Planning and Developing a Modern Sweet Cherry Orchard

Lynn E. Long

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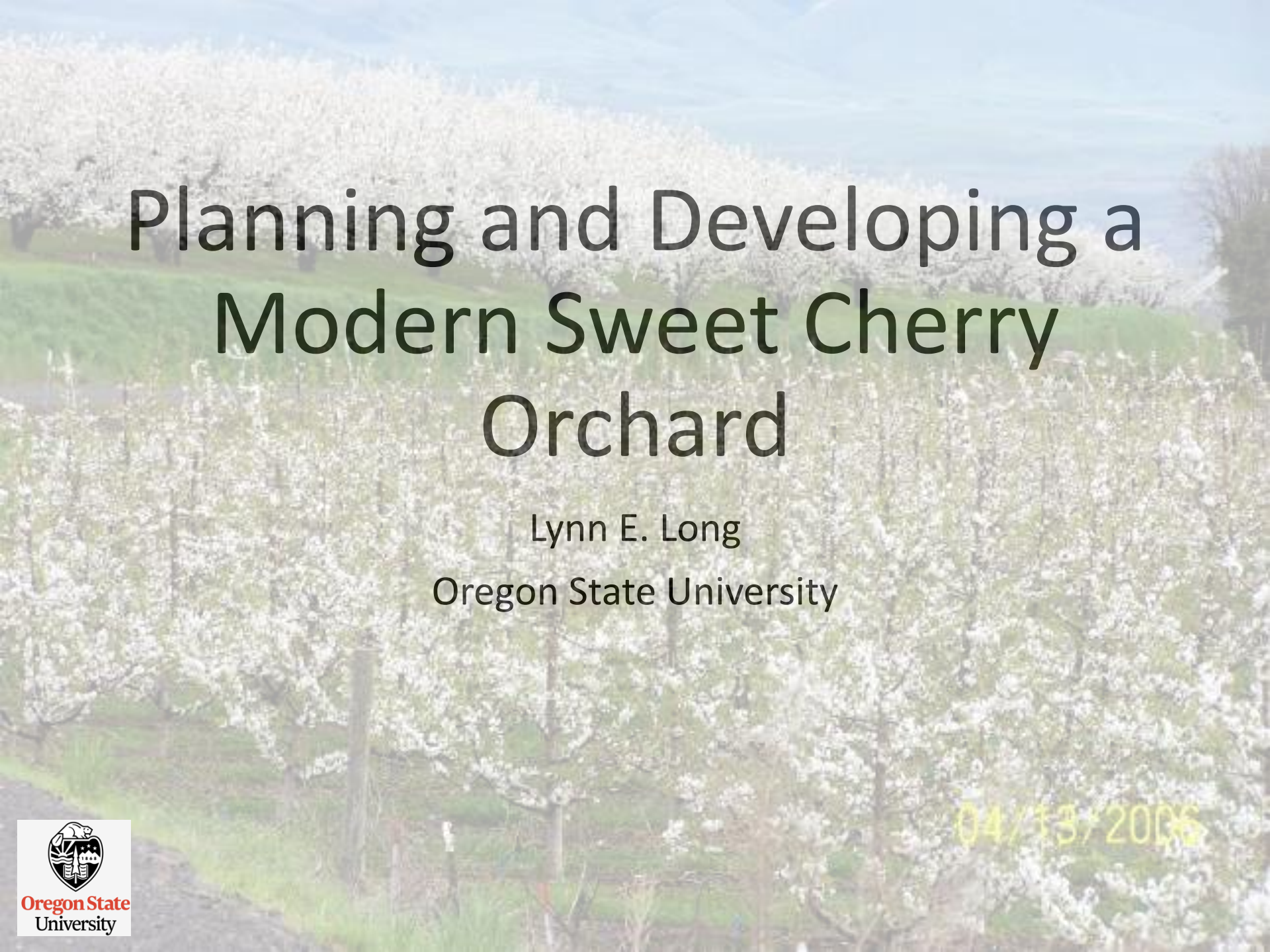

