Redhaven Rootstock Trial – 2019 data collection



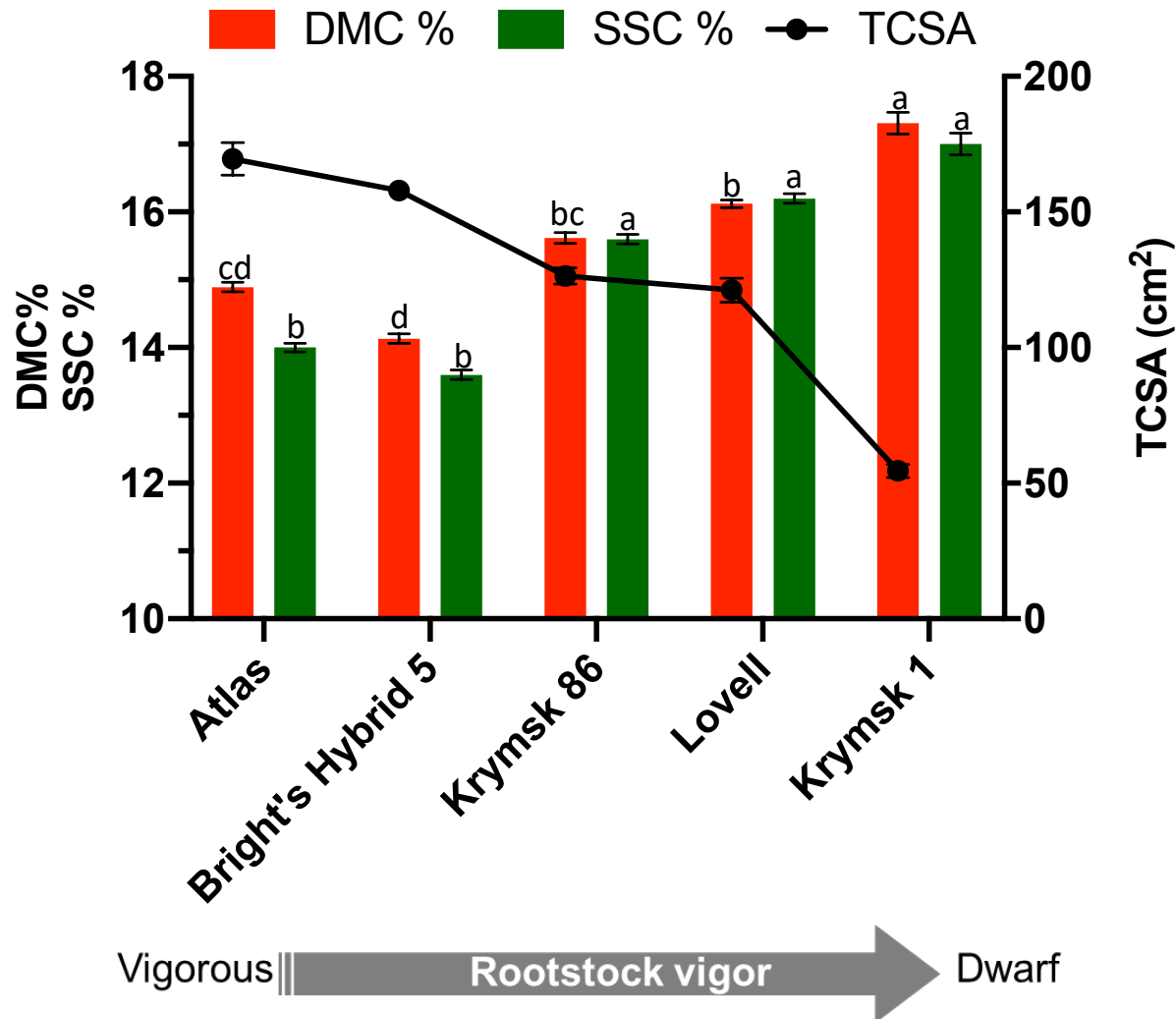
TR Turoni
DA meter



2009 NC-140 Redhaven Rootstock Trial – 2019 vigor and yield results



2009 NC-140 Redhaven Rootstock trial – 2019 fruit quality results at equal maturity



Decreasing vigor (increased light availability) increased both DMC and SSC

By controlling for **equal maturity**, we determined the **true impact of increased light availability on fruit quality development**

