Managing mango ripening and storage

Training for supply chain members

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What has to be managed?

Temperature
(room and fruit)

Humidity

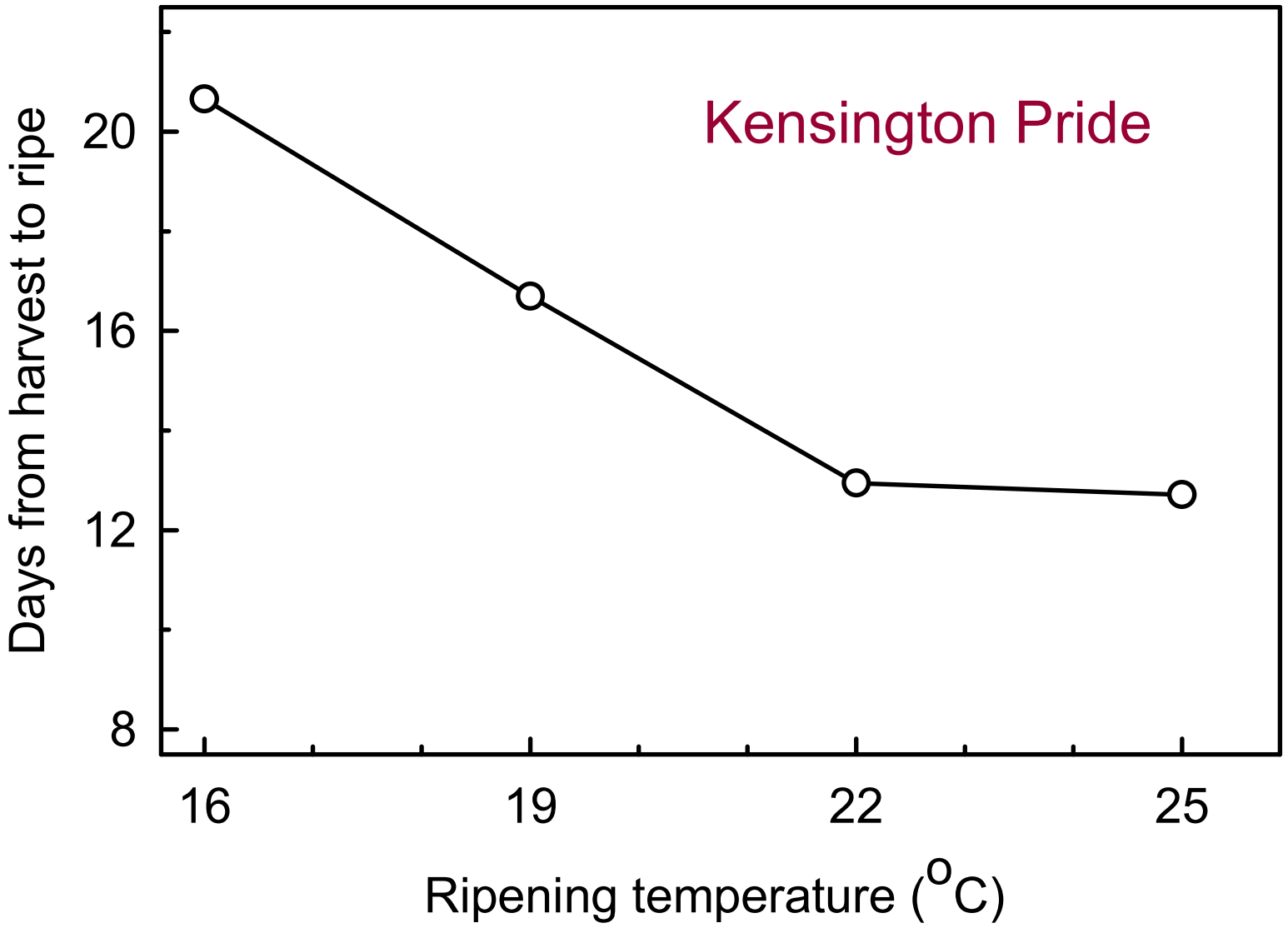
