

# Connecting the Dots: *Raspberry Production Challenges*

Miguel Ahumada, Sun Belle Inc.



# *Raspberry economics*

- ▶ 2013 in Ventura
  - \$187 million
  - #3 crop
- ▶ 2013 Santa Cruz
  - \$142.2
  - #2 crop

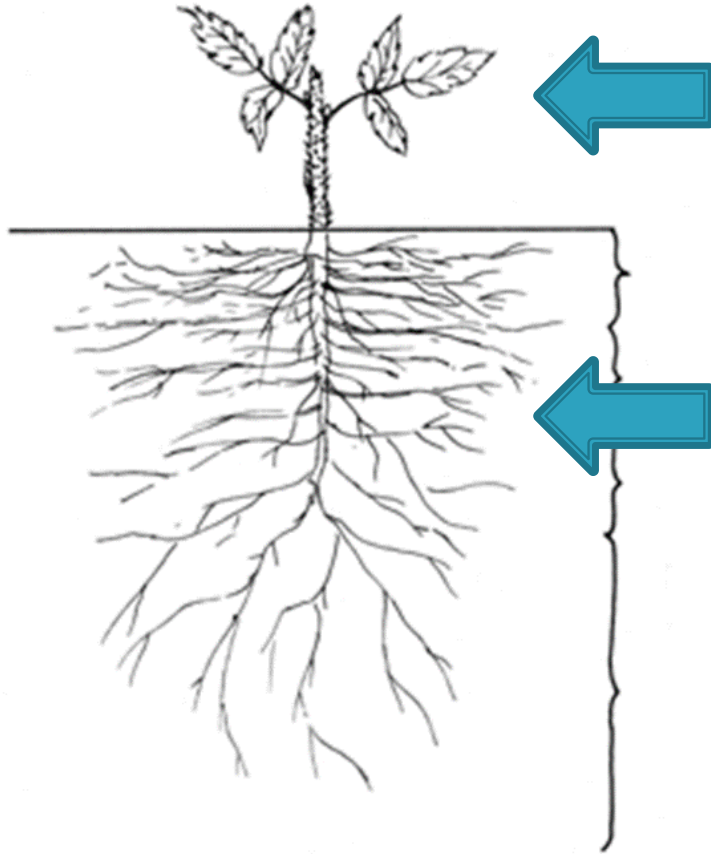
2012 in Monterrey (Salinas)  
\$41,35  
#15crop

- ▶ #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, organics prices varied through the seasons

# *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 Diseases management
  - Fertigation, Substrate, Plastics/mulches
- ▶ Mexico; the big challenge

# *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, UV light



# *High Tunnel*



Higher productivity



Need management !



# *Tunnel types*



French Tunnel



Sidewalls and Doors

# *Rain shelters*



Lower cost than tunnel



For windless areas



# *New Varieties*

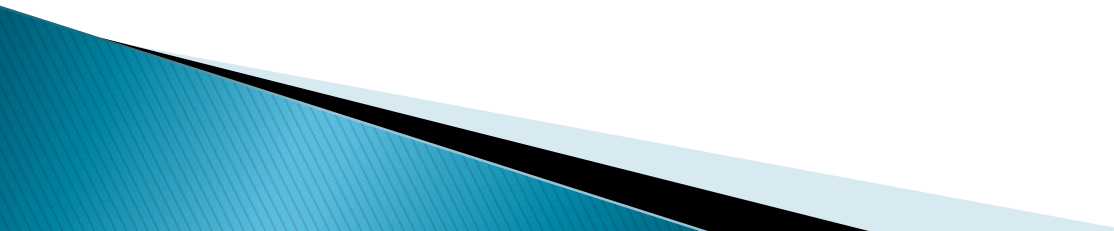
## Public

- 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 the Americas)