2017 Cresthaven Semi-dwarfing Peach Rootstock Trial

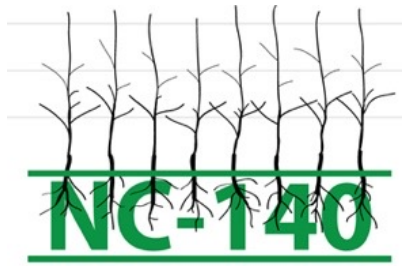
Objective:

Determine how **vigor** impacts **light availability**, **metabolite profiles**, and **fruit quality**, and if they are **truly different** when controlling for **equal maturity**.

Evaluate **rootstocks** and determine if any are a suitable **alternative** for CO.



2017 NC-140 Cresthaven Semi-Dwarf Peach Rootstock Trial



Sites: AL, CO, GA, MI, NC, NY, ONT, PA, SC, UT

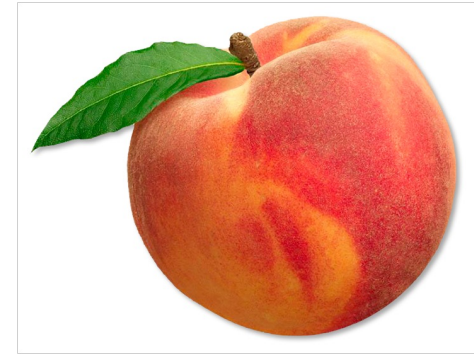
Coordinator: Ioannis Minas (Colorado State University)

Cultivar: 'Cresthaven'

Training system: KAC-V

Spacing: 6 x 15 feet (1.8 x 4.5 m)

Trees/acre: 484



Rootstock	Breeder, Country	Genetic origin
Controller™ 6 (HBOK 27)	UC Davis, USA	peach x peach hybrid (P. persica x P. persica)
Controller™ 7 (HBOK 32)	UC Davis, USA	peach x peach hybrid (P. persica x P. persica)
Controller™ 8 (HBOK 10)	UC Davis, USA	peach x peach hybrid (P. persica x P. persica)
MP-29	USDA-Georgia, USA	plum x peach interspecific hyb. (Prunus umbellata x P. persica)
Rootpac® 40 (Nanopac)	Agromillora Iberia, Spain	almond x peach interspecific hyb. [(P. dulcis x P. persica) x (P. dulcis x P. persica)]
Rootpac® 20 (Densipac)	Agromillora Iberia, Spain	plum x peach interspecific hybrid (P. besseyi x P. persica)
Guardian®	Clemson/USDA, USA	peach seedling (P. persica)
Lovell	G.W. Thissell, USA	peach seedling (P. persica)

The 2017 NC-140 'Cresthaven' Semi-Dwarf Peach Rootstock Trial

Controller™ 6

Controller™ 7

Controller™ 8

MP-29

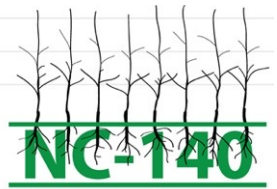
Rootpac® 40

Rootpac® 20

Guardian®

Lovell

2017 NC-140 Semi-Dwarf Cresthaven Peach Rootstocks Performance



5th leaf -2021

Rootstock	Survival (%)	TCSA (cm ²) fall 2021	% of Lovell	% of Guardian	Sucker ct.
Controller™ 6	100	32.25 ^c	83	72	0.0 ^c
Controller™ 7	100	15.59 ^d	40	35	0.0 ^c
Controller™ 8	100	36.30 ^{bc}	94	81	0.0 ^c
MP-29	100	13.03 ^d	34	29	0.0 ^c
Rootpac® 20	100	41.21 ^{ab}	106	92	4.4 ^a
Rootpac® 40	100	32.82 ^{bc}	85	73	0.4 ^{bc}
Guardian®	100	44.72 ^a	115	100	0.4 ^{bc}
Lovell	100	38.74 ^{abc}	100	87	1.2 ^b
Estimated LSD		8.42			1.20

