What can we do about fruit drop?

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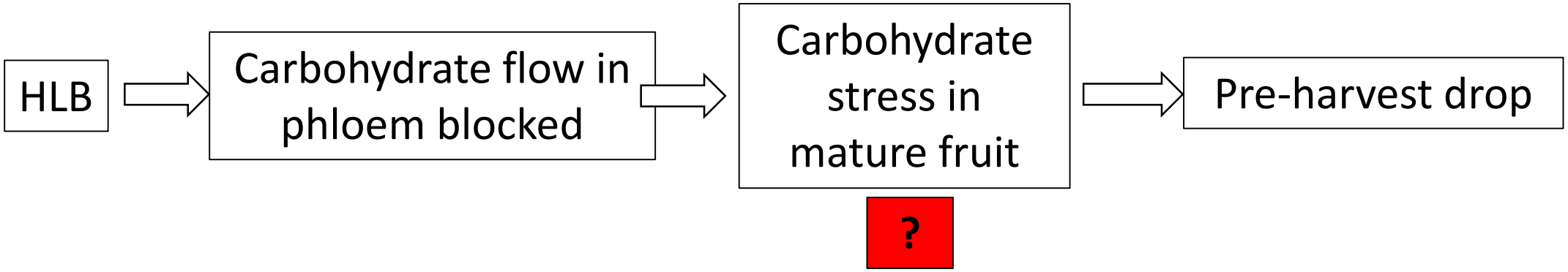
Effects of HLB on pre-harvest fruit drop

Rate of pre-harvest fruit drop in Florida reported by NASS, USDA

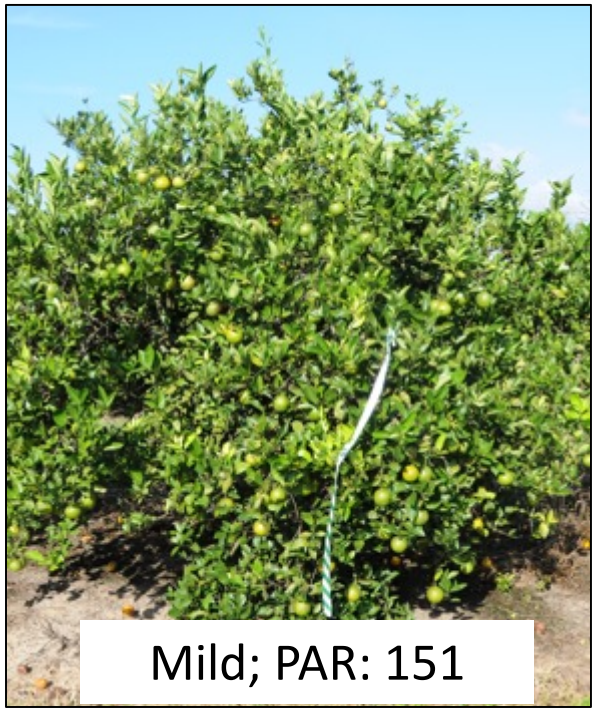
	Bearing trees (1000 trees)	Pre-harvest fruit drop (%)
Year		
2005-06	37,246	14
2009-10	33,685	15
2015-16	30,249	29
2016-17	28,925	30
2017-18	28,390	53

HLB-associated physiological responses related to pre-harvest drop

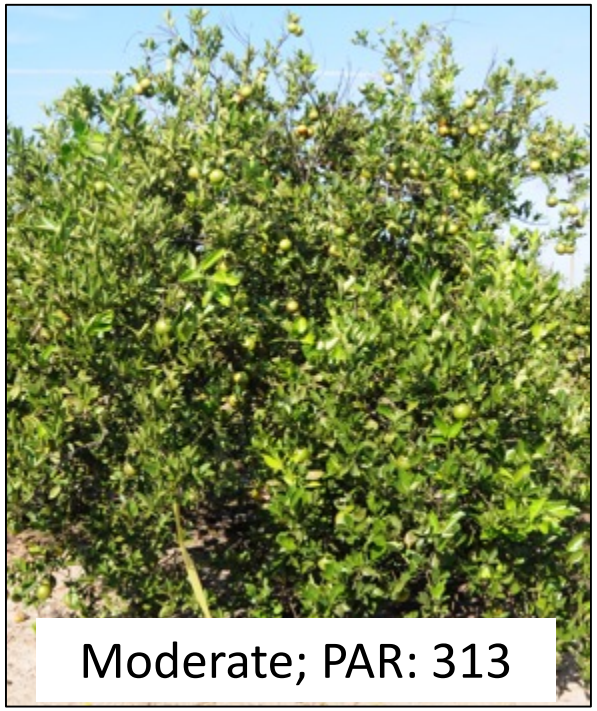
- Blocked carbohydrate flow
  - Phloem collapse in HLB-affected ‘Valencia’ trees
  - Disrupted sugar transport in the phloem
  - Carbohydrate shortage leads to abscission of young developing fruit during June drop



Photosynthetically active radition (PAR) is directly related to disease index rating



