



# Effects of Mechanical harvesting on Tree Health and Yield

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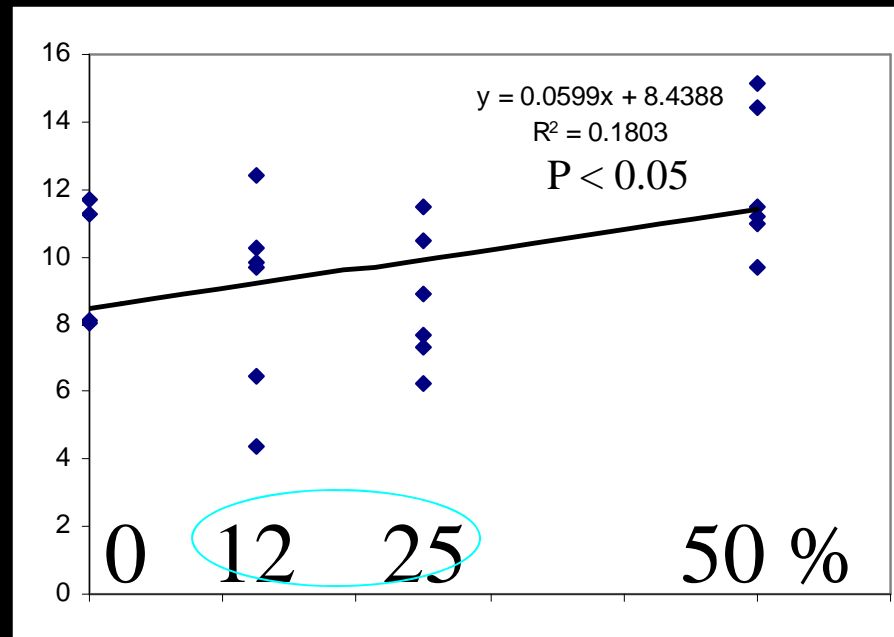
# ? Compensation for defoliation

M H and abscission chemicals? 20% def.  
No yield reduction even at 50 % def.

for 2 years (Yuan et al. 2005)

Leaf Photosynthesis

'Valencia' May 2003



% Defoliation

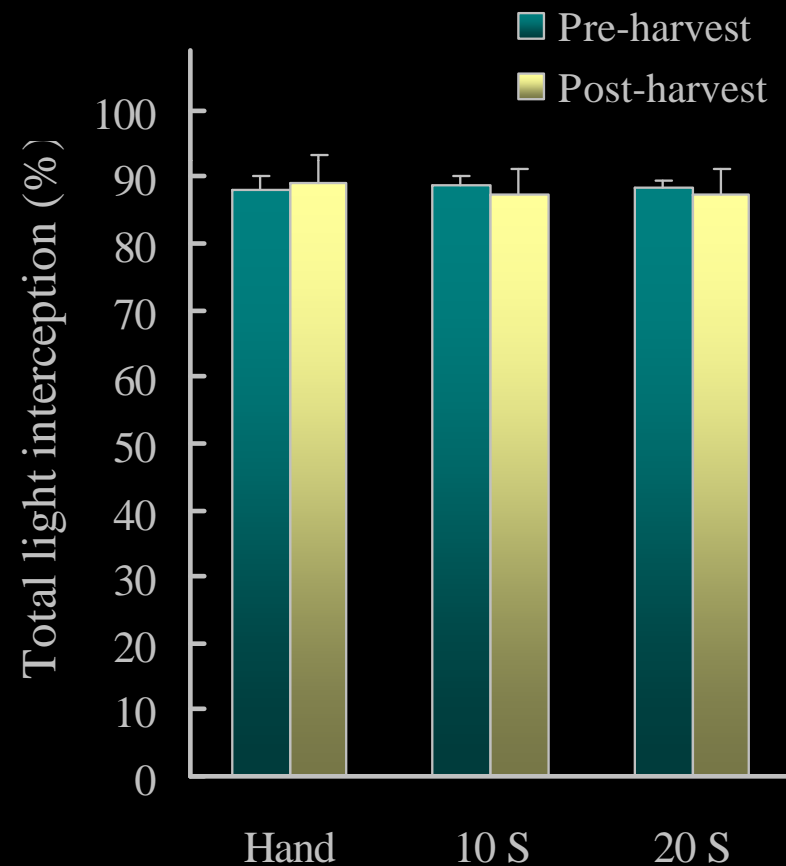
(G-Sanchez et al. 2003)