**Mean separation in columns by Tukey's HSD (P=0.05). LSD was calculated based on the number of observations per mean.

2017 NC-140 Semi-Dwarf Cresthaven Peach Rootstocks Performance



5th leaf -2021

Rootstock	TCSA (cm ²) fall 2021	Yield (kg/tree)	Yield eff. (yield/TCSA)	Avg. fruit ct.	Avg. fruit wt. (g)	Crop load (fruit/TCSA)
Controller™ 6	32.25 ^c	5.34 ^a	0.29 ^a	23 ^b	233.45 ^a	1.27 ^a
Controller™ 7	15.59^d	0.82^b	0.08^c	5^c	93.89^b	0.53^c
Controller™ 8	36.30 ^{bc}	5.87 ^a	0.25 ^{ab}	27 ^{ab}	212.57 ^a	1.14 ^{ab}
MP-29	13.03 ^d	1.48 ^b	0.20 ^{ab}	7 ^c	213.54 ^a	0.99 ^{abc}
Rootpac® 20	41.21 ^{ab}	6.98 ^a	0.27 ^a	31 ^a	220.78 ^a	1.18 ^{ab}
Rootpac® 40	32.82 ^{bc}	2.45 ^b	0.14 ^{bc}	9 ^c	209.96 ^a	0.64 ^{bc}
Guardian®	44.72 ^a	6.58 ^a	0.21 ^{ab}	28 ^{ab}	232.02 ^a	0.91 ^{abc}
Lovell	38.74 ^{abc}	5.25 ^a	0.22 ^{ab}	24 ^{ab}	221.76 ^a	1.00 ^{abc}
Estimated LSD	8.42	2.80	0.12	8.10	116.16	0.61

**Mean separation in columns by Tukey's HSD (P=0.05). LSD was calculated based on the number of observations per mean.



Iron chlorosis symptoms on the 2017 NC-140 Semi-Dwarf Cresthaven Peach Rootstocks



