Connecting the Dots: *Raspberry Production Challenges*

Miguel Ahumada, Sun Belle Inc.

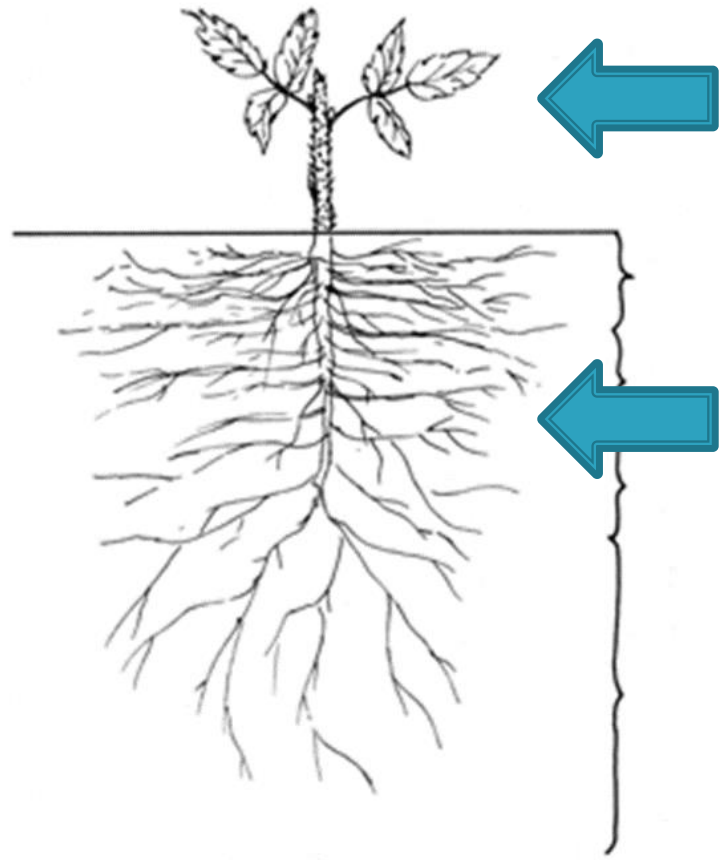
Raspberry economics

- 2013 in Ventura
  - $187 million
  - #3 crop
- #3 berry in US per capita consumption
- Can be highly profitable
  - $20K-$60K typical profit per acre
  - Winter prices can be 3x more than summer

Challenges

- High production cost
  - $60K-$70K per 2-year crop cycle
- Complex cropping system
  - Multi-cycle production
  - Few varieties, adaptability issues
  - Fruit quality
- Research and innovation still needed
  - Trellising systems
  - Pest and Disesase management
  - Fertigation, Substrate, Plastics/mulches
- Mexico

Mediterranean Climate



Shoots 59°F– 68°F

Roots 75°F

Cool Shoots – Warm Roots

Protected Culture

Wind

- Reduces plant growth and development
- Fruit damage: rubbing, abrasion, punctures

