

A photograph of a peach orchard. In the foreground, a large, mature peach tree with green leaves and small fruit is the central focus. The ground around the tree is covered with brown mulch. Two black plastic drip irrigation lines run parallel to each other, curving around the base of the tree. In the background, other peach trees are visible, spaced out in rows. The sky is overcast and grey.

Towards Optimization of Water Management Practices in Peach Orchards

Juan Carlos Melgar

Department of Plant & Environmental Sciences

CLEMSON
UNIVERSITY







Common practice is to start irrigation on the third leaf





How can we **optimize** water management?



How can we **optimize** water management?

1. Reducing water losses
2. Reducing water use without compromising yield and fruit quality



1. Reducing water losses - drip irrigation

Drip vs. micro-sprinkler

Same tree growth. Drip uses up to 35% less water

Micro-sprinkler provide a larger wetted pattern
(important on coarse soils)

1. Reducing water losses – subsurface drip irrigation

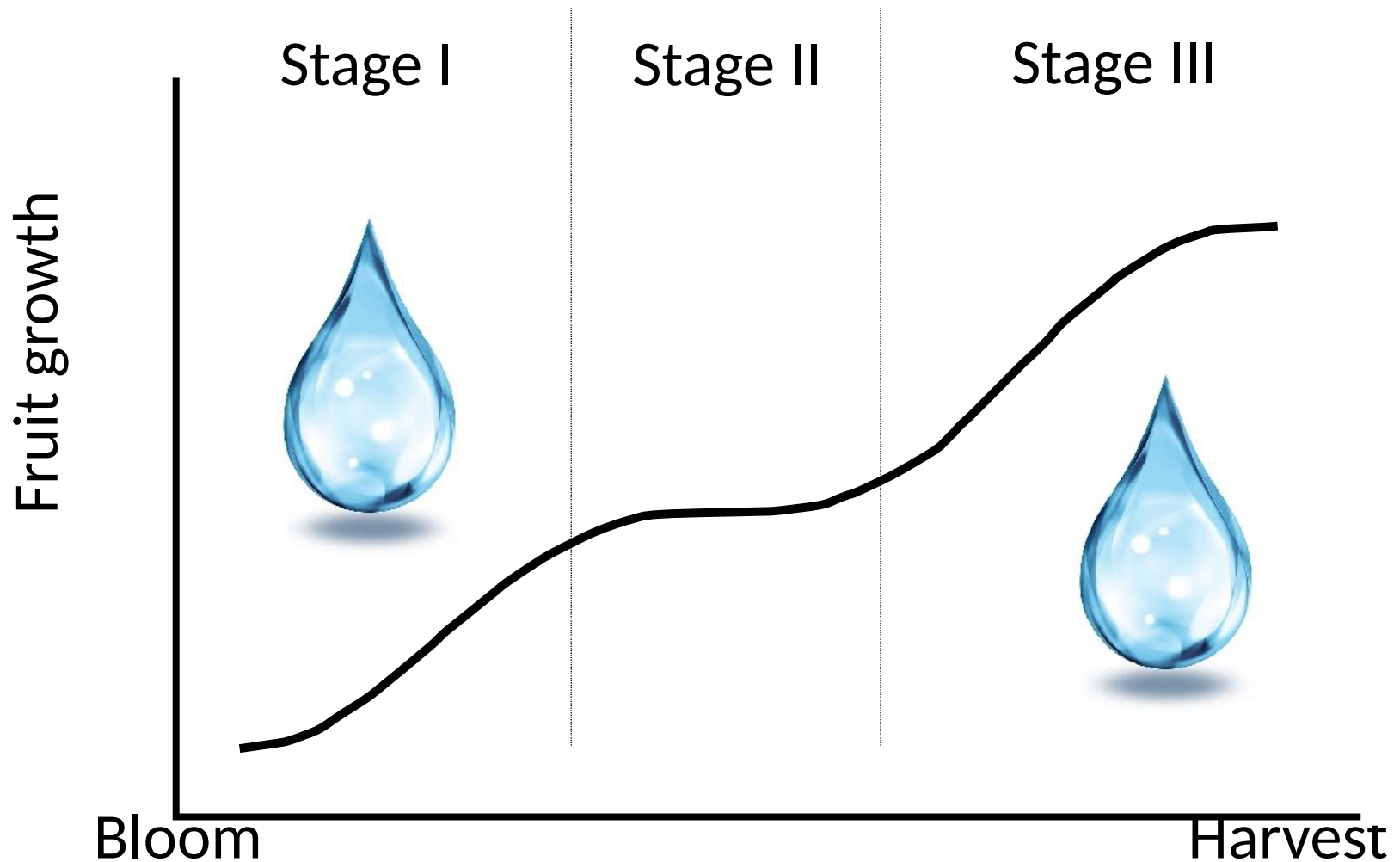


1. Reducing water losses – subsurface drip irrigation

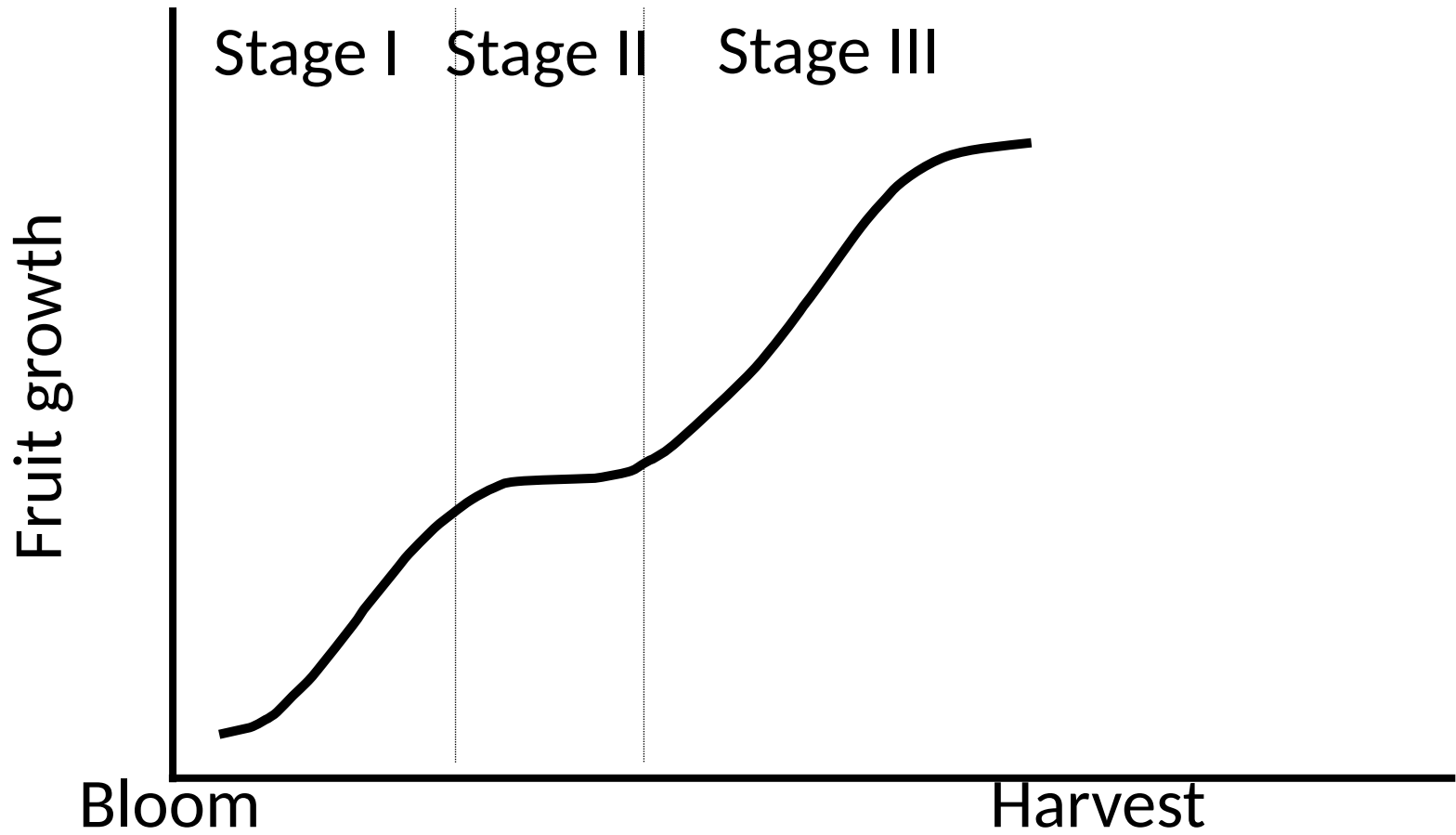


Photo courtesy of T. Trout, USDA-ARS,
Parlier, California.