Ethylene

Carbon
Dioxide
CO_2

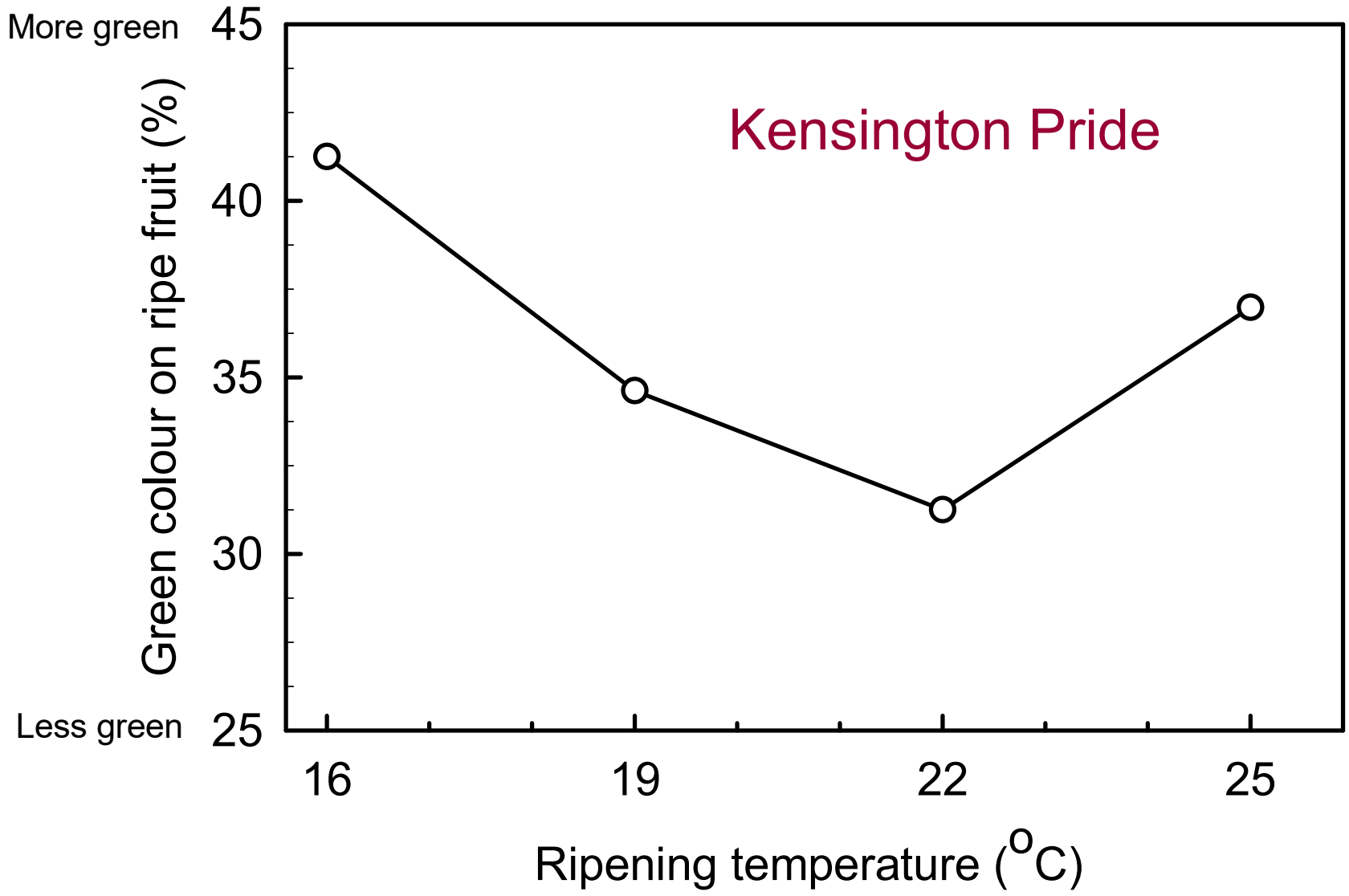
Ripening room design

- Insulated room
- Temperature control with cooling and heating
- Ethylene injection system
- Air circulation and ventilation
- Humidity control