Rain/Humidity

- Increased fungus

Sun

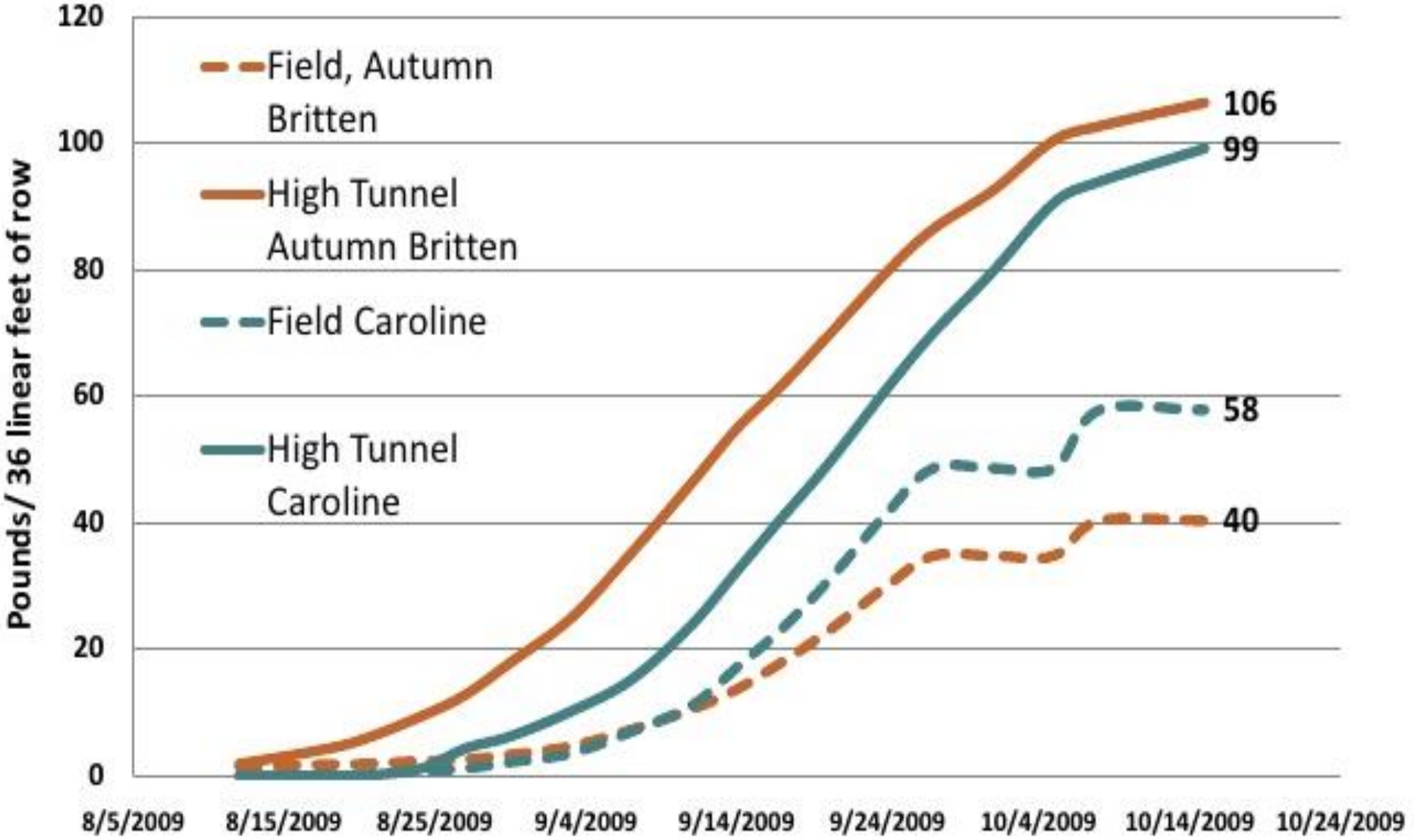
- Sun burn, white drupelets

High Tunnel vs. Open Field

Higher productivity

Lower productivity

Yield: High Tunnel vs. Open Field



Tunnel types

French Tunnel

Sidewalls and Doors

Rain shelters

Lower cost than tunnel

For windless areas

New Varieties

Public

- Diamond Jubilee – Berryworld Plus, UK
- Imara – Advanced Genetics, Netherlands
- Kwanza – Advanced Genetics, Netherlands
- Vintage – USDA ARS Oregon

Proprietary

- Adelita – Planasa
- Alicia – Driscolls
- Erika – Sun Belle (in Americas)