2. Reducing water use without compromising yield and fruit quality

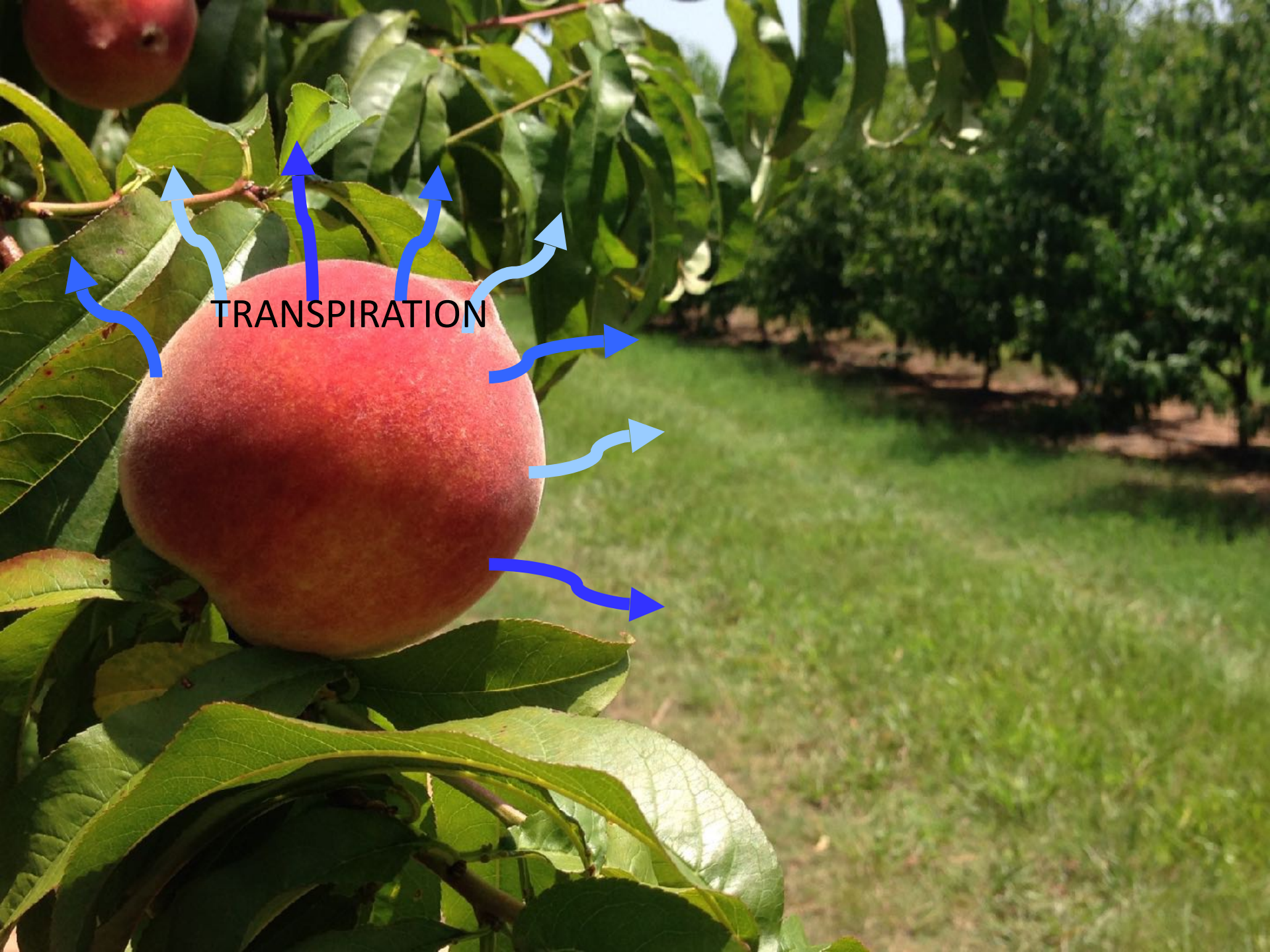


Fruit growth in an early-season variety





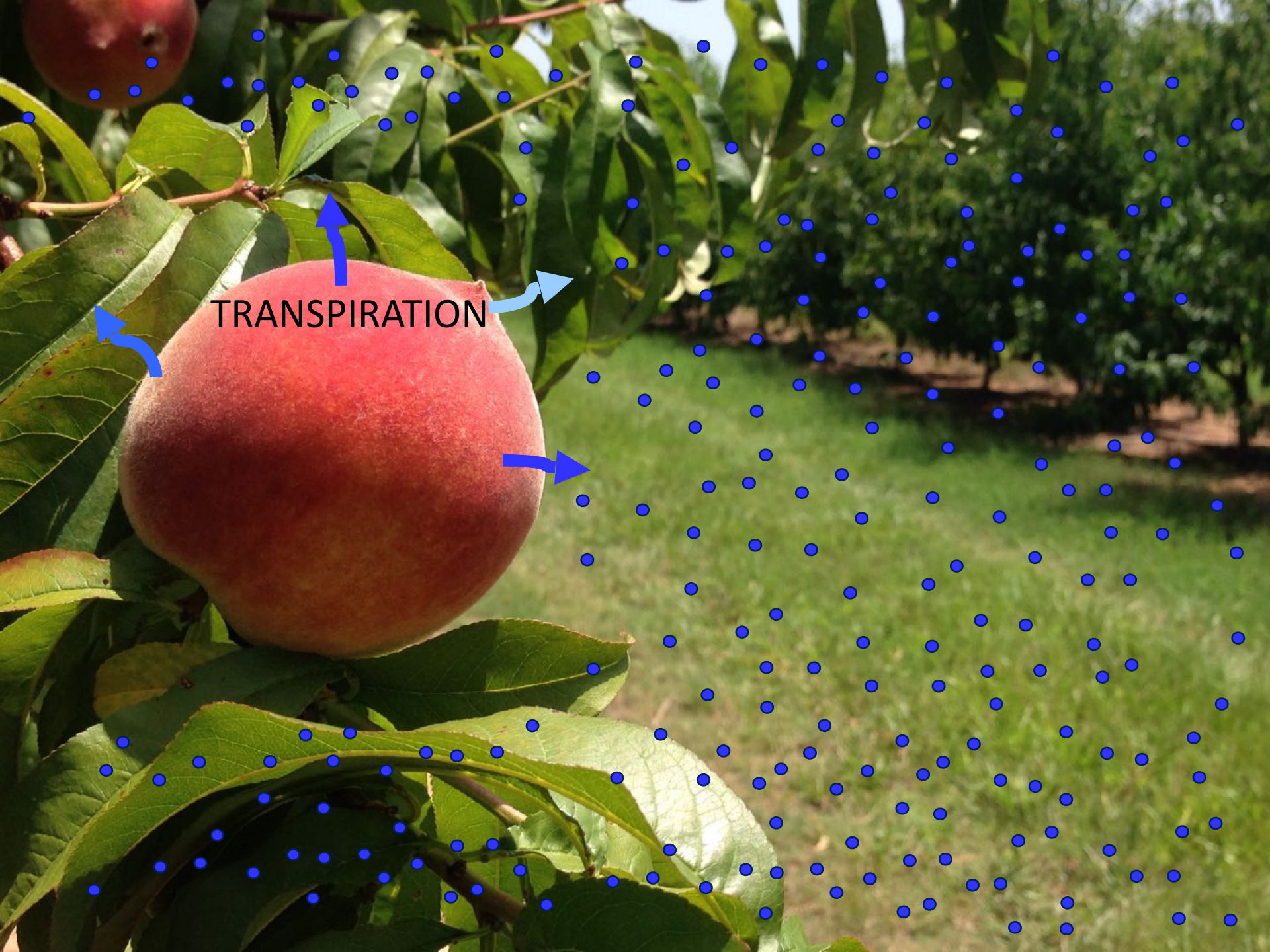
How do fruit use
water
(daily and throughout
the last growth
stage)?



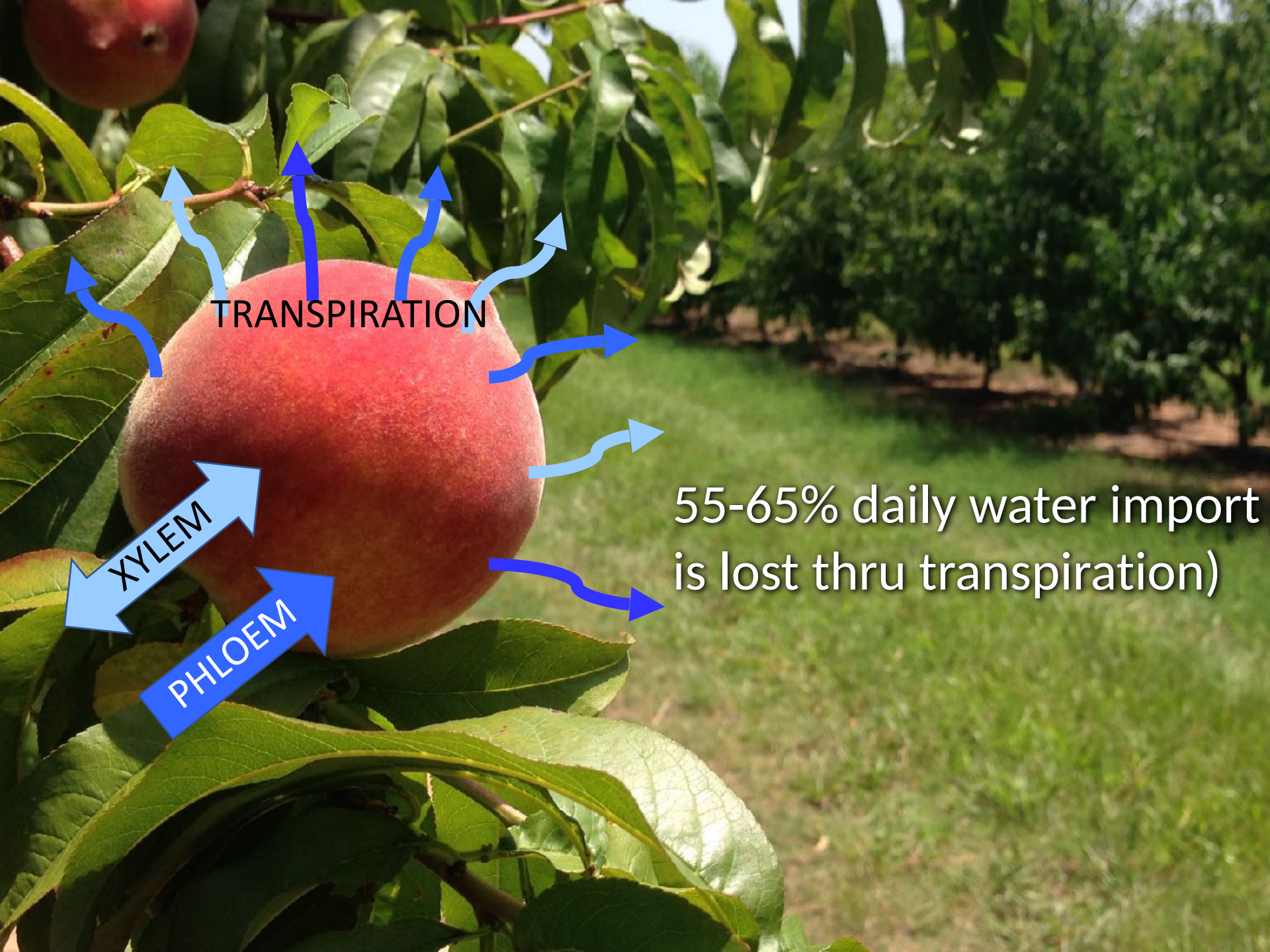
TRANSPIRATION



TRANSPIRATION



TRANSPIRATION



TRANSPIRATION

XYLEM

PHLOEM

55-65% daily water import is lost thru transpiration)