# Defoliation – Light Interception

Avg. 10 to 12%  
leaf area  
removed

No affect on leaf  
photosynthesis

No affect on  
canopy light  
interception or  
leaf area next  
year

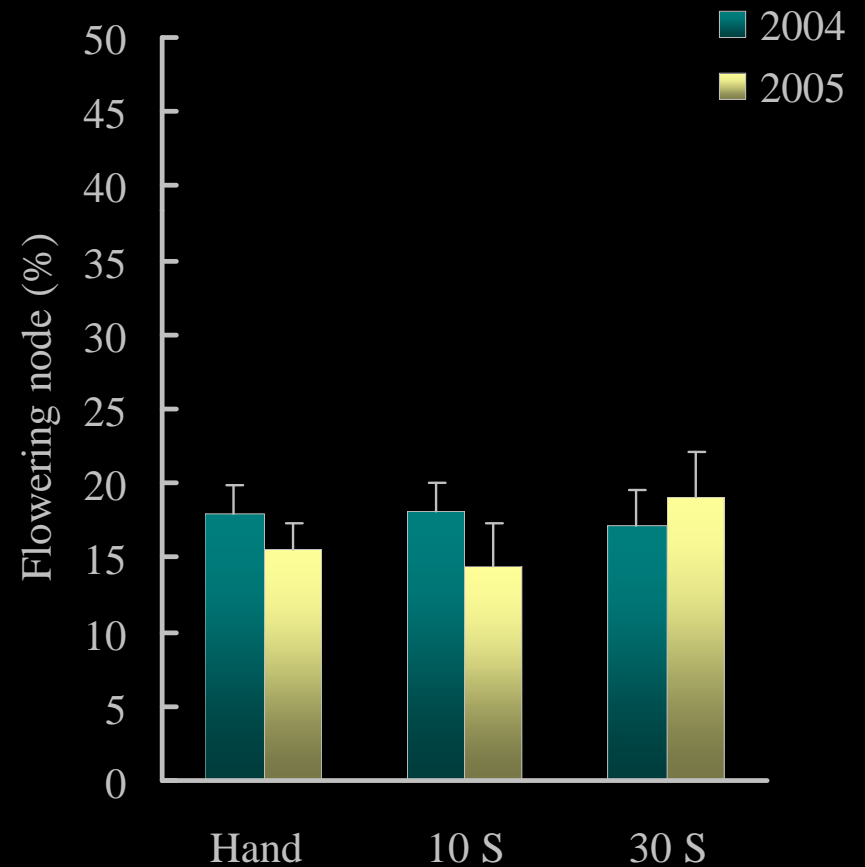


# Flower Loss: Nodes?

Avg. 10 to 12%  
leaf area removed

Does not affect leaf  
photosynthesis

No affect on canopy  
light interception,  
leaf area, or return  
bloom next year

