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The Equilifruit Disk: A Tool for Assessing Optimum Cropload

Equili-what?

- A hand-held thinning gauge
- Used after June drop to adjust final cropload
- Ideal conditions for use:
 - Spindle Training System
 - Renewable limbs
 - High Value Cultivars



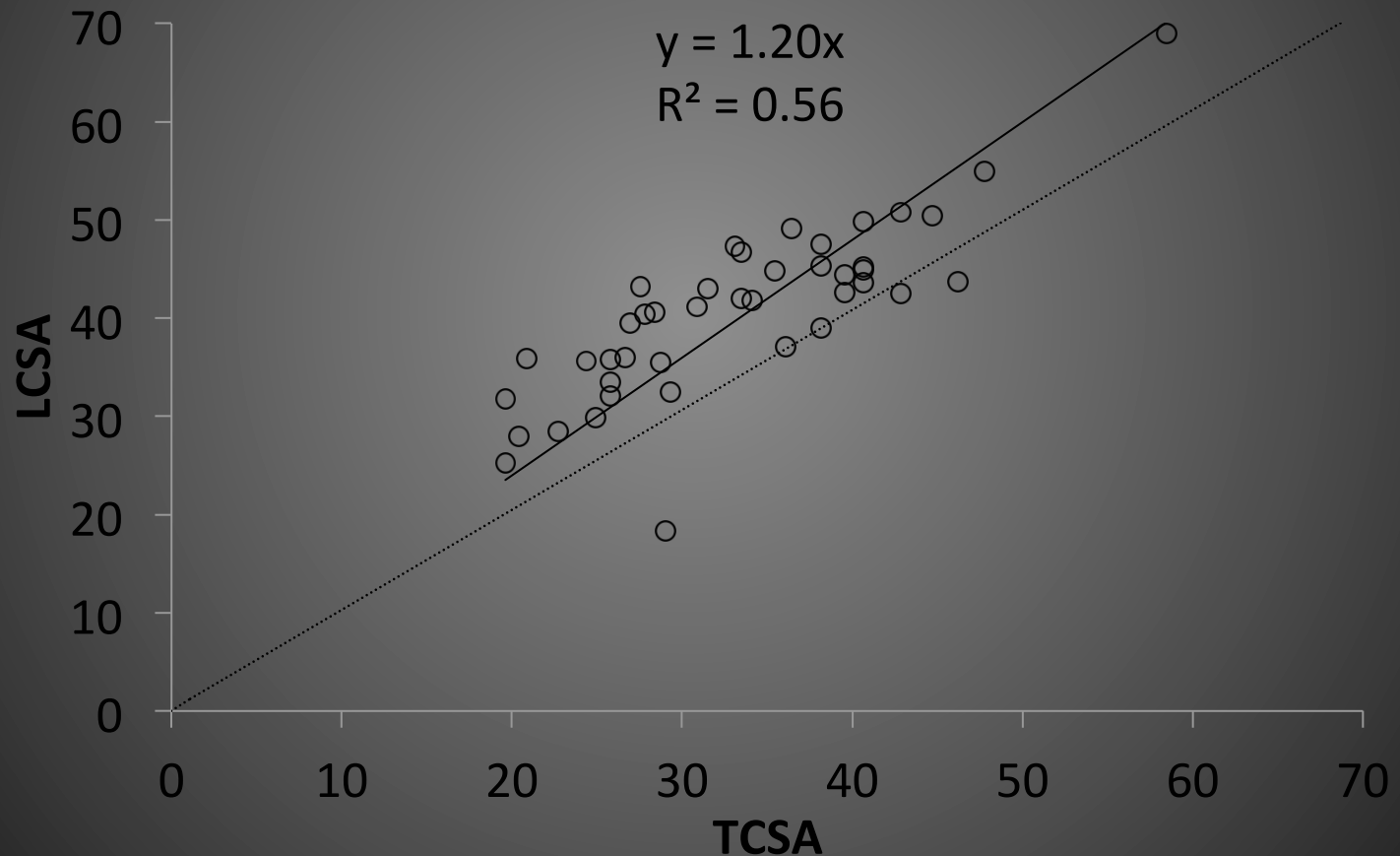
Background Information

- Developed by National Institute for Agricultural Research (INRA) France
- Small plastic disk with notches that correspond to branch diameters
- Utilized in two ways:
 - (1) spur pruning gauge – as designed in France, or
 - (2) as a tool that aids in determining the cropload of a given branch**

Evolution of Measuring Cropload

- Traditional Concept → Number of fruit per cross-sectional unit of the trunk (TCSA)
 - TCSA estimates canopy volume...
- Equilifruit Concept → Number of fruiting spurs per cross-sectional area unit of the fruiting branch
- With renewal-style pruning, there should be a close relationship...

