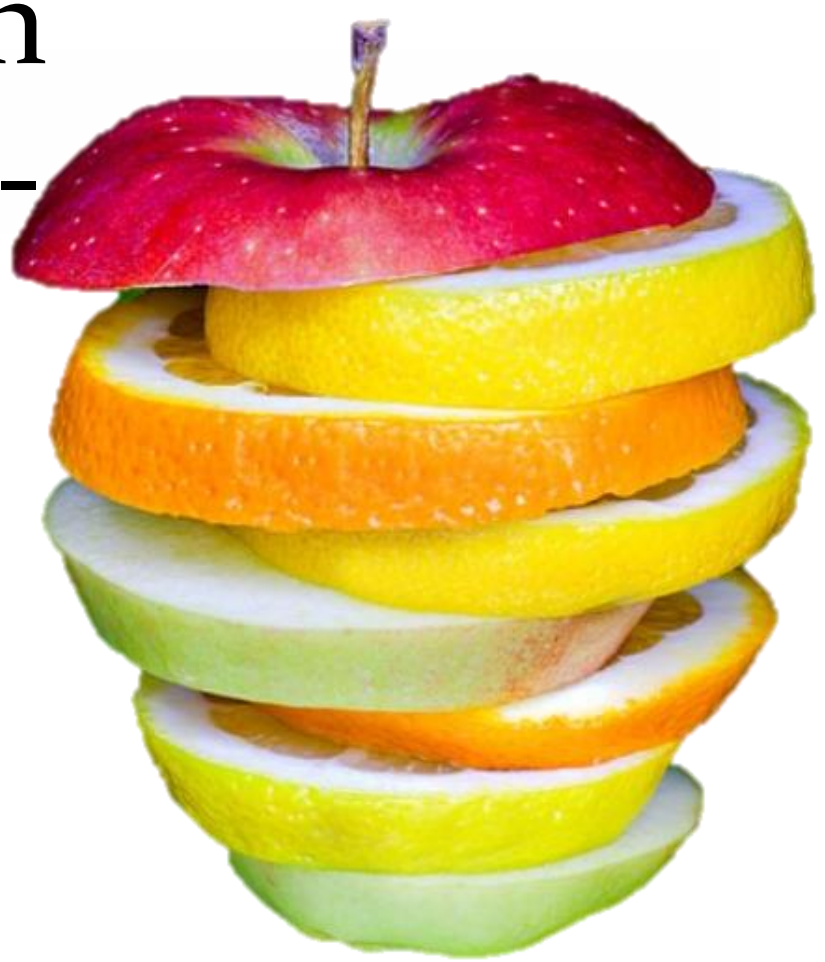
Maximizing Fruit Quality of Low-chill Peaches Through Optimum Preharvest-Management Practices



Mark Ritenour

University of Florida

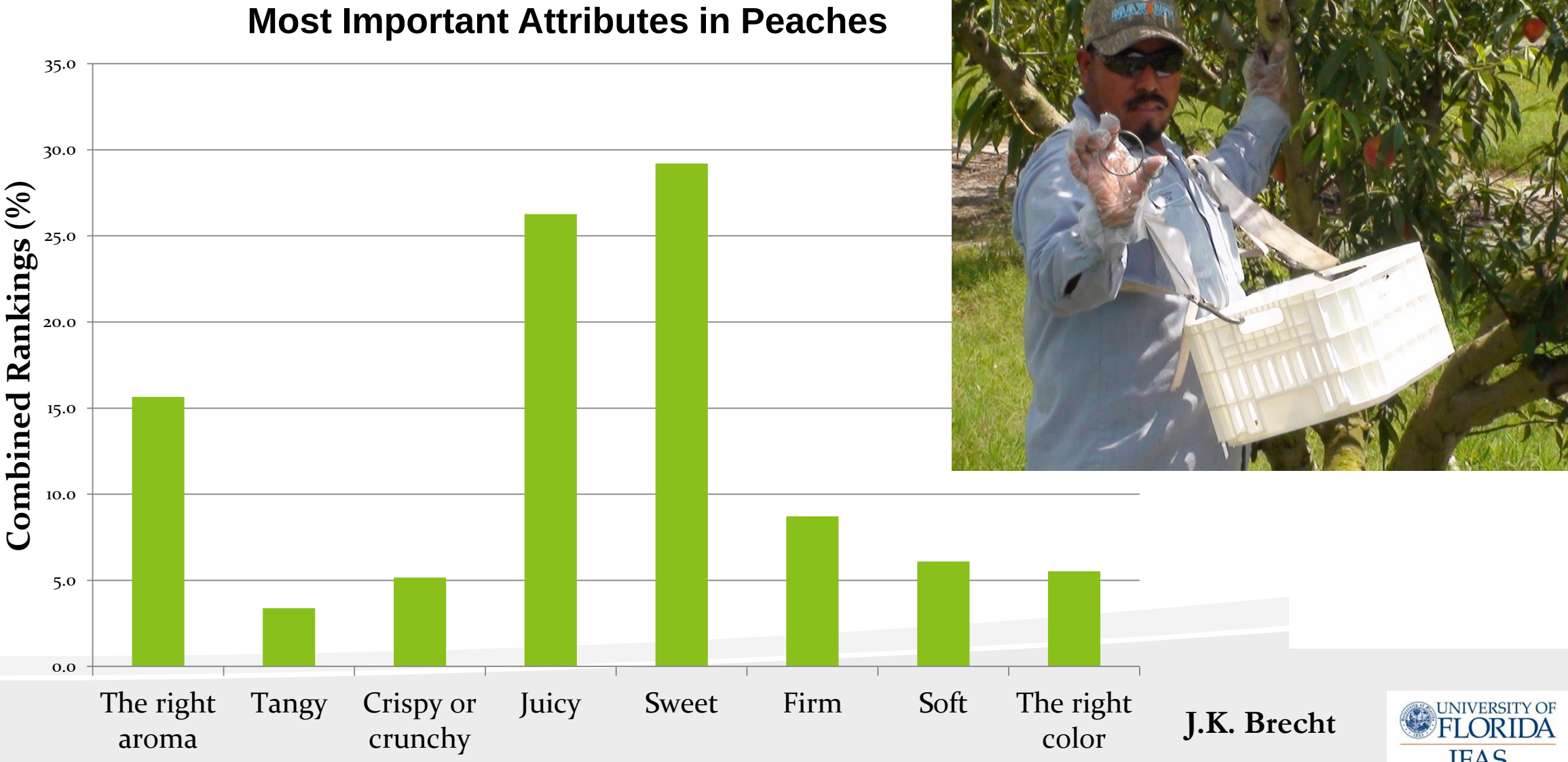
Indian River Research and Education Center, Fort Pierce