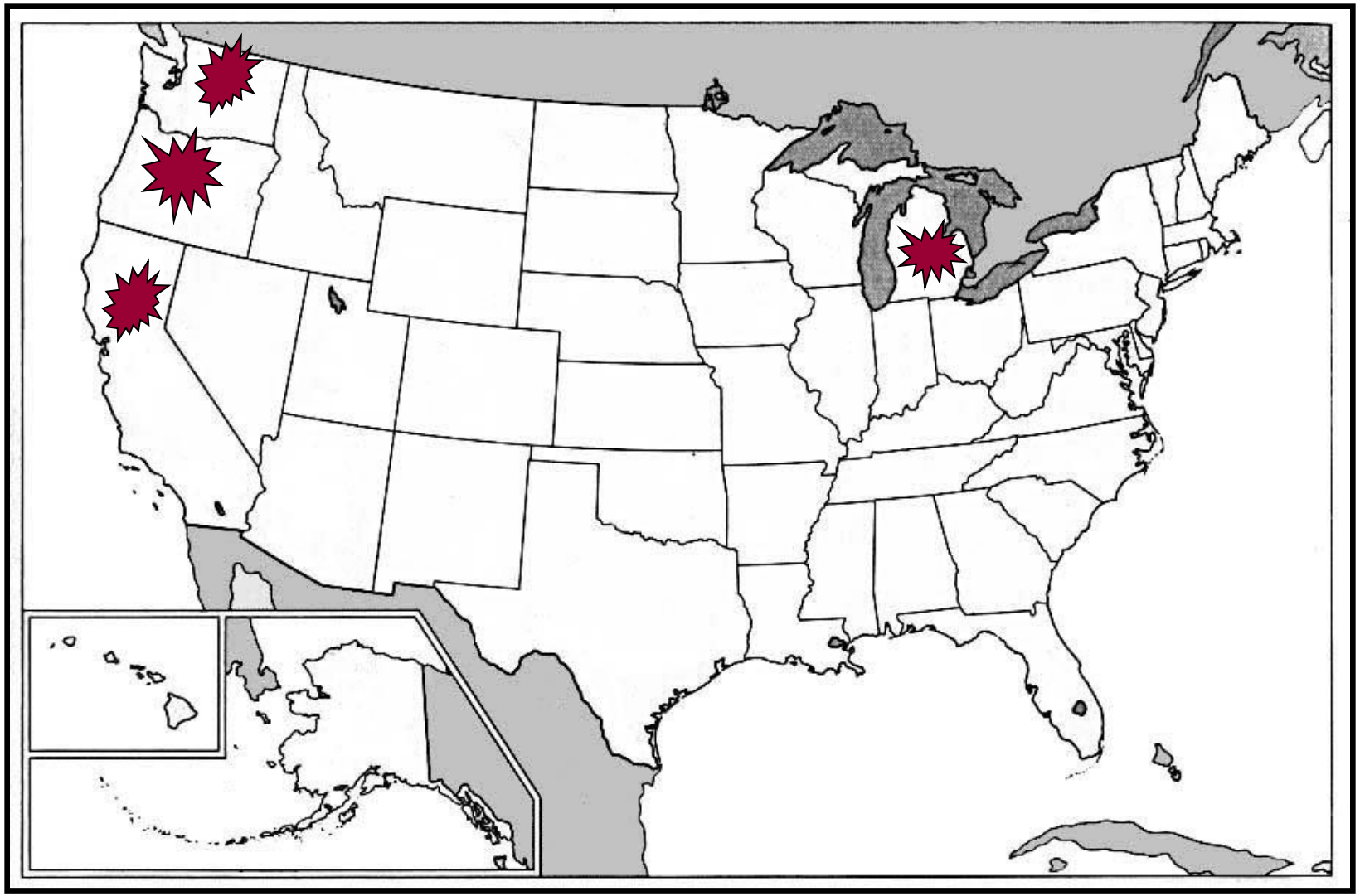

China
Japan
South Korea

35,000 - 50,000 tons/year

What should growers look for?

