Variable ripening of fruit in avocado consignments

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Background problem

- Despite careful grading
  - Variable ripening

- Packing to uniform softness after stimulating ripening not sufficient

Problem results in

- Logistical management problems
- Difficulty predicting ripening dates for “ready ripe” programmes
- Can not predict “sell by” dates

Possible solutions

- Pick more uniform fruit
- Grade on-line for uniformity
- Treat uniform batches for ripening

However first need

- To know what to predict
- Understand drivers for ripening

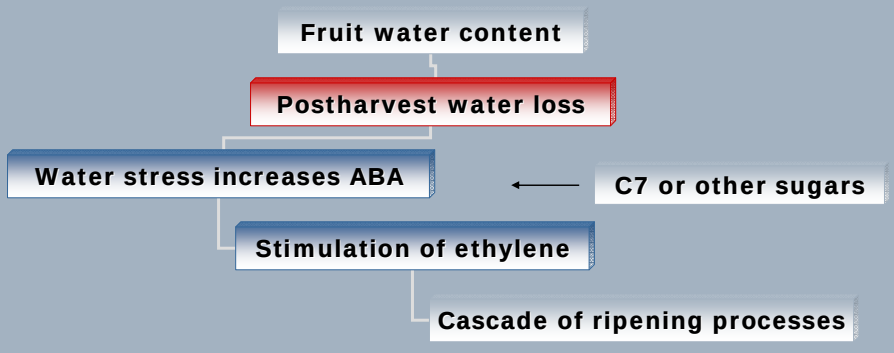
Previous work has indicated

- More mature fruit ripens faster
- More mature fruit contains less water

We know that

- When fruit picked net water loss
- Net carbohydrate loss

Therefore suggest ripening process may be induced by



If water or sugars involved

- Easy to measure
- Can use NIR technology on pack line
- Possible to grade fruit for uniform ripening

Objectives

- Evaluate the effects of water and ABA on ripening rate
- Check effects of ABA and water on ethylene evolution to better understand their role in ripening
- Consider water as a diagnostic tool

Fruit used

- Used fruit from same trees
- Picked early, mid season and late
- Used ‘Hass’ fruit

Treatments

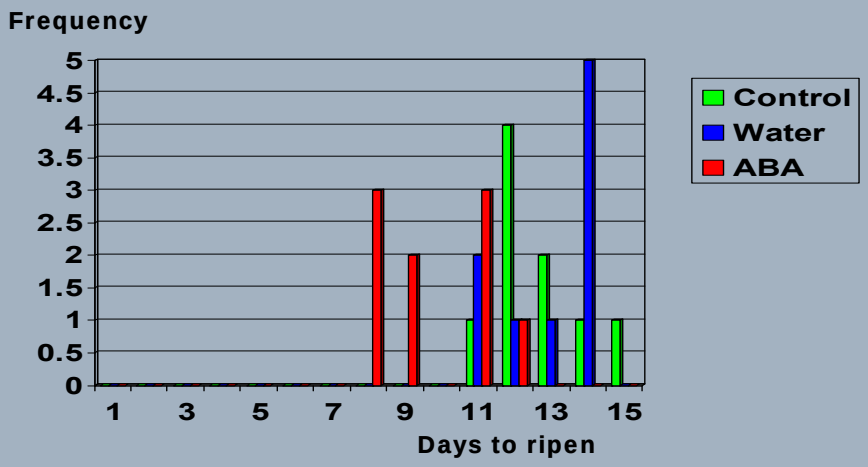
- Control
- Infused with water (1.5ml)
- Infused with ABA (48 µg/fruit)