ritenour@ufl.edu

UNIVERSITY OF FLORIDA
IFAS

Define “High Quality” Peach

Consumers' three highest preferences for peach attributes



J.K. Brecht

UNIVERSITY OF FLORIDA IFAS

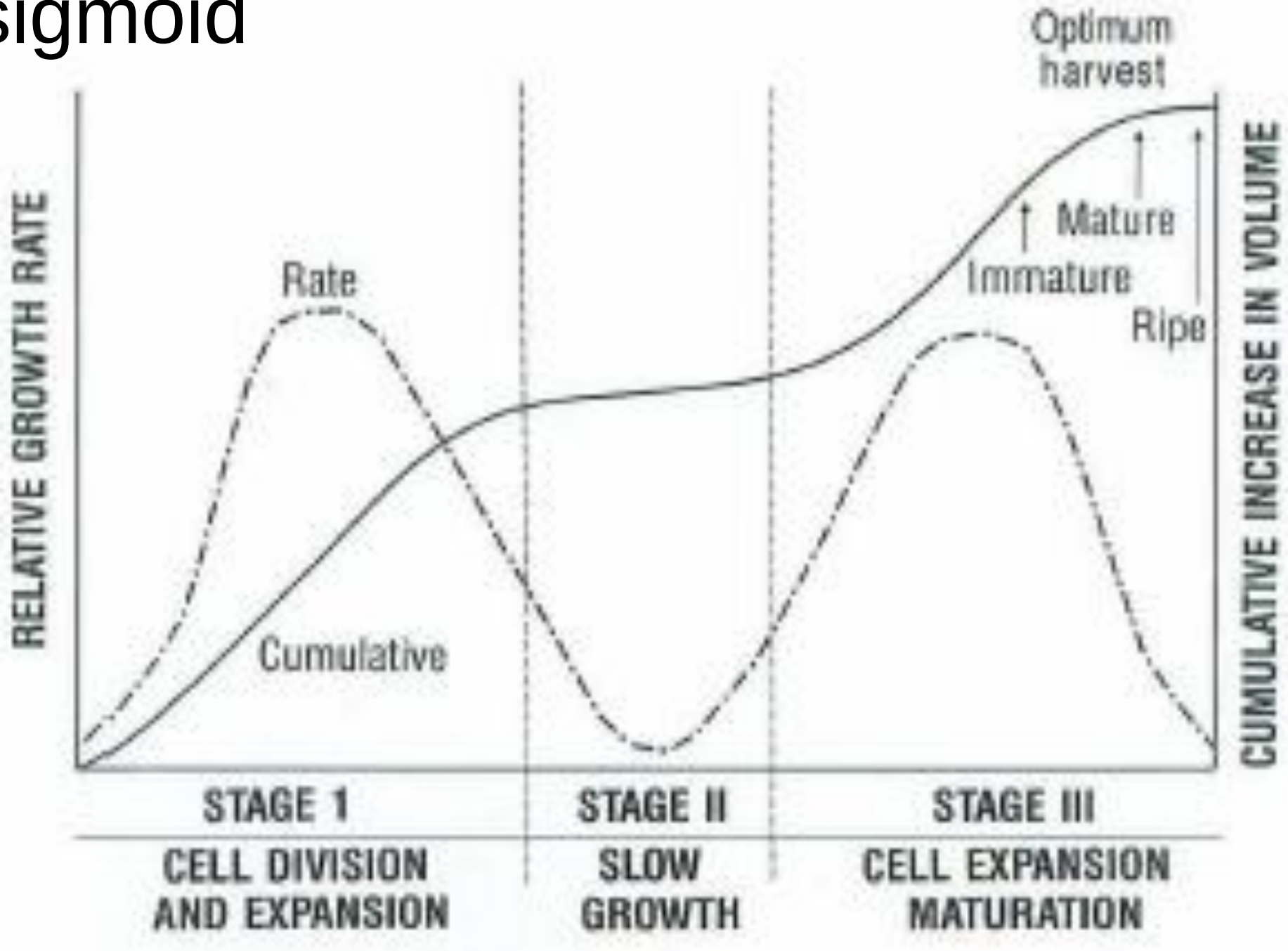
Fruit Development

Combination of cell division and cell enlargement

Fruit Growth Curves

- Double sigmoid.
  - **Stage I** – cell division and some cell enlargement
    - Lasts from bloom to ~50 days
  - **Stage II** – pit hardening, embryo growth
    - Last a few days to 2 months
    - Little increase in fruit size, but dry weight increases
  - **Stage III** – final swell, cell enlargement, water is very critical at this stage

Double sigmoid



Different Factors are Important

- Genotype
- Light
  - Light induces better fruit color
  - High light (exterior canopy) = better postharvest shelf life than shaded (interior) fruit.
  - Shaded fruit = more Internal Breakdown potential
- Temperature
  - High temperatures during bloom advance maturity, but also tend to decrease fruit size (probably due to CHO limits)

Different Factors are Important

- Plant nutrition (esp. N)
  - Excess N = delays fruit color development, greater postharvest fruit water loss, and more postharvest disease
- Water
  - Deficit water supply around floral bud initiation can result in misshapen fruit
  - Stage II growth appears most resistant to deficit irrigation, may result in fruit with thicker cuticle and denser trichomes (slower water loss postharvest)

Carbohydrate (CHO) Supply

Important for:

- Movement from Juvenility to the Adult Reproductive phase
- Floral Bud Initiation (FBI)
  - **E.g., Girdling, ringing** – causes CHO accumulation and results in greater flowering response in many plants
- Fruit Set
- Fruit Drop
- During fruit development, there are periods of resource limitation (not enough CHOs)