- Characteristics of desired varieties
  - Early to late harvest
    - 30-45 days +
  - Good shipping potential
    - Western Europe
    - Middle East
  - Large (28 mm +)
  - Firm
  - Rain crack resistant
  - Flavorful

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Cultivar Trial

- Established 1996
- Evaluated 100+
- Cultivars & selections
- Potential candidates for the Pacific Northwest cherry industry

- Thanks to Mel & Mike Omeg and Orchard View Farms

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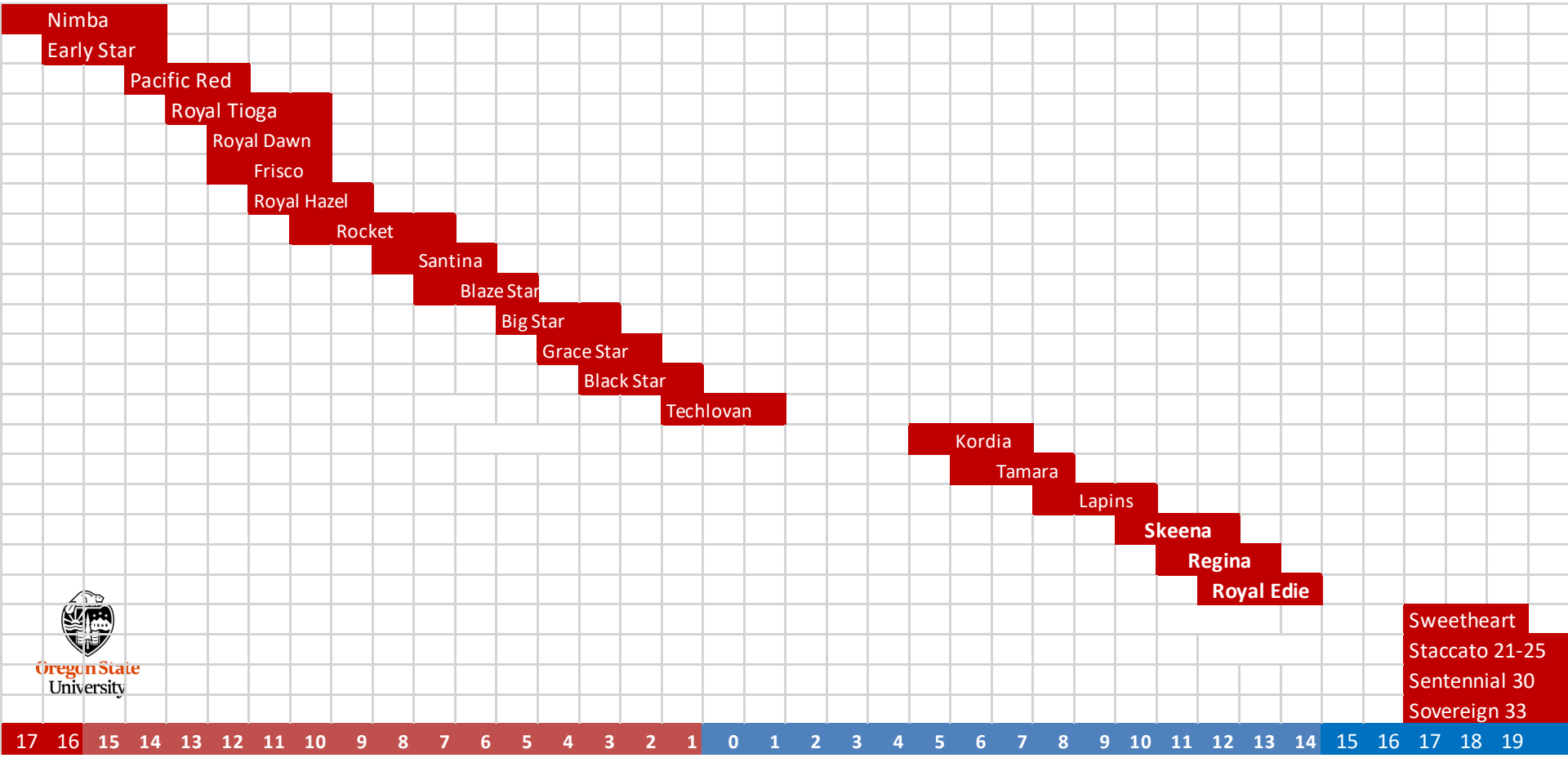
Relative Harvest Timings