## Others ?



# *Varieties*



Adelita



Erika

# *Leaf Height and Photosynthesis*

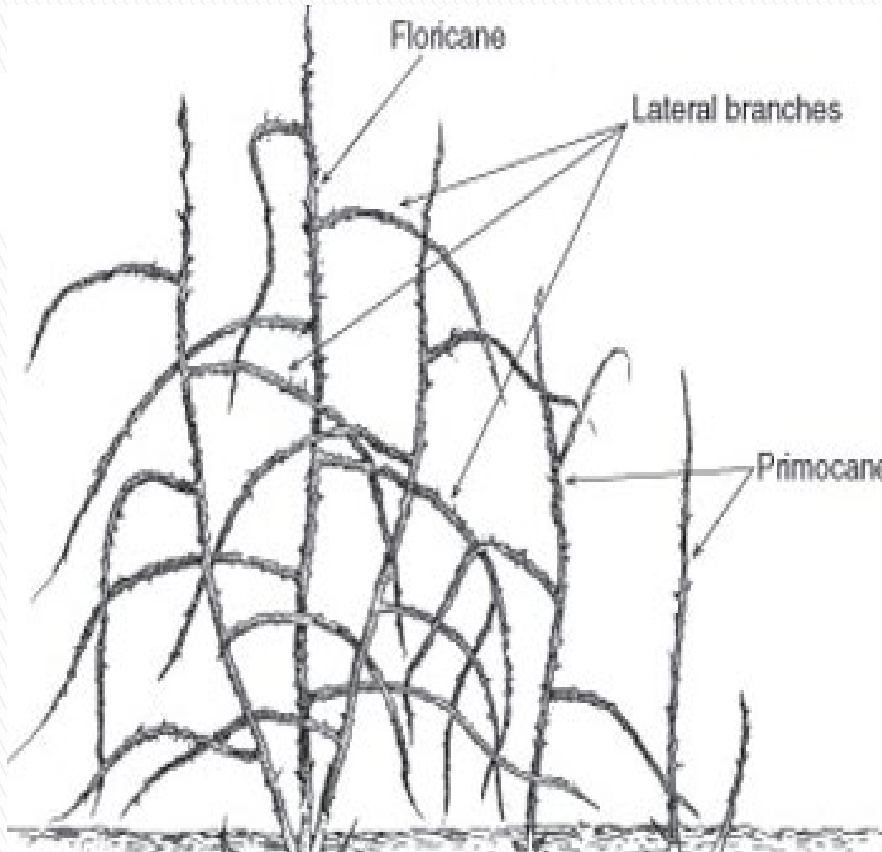
Leaf ht aboveground (cm) <sup>z</sup>	Photosynthetic photon flux ( $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ )	Stomatal conductance ( $\text{mmol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ )	CO <sub>2</sub> assimilation ( $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ )	Leaf fluorescence ( $F_v/F_m$ )
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
<i>P</i>	<0.0001	0.0048	0.0038	0.0328

<sup>z</sup>1 cm = 0.3937 inch.