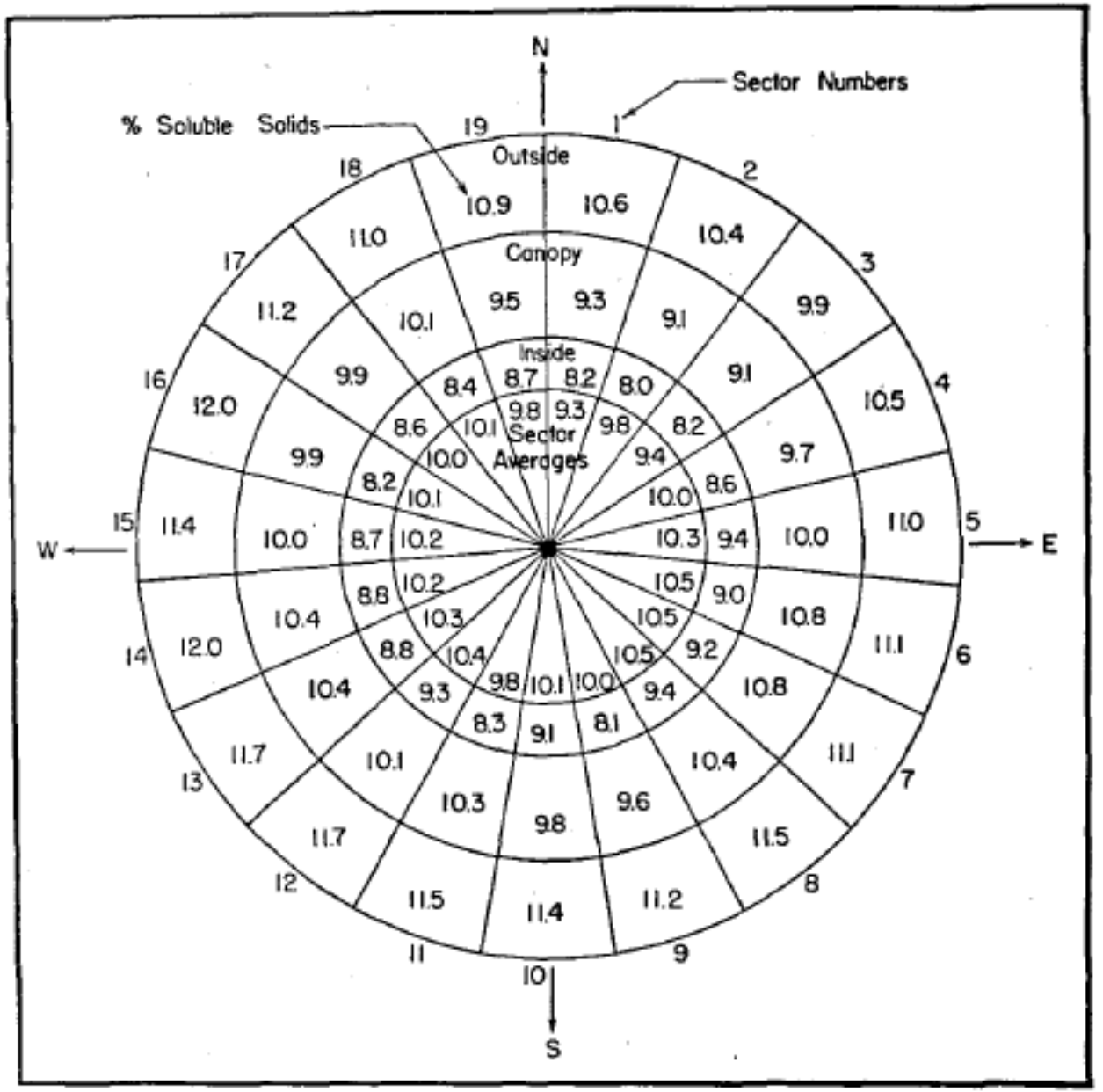
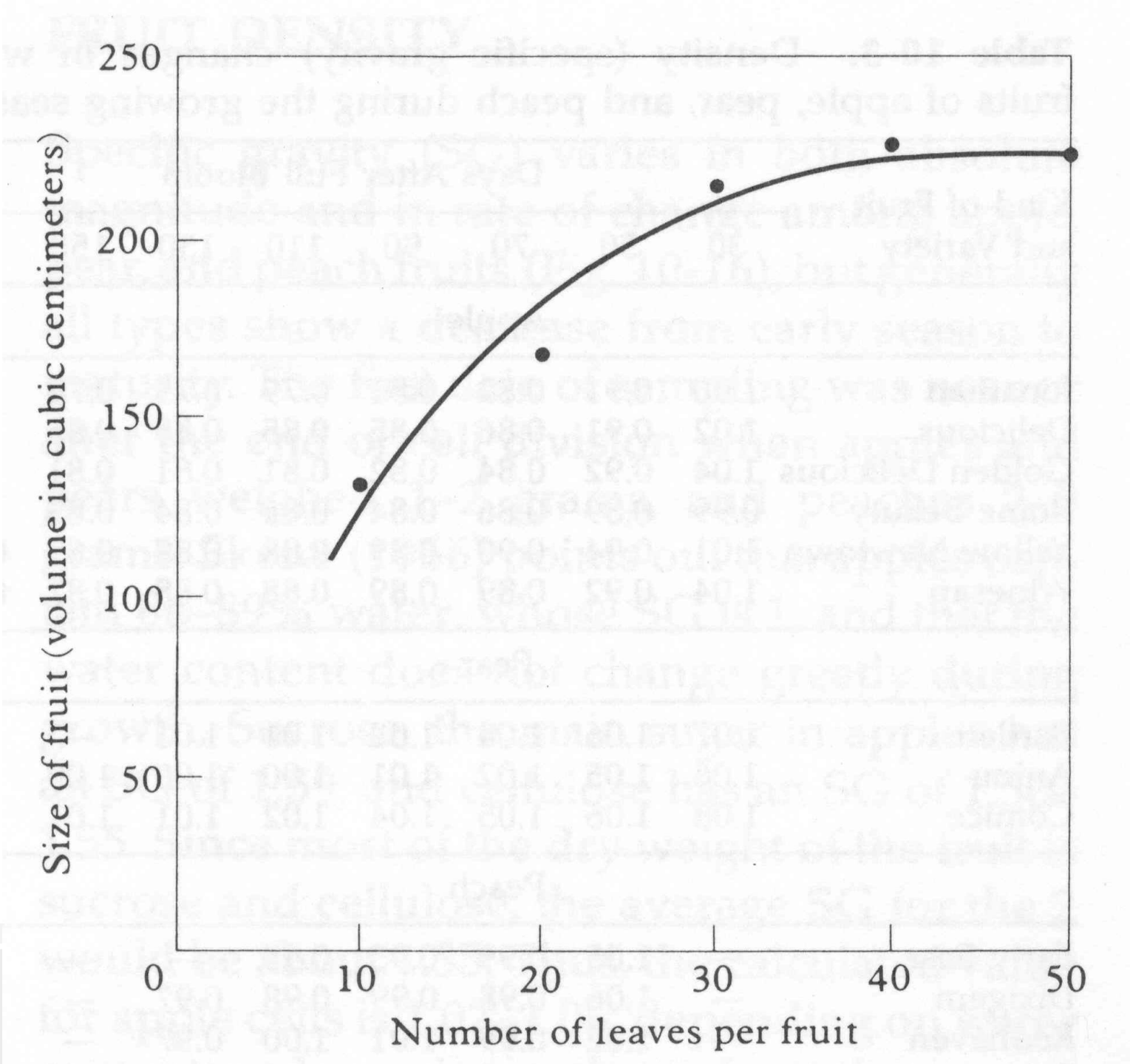