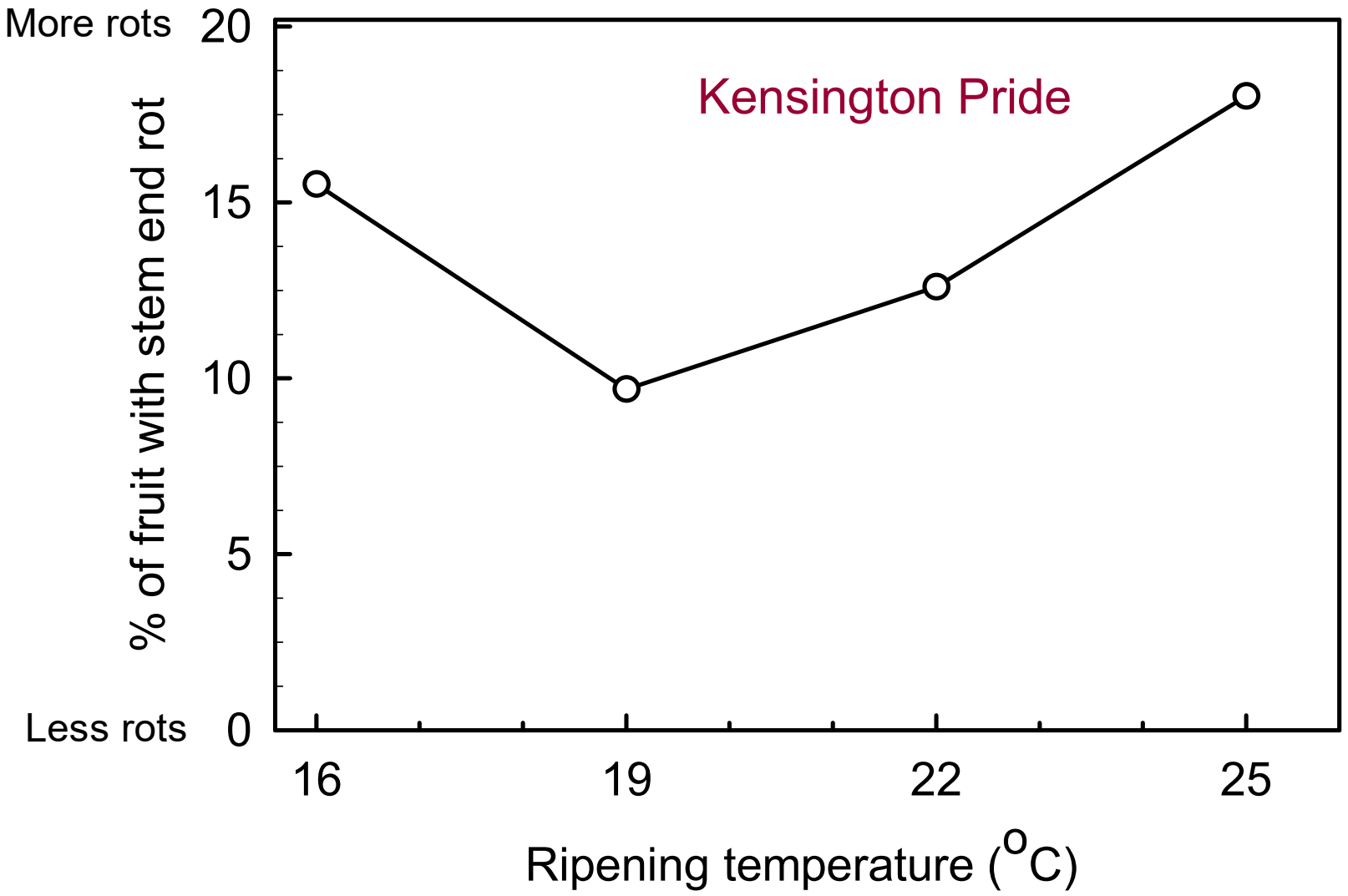
Temperatures affects ripening time



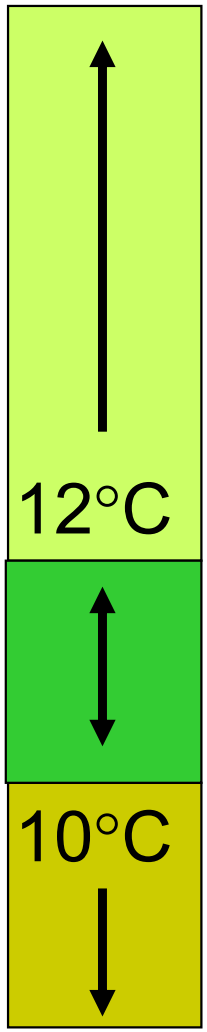
Temperature affects skin yellowing



Temperature affects fruit rots



Effect of temperature during storage



Too high

Softens, pale yellow colour, high acidity, rots develop

