



# Drying in the Almond Industry

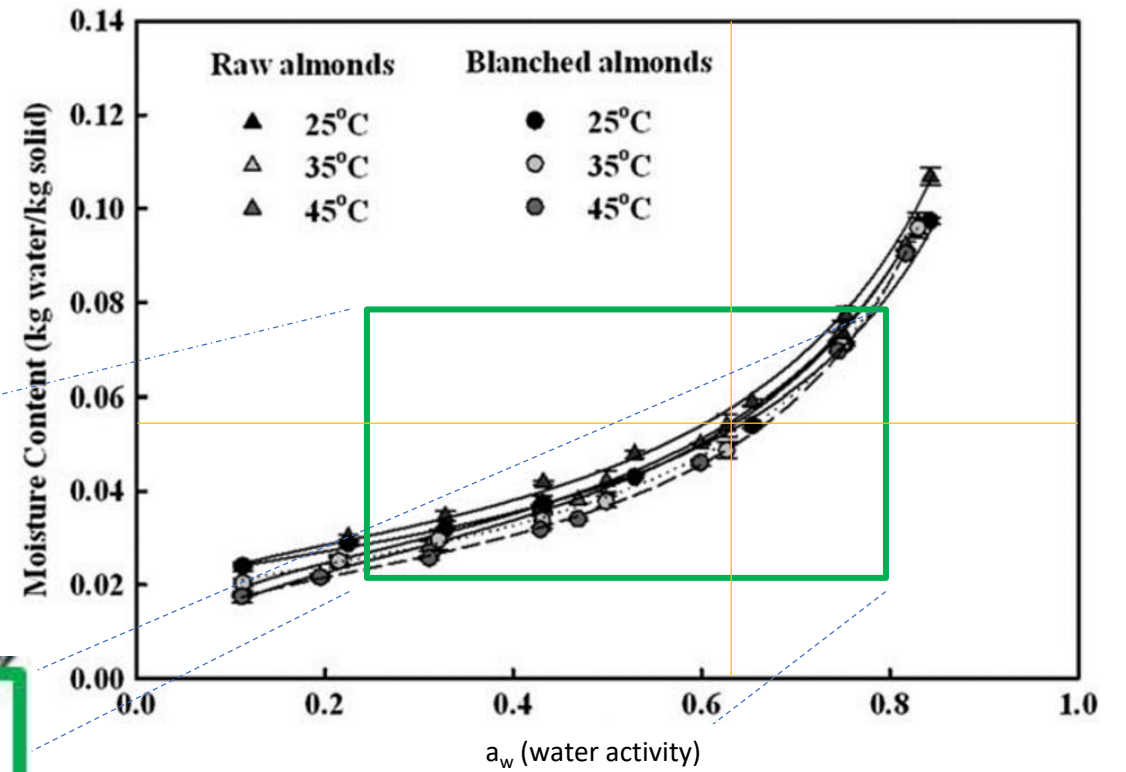
Dr. Michael Coates



# Isothermals

<https://www.almonds.com/almond-calculator/index.html>

~5.5% EMC on an average summer day



(L.Z. Taitano ET AL 2010)

0.65  $a_w$ , 65% RH

5.5 % MC

GAB equation:

$$m_e = \frac{m_0 C K a_w}{(1 - K a_w)(1 - K a_w + C K a_w)}$$

# Weather - Equations of State

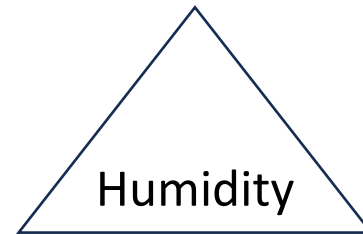
High pressure system



Low Pressure system



Pressure



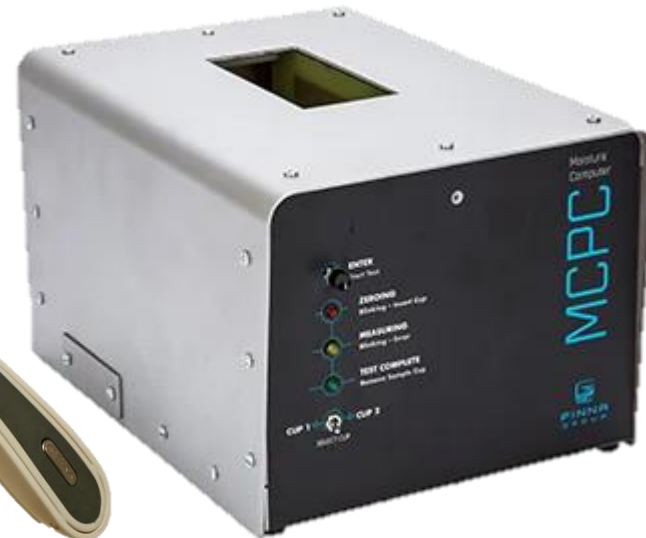
Temperature

Volume



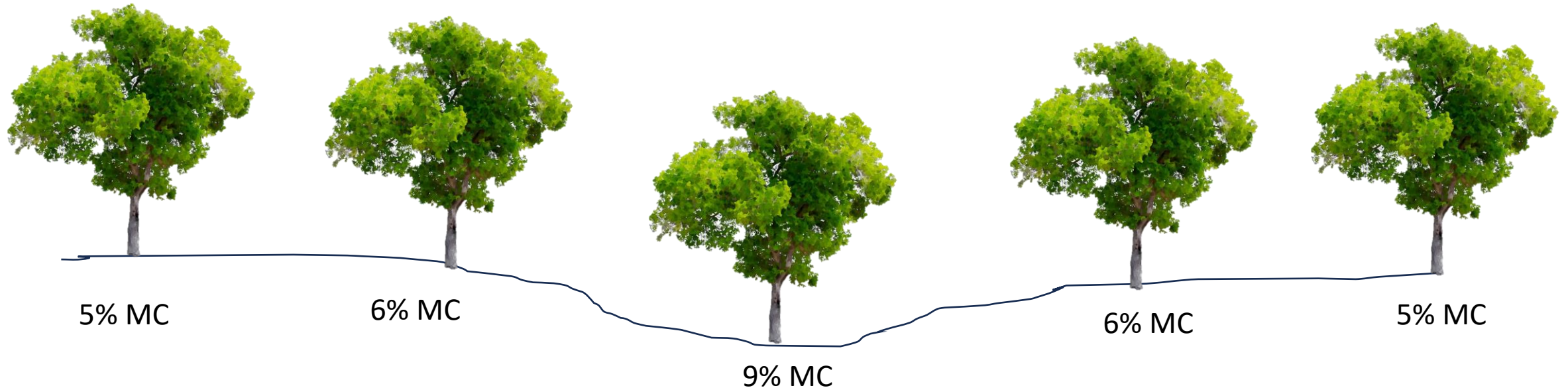
# Moisture meters

- Electrical impedance
- Equation based
- Infra-red





# Where do you sample?



# What is the best way to dry:

Ideally the weather returns to normal and then we do nothing.

Alternatively:

We need to use mechanical methods to dry the fruit.

Almas Almonds have pioneered the drying process and introduced fixed infrastructure to efficiently handle the drying process

Select Harvests have dried about 20,000 ton (field weight) over the last 2 years and have taken a lead in A-Frame drying.

They are working off of 6.5 t/m of A-frame, 20 kw fan with a max of 300 tonne

Note: Beware of companies that dry grain. We are moving about twice the moisture associated with grain, so traditional grain techniques may not work.