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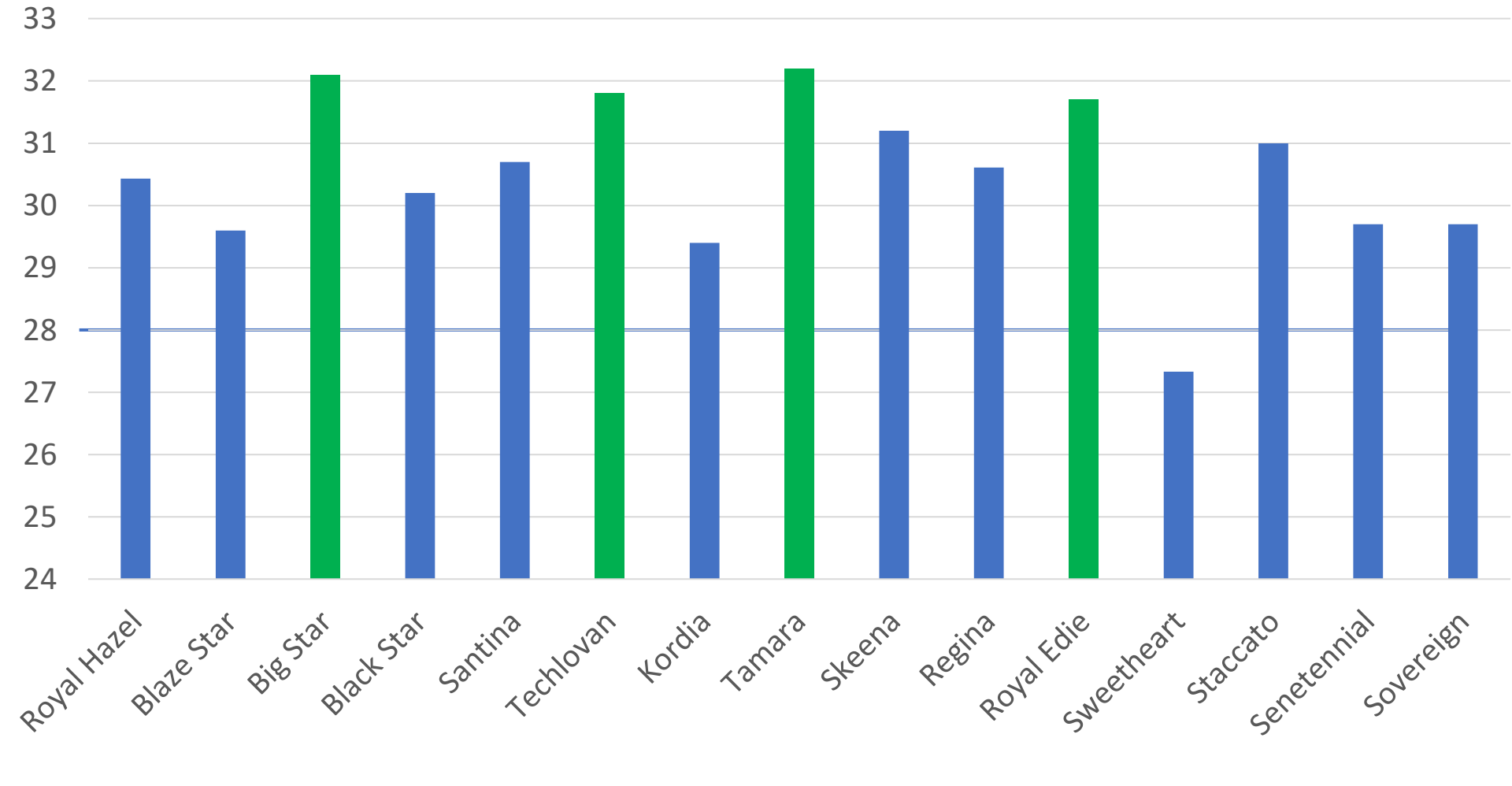
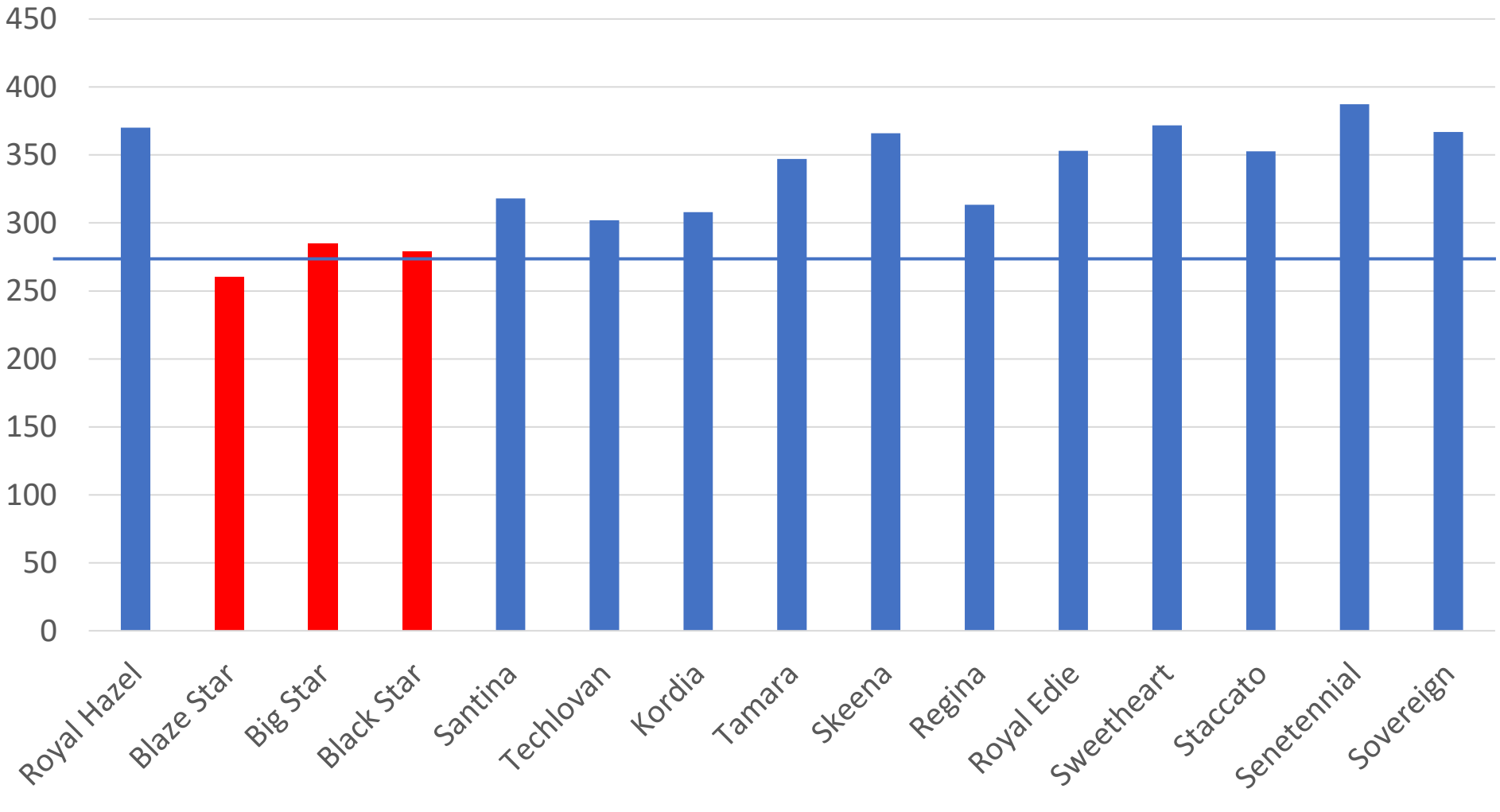