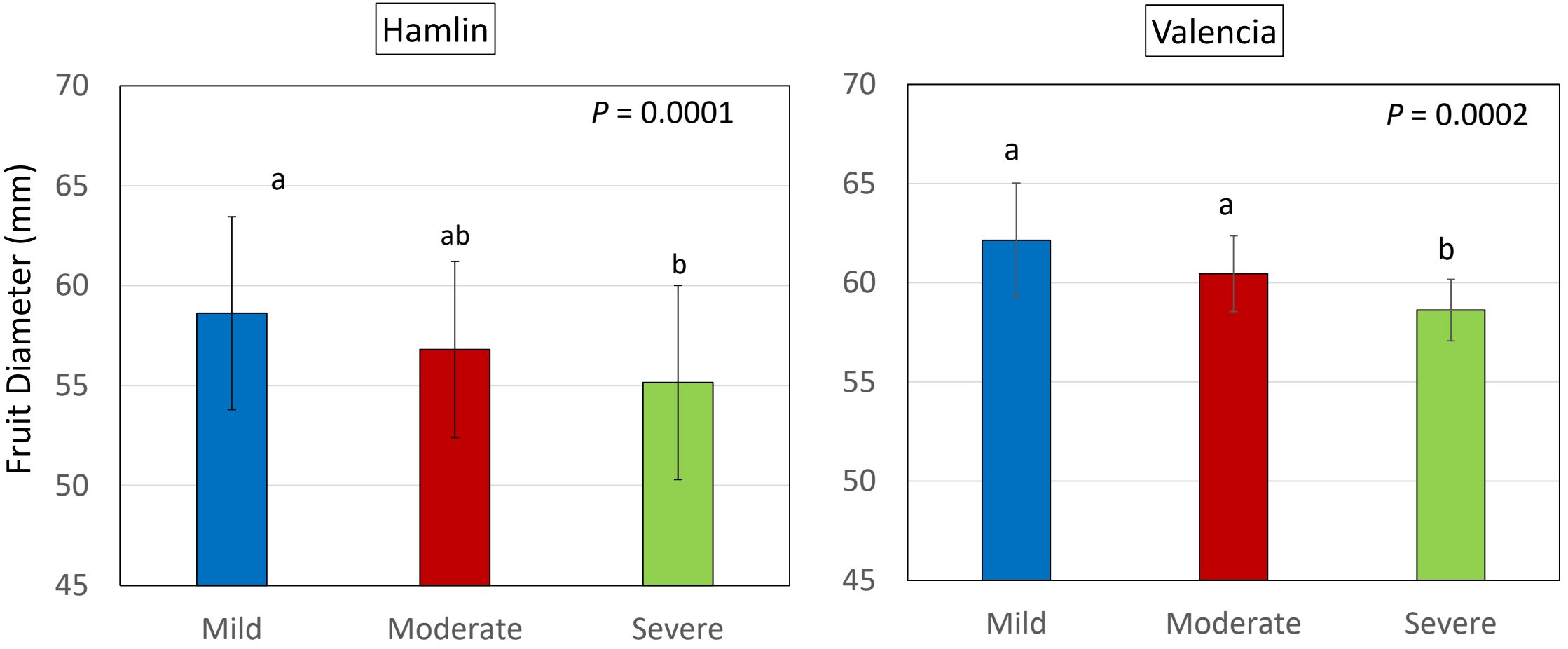
Low



Moderate

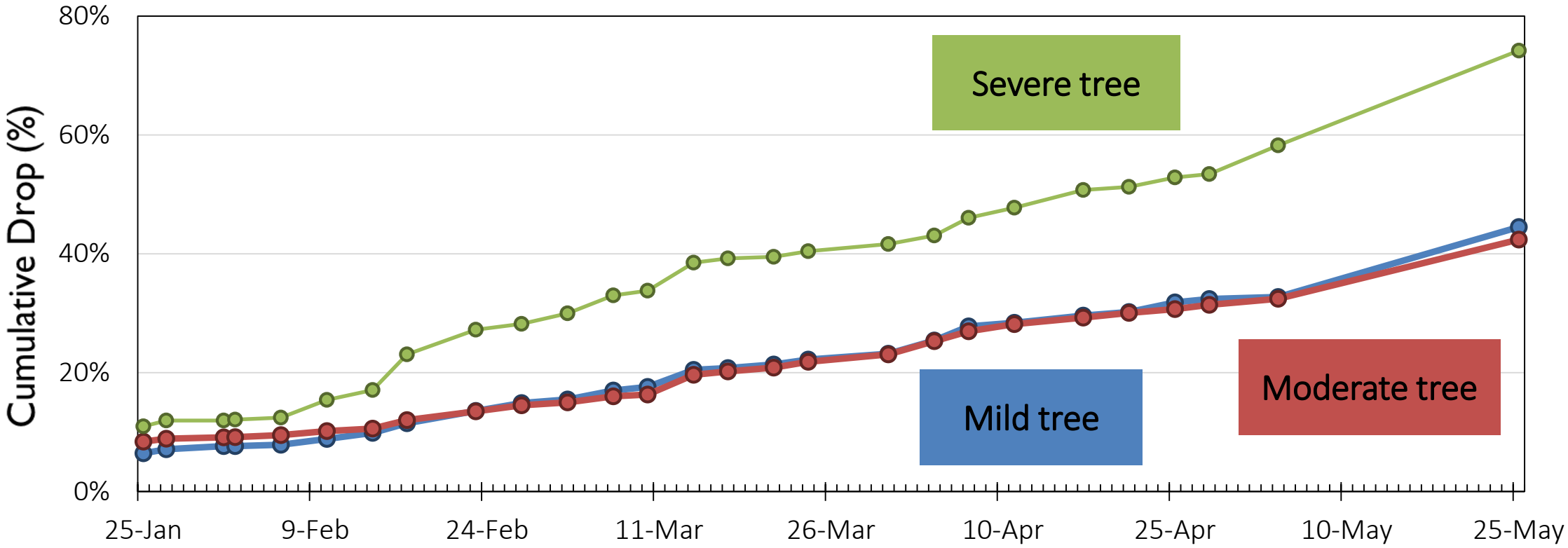
Severe

Severely symptomatic trees have small fruit