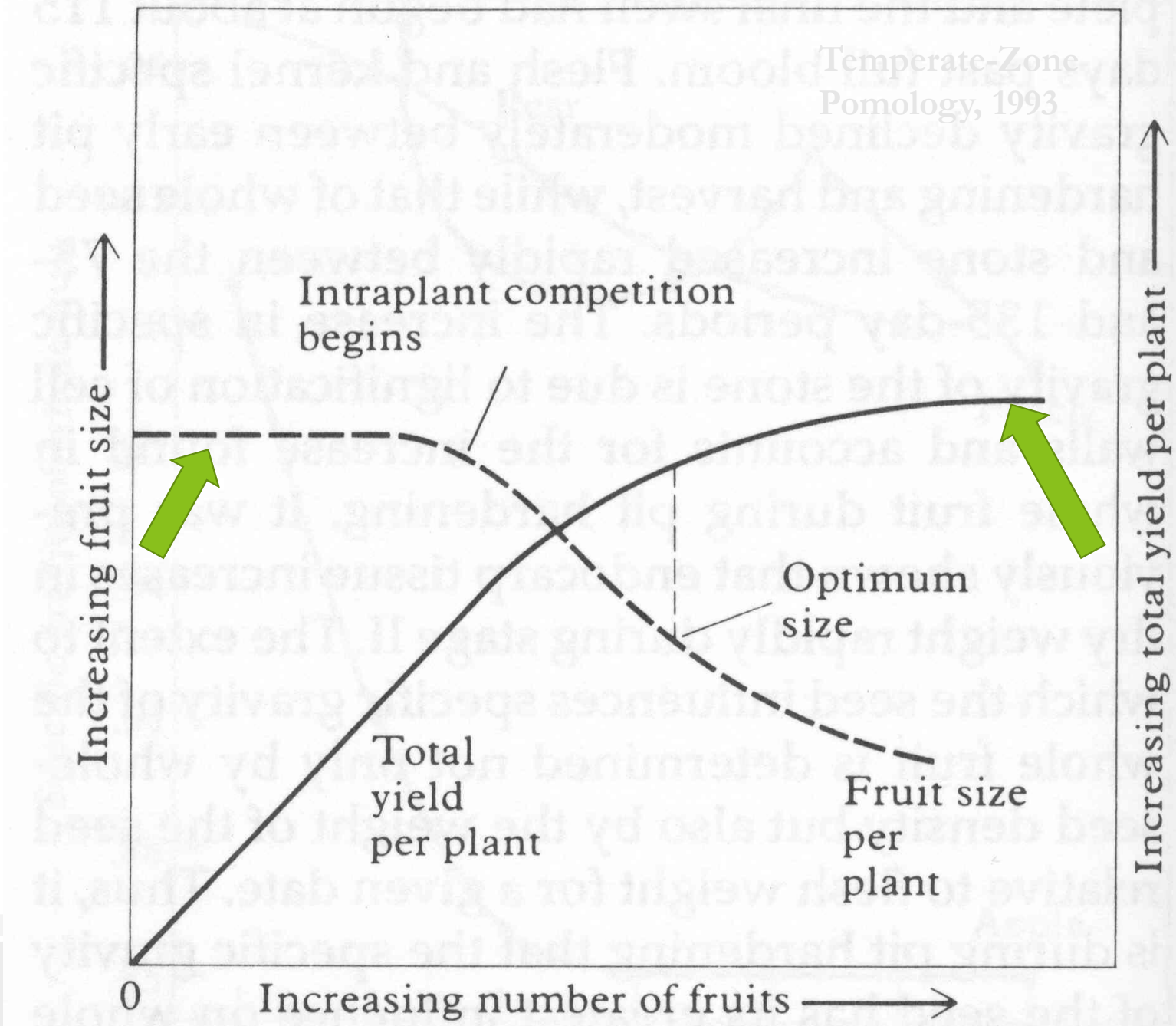
FIG. 2. Effect of direction of exposure and amount of shading on per cent soluble solids content of Valencia oranges.