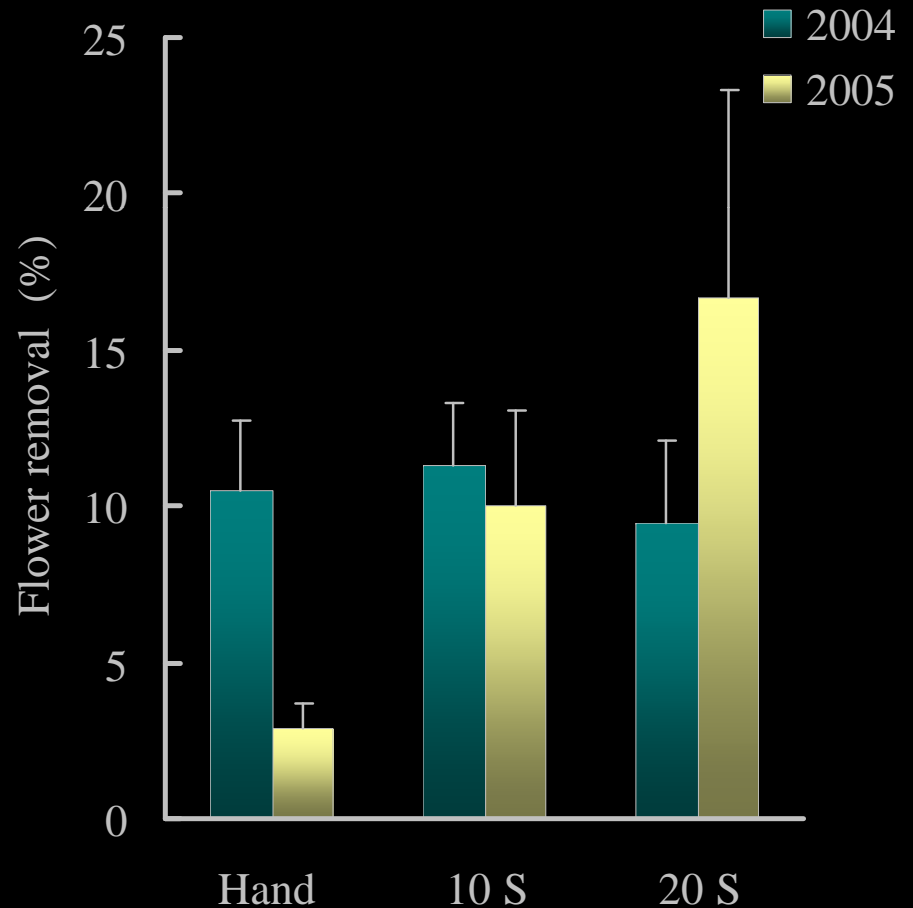


# Petal fall – Flower loss

10 to 15%  
fruitlets  
removed when  
harvested at  
bloom

Does not  
reduce final  
fruit set

Does not  
reduce next  
crop yield or  
fruit size

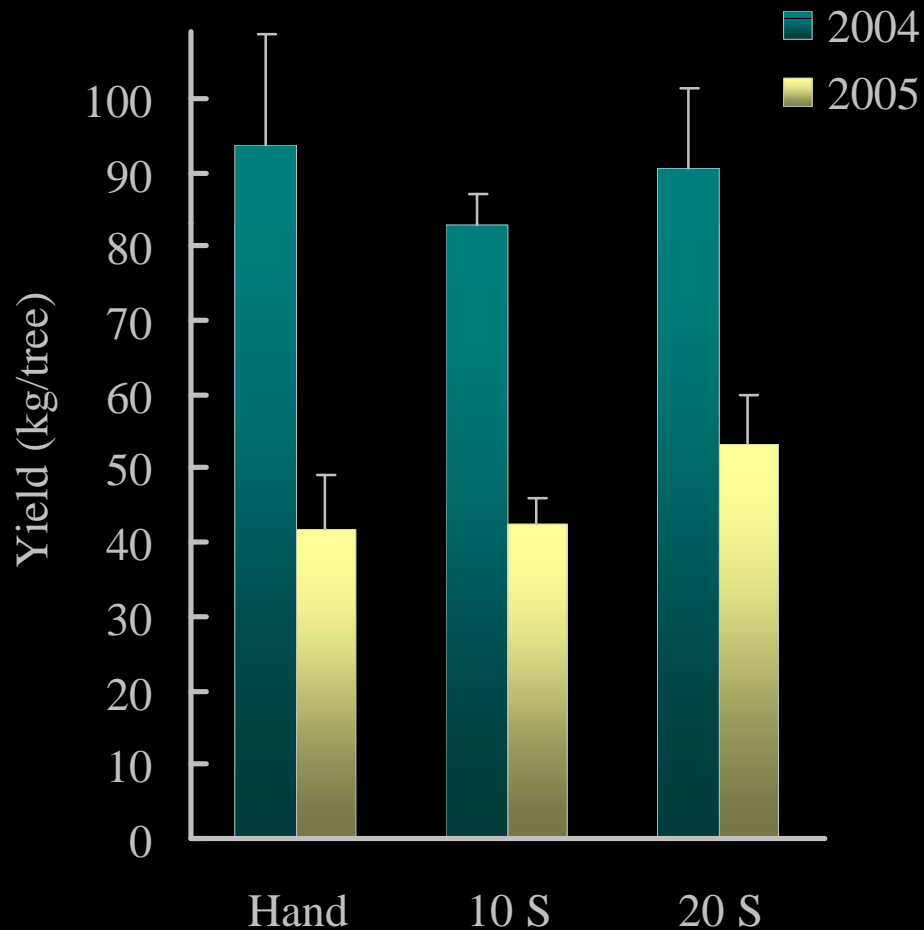


# Petal fall -- Yield

10 to 15% fruitlet removed at bloom

Does not reduce final fruit set

Does not reduce next crop yield or fruit size



# Effect of Mechanical harvesting on Tree Health and Yield

**W**hat do we know about mechanical harvesting on citrus tree health and yield?



No long term effect on 'Hamlin' yield (7- 8 years)



Yield Reduction in 'Valencia' when harvested late with or aggressive trunk shaking