Others

Varieties

Adelita

Erika

Leaf Height and Photosynthesis

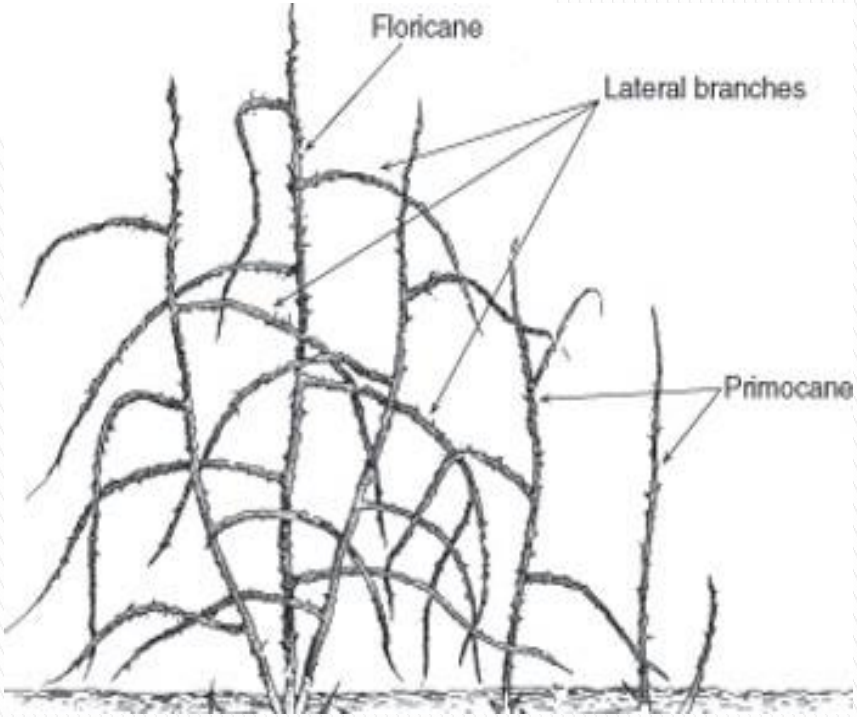
Leaf ht aboveground (cm)[z]	Photosynthetic photon flux ($\mu mol \cdot m^{-2} \cdot s^{-1}$)	Stomatal conductance ($mmol \cdot m^{-2} \cdot s^{-1}$)	CO_2 assimilation ($\mu mol \cdot m^{-2} \cdot s^{-1}$)	Leaf fluorescence (F_v/F_m)
40	346.7 c	252.6 b	5.5 b	0.80 a
80	547.7 b	302.9 a	8.6 a	0.78 b
120	857.5 a	329.7 a	5.3 b	0.78 b
P	<0.0001	0.0048	0.0038	0.0328

[z]1 cm = 0.3937 inch.

Carbon Dioxide Enrichment May Increase Yield of Field-grown Red Raspberry under High Tunnels