Sites & Reitz, 1949

Fruit Thinning

- Under optimal conditions, stone fruit set more fruit than are needed for a full commercial crop
- **Thinning** – Increasing the **leaf:fruit ratio** by removing some of the fruit causes the remaining fruit to be larger




Temperate-Zone
Pomology, 1993
Intraplant competition
begins
Increasing fruit size
Optimum
size
Total
yield
per plant
Fruit size
per
plant
Increasing total yield per plant
0
Increasing number of fruits

Fruit Thinning

- **Increases fruit size**
  - By decreasing competition for CHO/substrates needed for growth
  - Thinning before cell division ends tends to stimulate more cell division
  - Thinning after cell division may increase the size of cells
- **Increases fruit quality**
  - E.g. sugar content, color, etc.
  - CHO/substrate response

Fruit Thinning

- The ideal crop load will vary for different cultivars

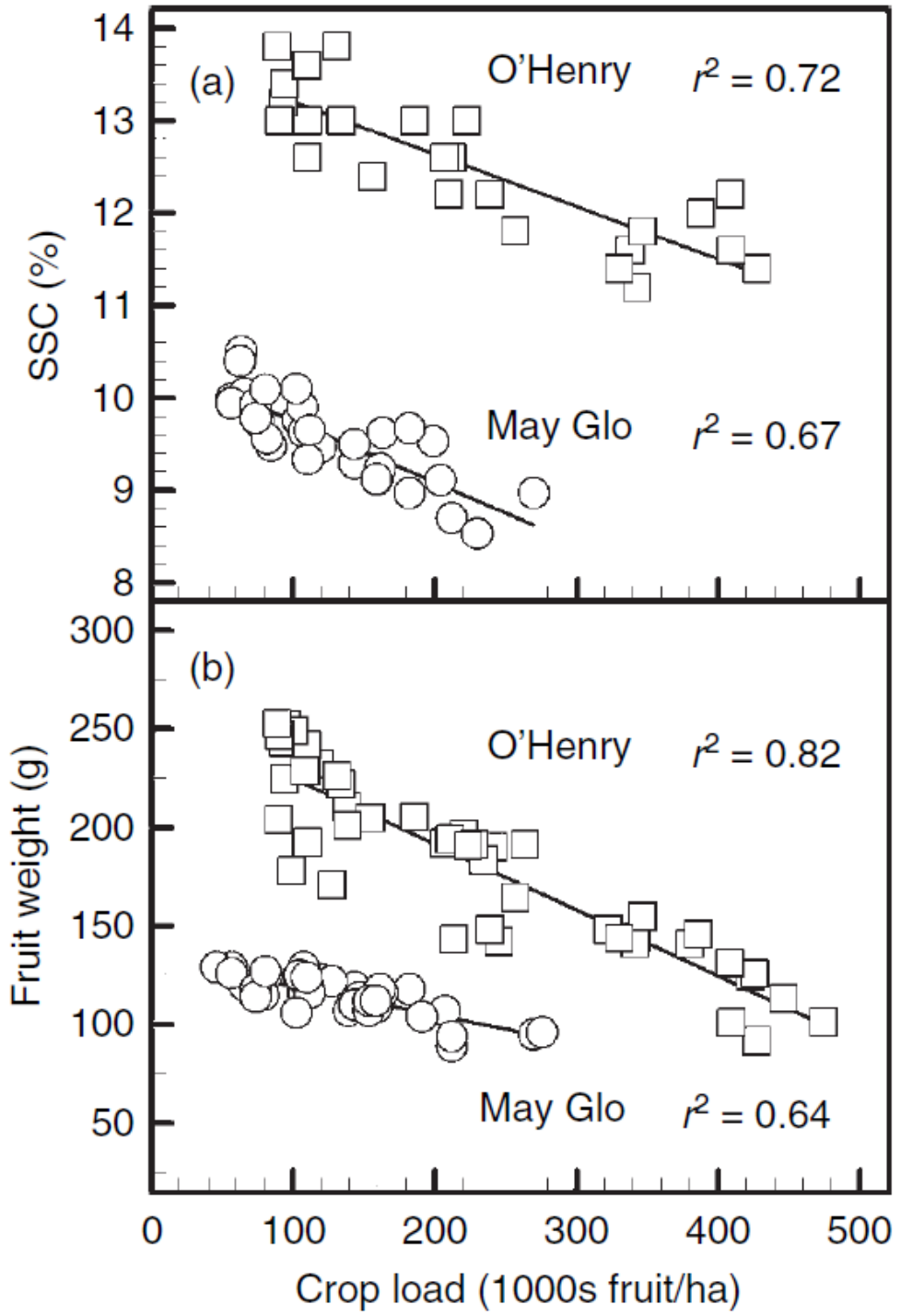
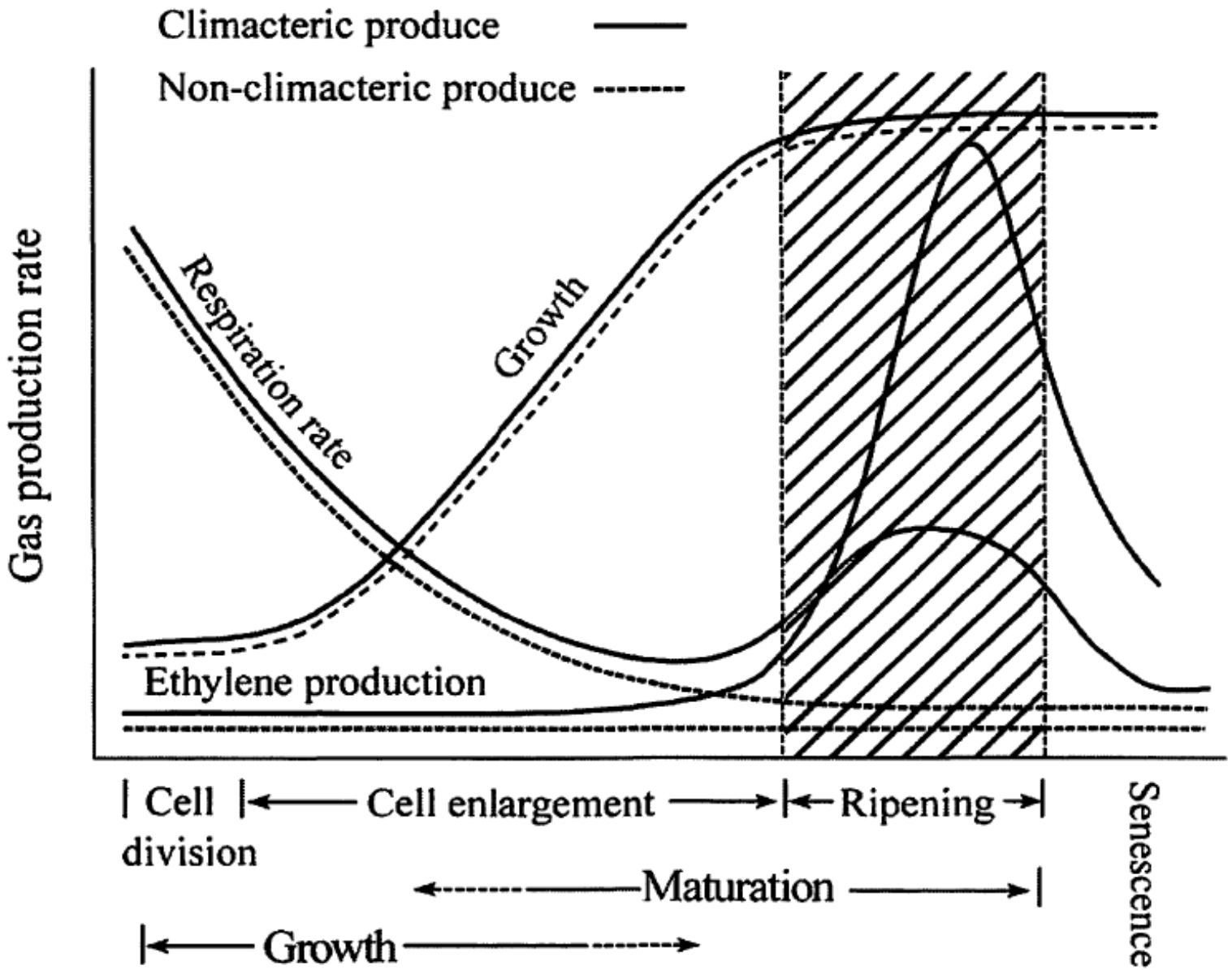