Controller™ 6



Controller™ 7



Controller™ 8



Lovell



MP-29



Rootpac® 20



Rootpac® 40

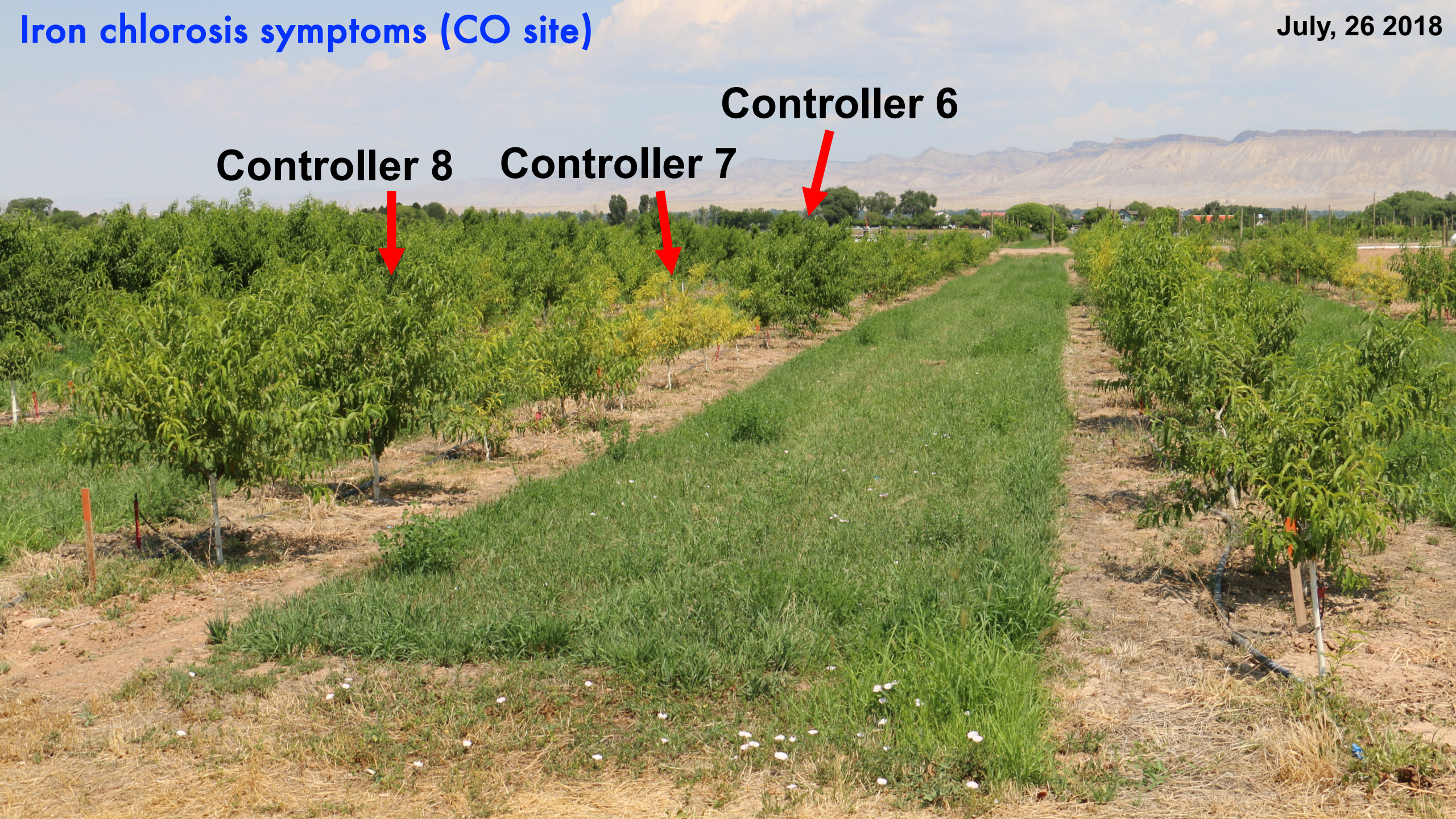


Guardian®

May, 30 2018



Controller 8 **Controller 7** **Controller 6**



Iron chlorosis symptoms (CO site)