10cm

20cm

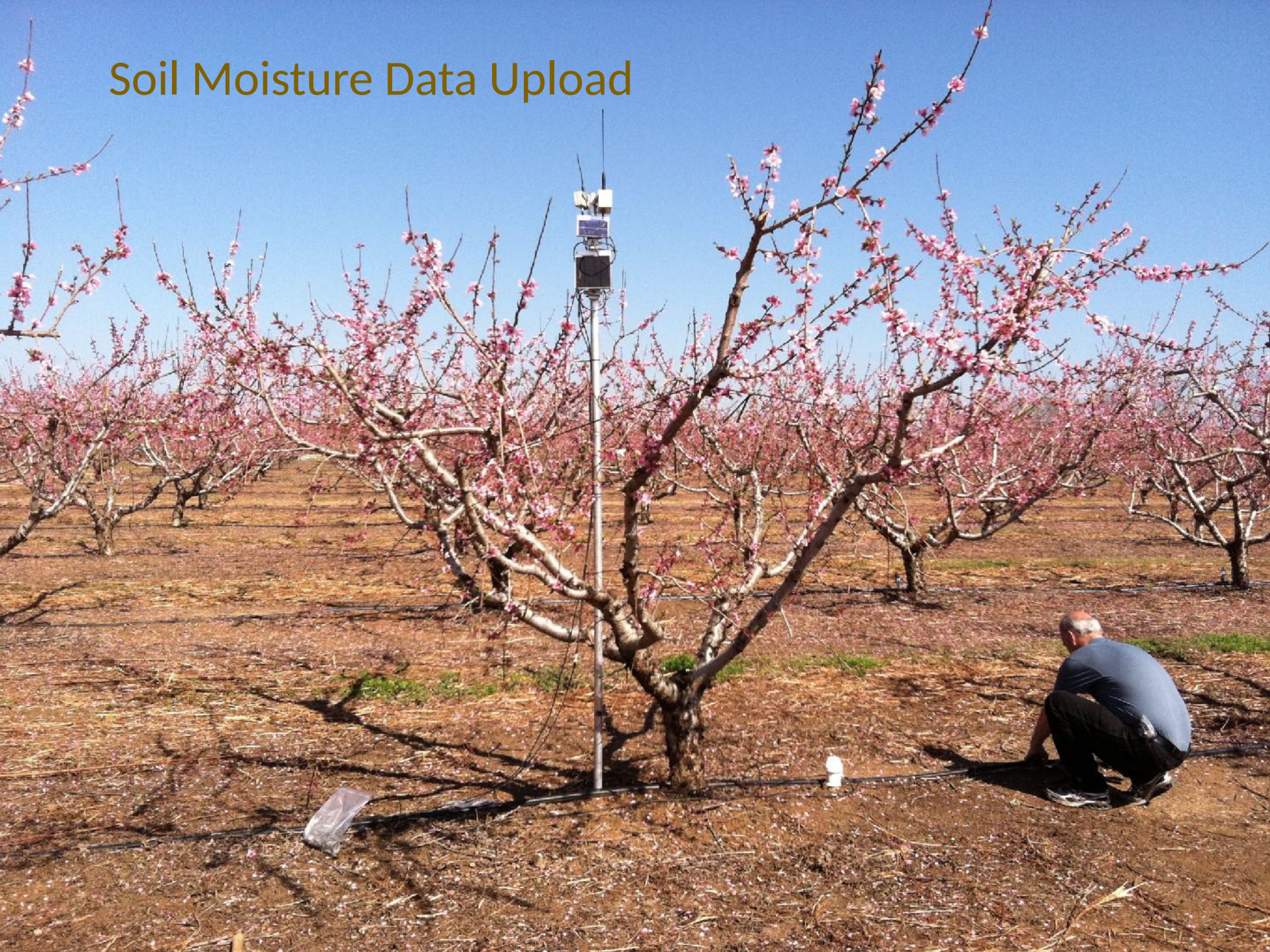
30cm

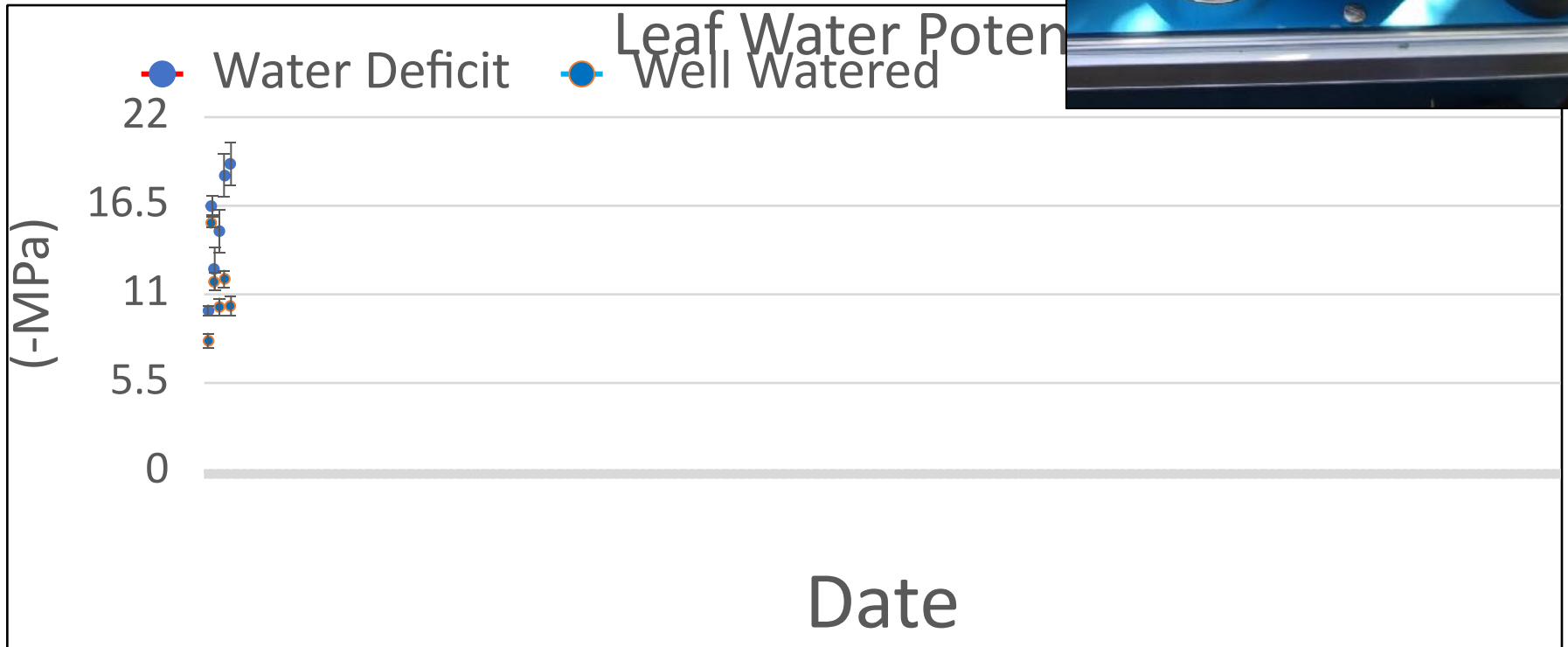
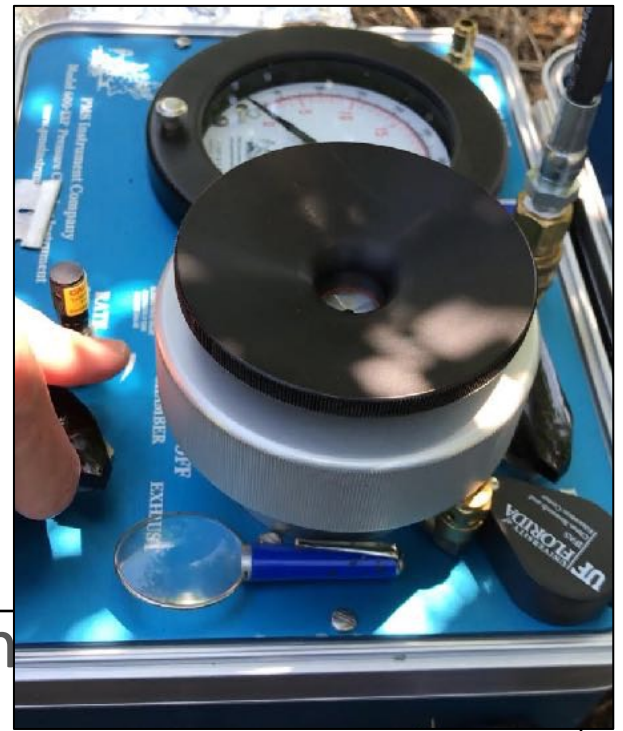
40cm