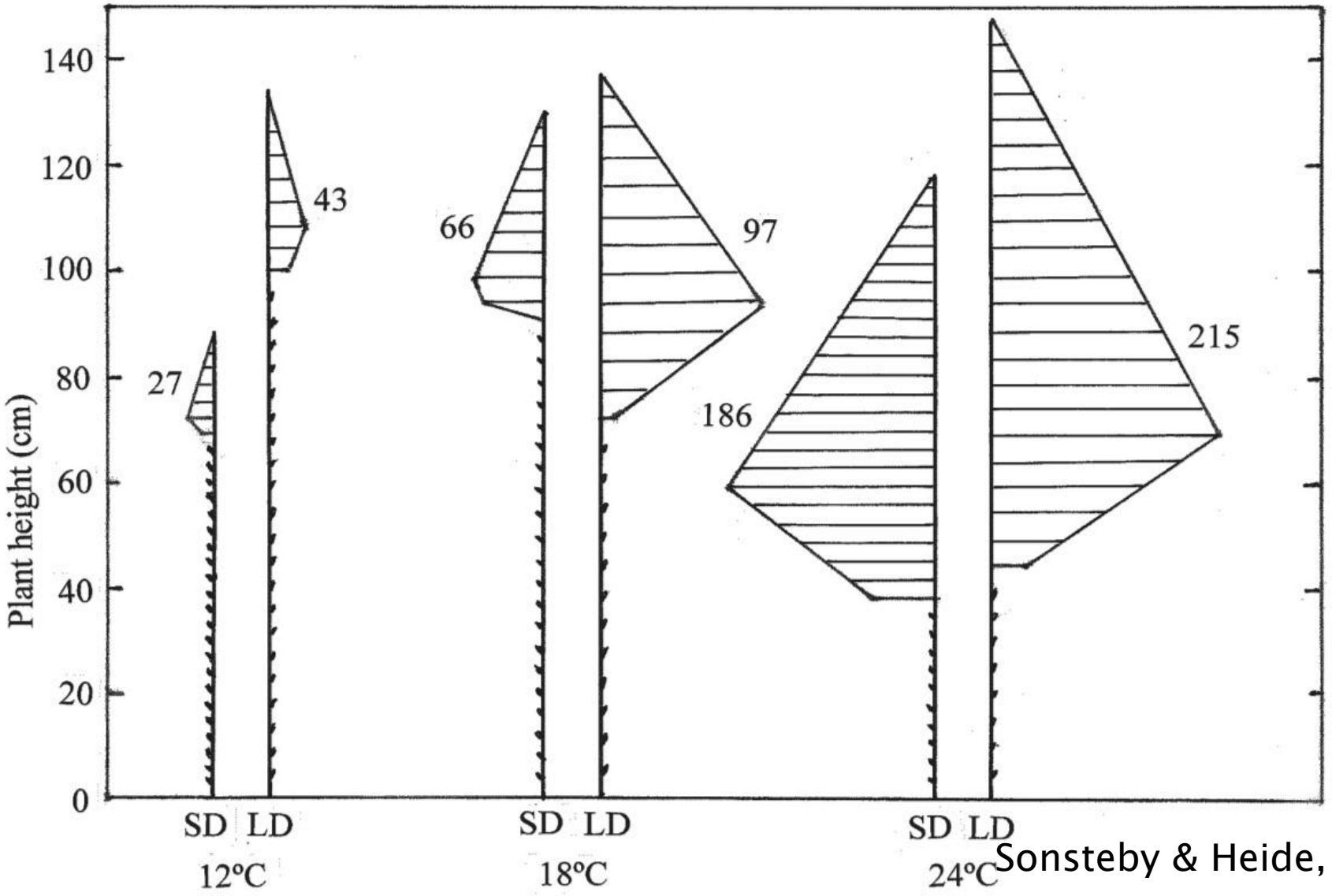
Mochizuki et al 2010

High Plant Density at 120 cm



Overcrowding in highly photosynthetic area

Plant Architecture & Flower Position



Sonsteby & Heide, 2009

Spur Blight

Didymella applanata

Yield Loss

Botrytis

Flower abortion

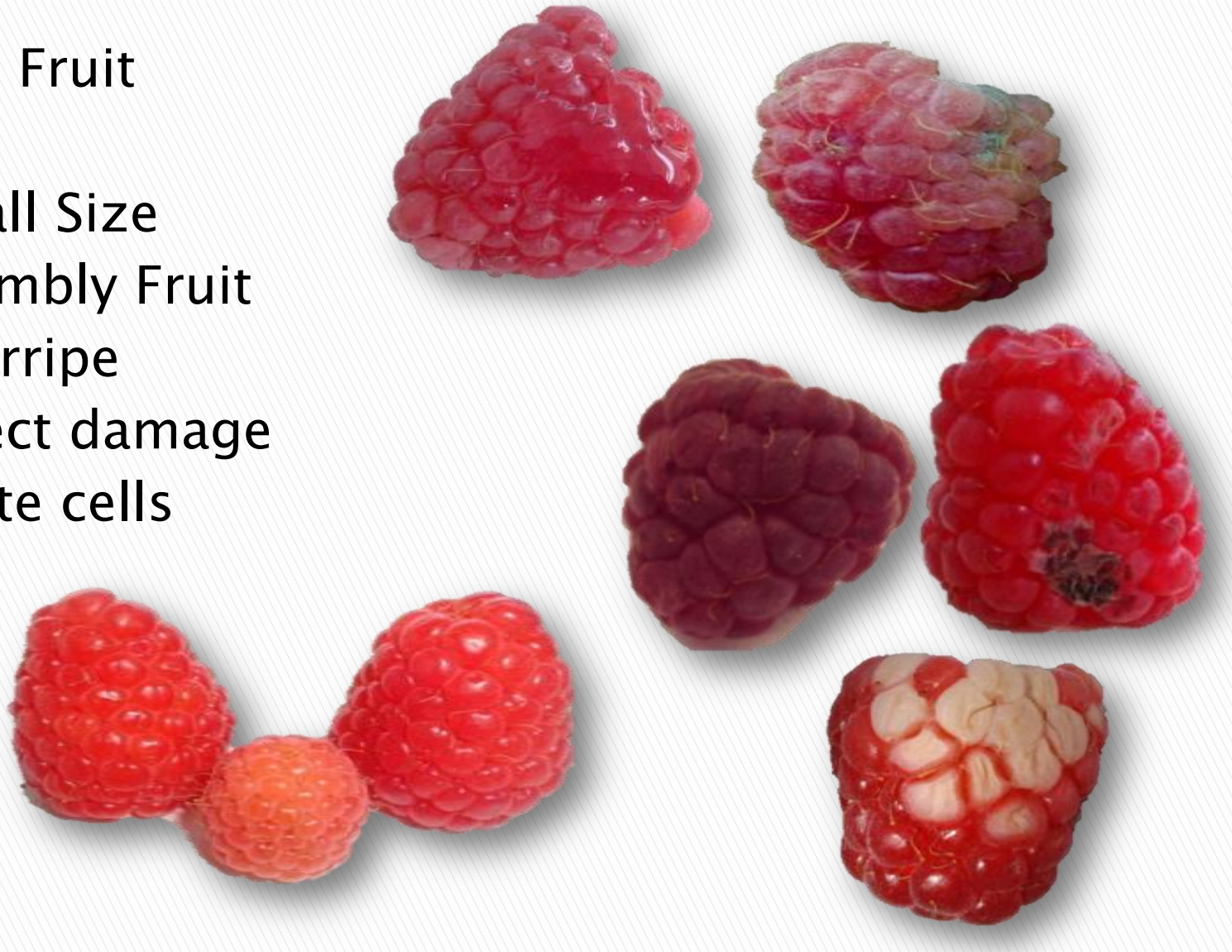