*Whitney et al.,*

**Problem:** Visible  
Physical injuries to trees  
occur during  
mechanical harvesting:



Defoliation



Petal fall



Bark scuffing



Root exposure



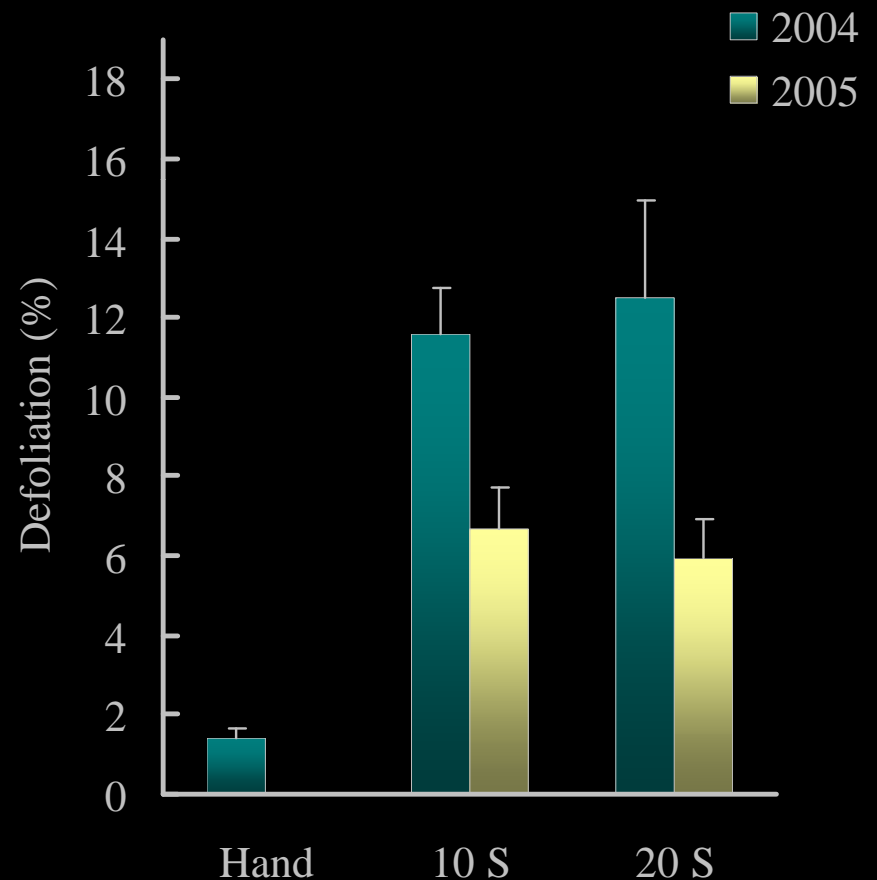


# Defoliation

Avg. 12 to 13%  
leaf area removed

No affect on leaf  
photosynthesis

Does not affect  
canopy light  
interception or leaf  
area next year



# Effect of Mechanical harvesting on Tree Health and Yield

Physical injuries occur during mechanical harvesting:



Defoliation



Petal fall



Bark scuffing  
Twig breakage



Root exposure



# Bark scuffing

Replaced with  
new bark  
tissue within a  
year

Does not  
reduce growth  
increment

No increased  
disease  
infections or  
pest invasions



# Physical injuries during mechanical harvesting:

 Defoliation

 Petal fall

 Bark scuffing, Twig loss

 **Root exposure**

Root death

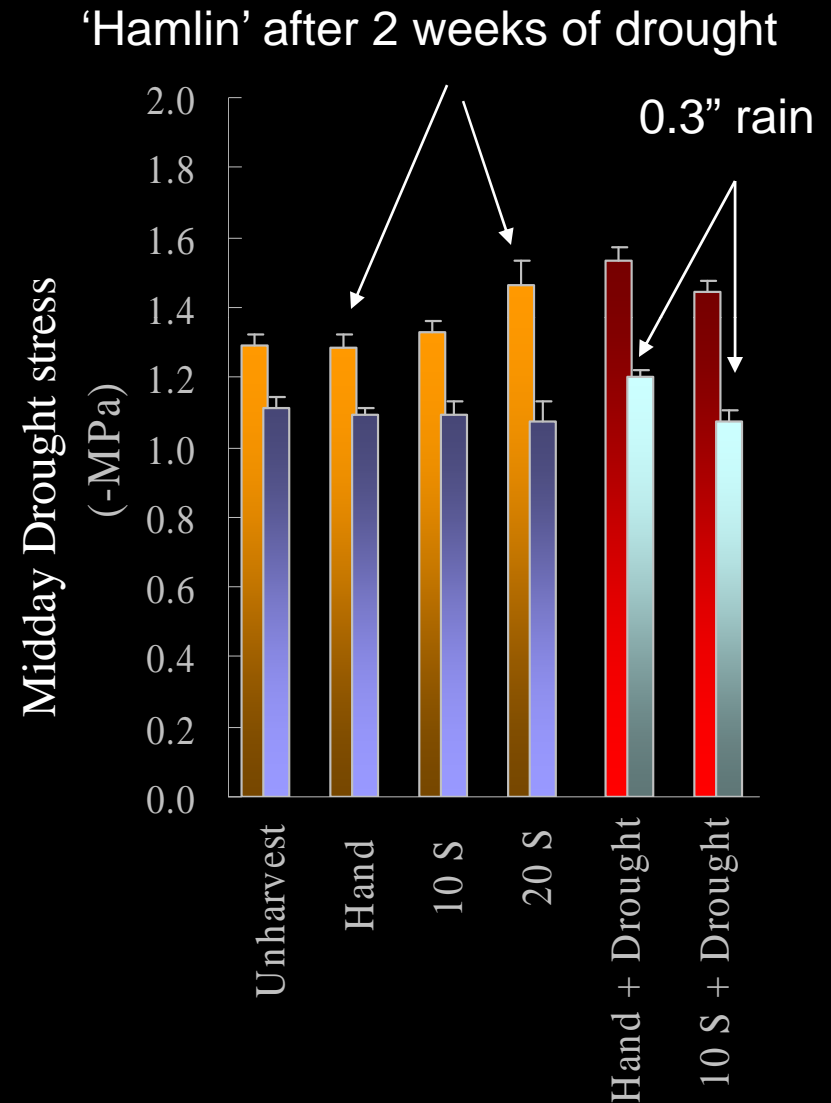
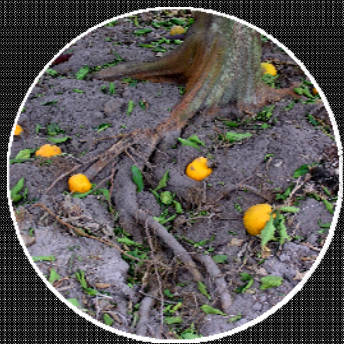
Water Relations?