Best

Too low

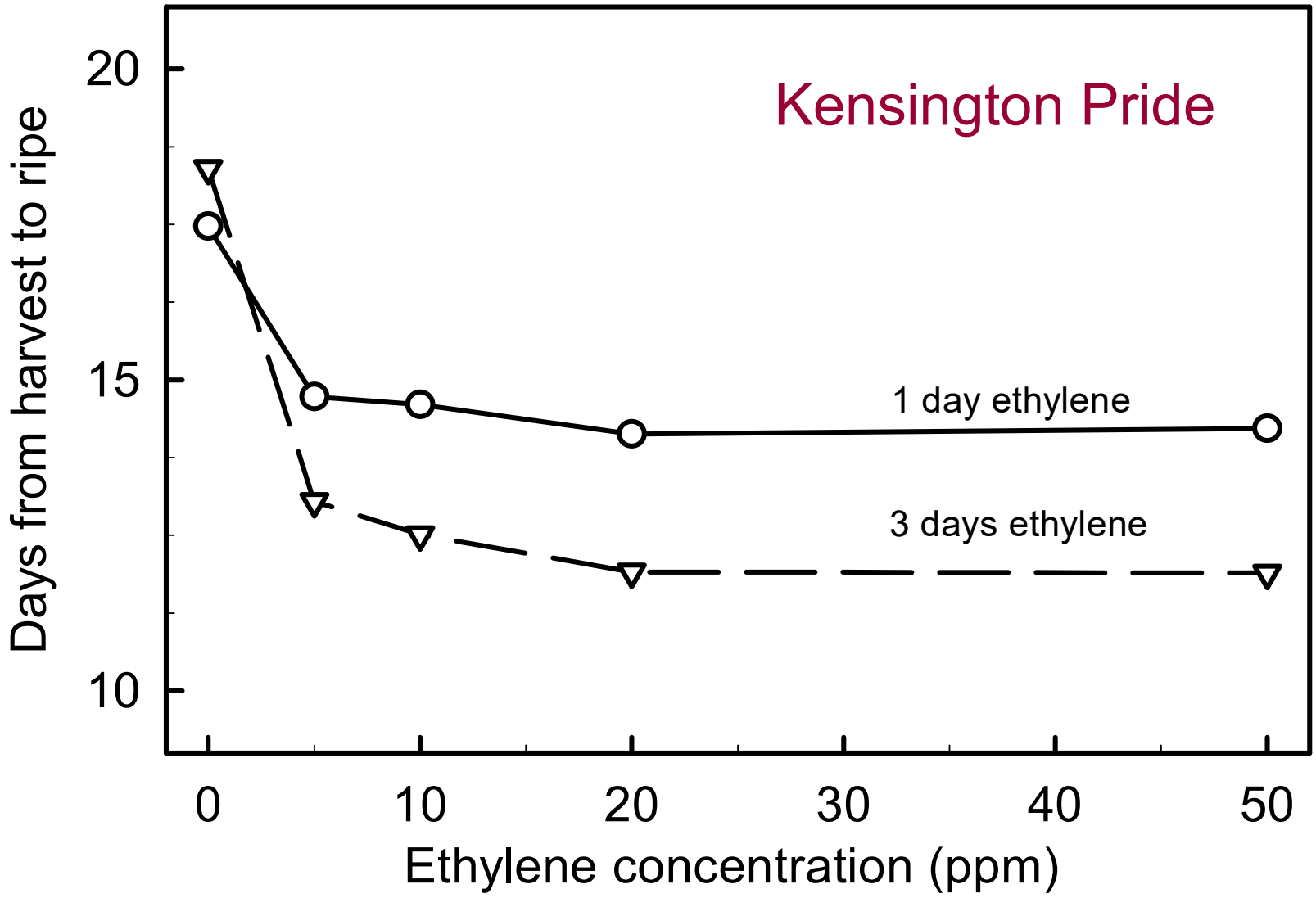
Chilling injury

Ethylene increases ripening rate and uniformity

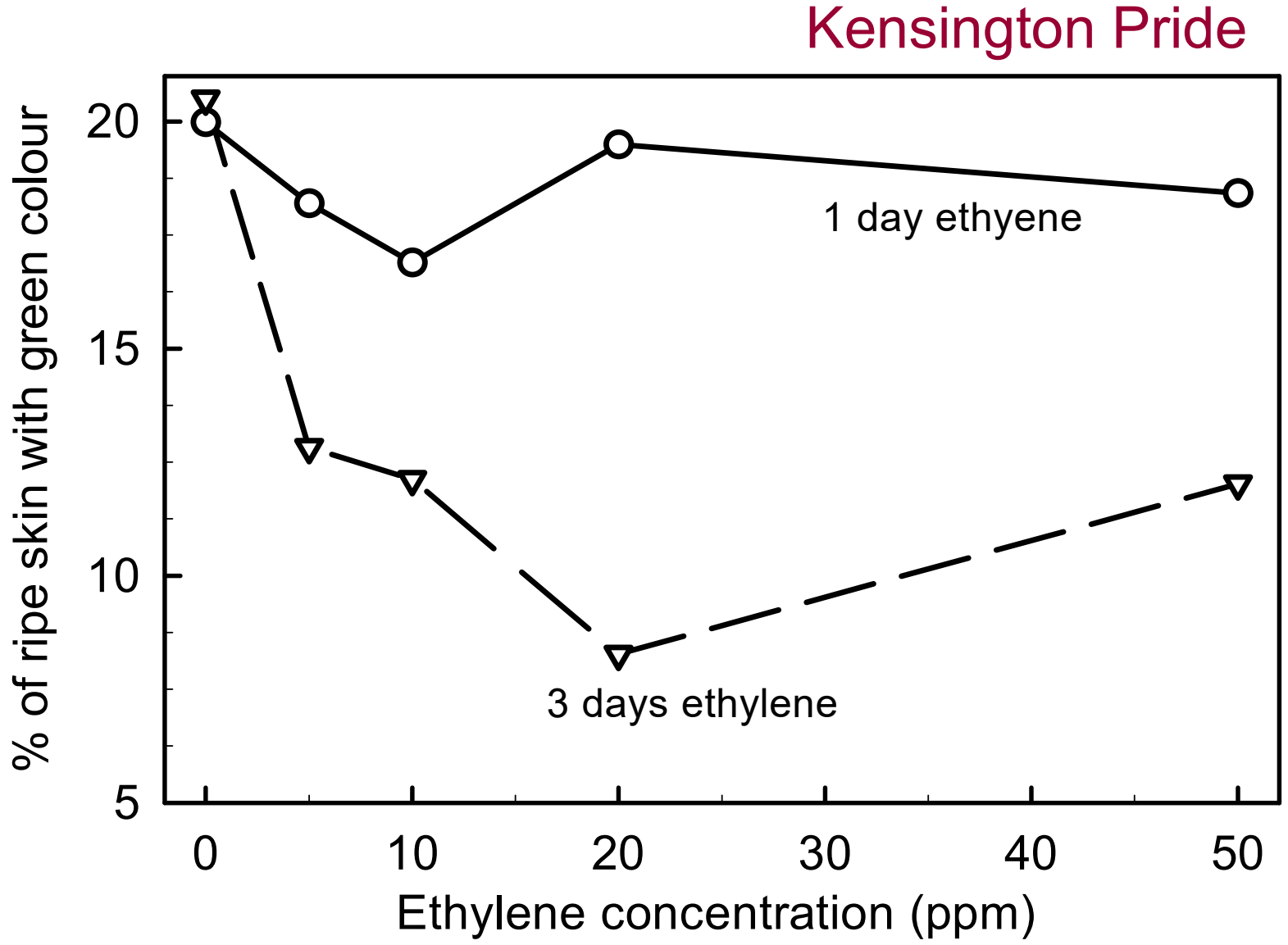
No ethylene 7 days 20°C

Ethylene 2 days + 5 days 20°C

Ethylene advances ripening



Ethylene increases skin yellowing



Ethylene duration affects ripening

Honey Gold mangoes held at 20°C for 6 days

No ethylene

10 ppm ethylene for 1 day

10 ppm ethylene for 2 days

10 ppm ethylene for 3 days

Controlling ethylene during ripening

Manual injection

Automated injection

Ethylene is available as pure ethylene or Ripe Gas (7% ethylene)