Cane botrytis

Trellising Impacts Quality

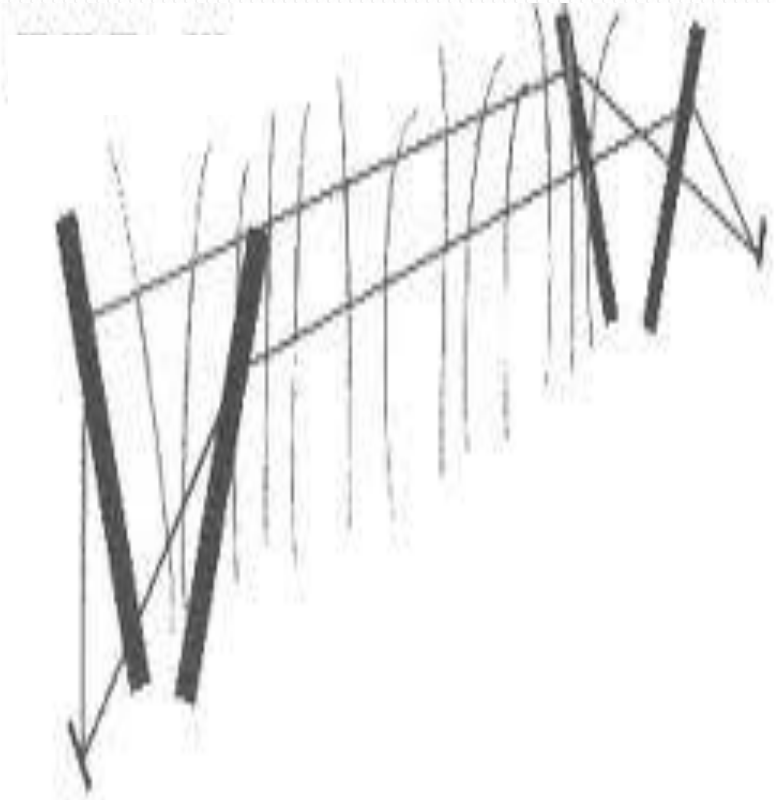
- Fruit Quality
  - Size and Sugars
- Disease incidence
- Insect control
  - Spray penetration
- UV light damage
- Harvest Speed
- Yield
  - Fruit size
  - Fruit per laterals
  - Laterals per canes
  - Numbers of canes