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

Mochizuki et al 2010

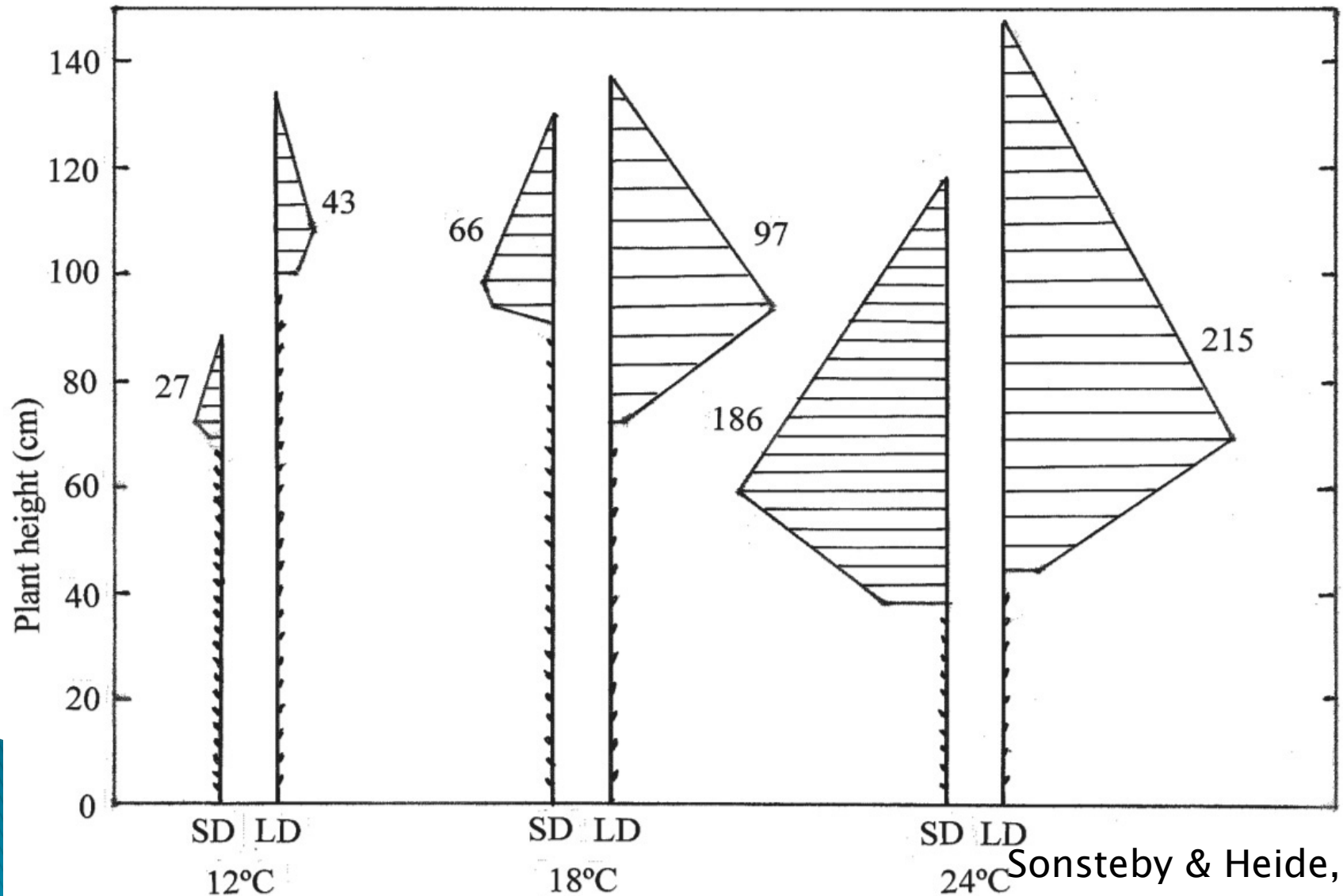
# *High Plant Density at 120 cm*



Overcrowding in highly photosynthetic area