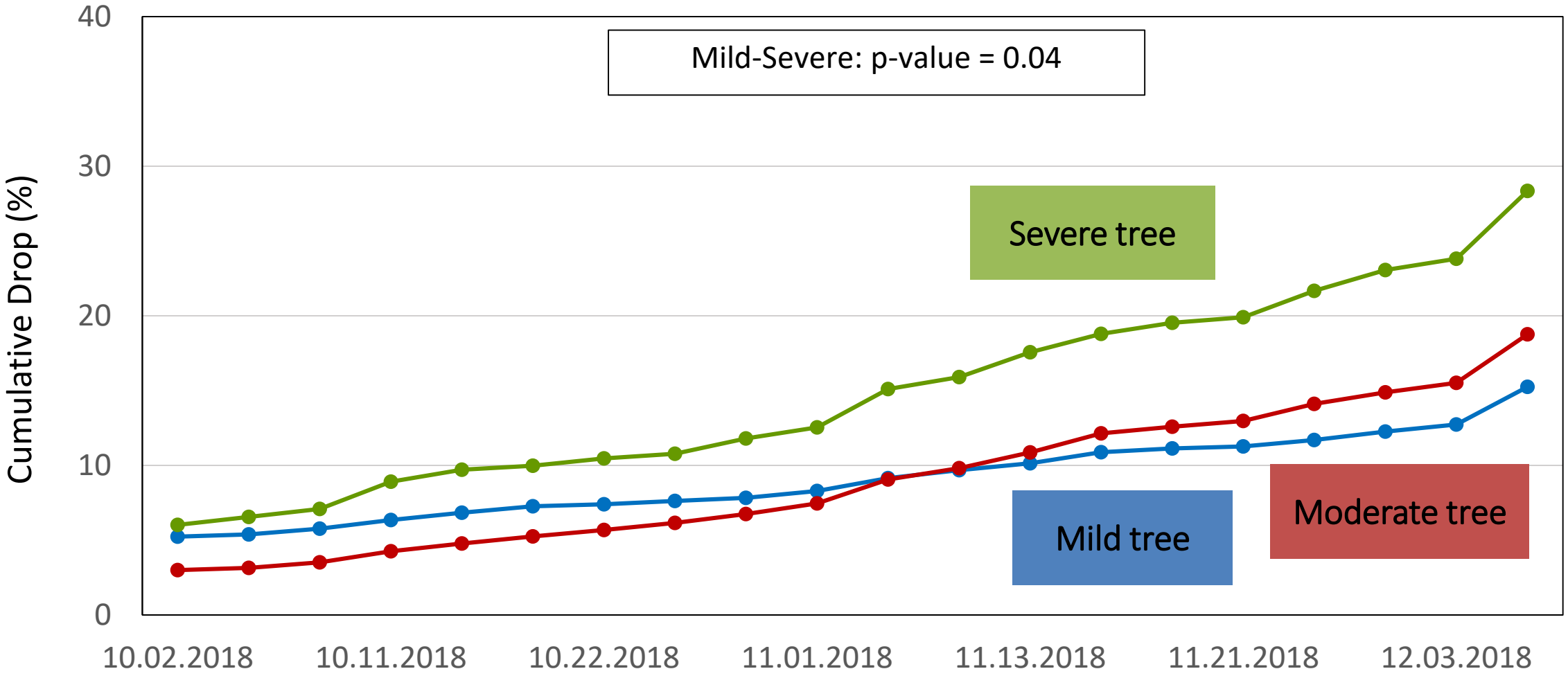


Study 1

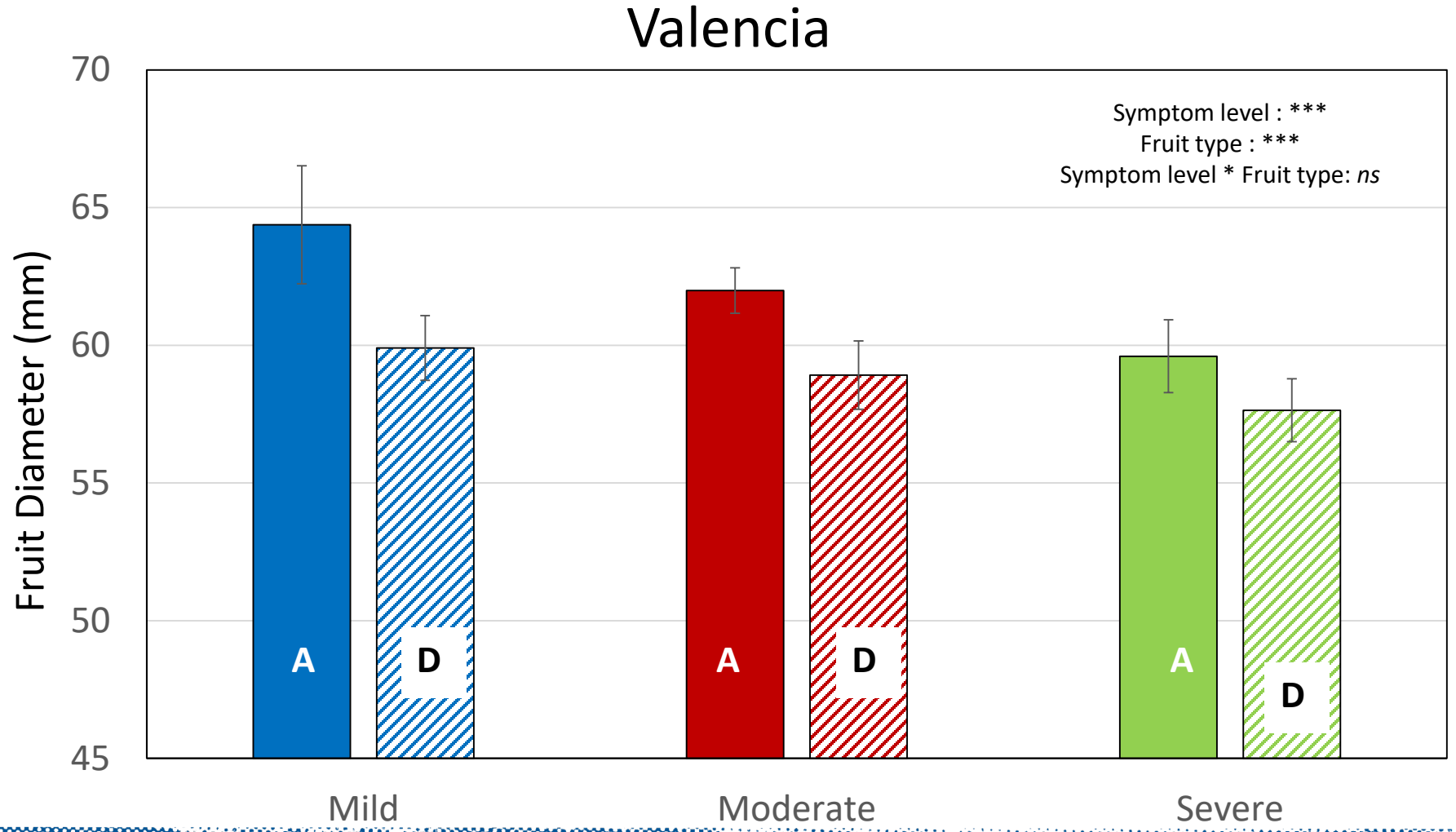
More the HLB symptoms, more is the drop!