50cm

70cm

Soil Moisture Data Upload

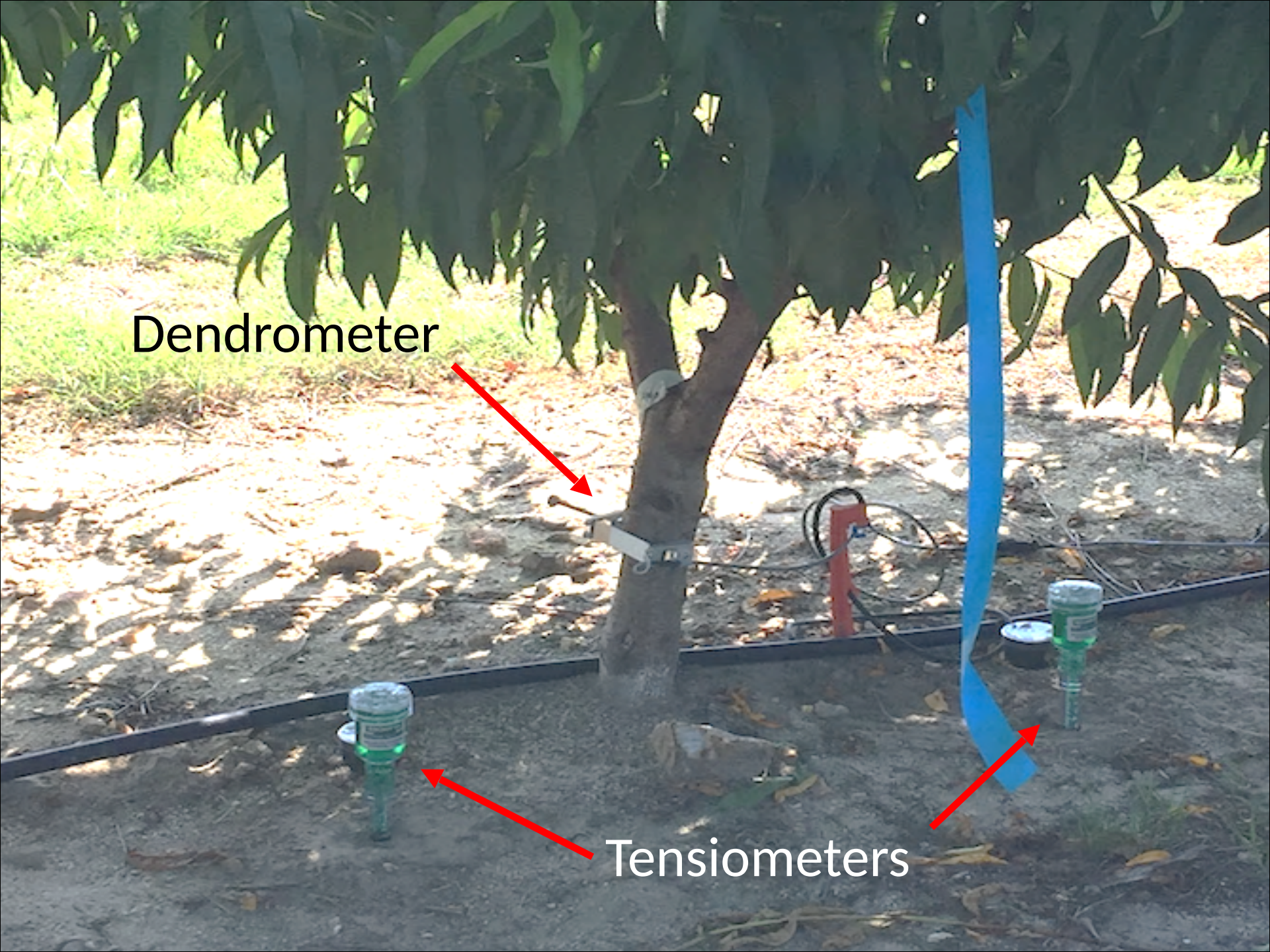




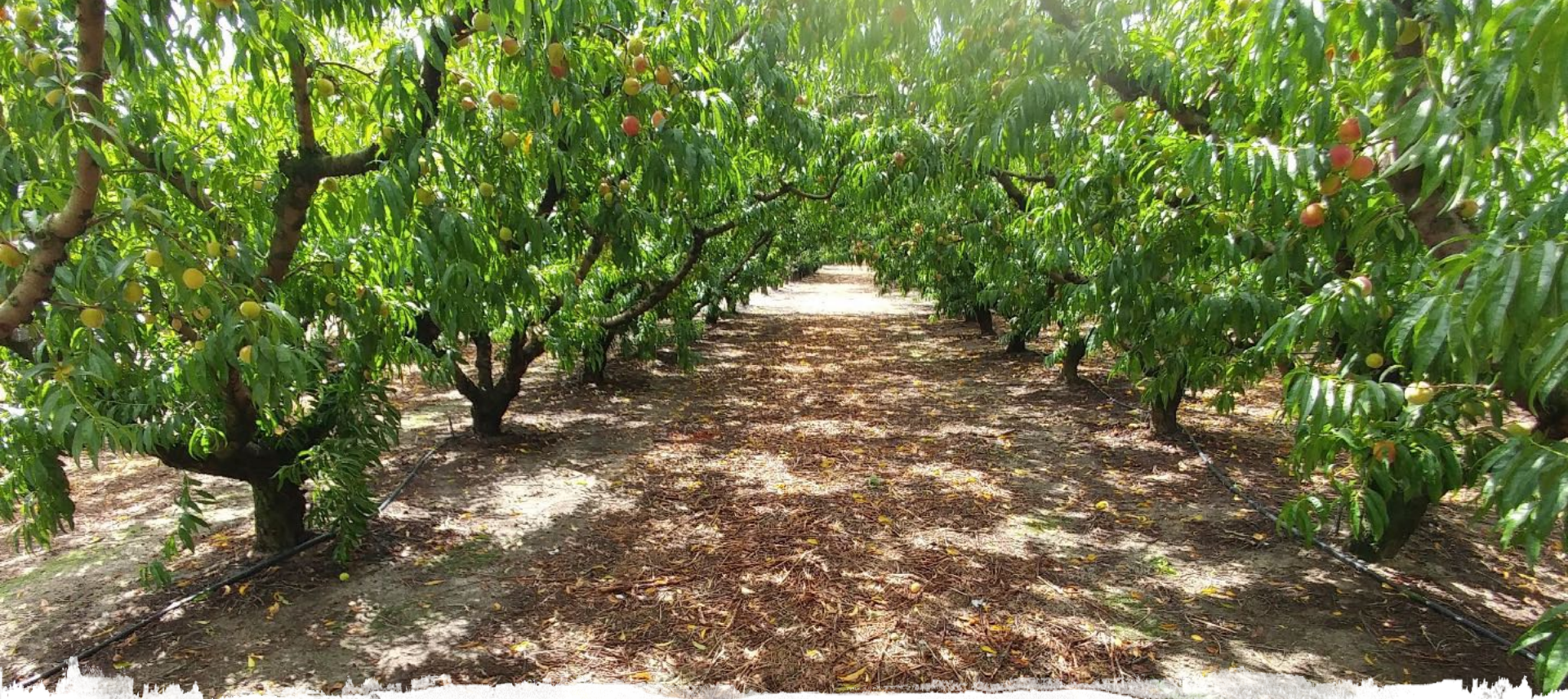
Dendrometer



Tensiometers







How different are patterns of fruit growth depending on

a) time to harvest (a month vs a week)?

b) irrigation events (before vs after irrigation)?

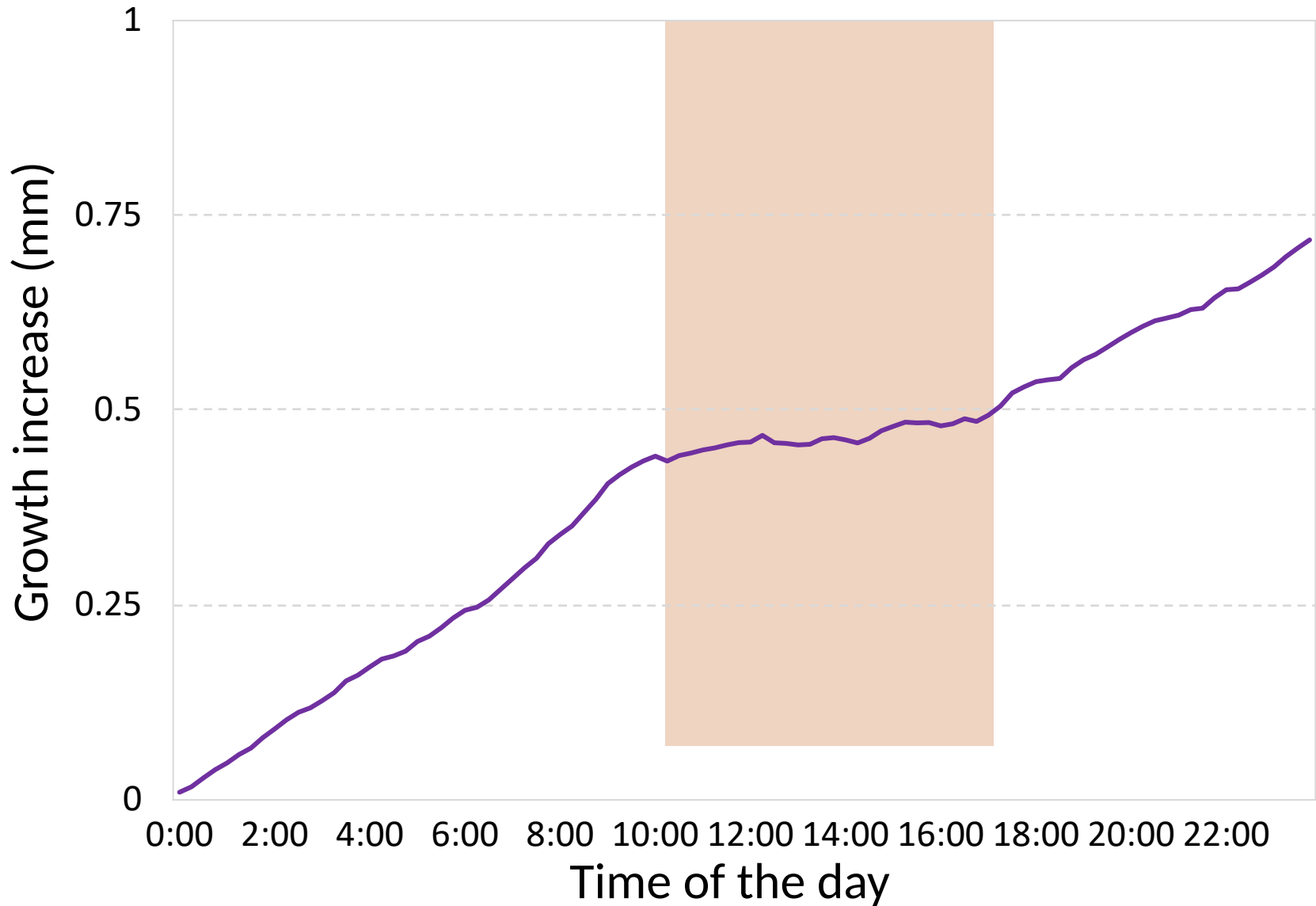


Ten dendrometers (Dynamax DEX100)
Measurements every 15 minutes

Peach variety	Measurement dates
Redskin	June 18 – July 11
Sunny J	July 11 – August 9

- 🍊 Determine size change every 15 minutes
- 🍊 Calculate accumulated fruit growth increase per day
- 🍊 Focus on specific times: a) from four weeks to harvest; b) before, during and after irrigation events

Accumulated fruit growth increase (24 h)

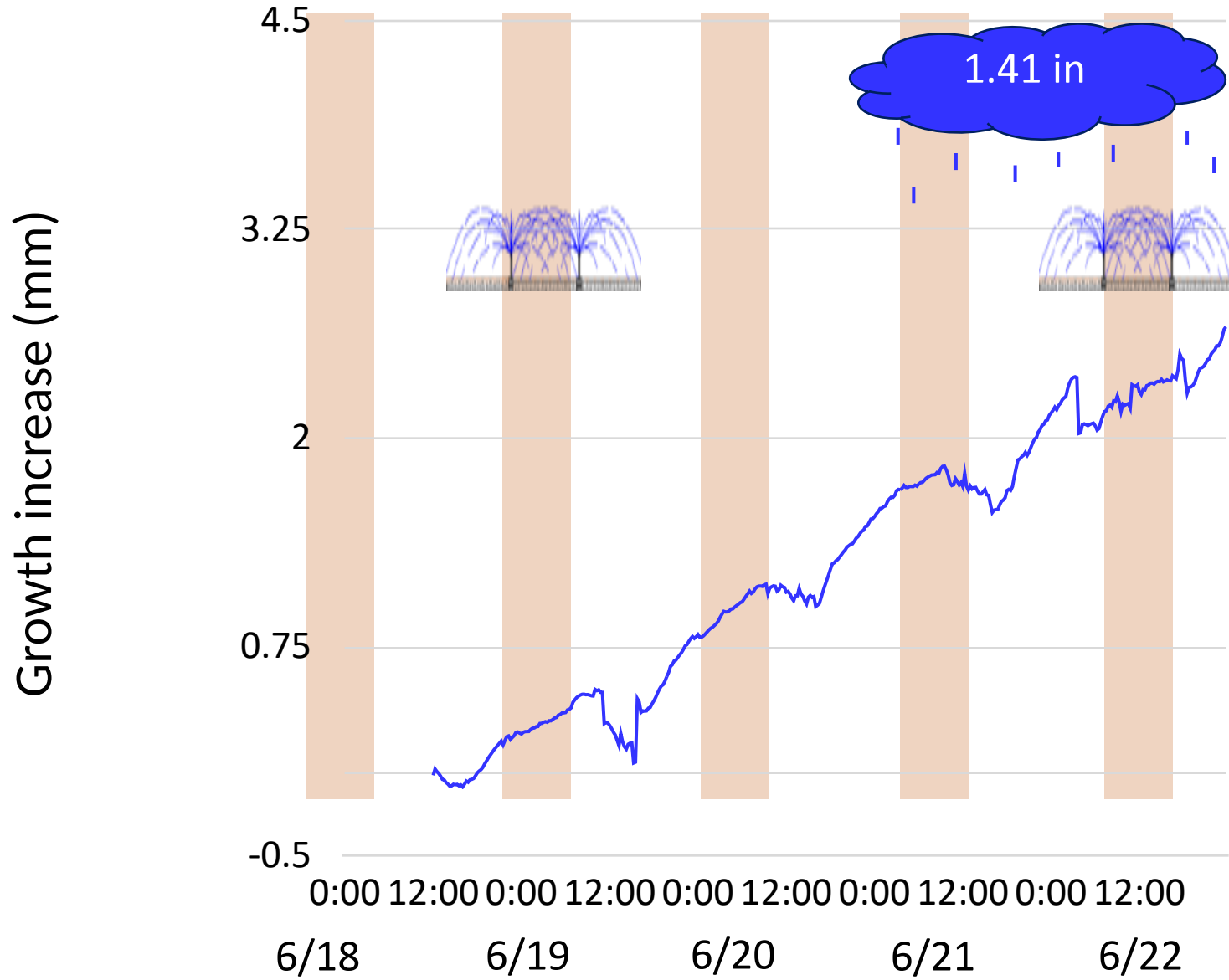


How different is the fruit growth pattern four weeks before harvest vs. two weeks before harvest?