Fig. 20.4. Relationship between (a) crop load and soluble solids concentration (SSC) and (b) crop load and fruit weight for 'O'Henry' peach and 'May Glo' nectarine. (Adapted from Crisosto *et al.*, 1997.)

Fruit Thinning

- For best results, thinning is **usually done early in fruit development during the cell division stage**
  - Early thinning especially important during high temperatures during and after bloom
  - Stimulates more cell division (= larger fruit) in the remaining fruit
- If thinned after rapid growth stage, often get very little effect
  - As thinning is delayed, there is less and less of an affect on fruit size

Fruit Maturity



Harvest Maturity

- Harvest maturity determines a fruit's postharvest potential:
  - **Too early** = poor flavor potential, and greater susceptibility to physiological disorders, abrasion injury, and water loss
    - The ability of the fruit to ripen properly can be compromised
    - More susceptible to chilling injury (internal breakdown)
  - **Too late** = greater susceptibility to bruising and decay; possible off-flavor

Maturity Indices

- Size (minimum diameter)
  - Peaches may begin ripening before they reach full size
- Ground color development (green to yellow)
- Softening first occurs at the blossom end
- Location on tree: top and outside fruit normally mature first
- Also, internal color, soluble solids content (SSC), acidity and SSC/acidity ratio all change

Quality Indices

- High SSC is the most important attribute for high consumer acceptance
- Fruit acidity, SSC:acidity ratio and phenolic content are also important for consumer acceptance
- Fruit below 6-8 pounds-force are more acceptable to consumers than firmer fruit

- (from Crisosto, Mitcham & Kader, "*Nectarine & Peach: Recommendations for Maintaining Postharvest Quality*" http://postharvest.ucdavis.edu/PFfruits/NectarinePeach/)