Similar trend in Hamlin!
Severe symptoms = Higher fruit drop

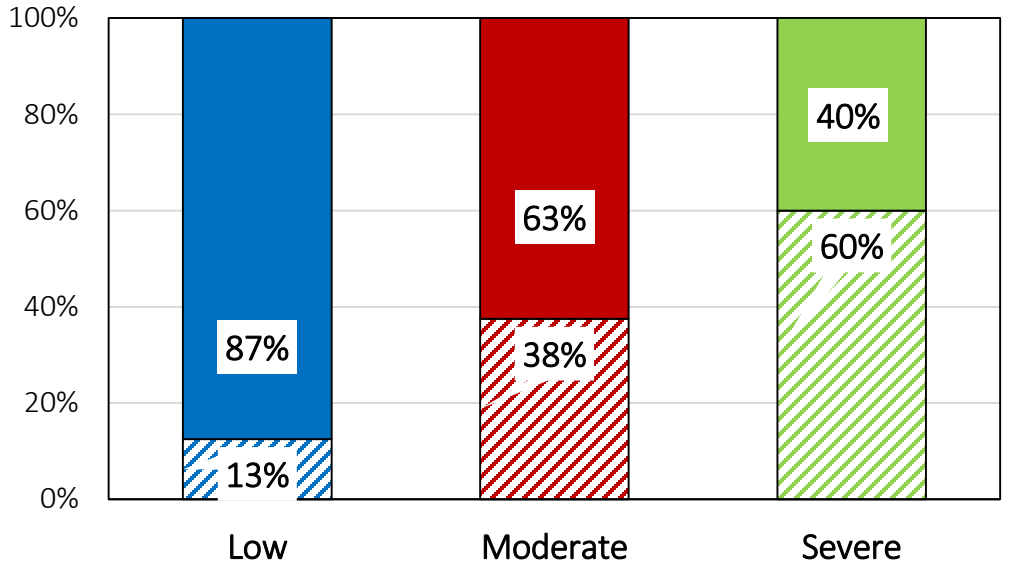


Valencia and Hamlin showed the same trend, Small size fruit are more likely to drop!



A- Attached
D-Dropped

Tight and loose fruit from trees at different HLB symptom levels



Loose fruit (FDF < 6 KgF)

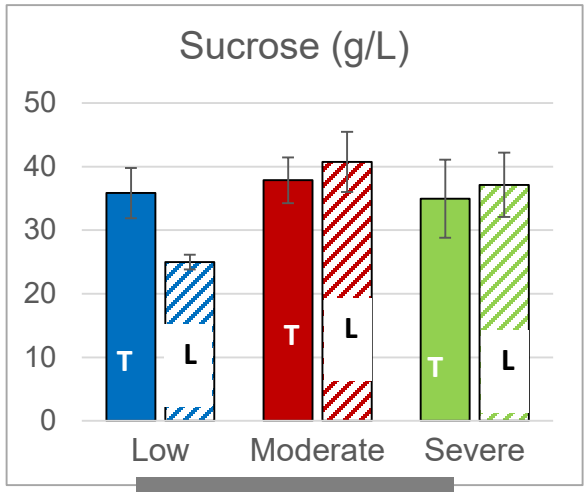
Mild tree

Moderate tree

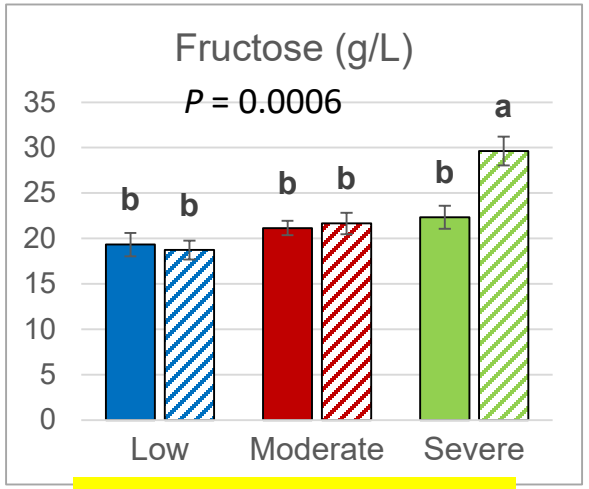
Severe tree

Study 2

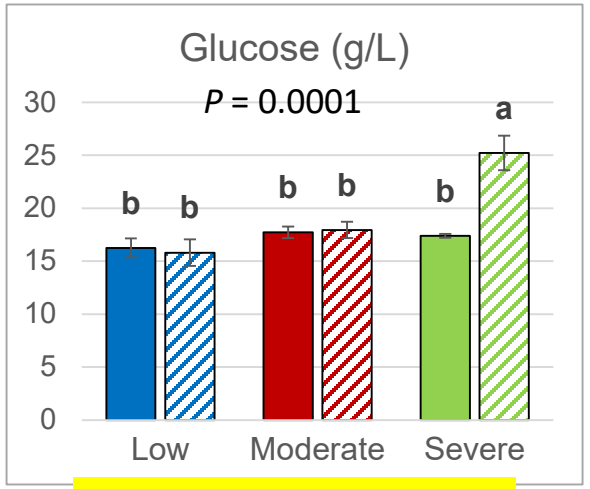
Low carbohydrate availability is *not* the main cause of pre-harvest fruit drop