Relationship between TCSA and LCSA: 2012 G. Delicious Chemical Thinning Experiment




Using the Equilifruit Disk

- The notches that are present on the disk correspond with 3 pieces of information:
 - 1) The branch diameter
 - 2) A fruit number
 - 3) A delta (Δ) value



Using the Equilifruit Disk

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- A close-up photograph showing a person's hand holding a blue Equilifruit Disk against a tree trunk. The disk is a blue, wedge-shaped plastic device. In the background, a green Equilifruit Disk is already attached to a tree branch. The green disk has some text on it, including "Ø24 4.5cm²", "Ø22 3.8cm²", "Ø20 3.1cm²", and "Ø18 2.5cm²". The scene is outdoors, with sunlight filtering through the leaves.
- To avoid variation, the disk should be used out from the trunk/branch collar
 - Proper fit
 - Use on leader...

Using the Equillifruit Disk:

- Refer to the F-value. This is the number of fruit that should be left
- Count / Estimate the number of fruit on limb
- Remove excess fruit in order:
 - Damaged fruit
 - Small fruit
 - Clustered fruit

Methods

- Mature plantings of V. Axis / Tall Spindle trees
- Renewal Pruning
- Supra-optimal crop
 - After chemical thin
- After June Drop



Objectives

- Determine the accuracy and efficacy of the Equilifruit on 3 varieties:
 - Golden Delicious
 - Buckeye Gala
 - HoneyCrisp
- Cropload
- Fruit Weight
- Yield
- Fruit Size Distribution



Treatments:

1) “Unthinned” Control

2) Equilifruit F-value

3) 7-8 in. between solitary fruit

All treatments applied after June drop
to trees with excessive croploads

Unthinned Control



Equilifruit F-value

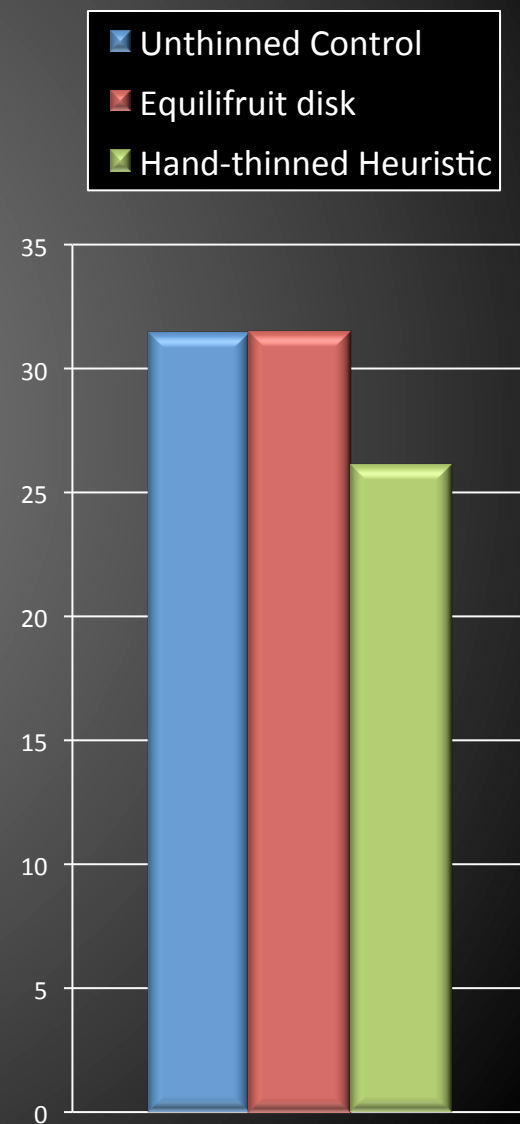


7-8 inch Rule

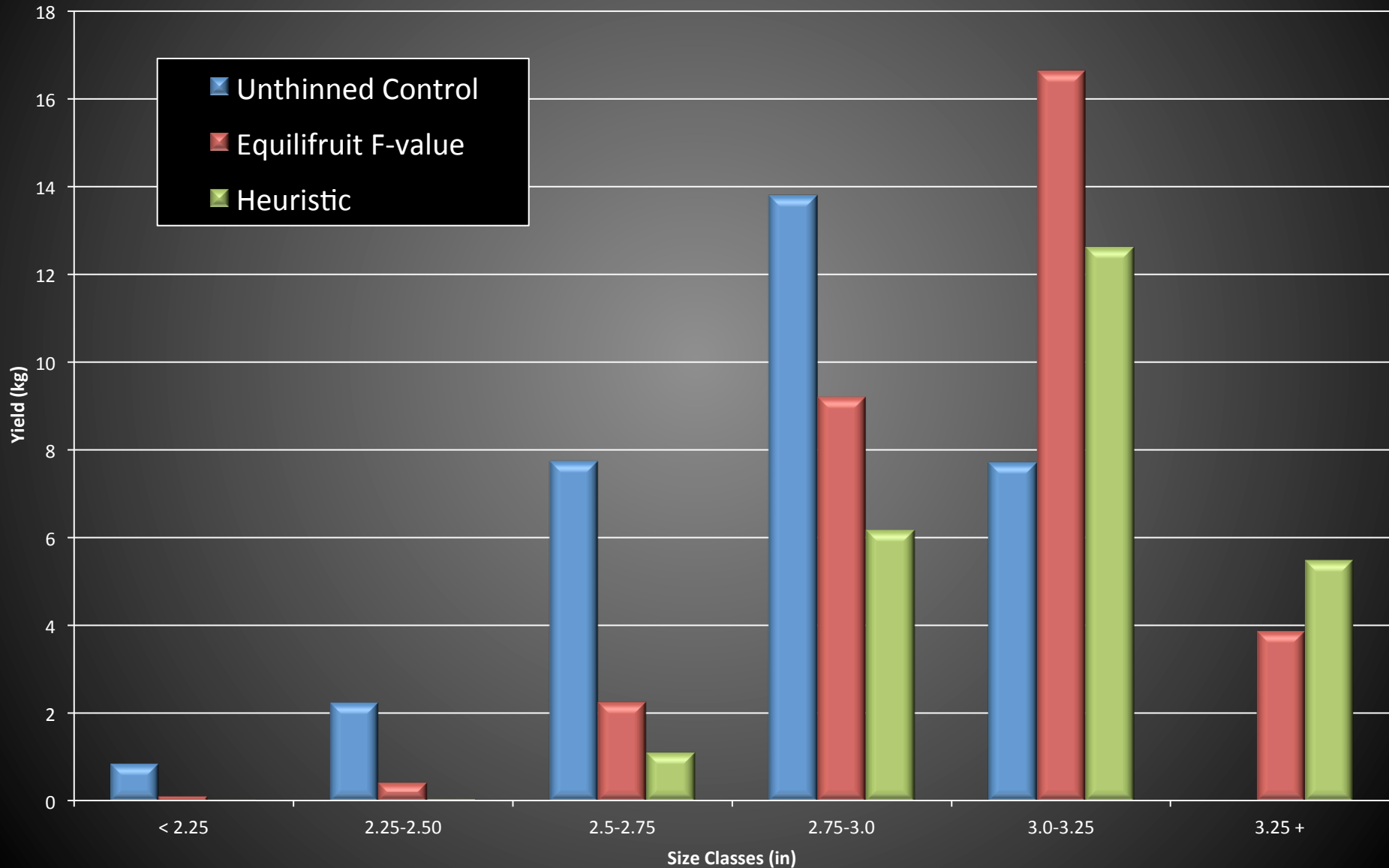


2009 Golden Delicious Equilifruit Trial: Crop load, mean fruit weight, and whole tree yields

Treatment	Cropload (#fruit/TCSA)	Mean Fruit Weight (g)	Yield (bu/tree)
UTC	10.5a	178a	1.74a
Equilli-F	8.4ab	215ab	1.74a
Heuristic	6.3b	237b	1.44a