Melting Flesh *vs* Nonmelting Flesh

- **Melting flesh varieties** need to be harvested before ripening gets substantially underway because excessive softening limits their shelf life

- **Non-melting flesh varieties** can be harvested at a riper stage and still be firm enough to withstand handling

= higher SSC (Brix, sugar) and lower acidity

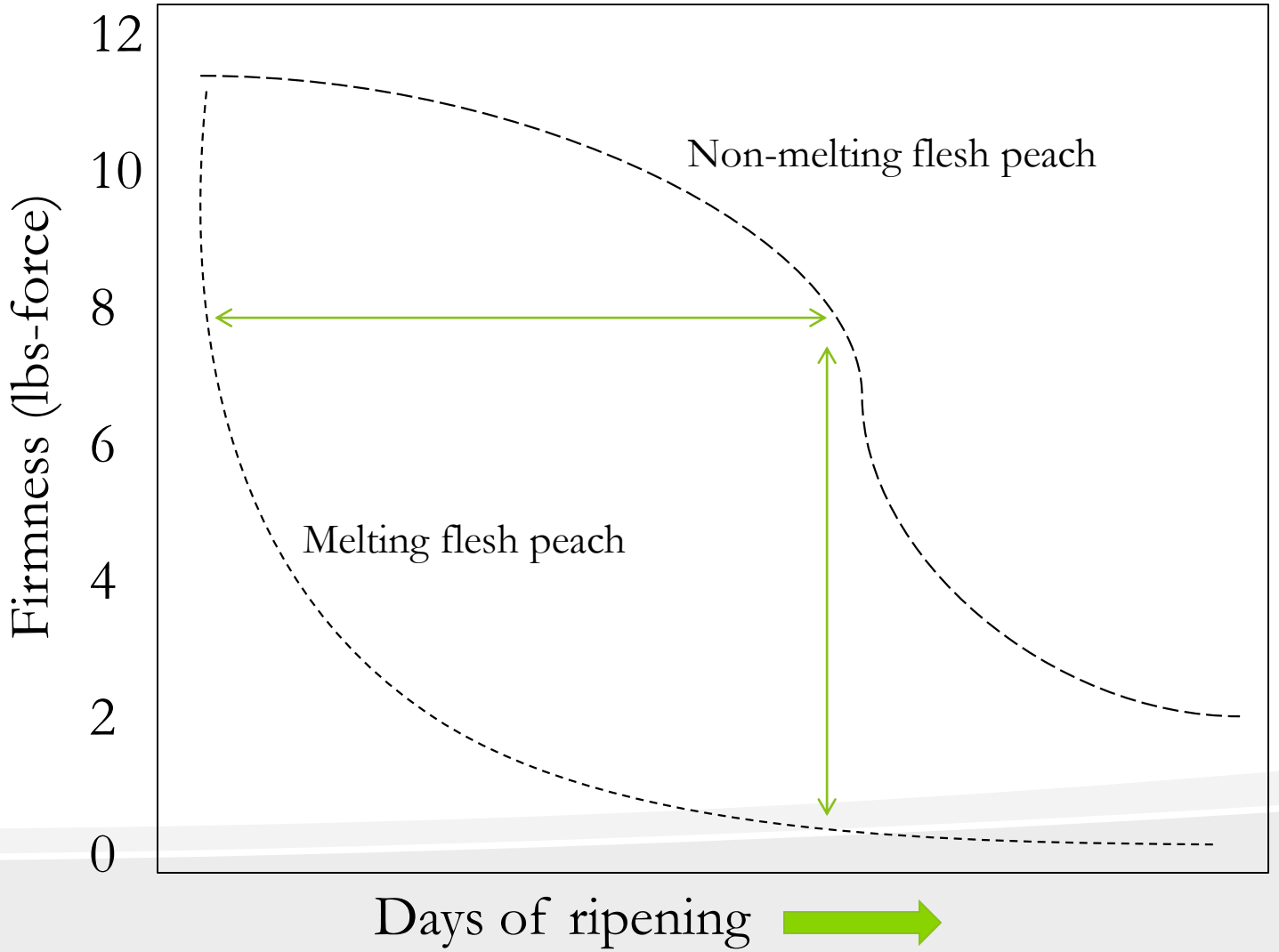
= better color and more peach flavor

= less susceptibility to internal breakdown (chilling injury)

Melting Flesh *vs* Nonmelting Flesh

- Let's say that 8 lbs is the minimum firmness/maximum maturity that can be run over your packingline or shipped without incurring bruising
  - ➡ *An 8-lb non-melting flesh peach is a much riper fruit than an 8-lb melting flesh peach*
- Actual bruising thresholds actually vary substantially and therefore must be determined for each variety

Melting Flesh and Nonmelting Flesh Peaches Have Different Softening Patterns



J.K. Brecht

UNIVERSITY OF FLORIDA IFAS

Thank You