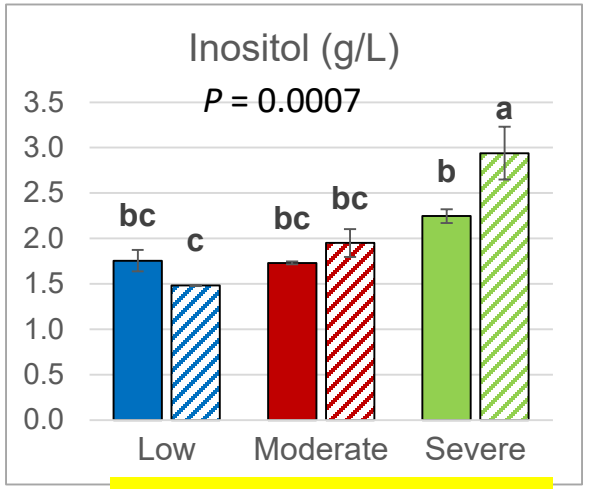
Fruit type: *ns*
Symptom level: *ns*



Fruit type*Symptom level:
P = 0.0111



Fruit type*Symptom level:
P = 0.0012

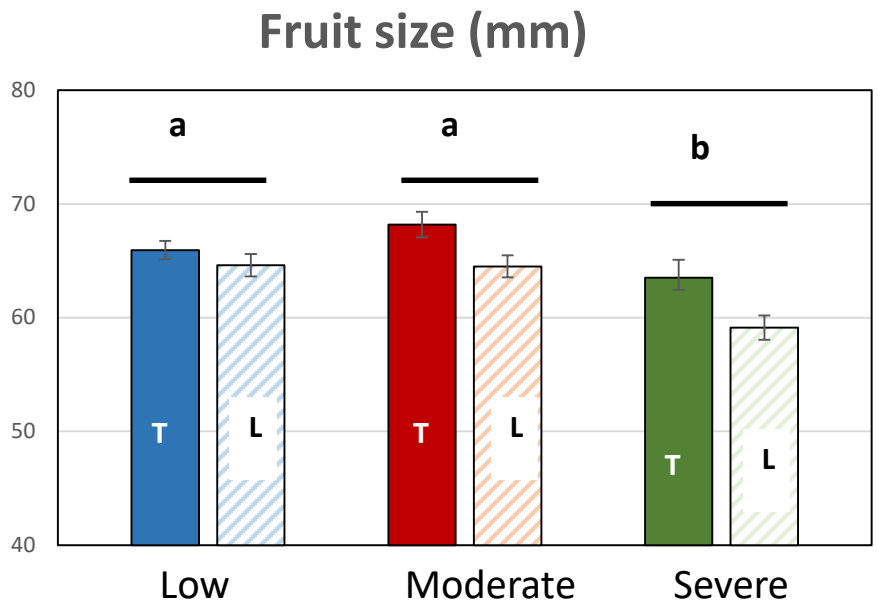


Fruit type*Symptom level:
P = 0.0269

- Loose fruit from severe trees had the greatest concentrations of sugars among all groups
- Loose fruit did *not* have lower concentrations of sugars in juice than tight fruit

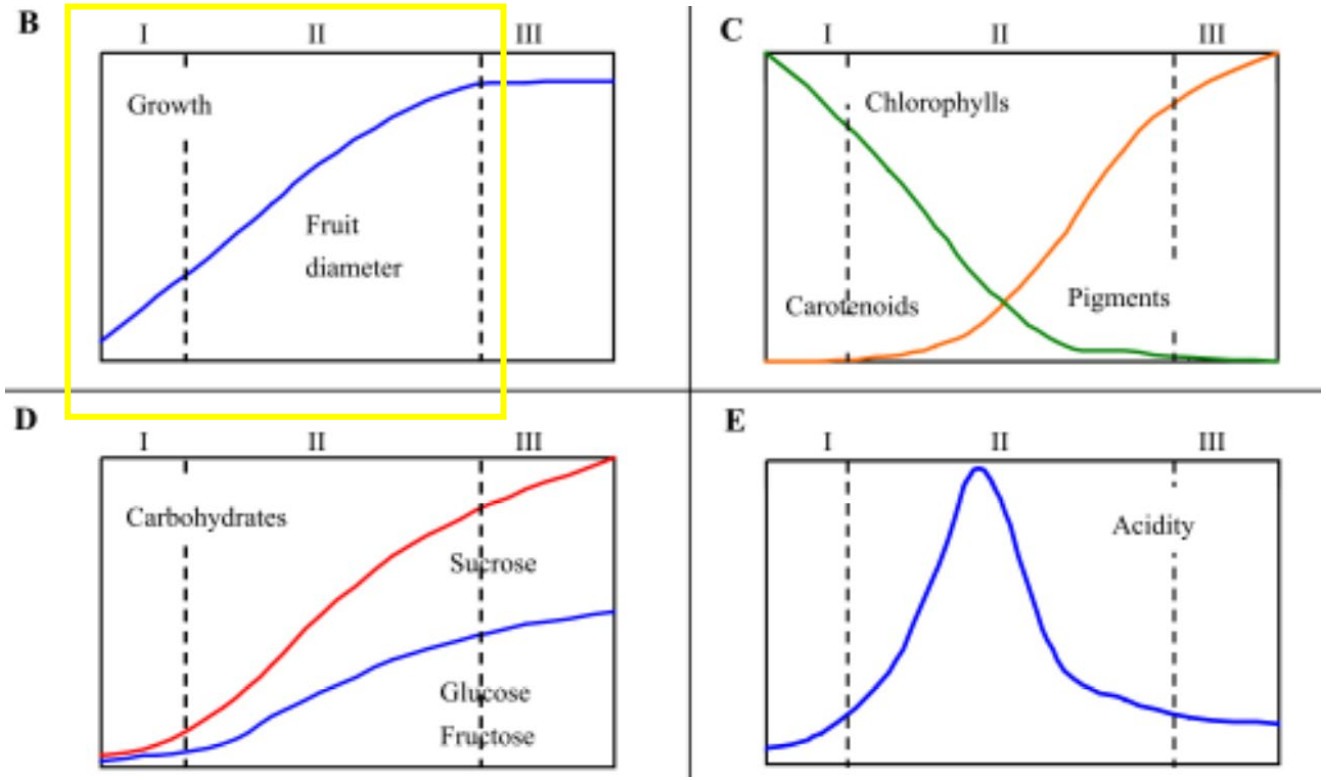
Fruit drop is related to fruit size.