# *Plant Architecture & Flower Position*



# *Spur Blight*



*Didymella applanata*



Yield loss



# *Botrytis*



Flower abortion



Yield loss

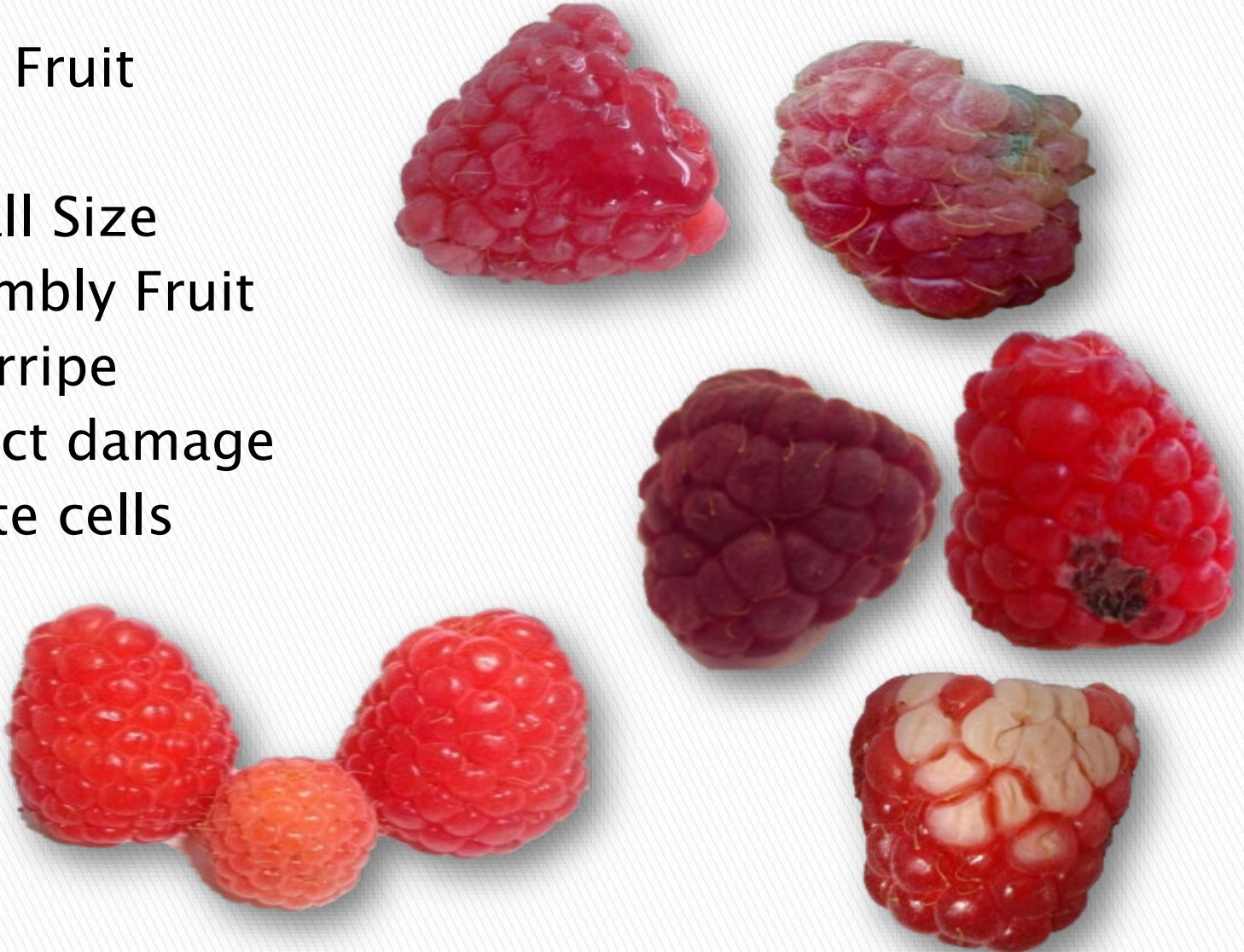
# *Trellising Impacts Quality*

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