Measured

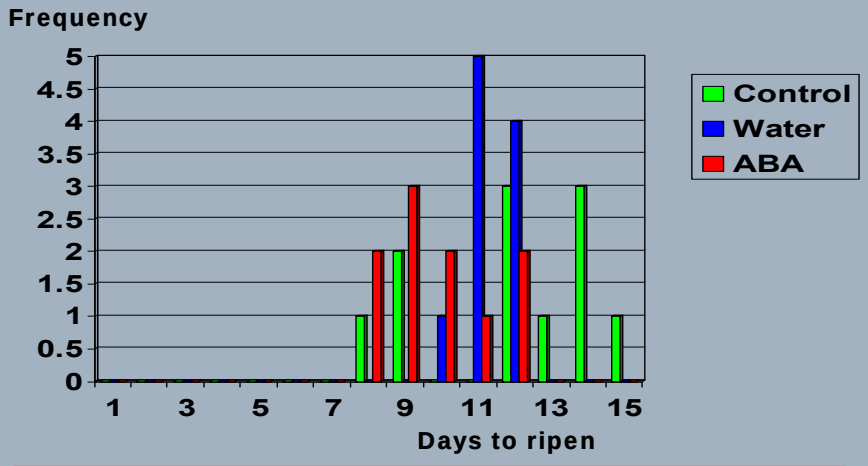
- Days to ripe
- Ethylene evolution

What did we find?

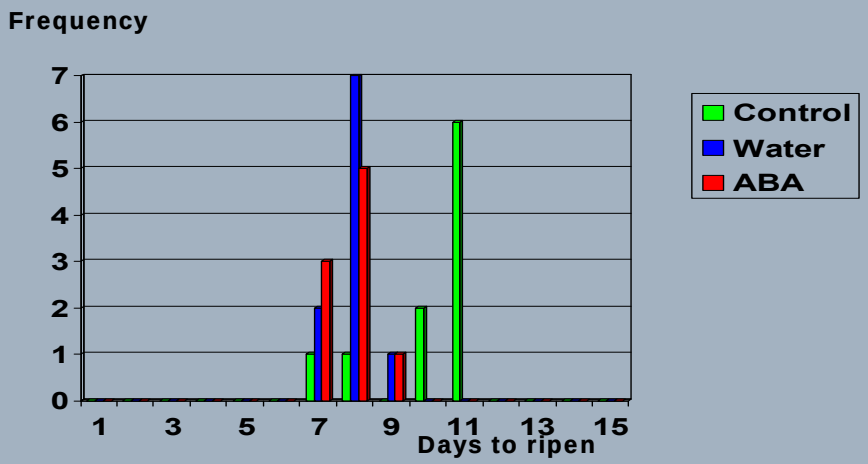
Effect of ABA and water on ripening (early harvest)



Effect of ABA and water on ripening (Mid season harvest)



Effect of ABA and water on ripening (late harvest)