# Root exposure – Drought stress

Little effect on root water and nutrient uptake, exc. excessive shaking and drought

Little effect on fine root growth



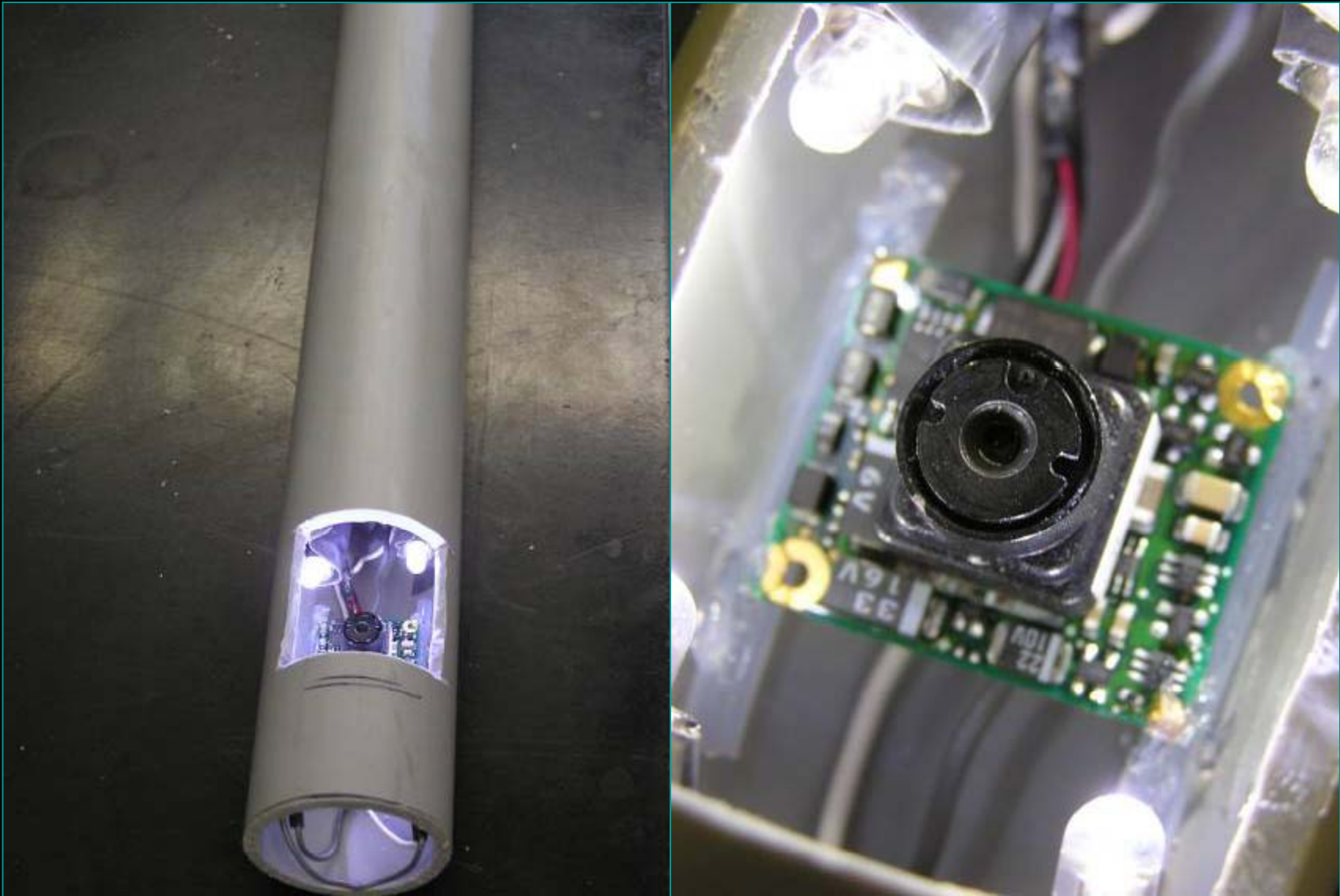
# Root exposure

Little effect on root water and nutrient uptake, exc. excessive shaking and drought

Little effect on fine root growth



# Root periscope



Video of Repeated  
measurements



Root growth  
through time