Common Fruit Quality Issues

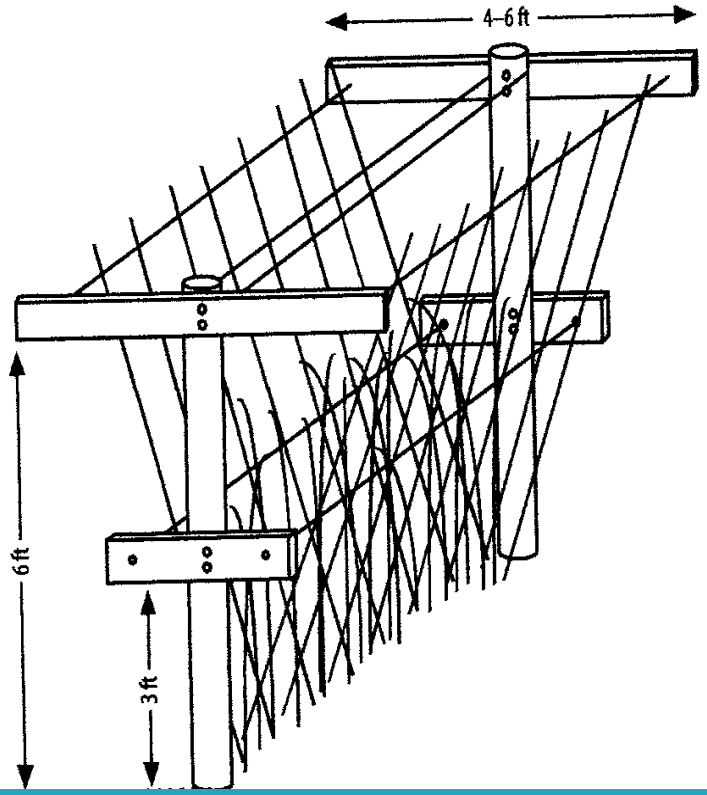
- Soft Fruit
- Rot
- Small Size
- Crumbly Fruit
- Overripe
- Insect damage
- White cells