# Drying

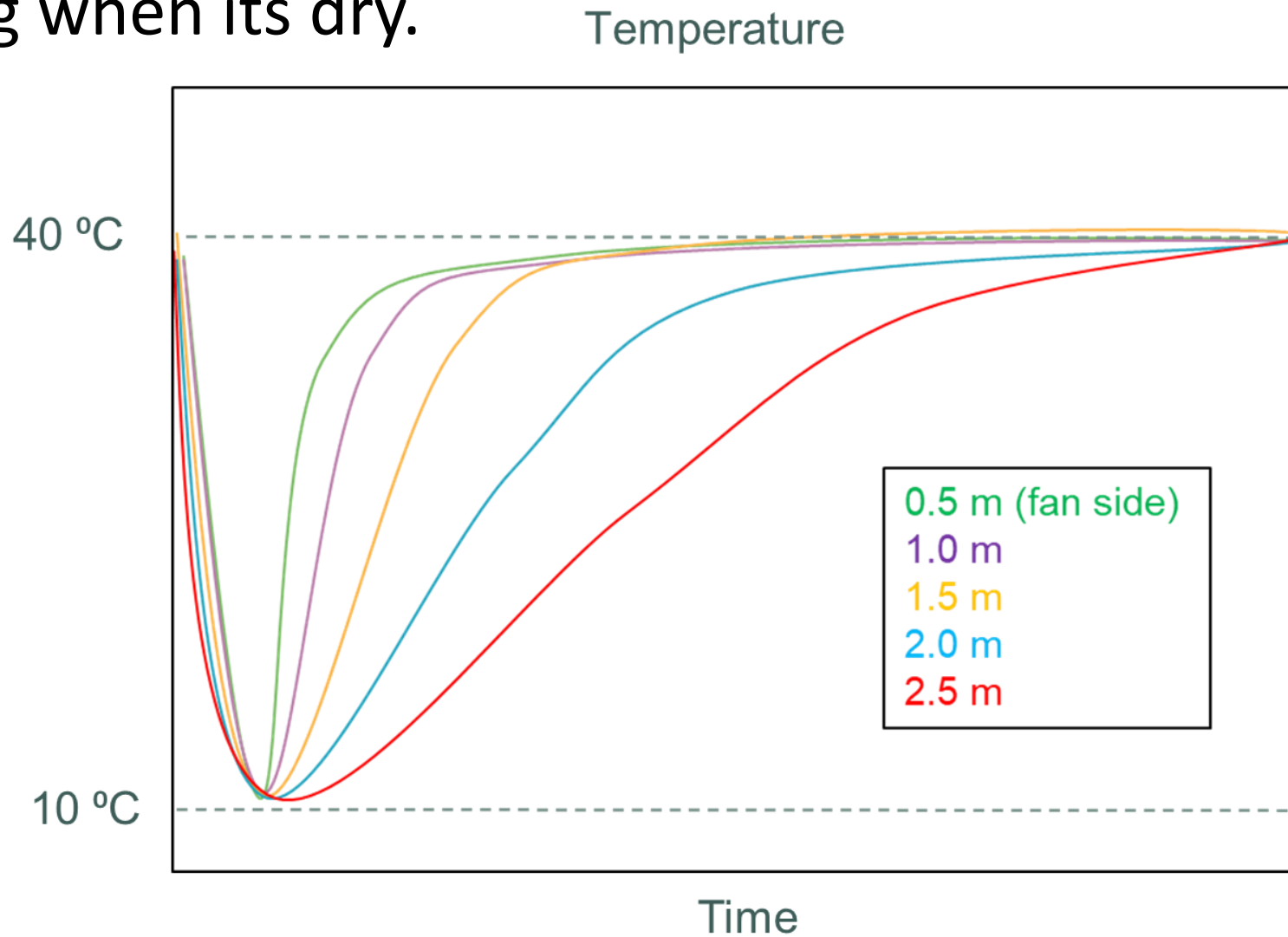
- We have demonstrated stockpile drying works, but we don't understand the unintended consequences.
  - Shelf life
  - Concealed damage (>8%)
  - Optimized design
- We also need to consider workflow.





# Monitoring

- Knowing when its dry.







Thanks to all involved:

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Many more....