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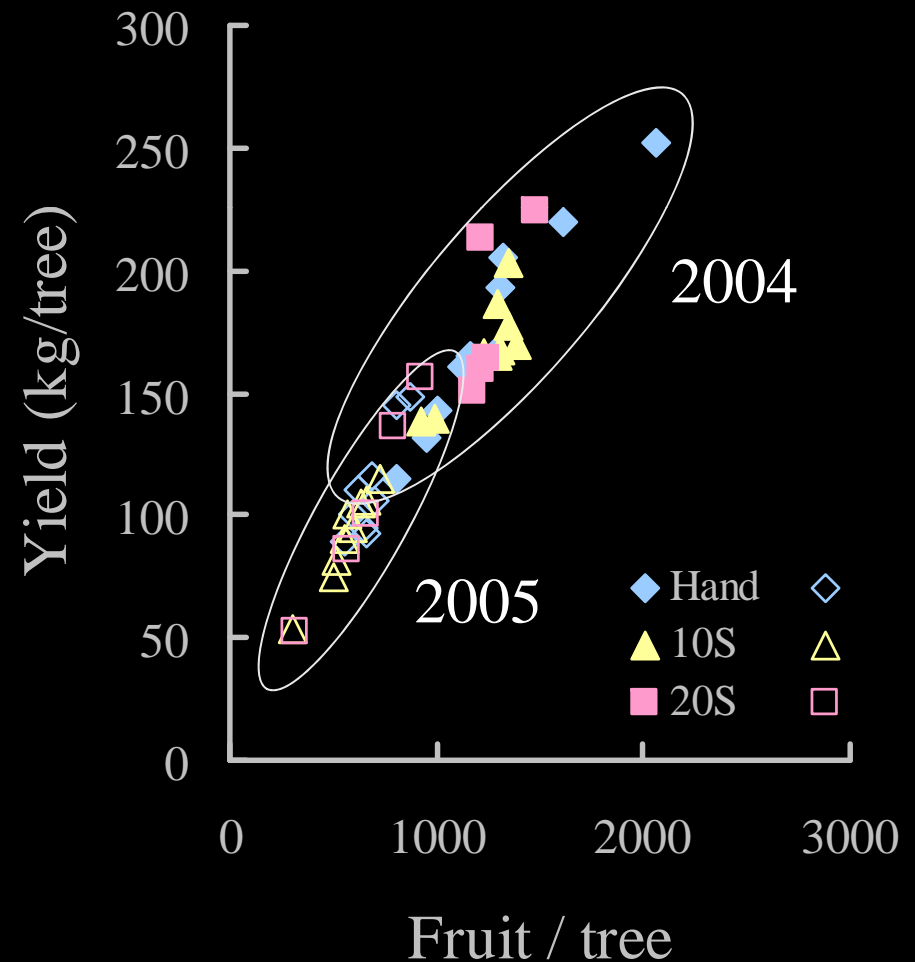
## Summary



Annual variation in yield is not related to harvest methods



Visible Injuries by mechanical harvesting are relatively mild and do not affect tree health and return yield



# Effect of Mechanical harvesting on Tree Health and Yield

## Exception



Harvesting 'Valencia' after May can remove young fruit and reduce yield of next crop