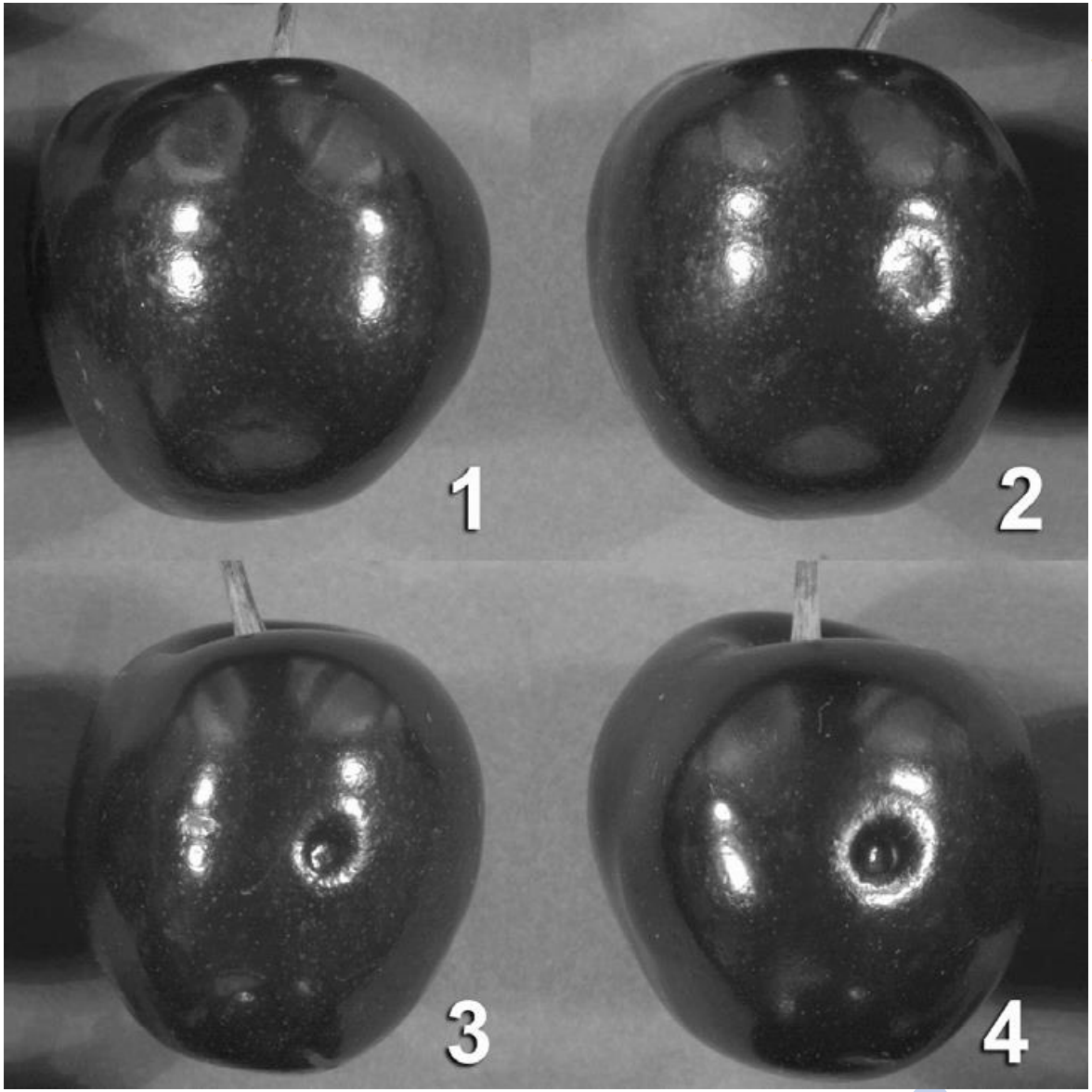
Fruit Size of Selected Varieties (mm)