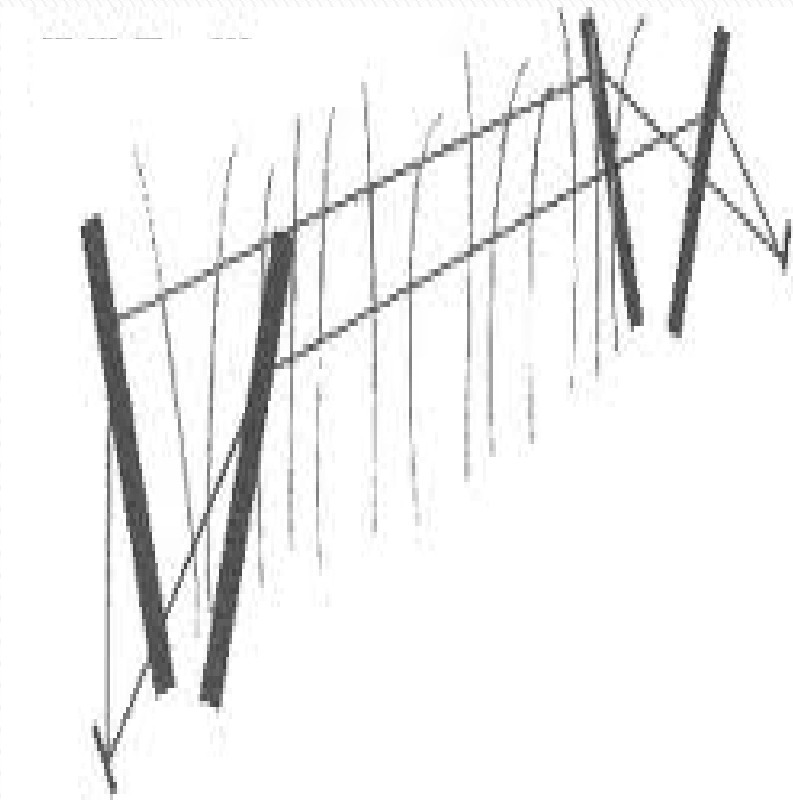


# *Common Fruit Quality Issues*

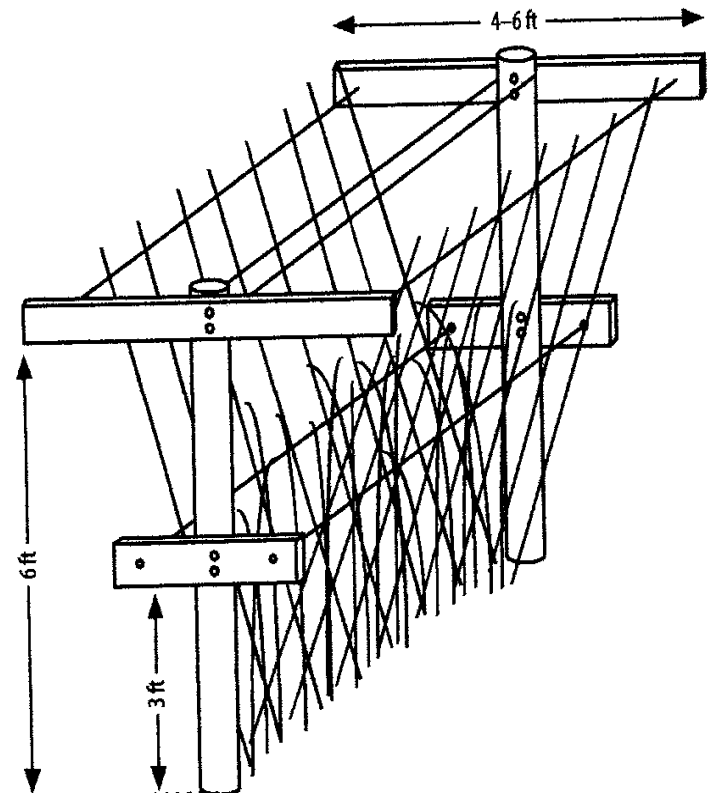
- ▶ Soft Fruit
- ▶ Rot
- ▶ Small Size
- ▶ Crumbly Fruit
- ▶ Overripe
- ▶ Insect damage
- ▶ White cells