Leaf number, aborted seeds, leaf blotchy mottle etc. had no effect

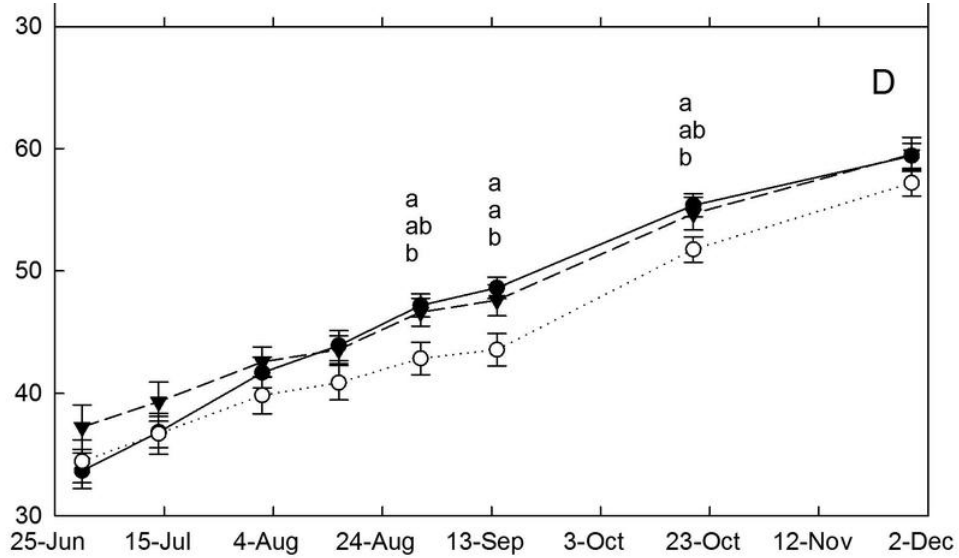


Fruit type: *P* = 0.0007
Symptom level: *P* = 0.0037

Fruit growth occurs in stage 1 and 2

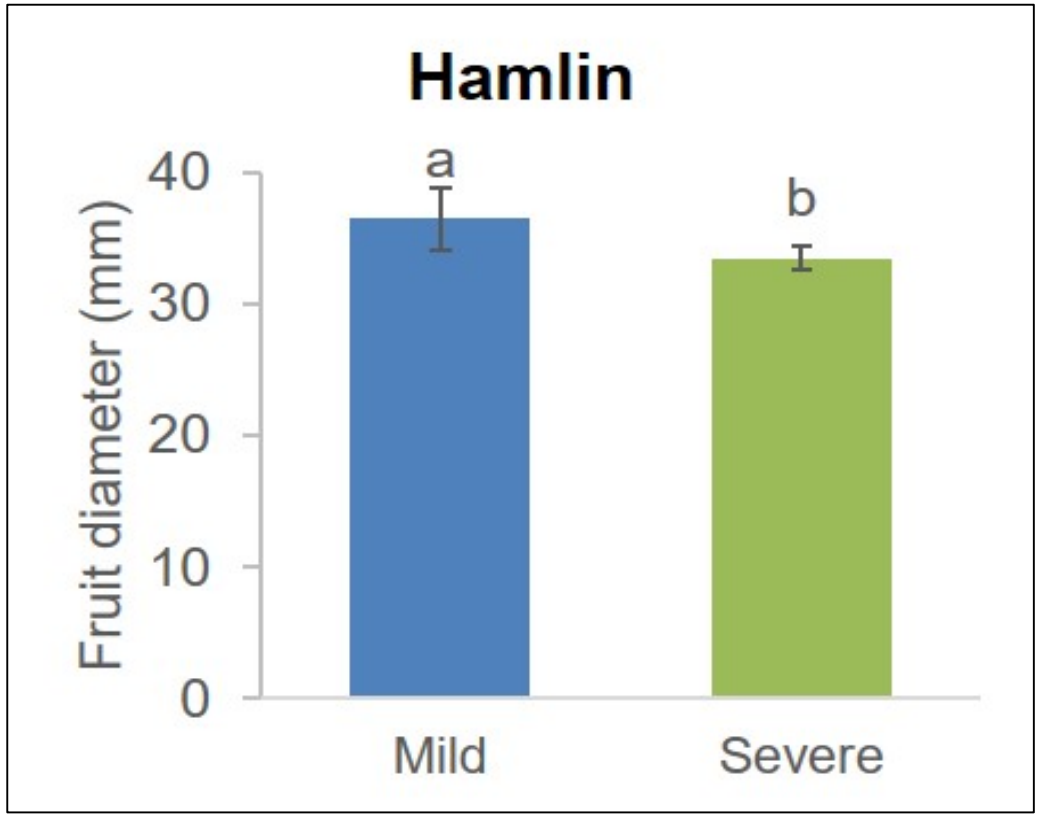


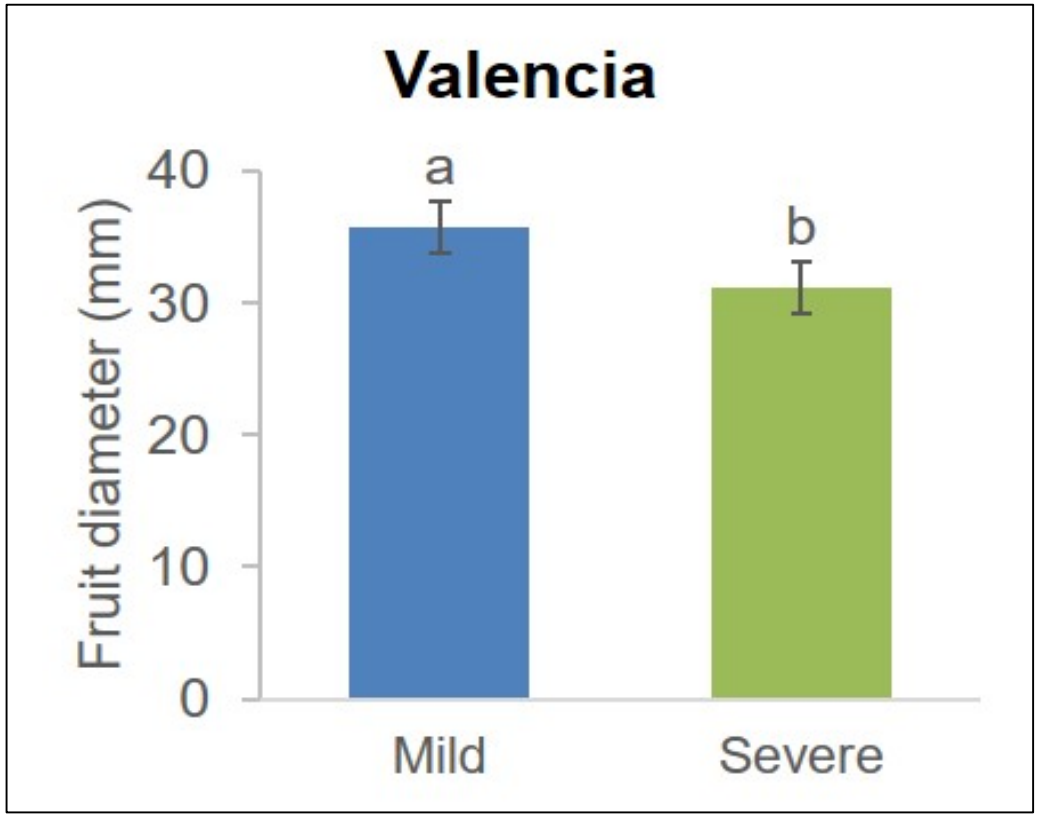
Fruit growth is related to water accumulation in Phase 2