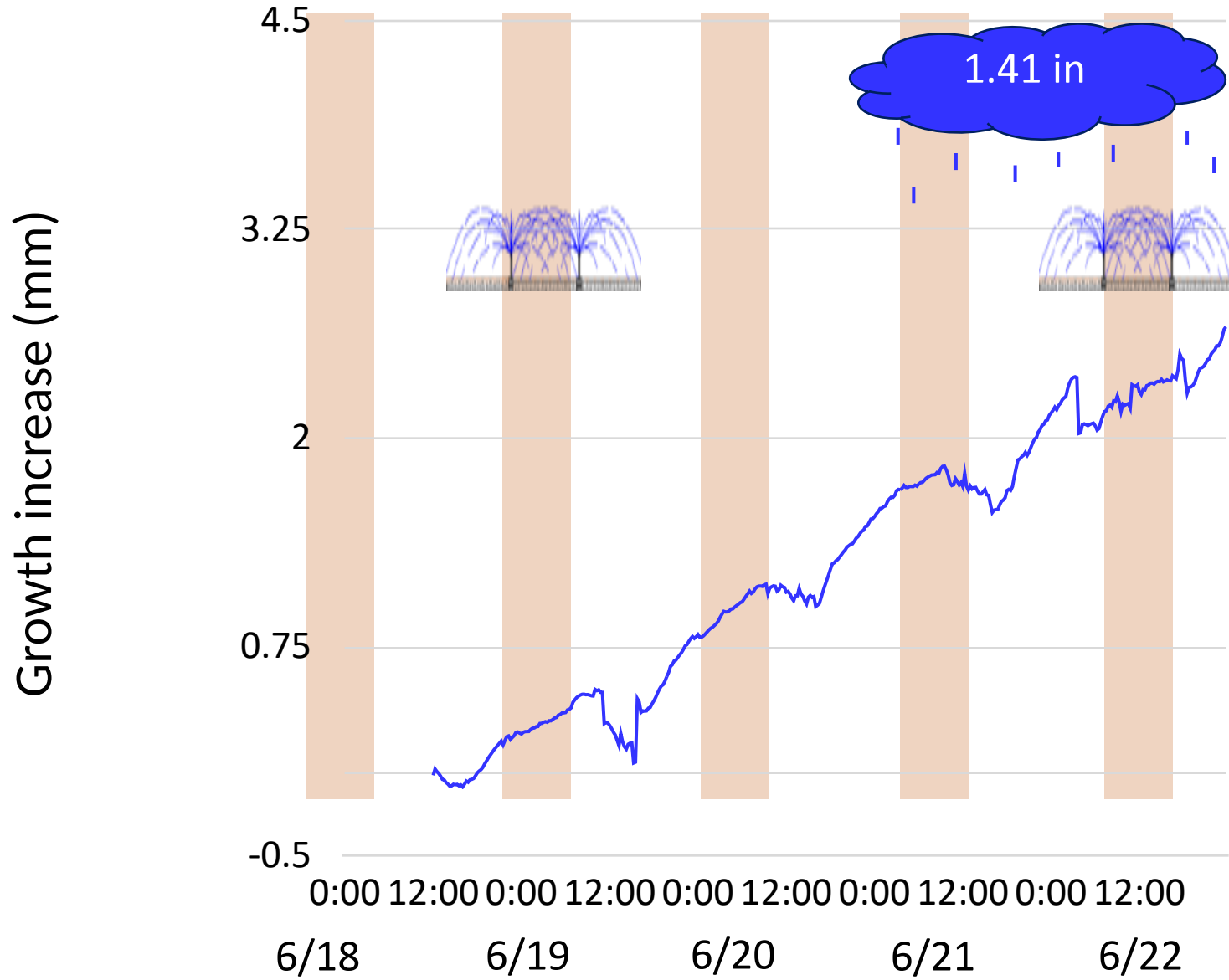
Accumulated fruit growth, 18-22 June

 Redskin

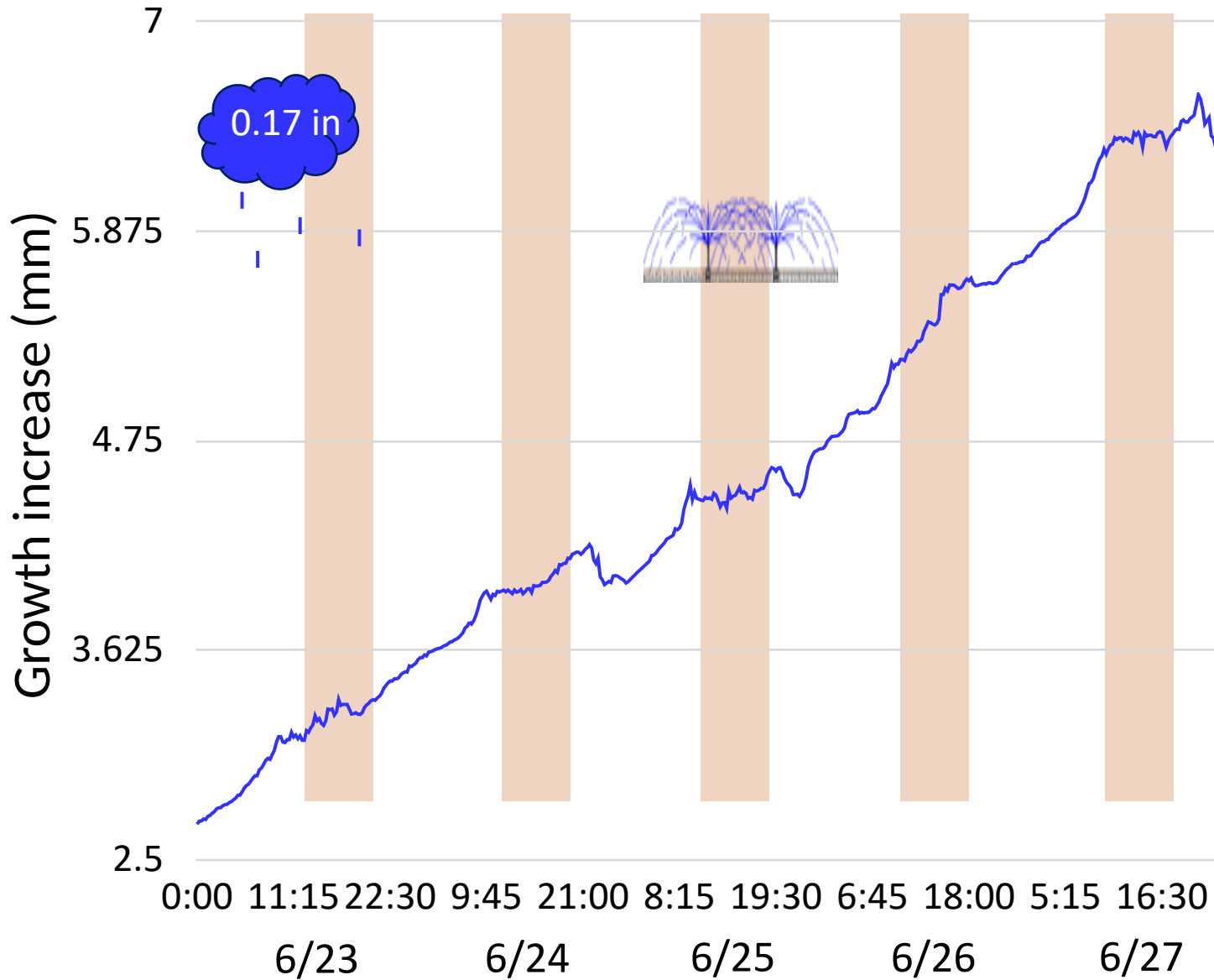


Accumulated fruit growth, 18-22 June

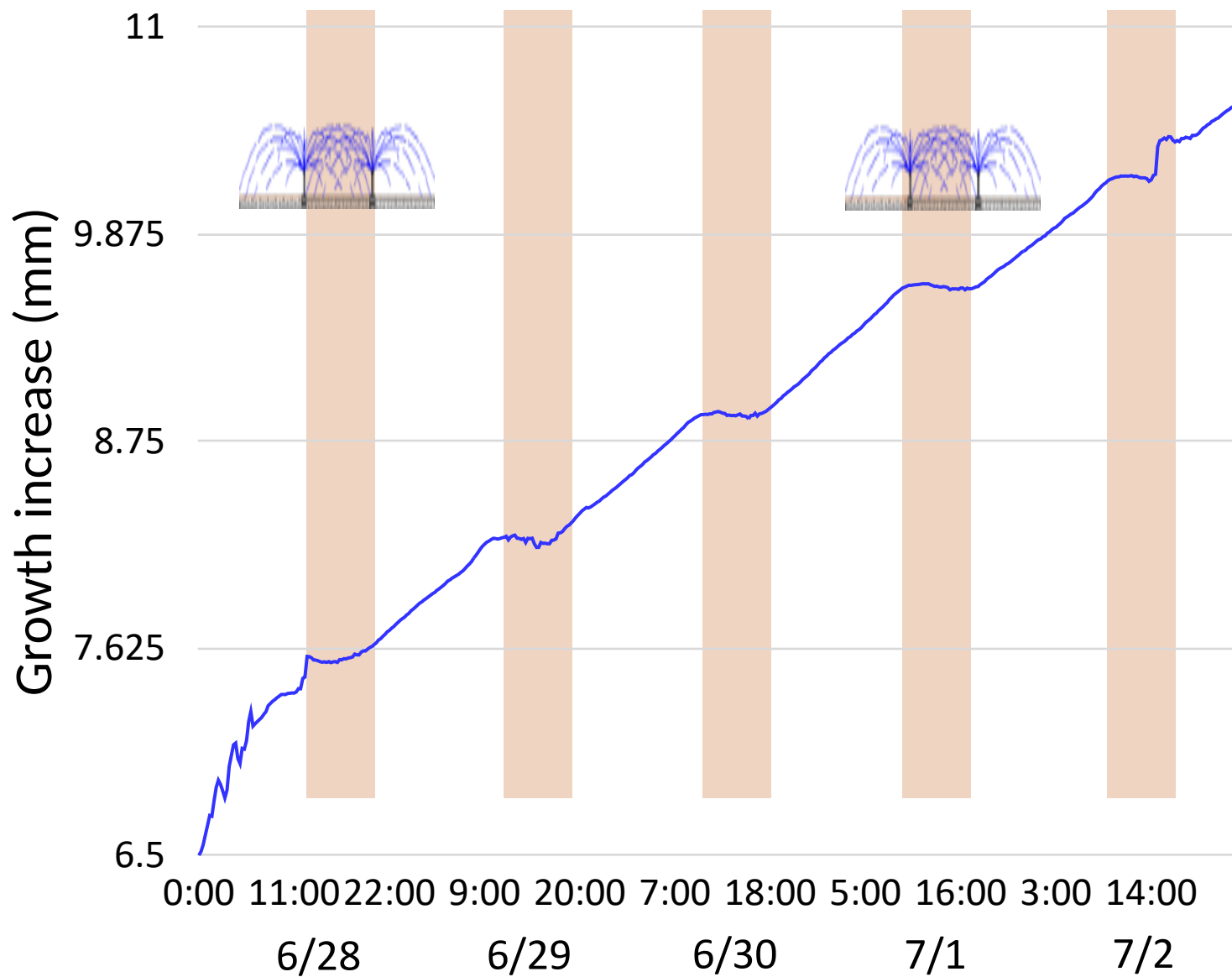
 Redskin



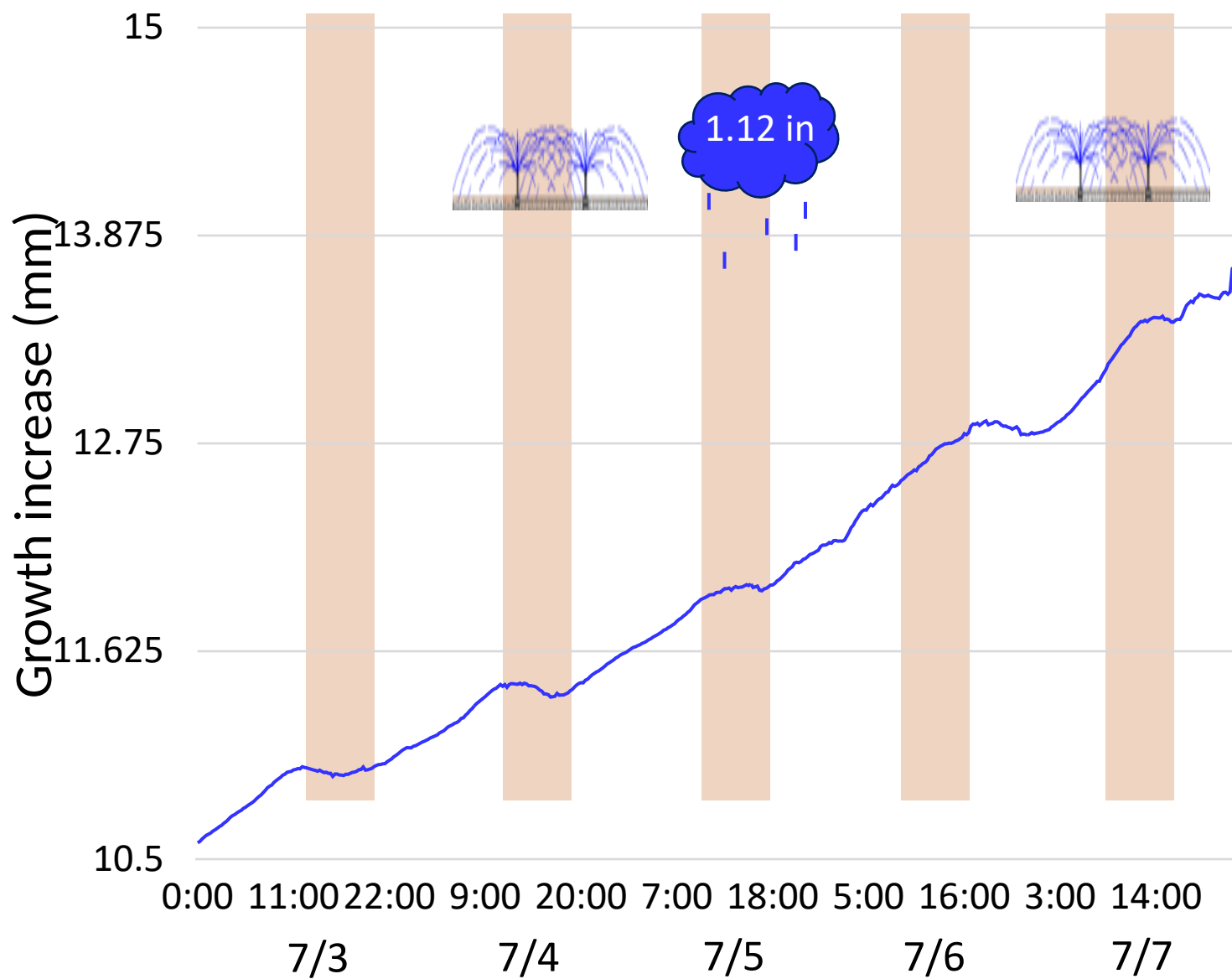
Accumulated fruit growth, 23-27 June



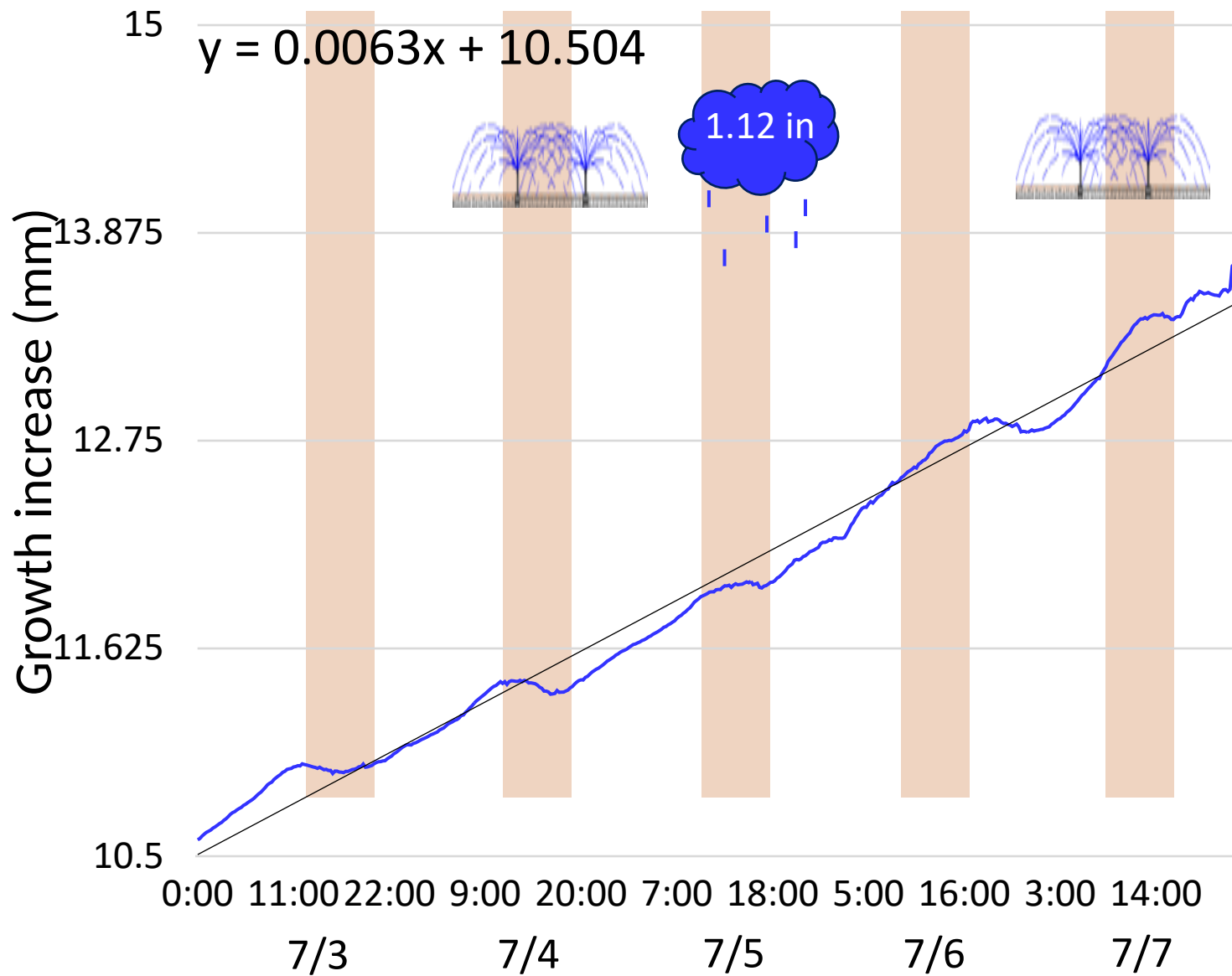
Accumulated fruit growth, 28 Jun-2 Jul



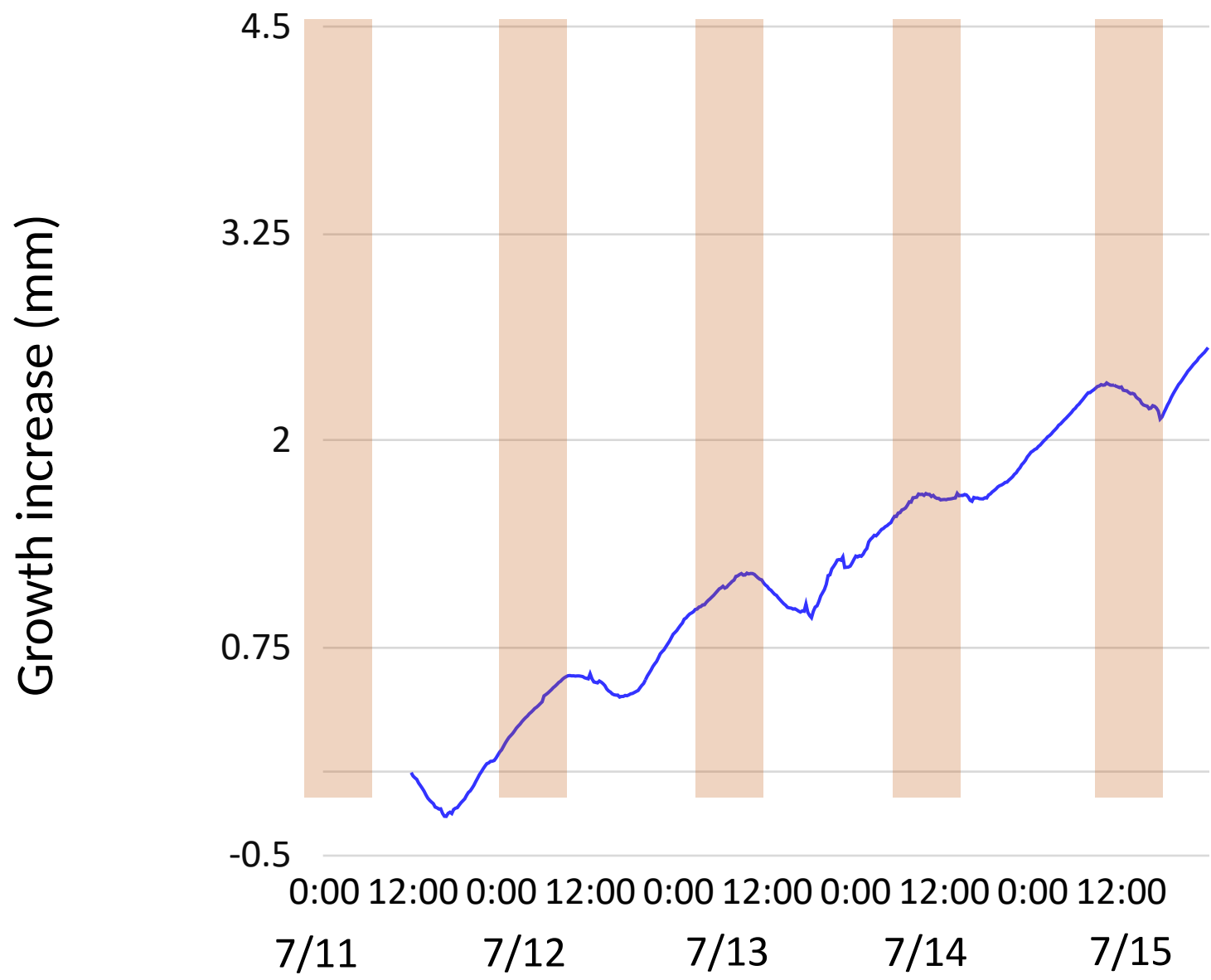