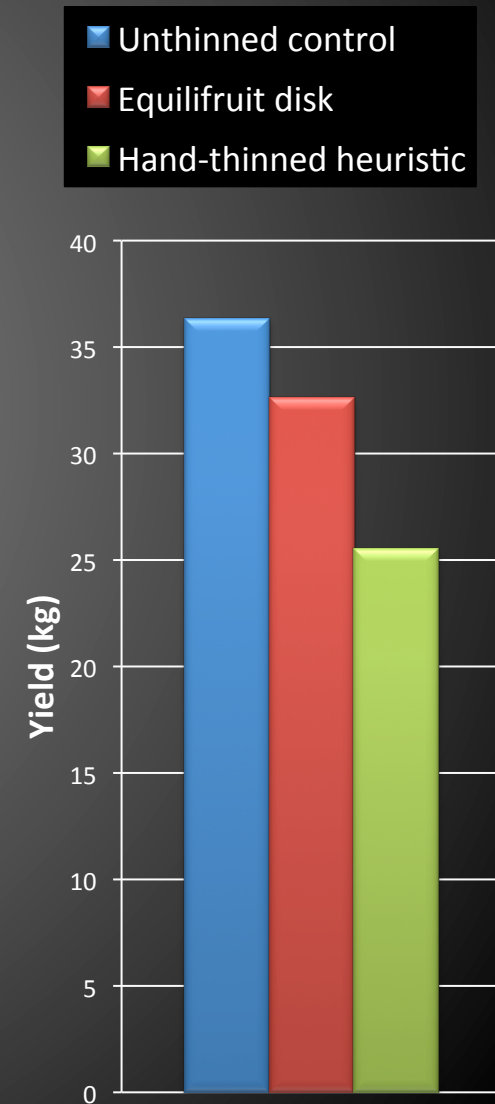


2009: Fruit size distribution of 3 hand thinning treatments on Golden Delicious

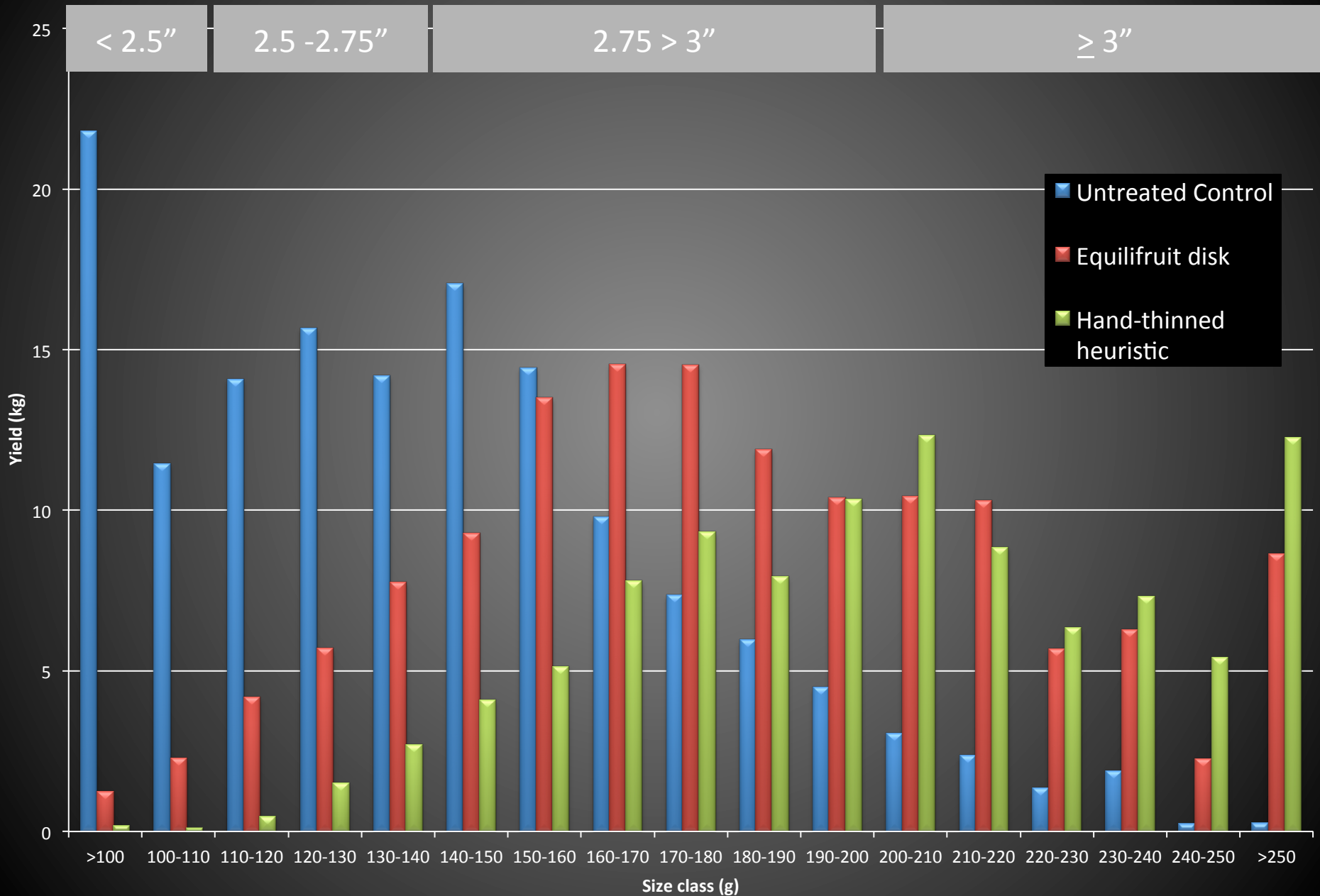


2010 Golden Delicious Equilifruit Trial: Crop load, mean fruit weight, and whole tree yields