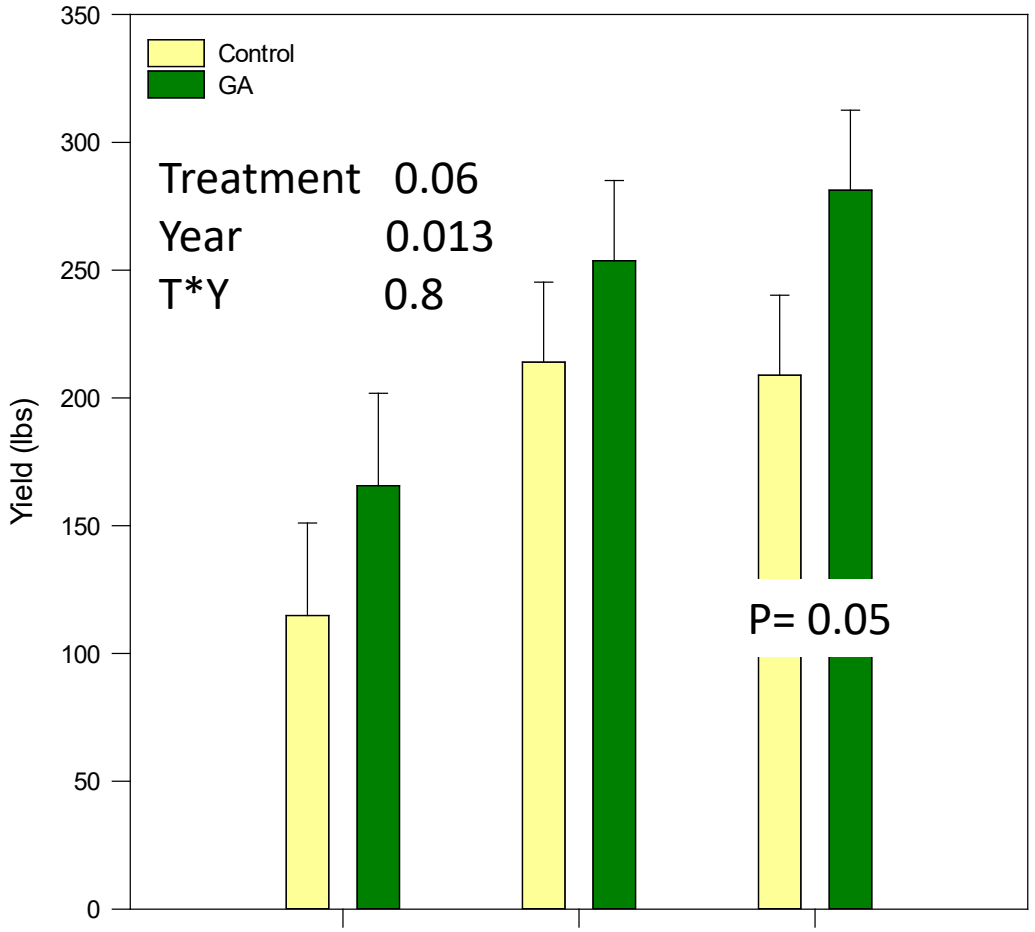
Valencia fruit continues to grow until December-early January

As early as end of spring (MAY), differences in fruit size can be observed





Fall GA application even though reduced flowering but did not decrease yield in Valencia