# *“V” trellis variations*

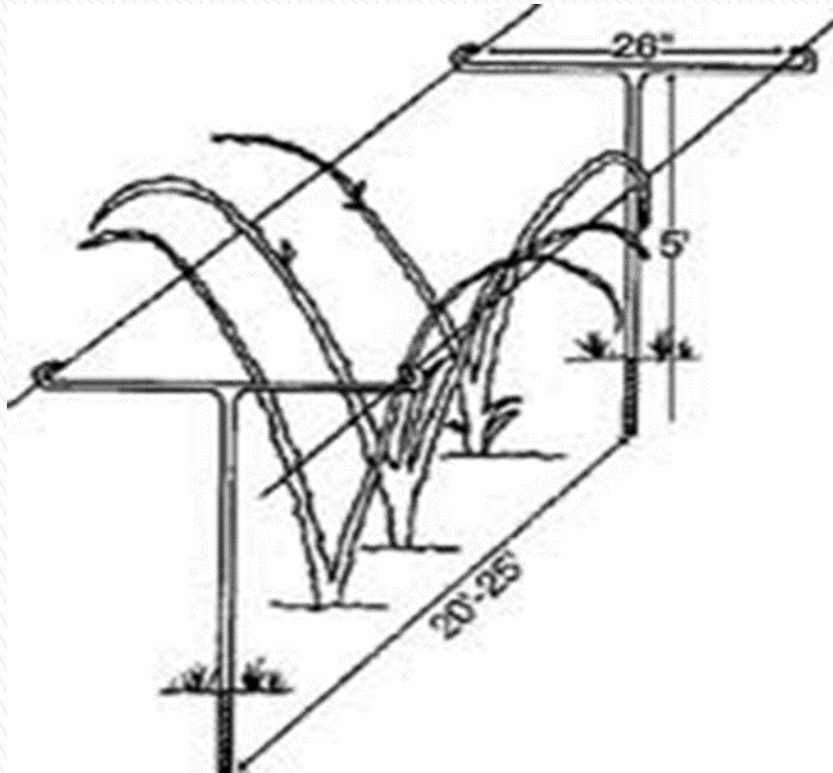


Narrow



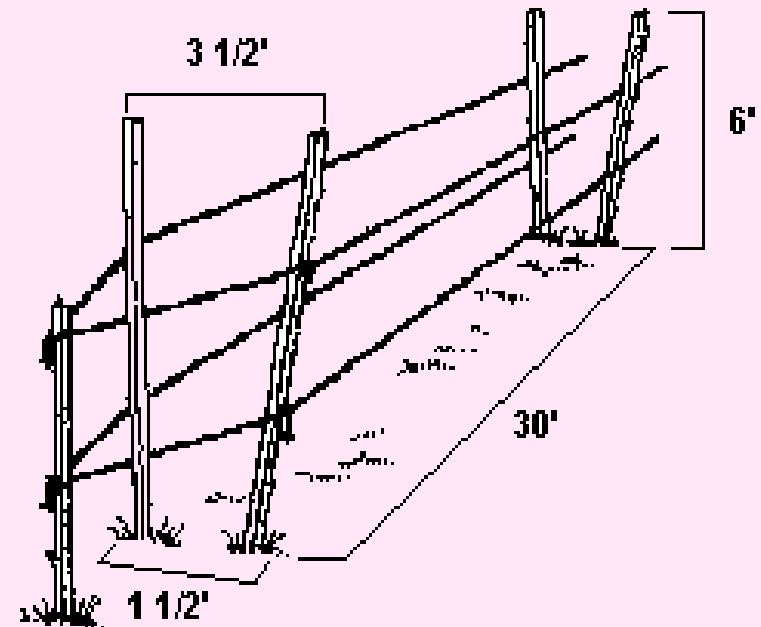
Wide

# *“V” trellis variations*



“T” posts

Figure 2. A V-trellis system for raspberry plants.



Wide

# *“V” trellis variations*



Shift system pre bloom



Post bloom



# New look to “V” trellis



Wide bed



More light

# *First crop*



1<sup>st</sup> crop on primocane