Treatment	Cropload (#fruit/TCSA)	Mean Fruit Weight (g)	Yield (bu/tree)
UTC	16.2a	129a	2.01a
Equilli-F	10.3b	169b	1.80ab
Heuristic	6.4c	195c	1.41b



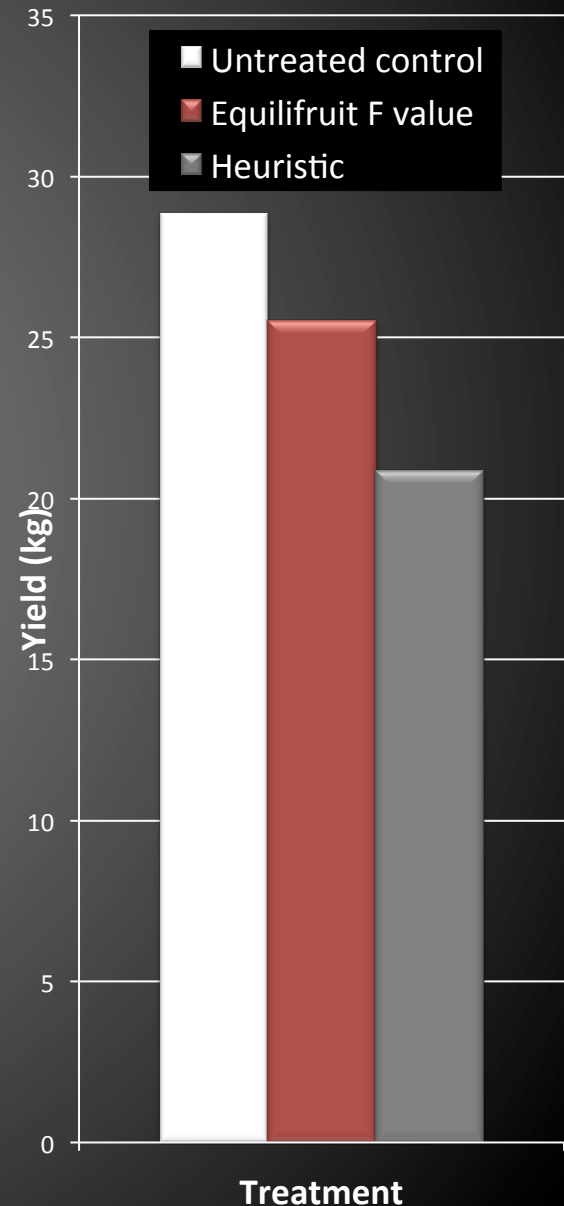
Fruit Size Distribution of three hand thinning treatments on Golden Delicious