“V” trellis variations

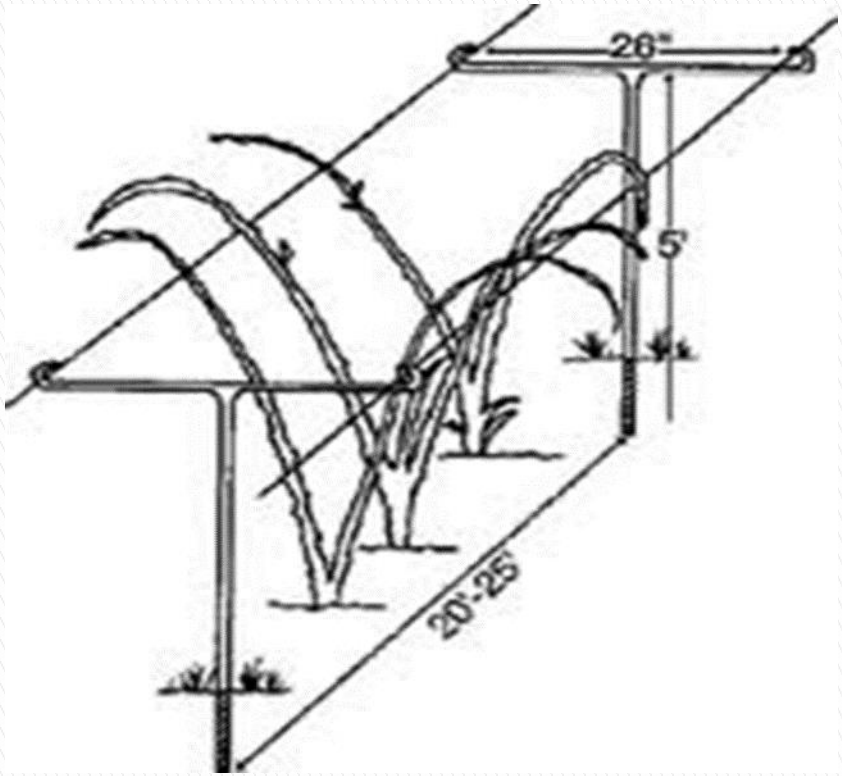


Narrow bed

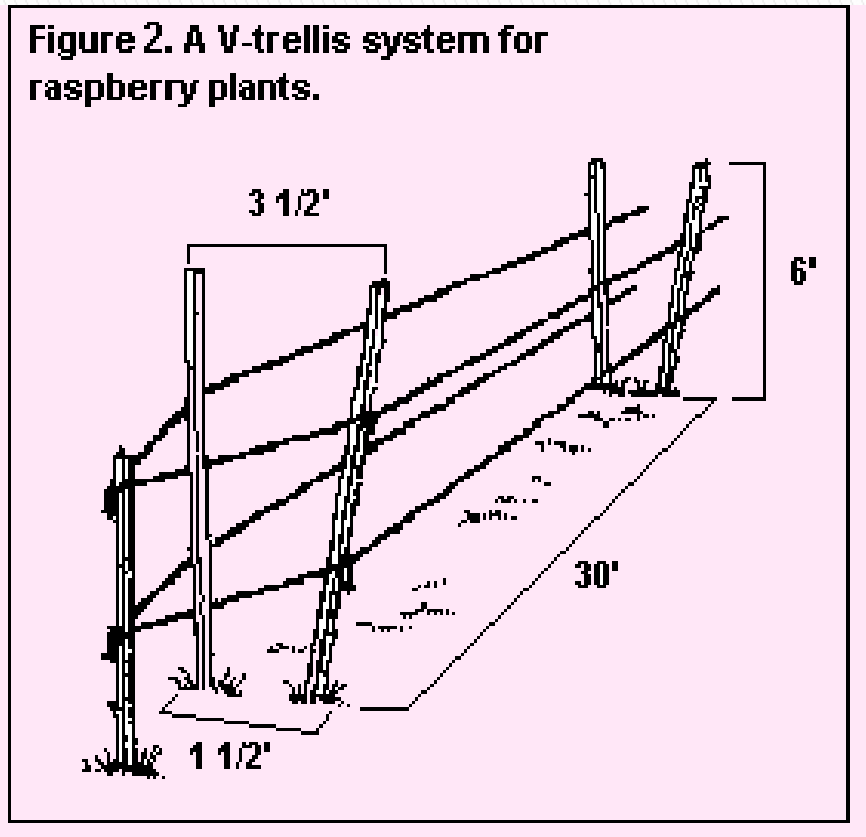


Wide bed

“V” trellis variations



“T” posts V



Wide-bed

"V" trellis variations

Shift system pre bloom

Post bloom

New look to “V” trellis

Wide bed

More light

First and Second Harvest

1st crop on primocane

2nd crop on floricane

Alternative Treatments for 2nd crop

Cutback and Mow Down

Low Down and Cutback

Cutback height affects yield

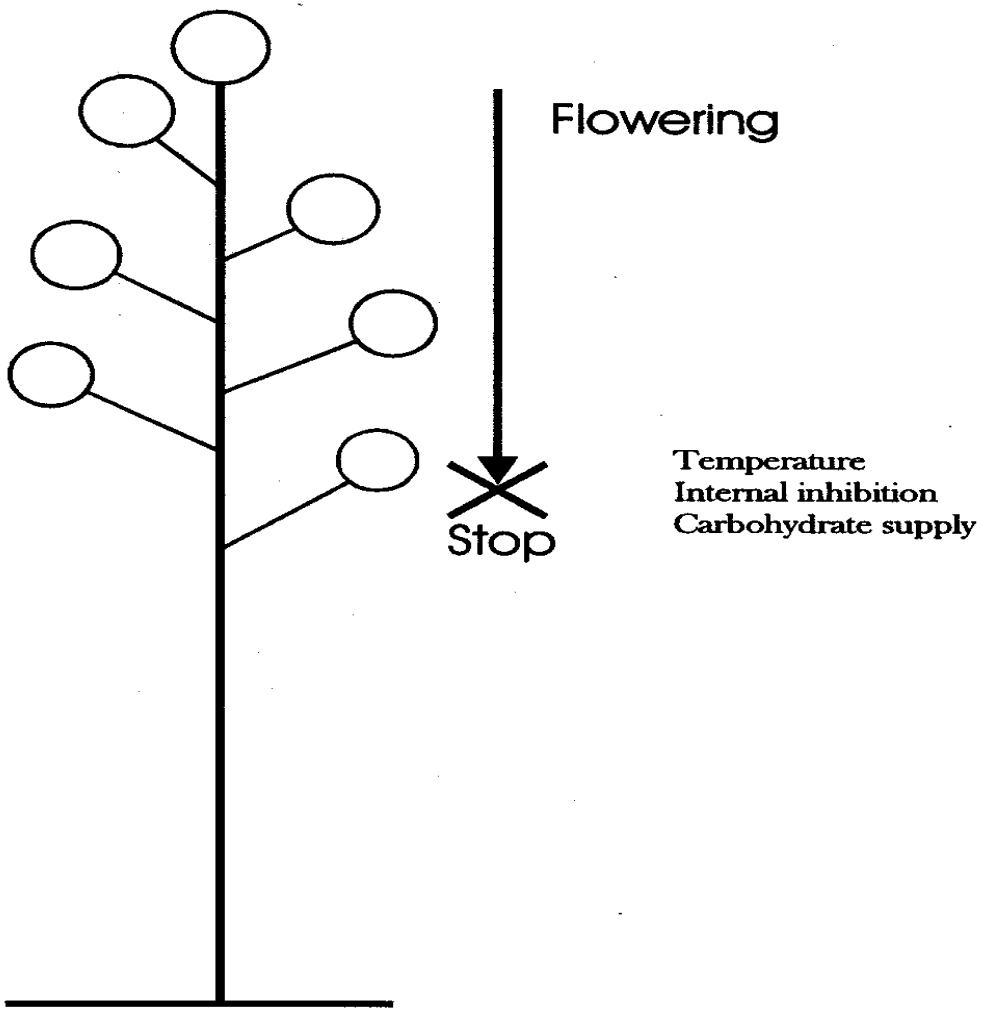
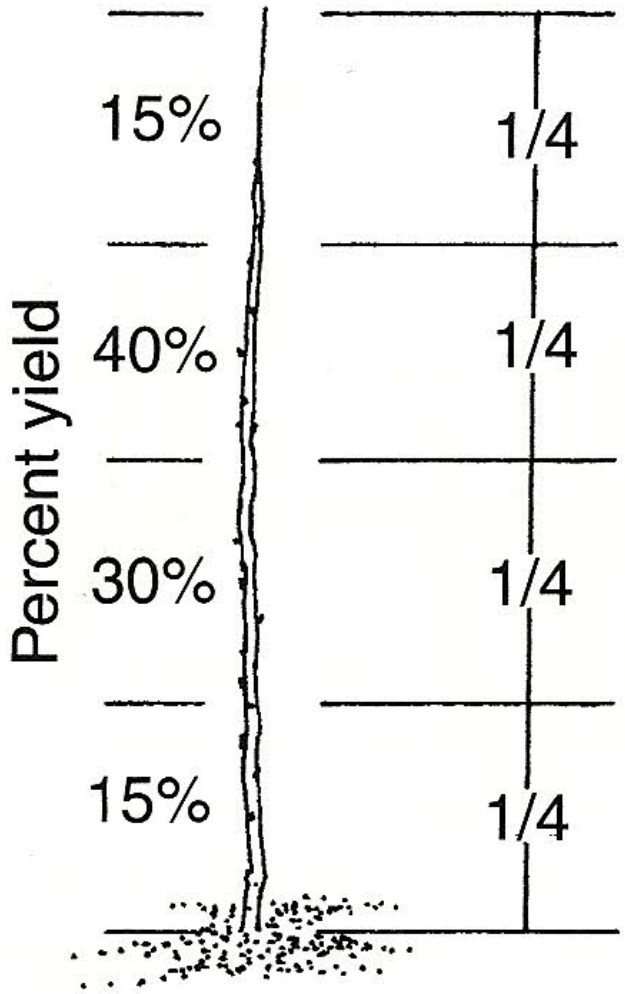


FIG. 6
Flowering generally does not move fully to the base of the cane.

Carew et al. 2000

Cutback height affects yield



Fertigation

Predictability

Full control=max growth

Water use

- 3-5 acre foot per season
- 1 acre foot = 326,000 gallons
- 978,000 to 1,630.000 gallons
- Use evapotranspiration (ET) to monitoring plants use or other methods
- Education of irrigators

Soil Management: Cover Crops

- Add organic matter and N to soil
- Reduced pesticide and soil runoff in winter
- Reduced dust may reduce mites
- Reduced weeds

Cover crops may have many benefits

the end

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- “We can not solve our problems with the same level of thinking that created them” — Albert Einstein

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- Questions?