Accumulated fruit growth, 3-7 July



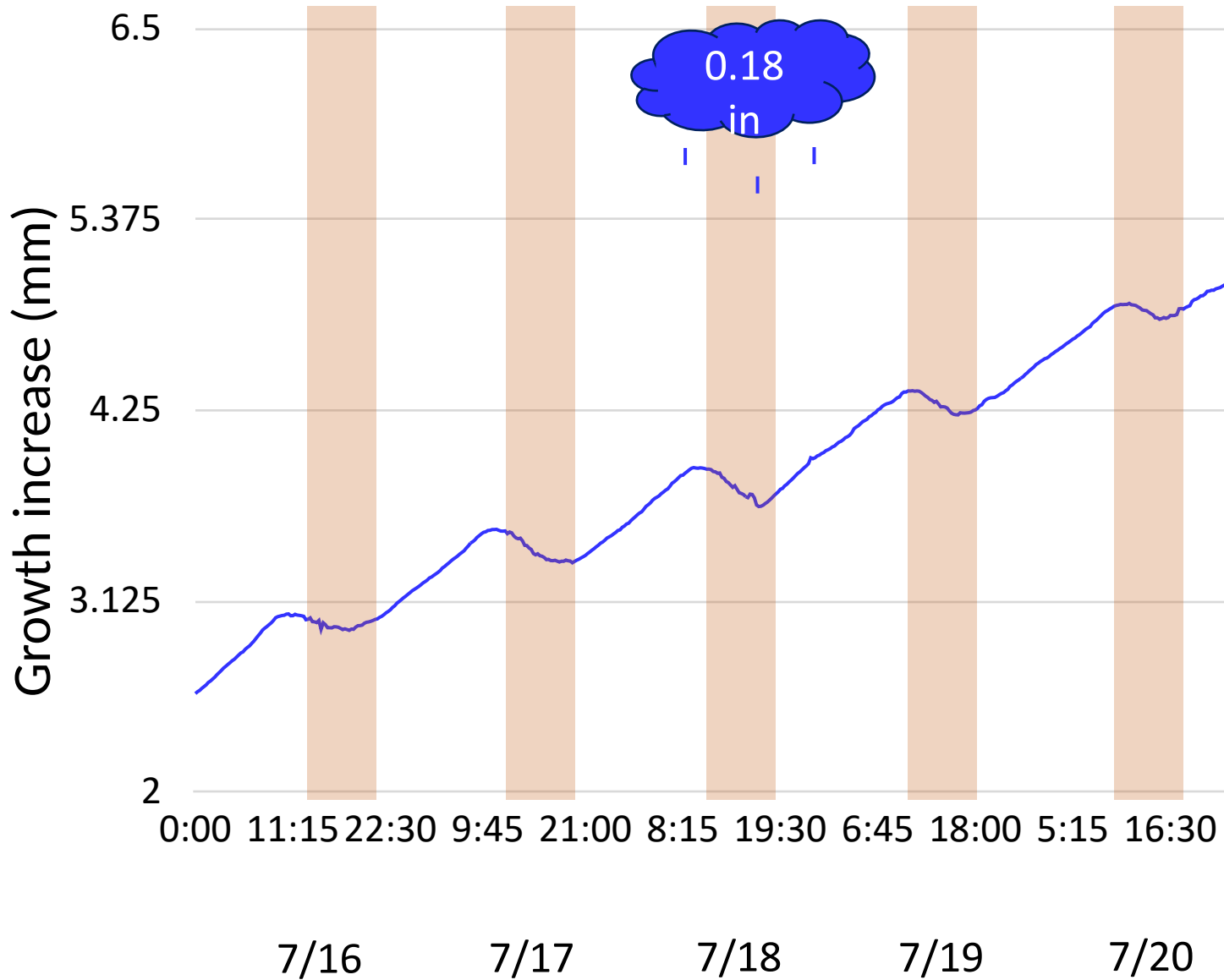
Accumulated fruit growth, 3-7 July



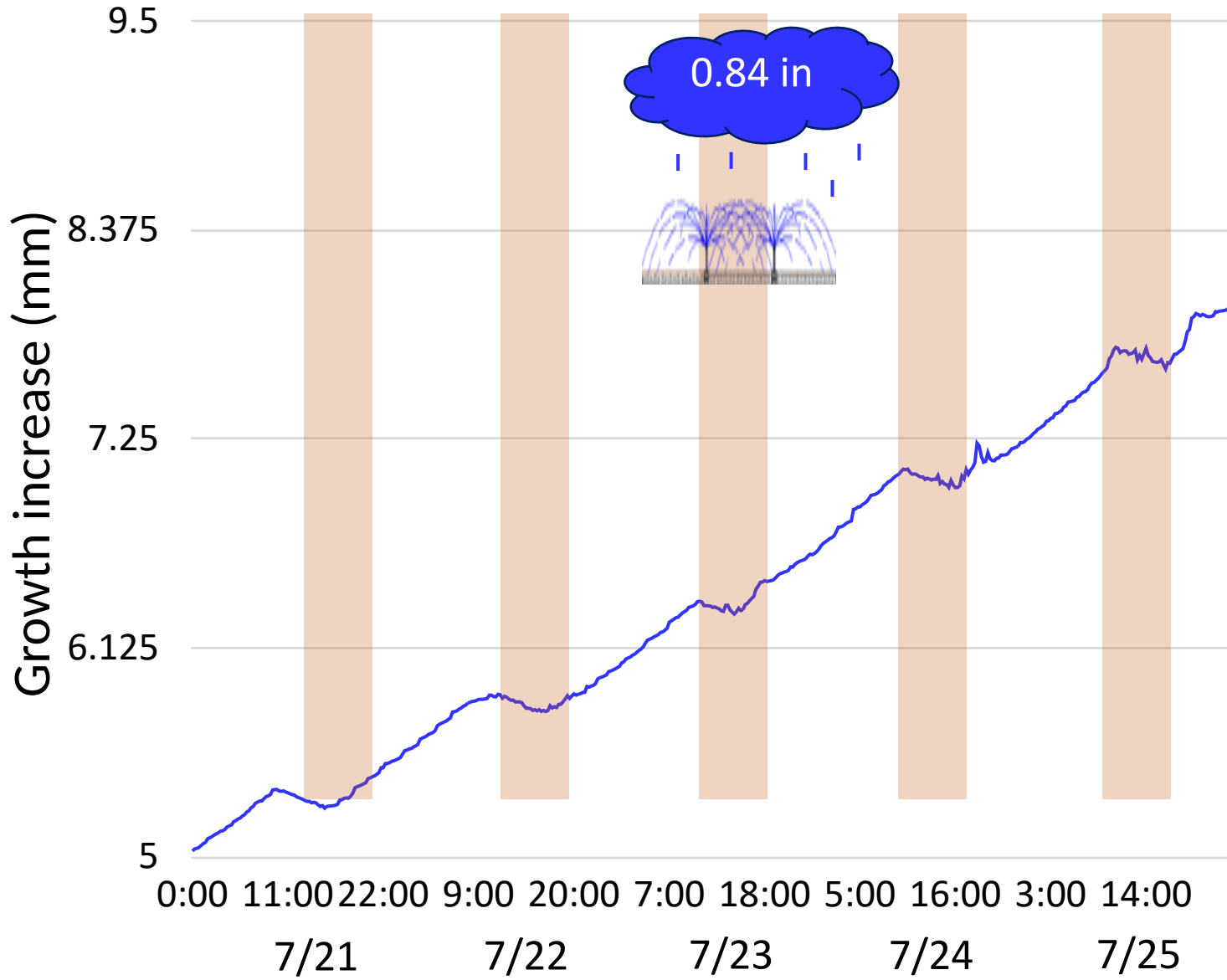
Accumulated fruit growth, 11-15 July



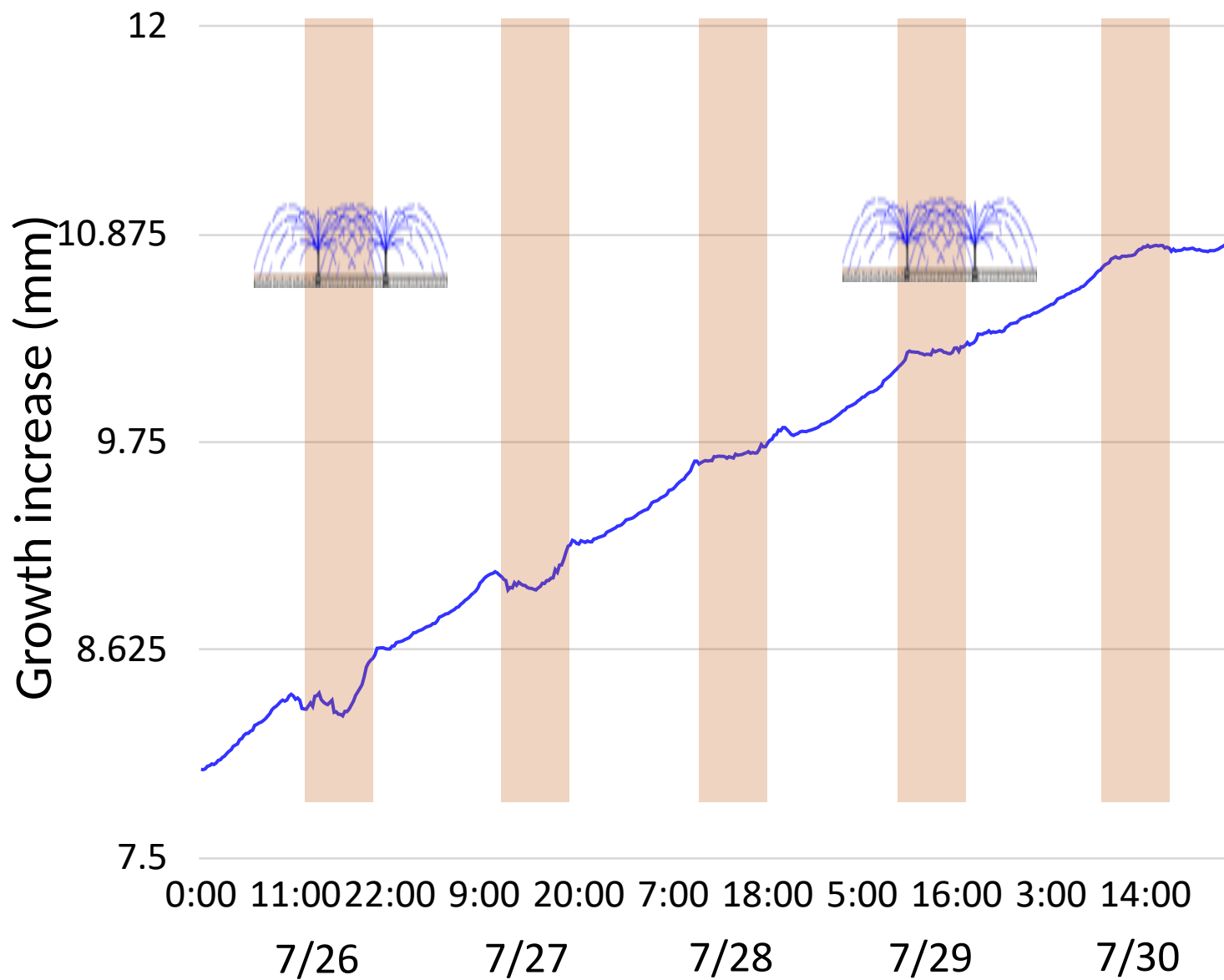
Accumulated fruit growth, 16-20 July



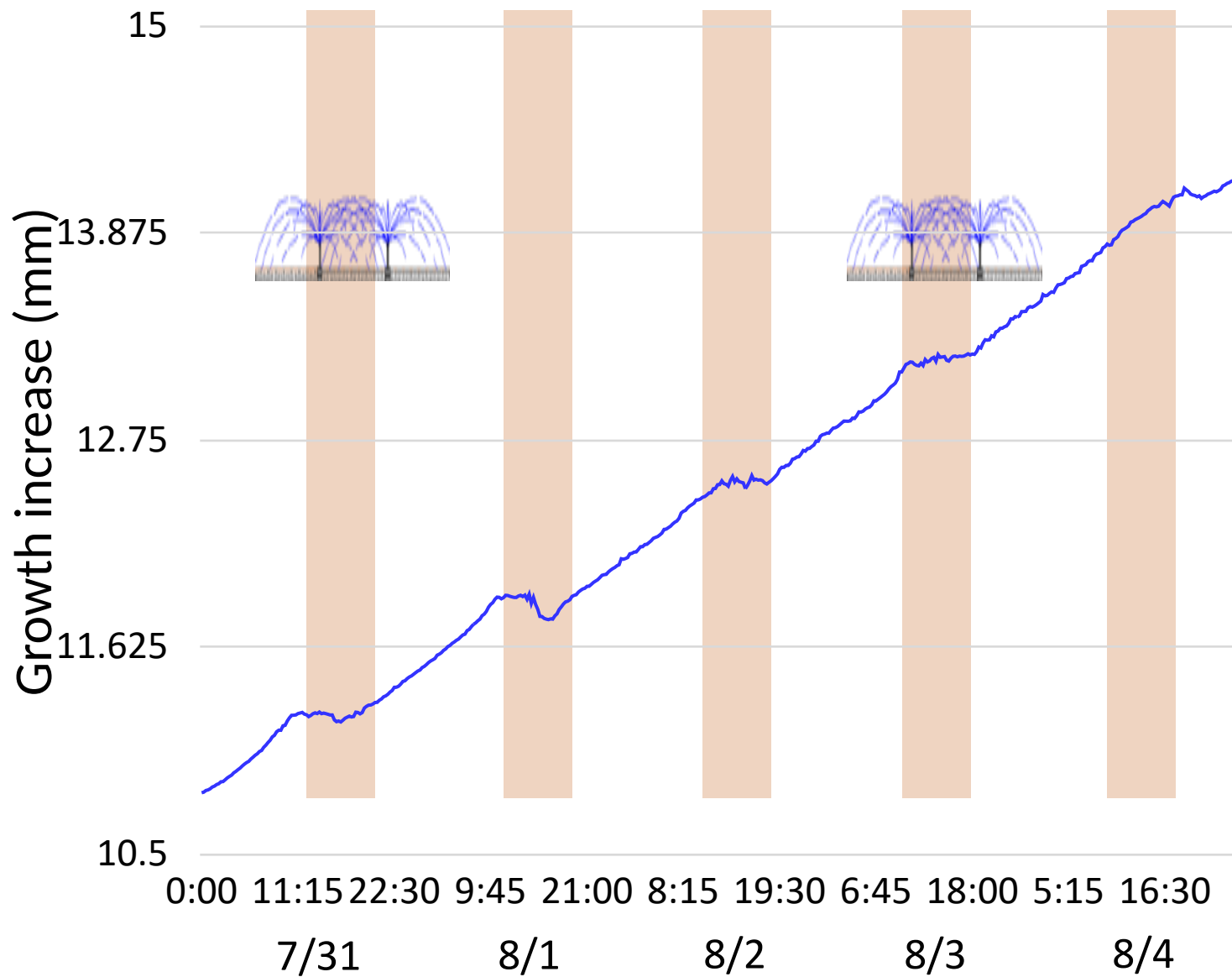
Accumulated fruit growth, 21-25 July



Accumulated fruit growth, 26-30 July