2010 Buckeye Gala Equilifruit Trial: Crop load, mean fruit weight, and whole tree yields

Treatment	Cropload (#fruit/TCSA)	Mean Fruit Weight (g)	Yield (bu/tree)
UTC	9.9a	137a	1.60a
Equilli-F	6.3b	156a	1.41a
Heuristic	4.5b	155a	1.23a



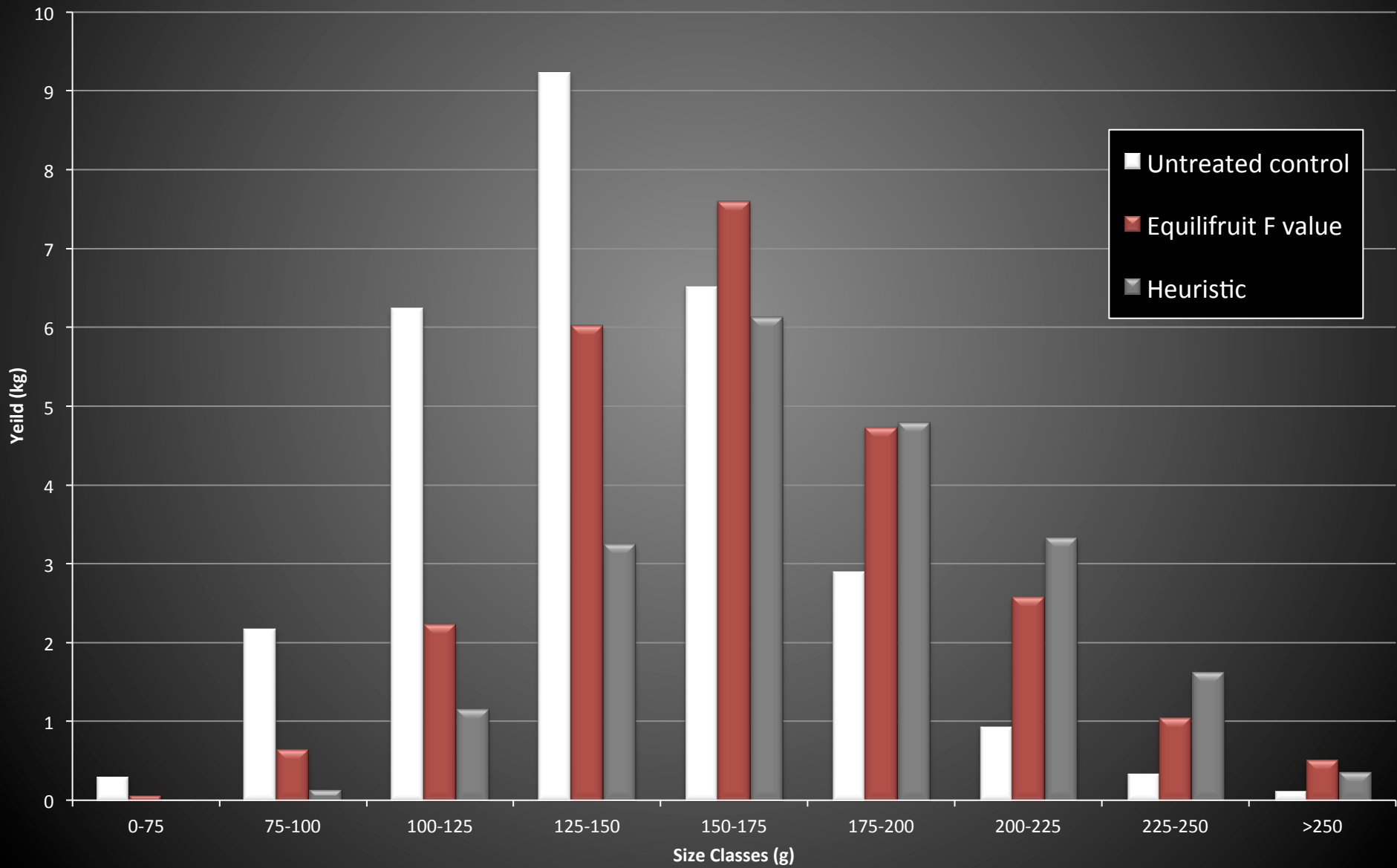
2010: Fruit size distribution of three hand thinning treatments on Buckeye Gala