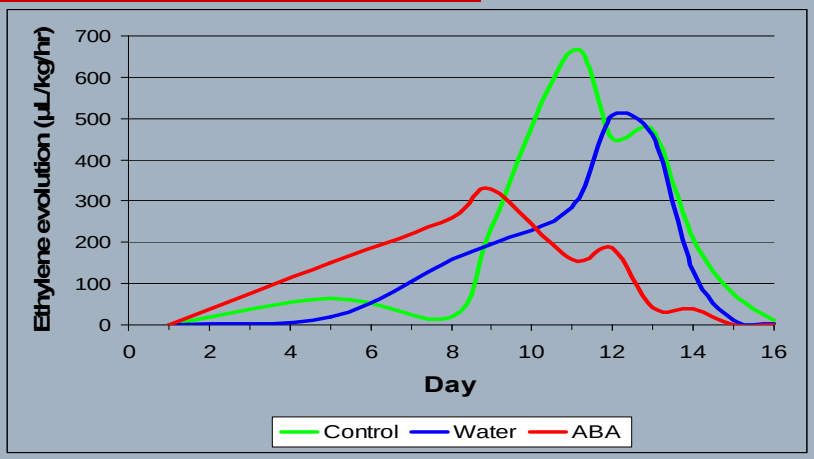


Therefore appears that

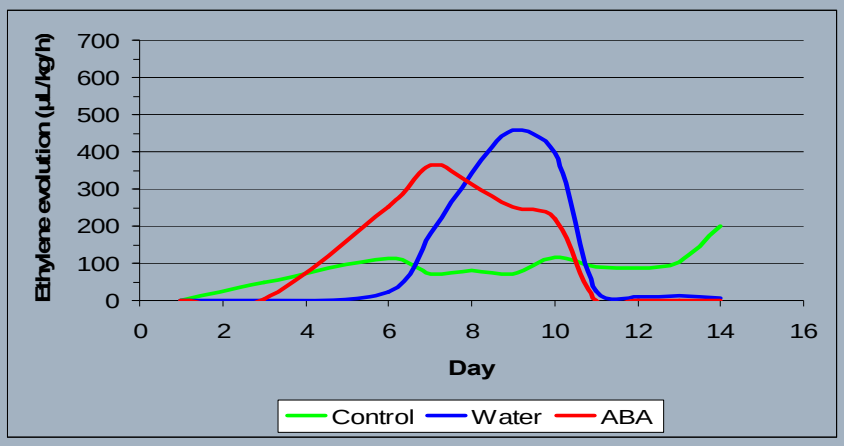
- ABA caused earlier ripening
  - Particularly in early harvest
- Water decreased ripening spread
  - Particularly mid season
- Appears that water and ABA do impact on ripening

How did water and ABA affect ethylene evolution?

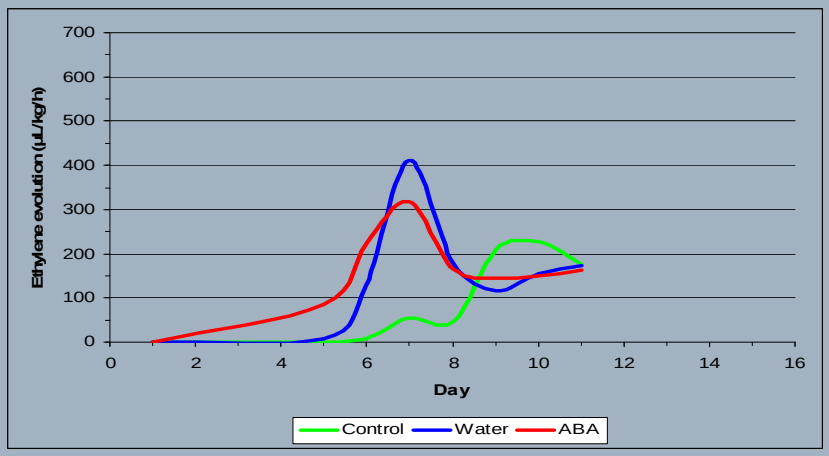
Effect of ABA and water on ethylene evolution (early harvest)



Effect of ABA and water on ethylene evolution (mid season harvest)



Effect of ABA and water on ethylene evolution (late harvest)



Therefore further appears

- ABA causes earlier ethylene production
- Water generally delays ethylene
- Water creates clearer peak
  - less variation in days to ripe

Other links to water effect

- Field experiment across season
  - Water was most important single factor in days to ripe
- Present season, early to late, different areas
  - Water : days to ripe $r^2 = 0.74$

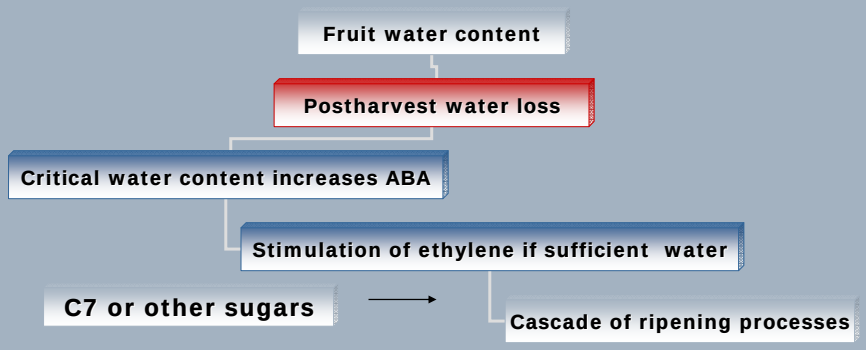
Therefore suggest that

- Water content and ABA play role in ripening
- ABA stimulates ethylene (starts ripening)

Therefore suggest that

- Is minimum and optimal water content
  - Too much decreases ripening
  - Too little inhibits subsequent processes
- Other factors (possibly sugars) play role in ripening process

Therefore suggest ripening process may be induced by



How does this help solve variable ripening?

- Preharvest factors critical
- Water drives initiation of process
  - Irrigation management
- Possible carbohydrate relations
- Could be possible to sort on pack line

Problem can be solved

THANK YOU