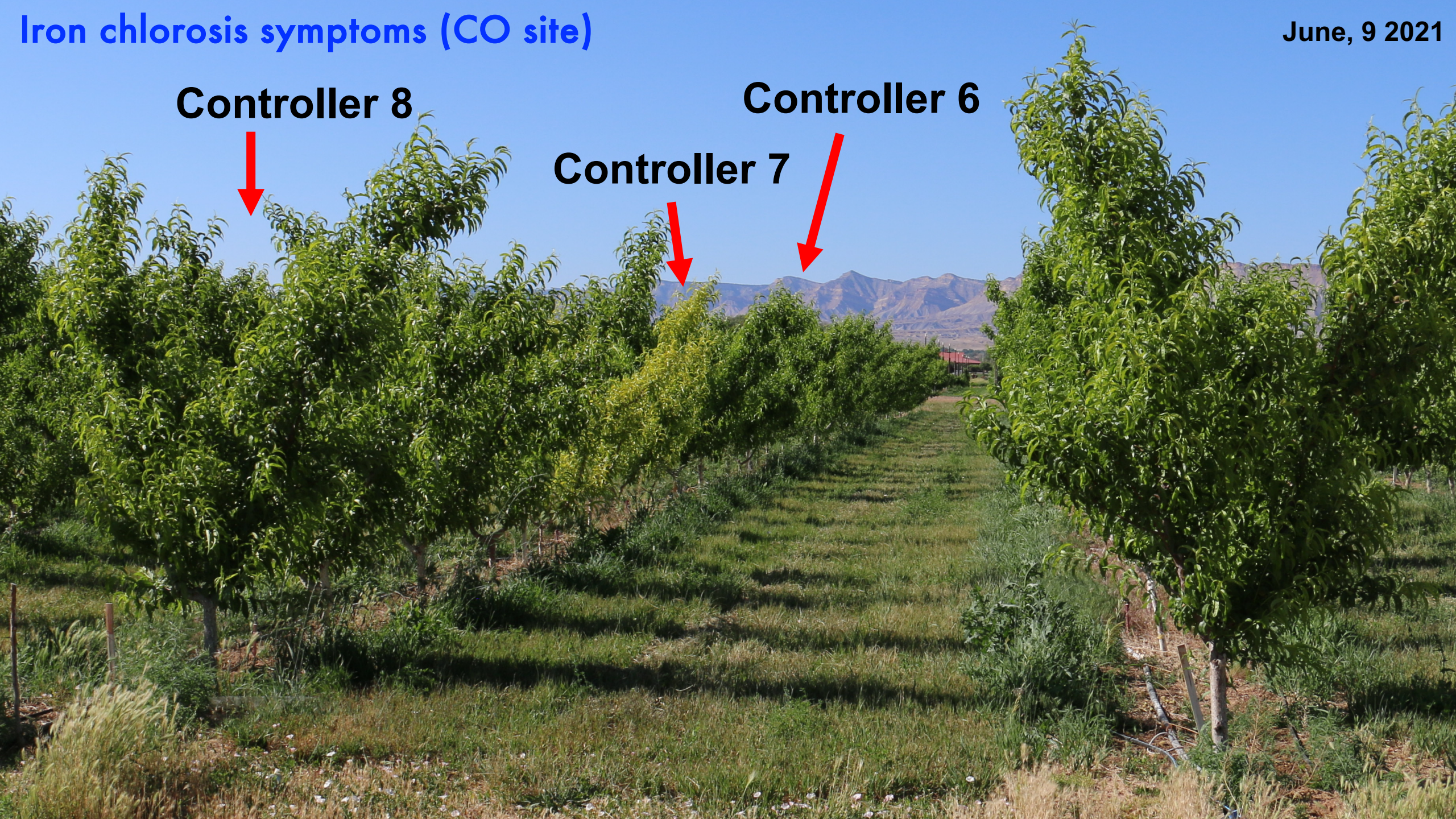
June, 9 2021

Controller 8

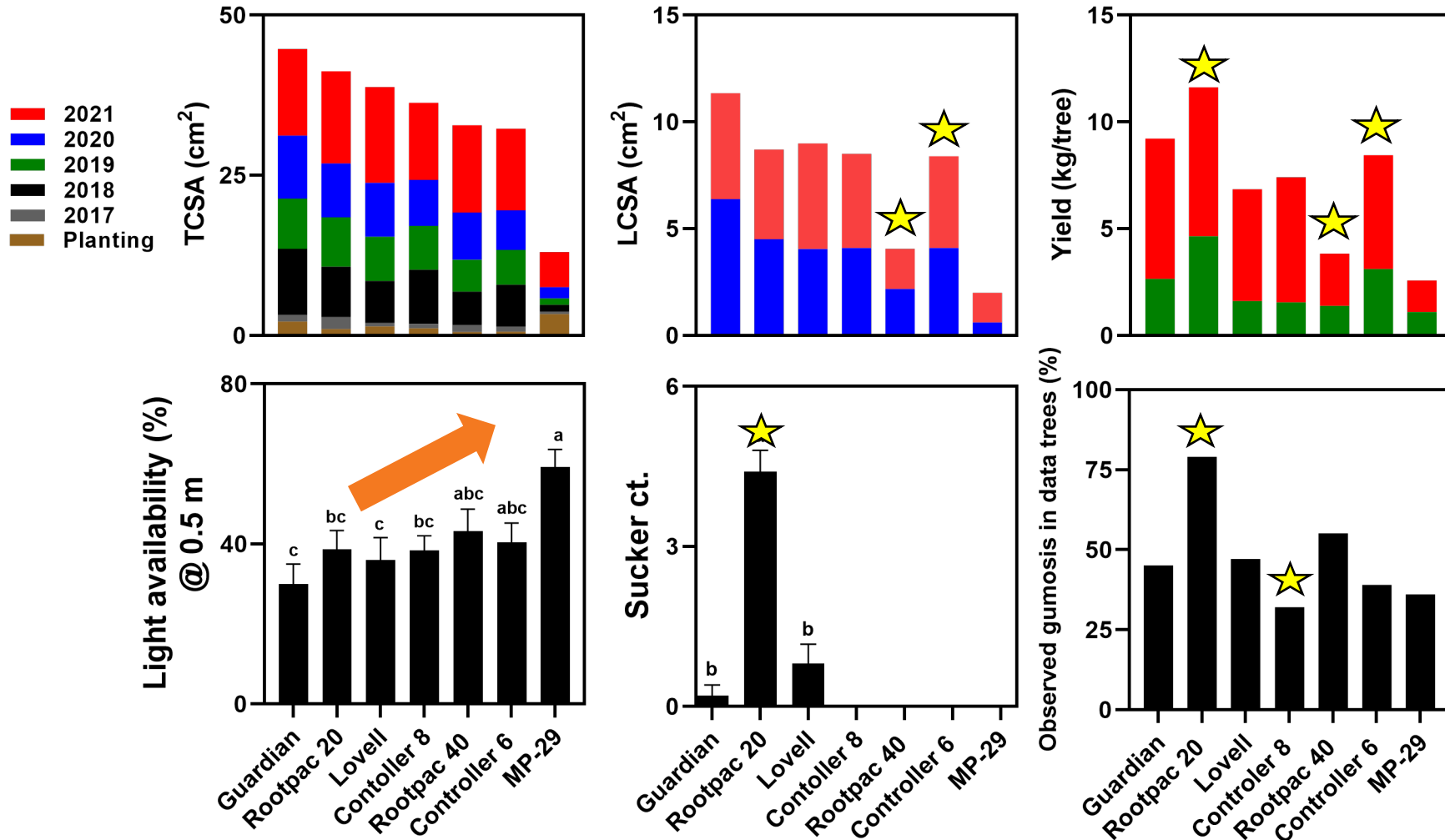


Controller 6

Controller 7



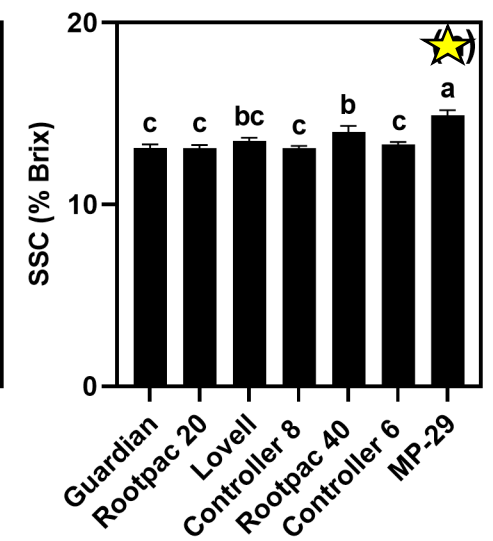
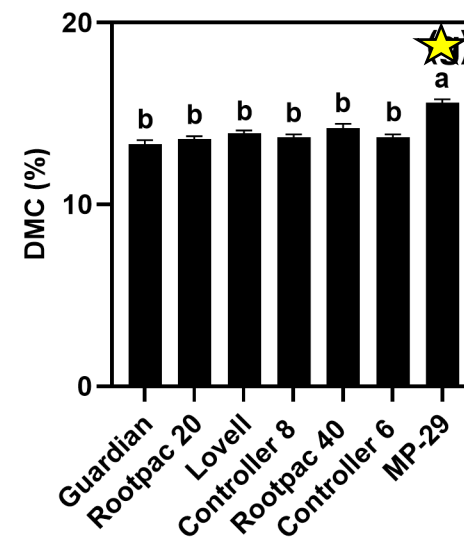
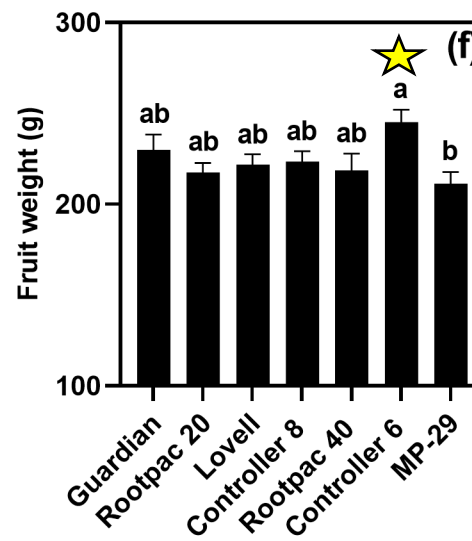
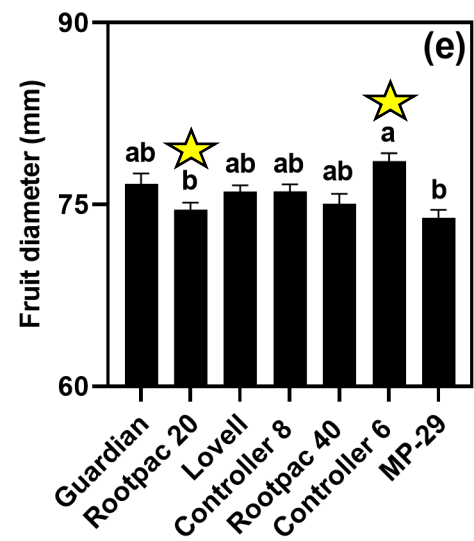
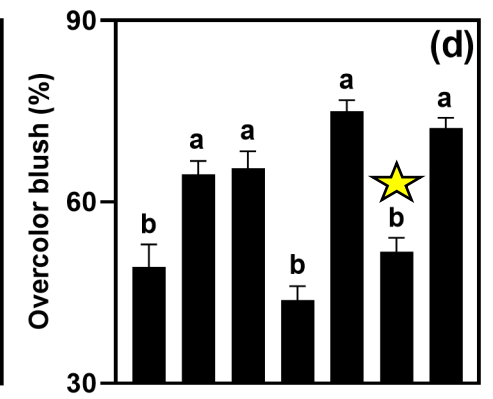
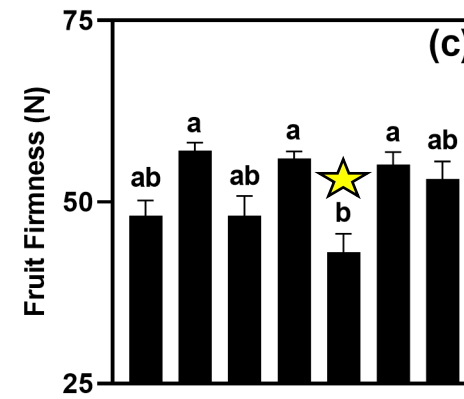
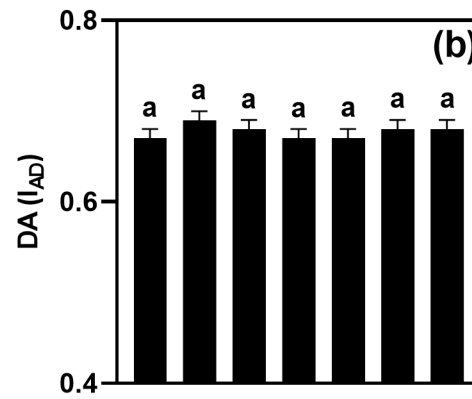
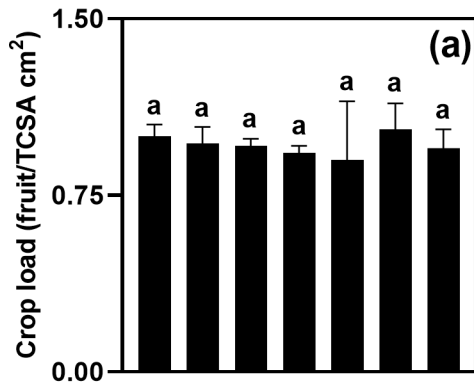
2017 NC-140 Cresthaven Semi-Dwarf Peach Rootstock Trial



Vigorous || Rootstock vigor → Dwarf

2017 NC-140 Cresthaven Semi-Dwarf Peach Rootstock Trial

2021 Fruit quality data



2017 NC-140 Cresthaven Semi-Dwarf Peach Rootstock Trial

Guardian

- Vigorous with an upright habit
- Excessive water sprouts that compete poor proleptic shoot formation

Rootpac 20

- Good precocity, high early yields,
- Excessive suckering, smaller fruit size

Lovell

- Good overcolor development

Controller 8

- Poor overcolor development

Rootpac 40

- Small scaffolds, better suited as a single leader?

Controller 6

- Good fruit size and good proleptic shoot formation
- Increased shade lowers over color development

MP-29

- Enhanced fruit quality profile
- Quality of bare root stock at planting makes evaluation difficult



Questions?

Jeff.pieper@colostate.edu

<http://minas.agsci.colostate.edu>

Acknowledgements

Advisor



Dr. Ioannis Minas

CSU_Pomology Team



Jeff
Pieper



David
Sterle



Emily
Dowdy



Brendon
Anthony