< 2.5"

2.5 -2.75"

2.75 > 3"

≥ 3"

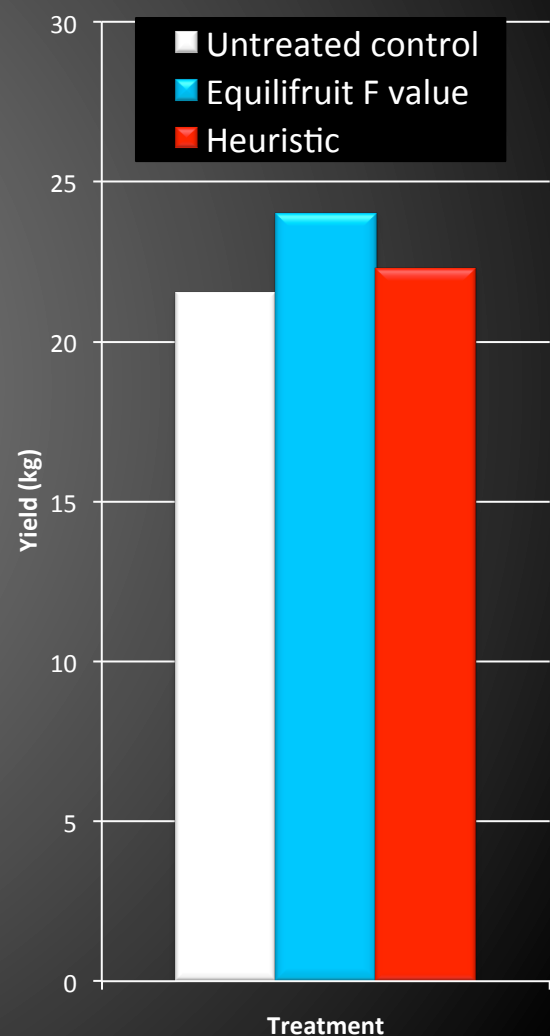




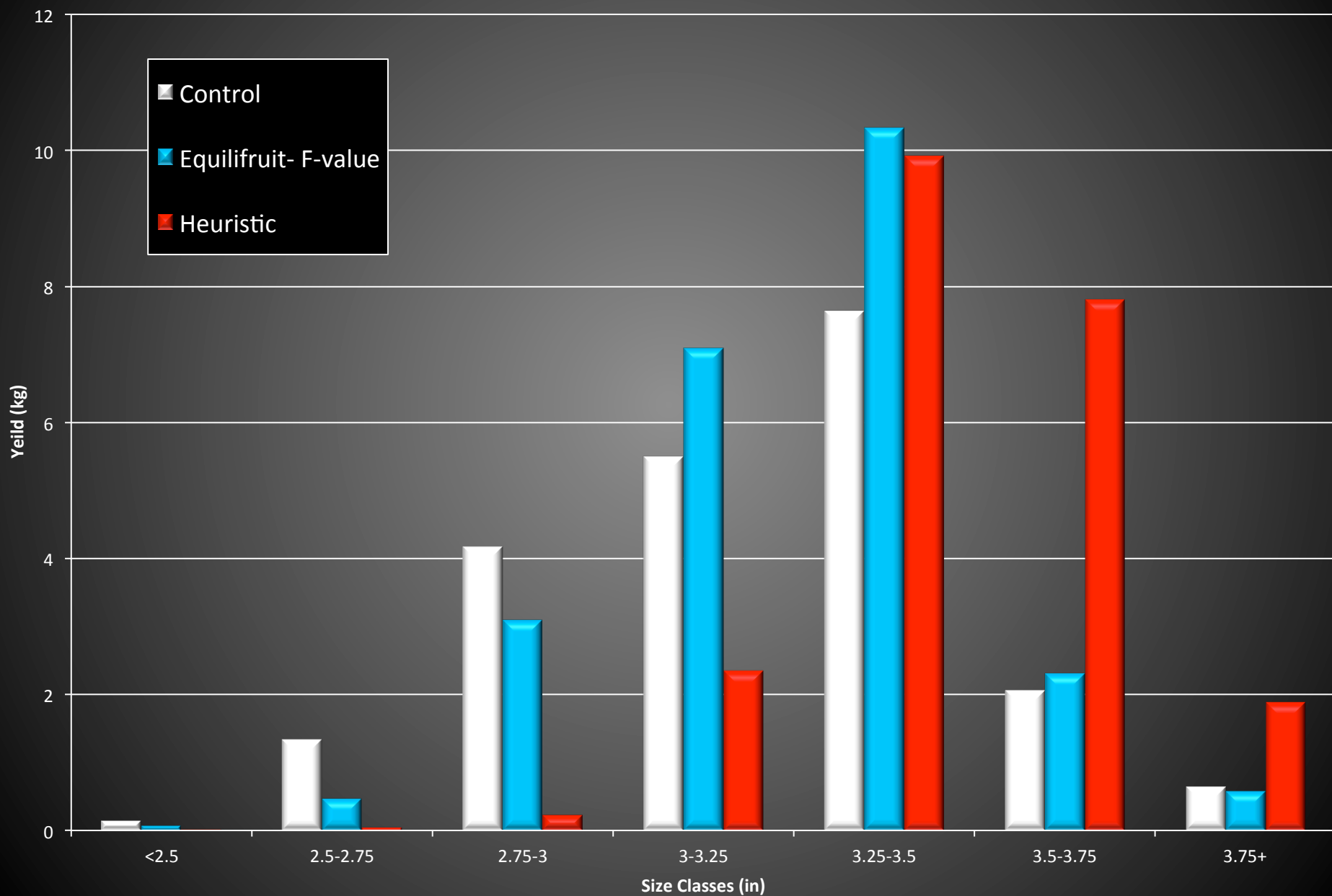
2010 HoneyCrisp Equilifruit Trial:

Crop load, mean fruit weight, and whole tree yields

Treatment	Cropload (#fruit/TCSA)	Mean Fruit Weight (g)	Yield (bu/tree)
UTC	7.3a	212a	1.19a
Equilli-F	7.2a	217a	1.33a
Heuristic	4.2b	269b	1.23a



2010:Fruit size distribution of three hand thinning treatments on HoneyCrisp



Equillifruit Disk

- Optimized cropload: fruit size ratio
- Prevented “rule of thumb” over-thinning
- Is most practical on spindle-type trees with renewal style pruning
 - Even simple low-cost technologies require good Pomology

How can you use the Equilifruit Disk?

- Equilifruit can be used to:
 - Adjust cropload after inadequate chemical thinning
 - Increase fruit size with minimum yield reduction
 - Provide example trees for laborers
 - Train and re-calibrate laborers



Other Potential Uses?

- Pruning: Adjust crop potential
- Spur extinction (spur pruning)
- Measure adjusted crop
 - Chemical Re-thinning or after frost
 - Are we there yet?
- (Hand Thinning)
- Smaller, simpler trees= accurate crop mgt.
- This tool helps us take advantage of this!

Assessing Frost Damage, 2012

2012 Gala Frost Damage Summary

Percent of blossoms dead	31%
Number of living blossoms	340
Optimal cropload (fruits per limb)	40
Percent of optimal crop	850%

2012 Goldrush Frost Damage Summary

Percent of blossoms dead	49%
Number of living blossoms	505
Optimal cropload (fruits per limb)	77
Percent of optimal crop	655%



First Shot: Dormant Pruning

- Pruning reduces crop potential by removing bearing surface / flowering spurs
- Work the math backwards:

1500 BPA / 1000 TPA = 1.5 BPT

100 ct: 150 fruits per tree

~24 fruiting branches / tree



8

Gala / M. 9
with ~ 24
fruiting
branches



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