Defoliation before CB

# Nitrogen content

	Hand defoliation		Defoliation with AN 20 - 20%	
Date sampled	Canes	Roots	Canes	Roots
11/21/2013	0.84	1.58	1.07	1.89
1/2/2014	1.11	2.45	1.29	2.58
1/14/2014	1.40	1.49	1.82	2.51



# *Alternative Treatments for 2<sup>nd</sup> crop*



Cutback and Mow Down



Low Down and Cutback



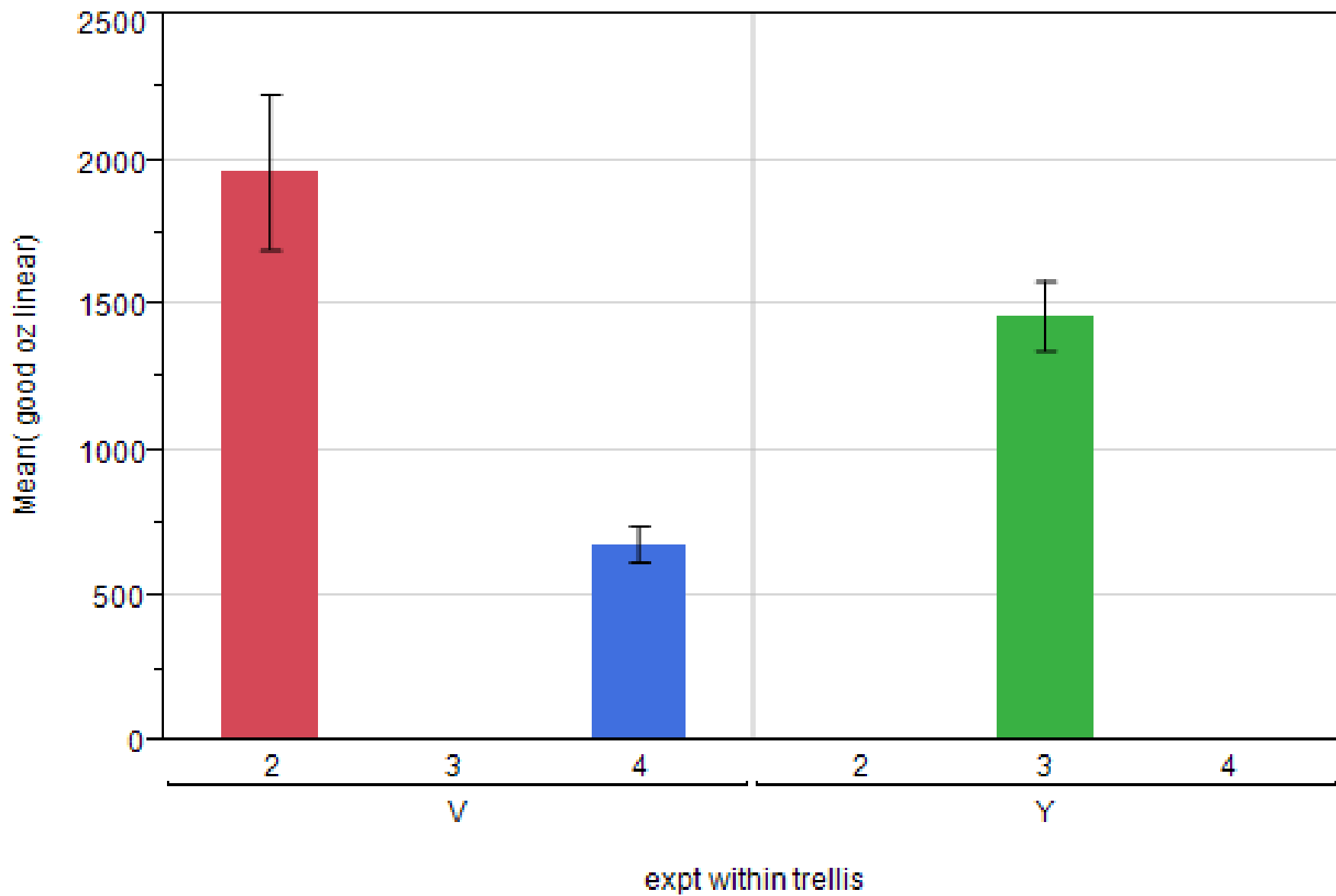
# 3 rows vs 2 rows;