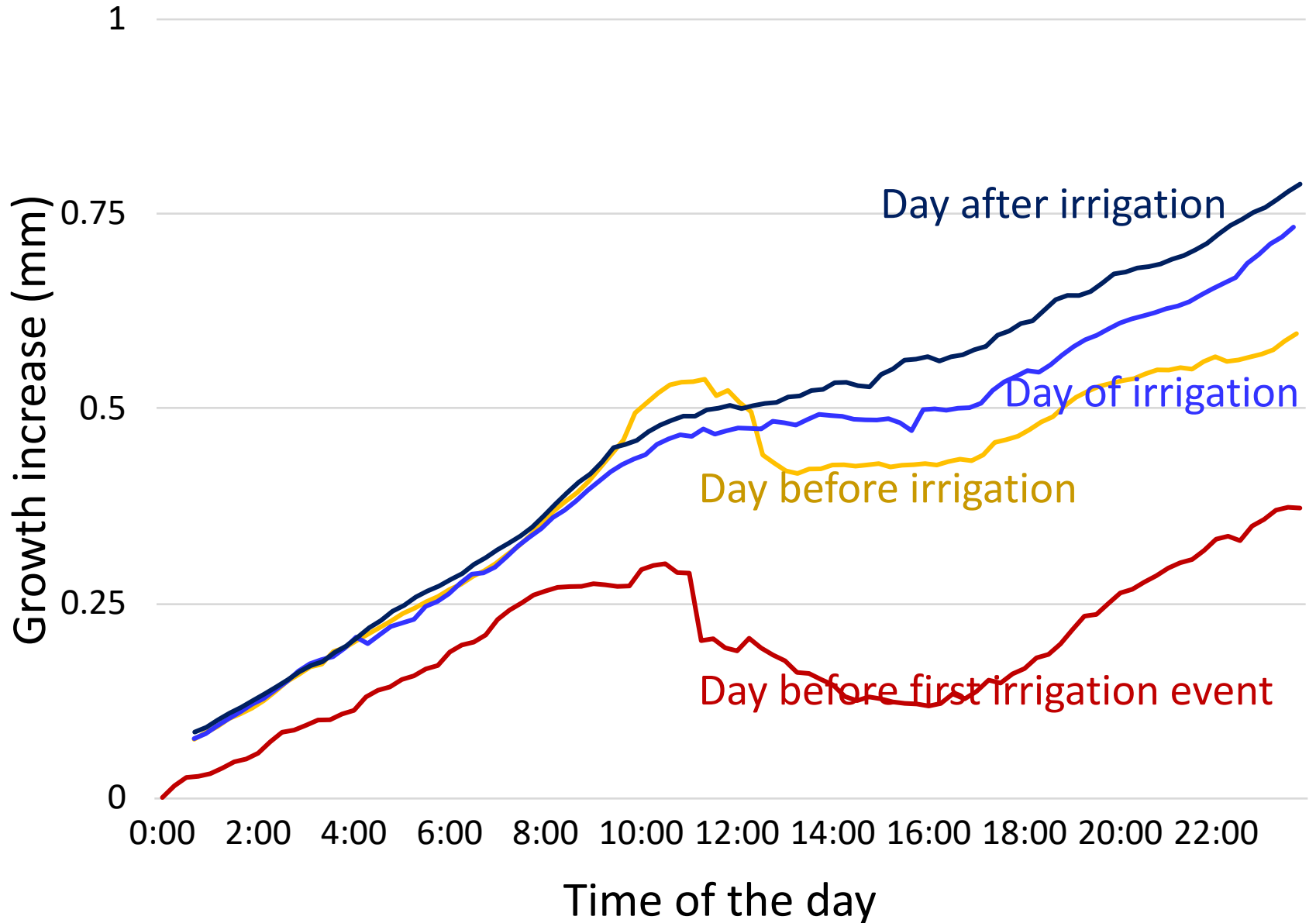
Accumulated fruit growth, 31 Ju-4 Aug



How different is the fruit growth pattern before and after irrigation?



Average fruit growth in a day





🍑 Differences in fruit growth patterns were observed around the

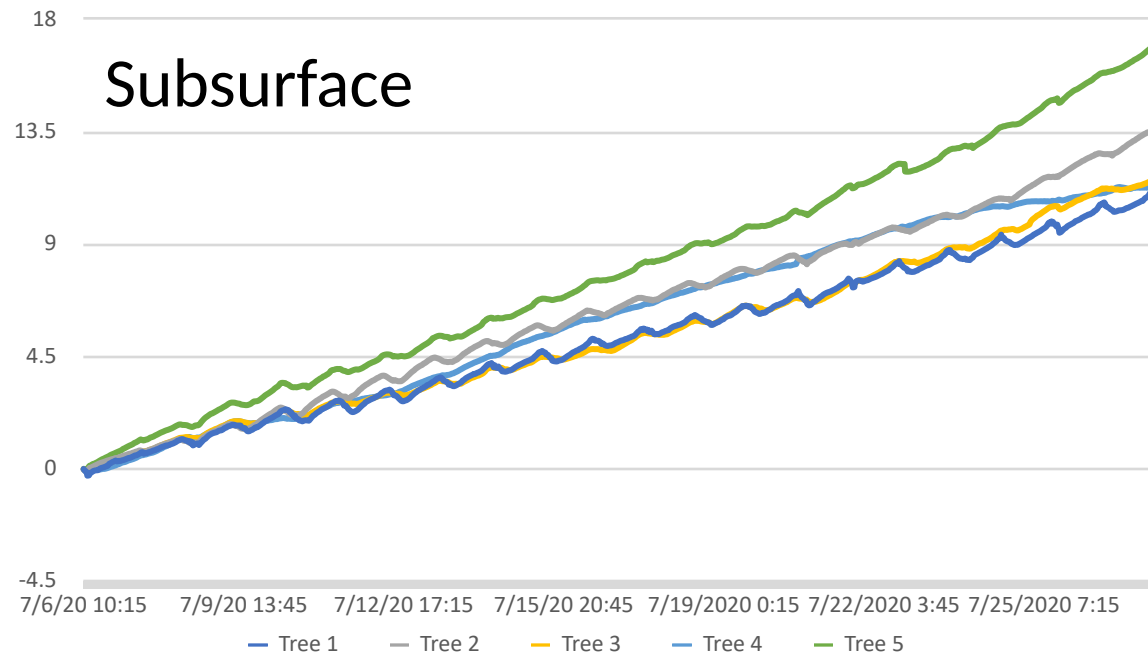
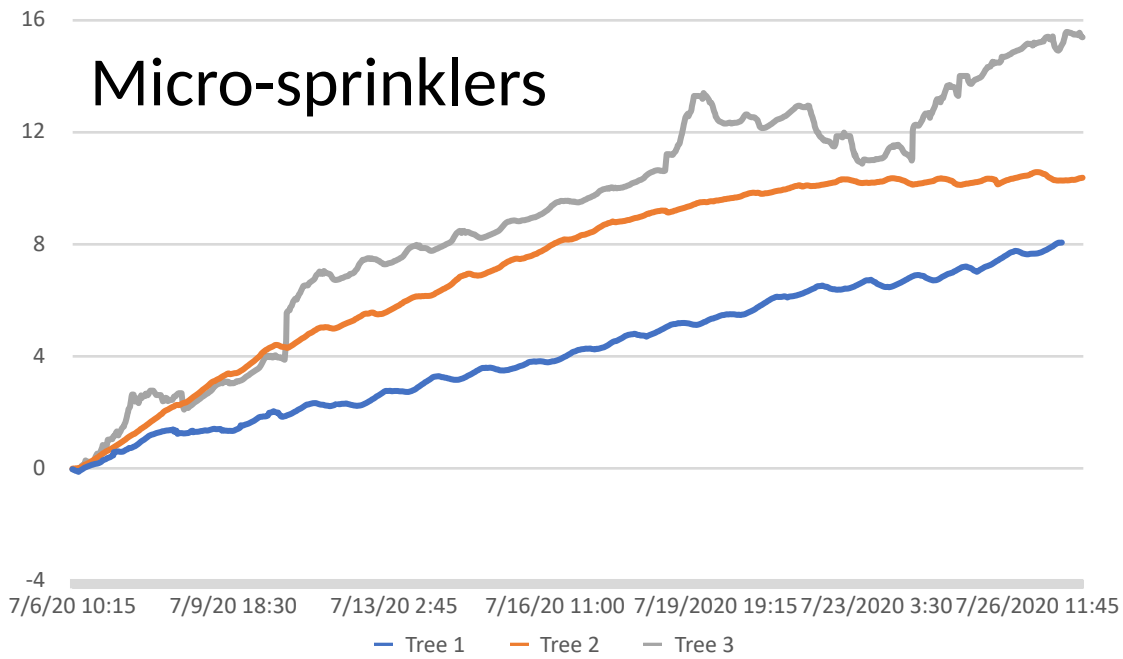
🍑 There is some room for improvement about four weeks before harvest, especially in orchards with low irrigation frequencies



🍑 Fruit did not lose size the days of irrigation and after irrigation

🍑 Reducing dry periods would reduce daily fruit losses

Accumulated growth (mm)







Acknowledgements

Project supported by SC Department of Agriculture
Specialty Crop Block Grant Program

Project number AM180100XXXXG026

Titan Farms, Ridge Spring, SC



Questions?

jmelgar@clemson.edu