Shot – inject 100ppm ethylene every 8-12 hours for 2-3 days

Trickle – inject 10ppm ethylene continuously for 2-3 days

High CO_2 reduces skin yellowing

Air

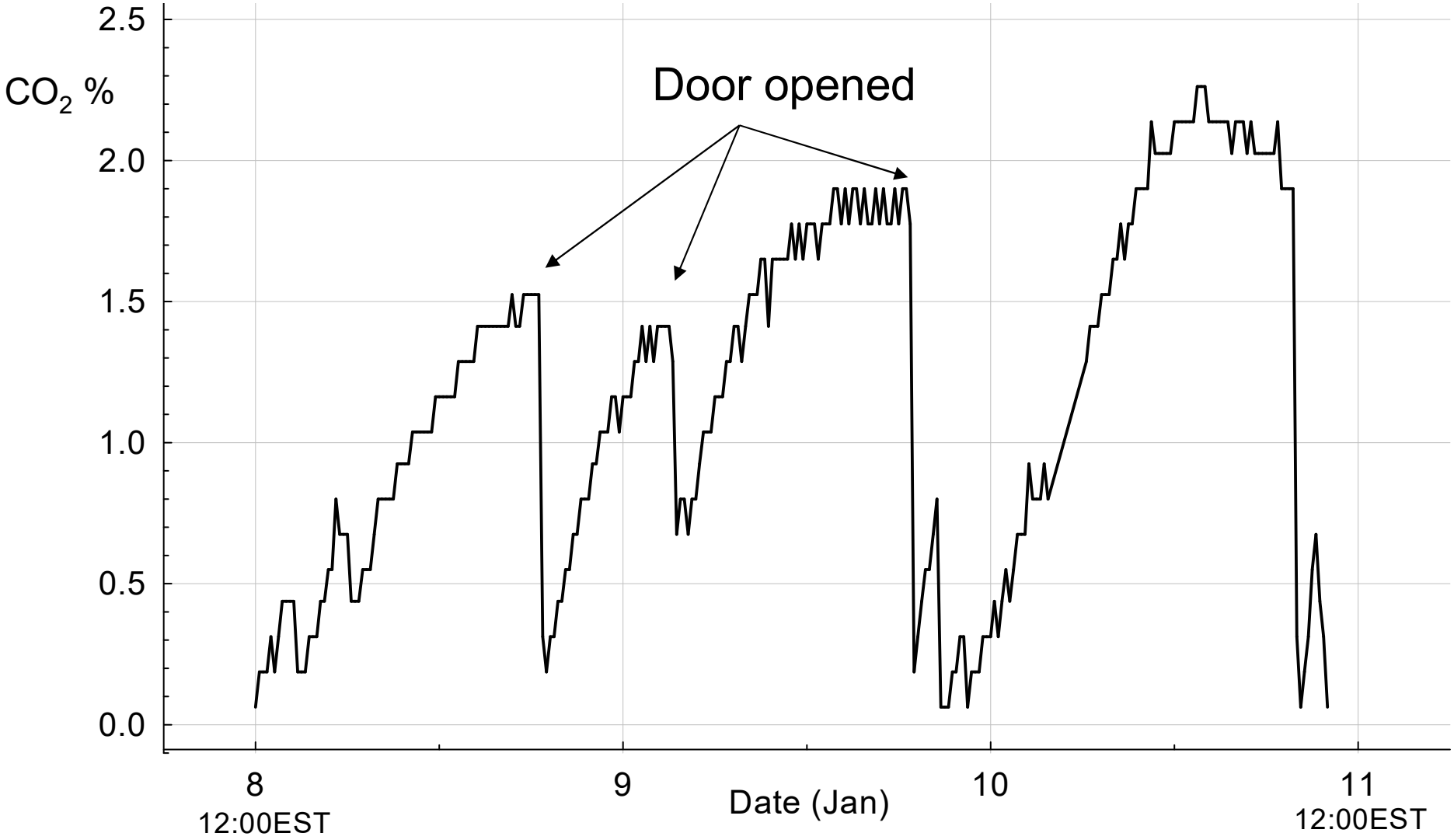
4.5% CO_2

Mangoes held under ethylene for 2 days at 20°C and then 3 days in air or CO_2

Monitoring found high CO_2 levels

- Up to 5.3% CO_2 in ripening and holding rooms
- Automatic venting systems did not remove all CO_2
- Opening doors to vent room varied in effectiveness

CO_2 level increases when ripening room is closed



Ventilation requirements

Inlet

Outlet

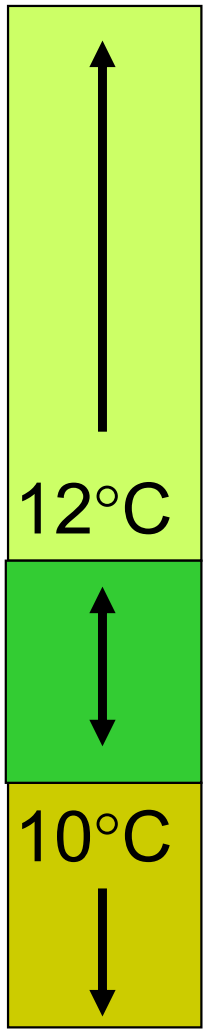
Automatic venting – place inlet behind cooling coil and outlet on opposite wall near floor (CO_2 is heavier than air)

Manual venting – open door for at least 10 minutes every 8-12 hours

Storing mangoes

- Before ripening
  - Store at 12°C for maximum 5 days (from arrival at market)
- After ripening
  - Store at 12°C for maximum 3 days
- Risks
  - Less skin yellowing
  - Dull appearance
  - More rots
  - More lenticel spotting

Effect of temperature during storage



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Managing temperature during ripening

Precool or warm fruit to 18-20°C – forced-air is best

Remove respiration heat – leave space around each pallet for air circulation or use forced-air every 6-8 hours

Managing temperature during storage

Fruit temperature 2°C cooler in pallet under cooling coil

Leave space around pallets to allow air circulation

Position cooling coils to ensure even air distribution

Managing ripening and storage

Storage of hard green fruit

Temperature – 10-12°C for maximum of 5 days, even air circulation
Humidity – at least 85%

Ripening

Temperature – 18-20°C, forced-air system is best
Humidity – at least 85%
Shot - 100ppm ethylene every 8-12 hrs for 2-3 days
- open doors for at least 10 minutes to vent before re-gassing
Trickle - 10ppm ethylene continuous for 2-3 days
- automatic venting, 1 room volume change every hour

Holding ripening fruit

Temperature – 18-20°C until ready for sale
Venting – open doors for at least 10 minutes every 8-12 hours or use automatic venting

Holding ripe fruit

Temperature – 10-12°C for maximum of 3 days

Acknowledgements

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