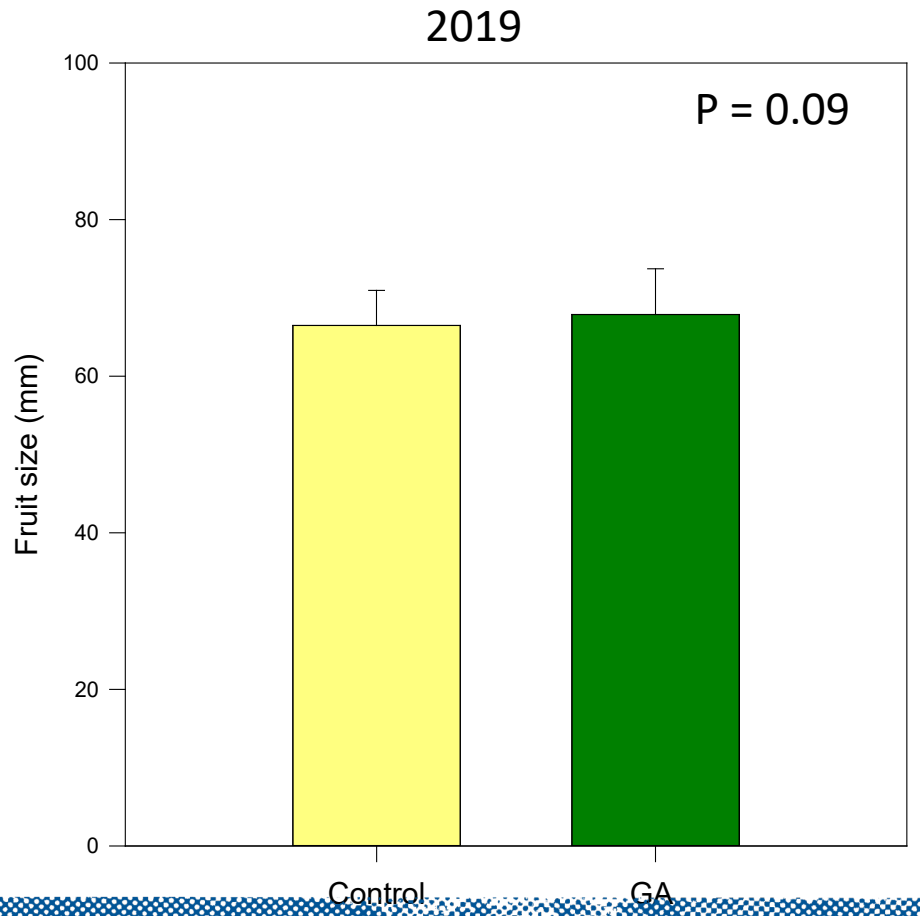


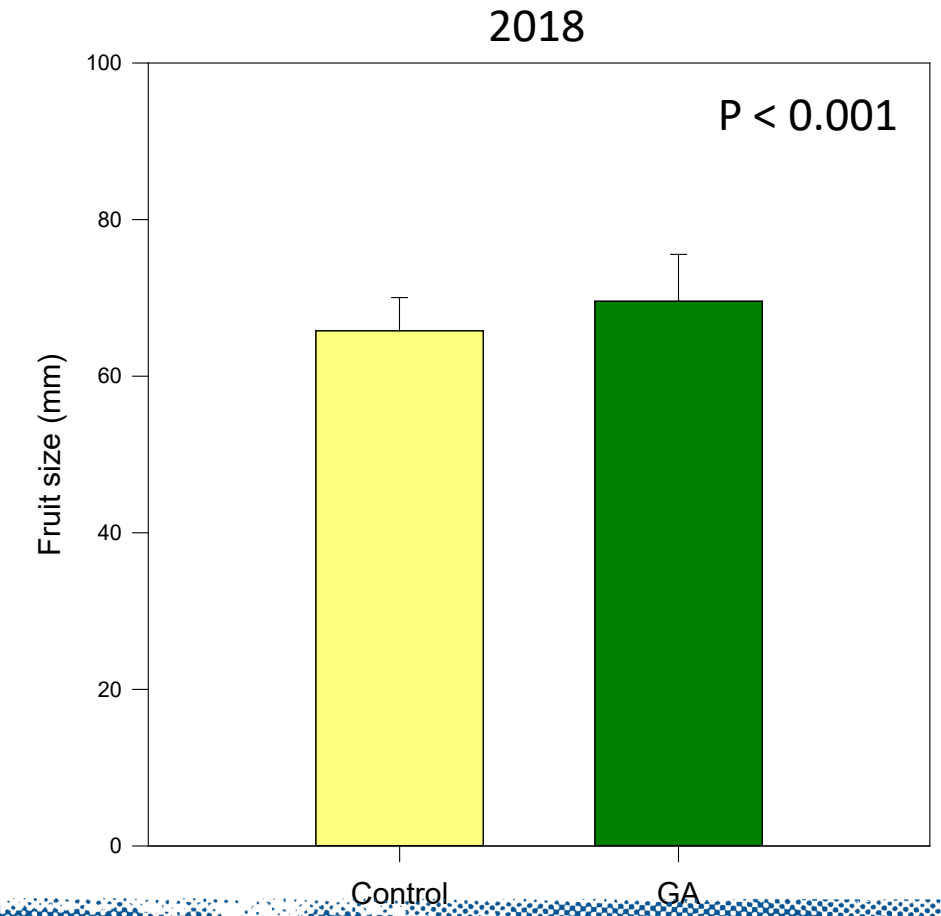
GA was applied to suppress off season flowering in fall and early spring to reduce risk of PFD

3 year cumulative yield	
Control	538 lb
GA 5X	654 lb

Study 4

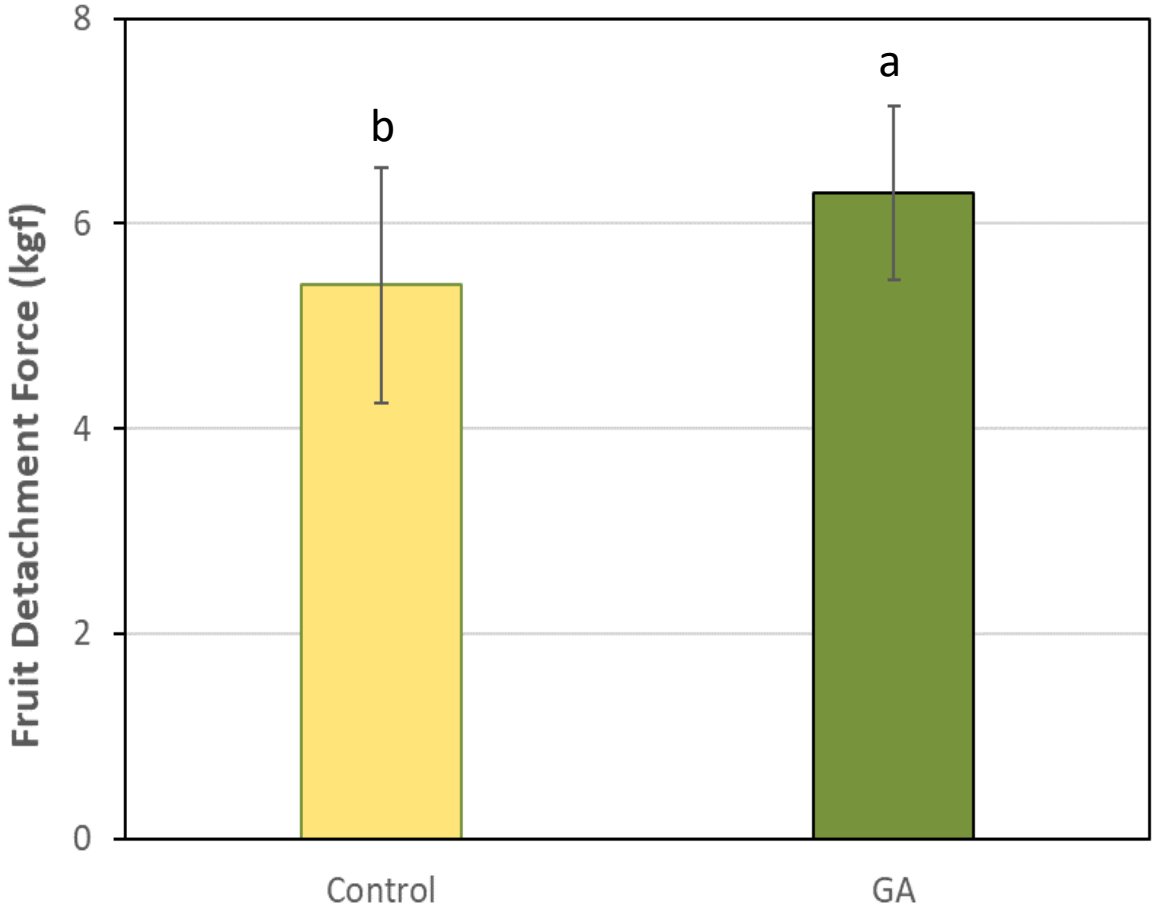
Use of GA application resulted in larger fruit





Study 4

Early in the season application of GA improved fruit retention



Previous PGR studies included application close to harvest time therefore, it is likely why they were not successful in reducing fruit drop

Take home message!

- Increased fruit drop is not due to starvation of carbohydrate in fruit
- Higher sugar concentrations in small fruit/dropped fruit are likely due to more concentrated juice , suggesting lower water uptake by the tree
- PGR efficacy is sensitive to growth stage of fruit
- GA has potential to improve fruit size and reduce fruit drop, further evaluation need
- Good caretaking early in the season, during fruit growth
  - Spoon feeding tree with water and nutrients!

Thank you!

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Haines City Growers
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CRDF (GA work)