Lack of light, difficult sprays penetration



More light, space for laterals, air movement



# *Cutback height affects yield*

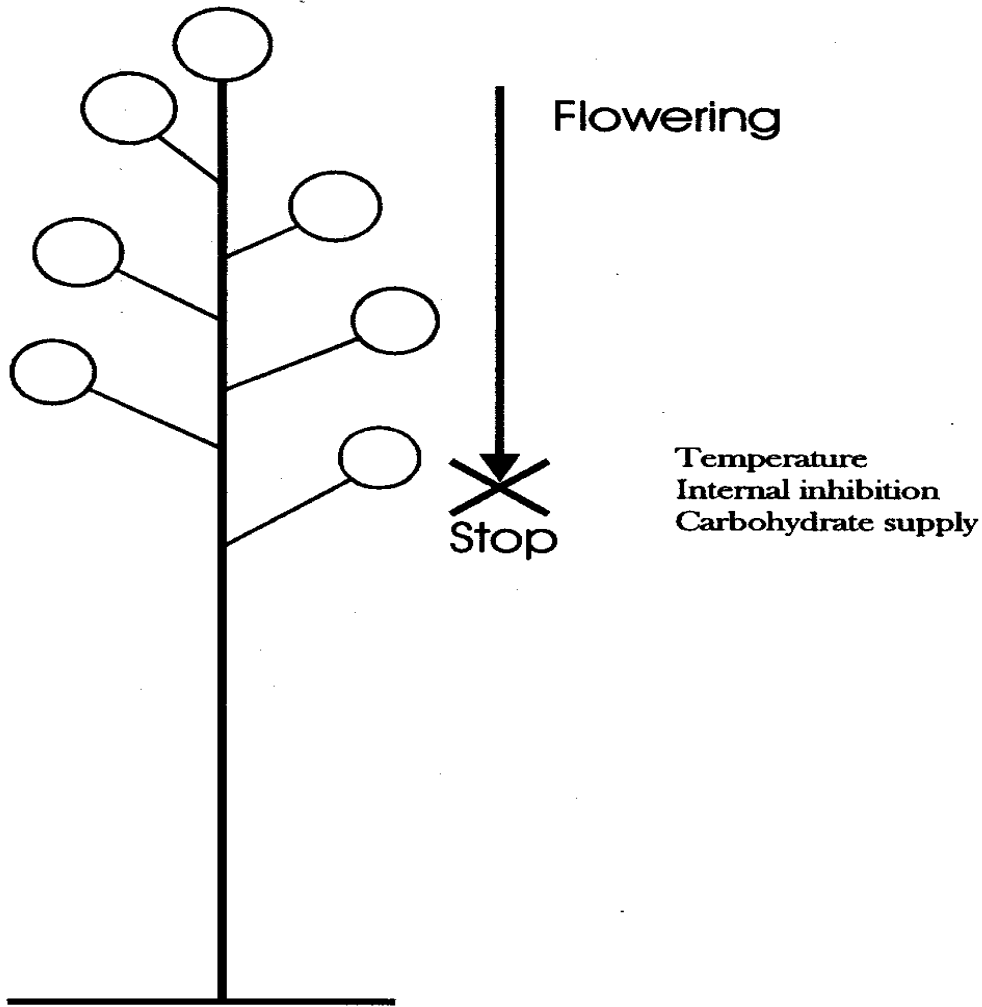
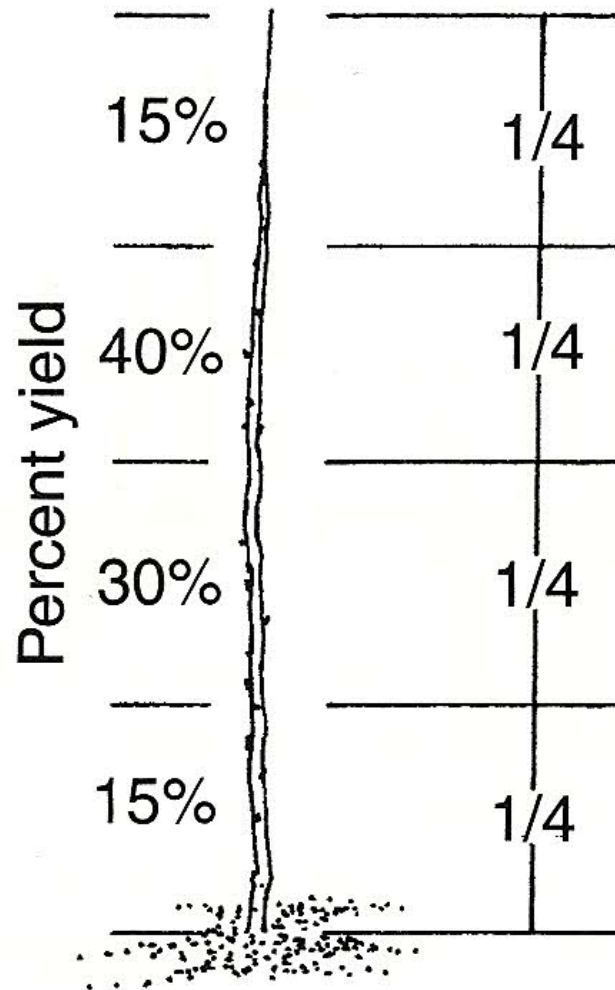


FIG. 6

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

# *Cutback height affects yield*



# Fertigation



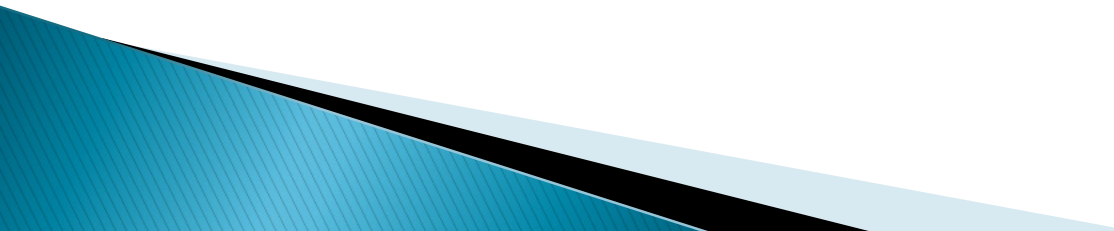
Predictability



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*

- ▶ [mahumada@sun-belle.com](mailto:mahumada@sun-belle.com)
  - ▶ (805)415-5242
  - ▶ “We can not solve our problems with the same level of thinking that created them”  
— [Albert Einstein](#)
  - ▶ Questions?
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