Fruit Firmness of Selected Varieties (g/mm)





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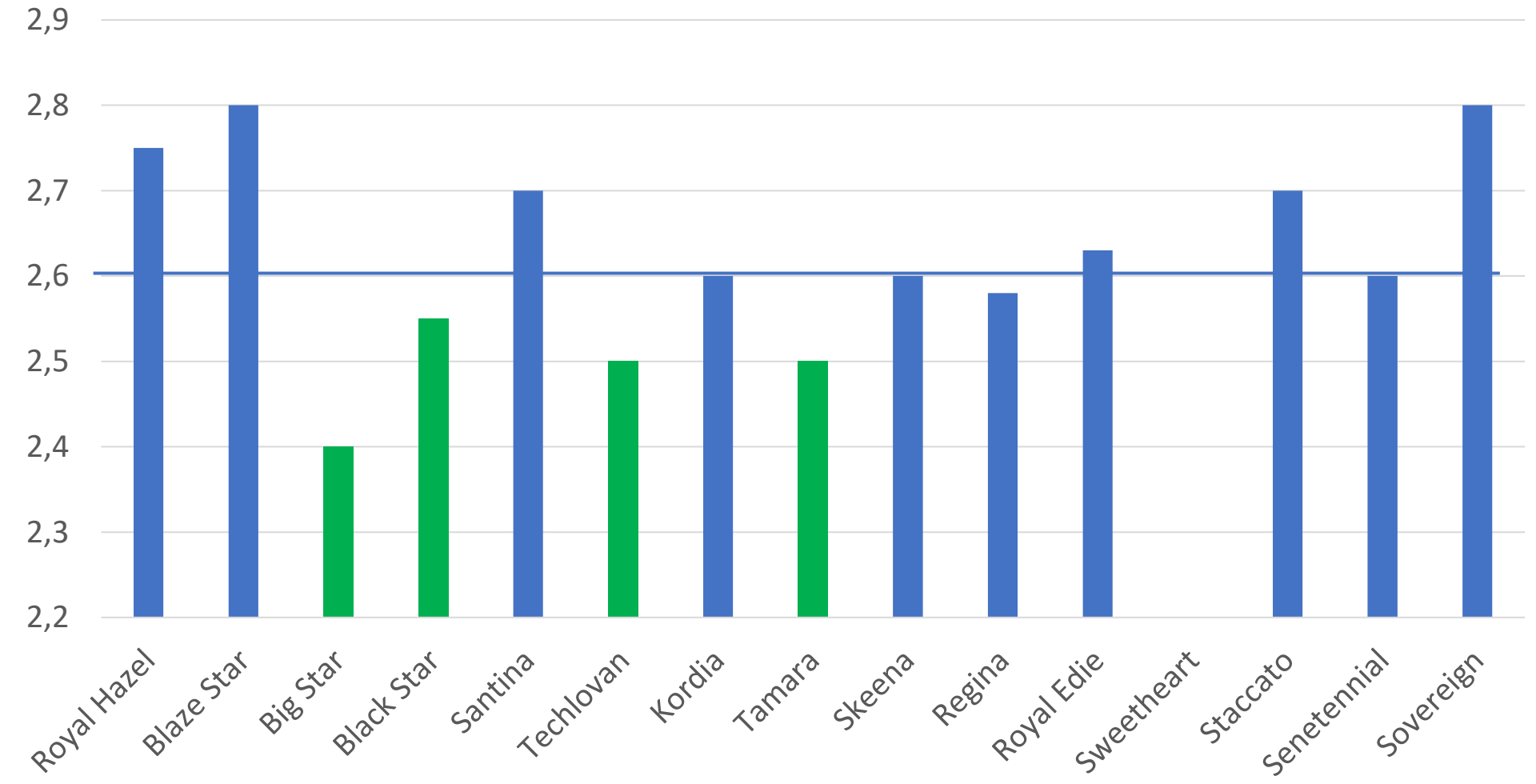
Fruit Pitting Potential of Selected Varieties



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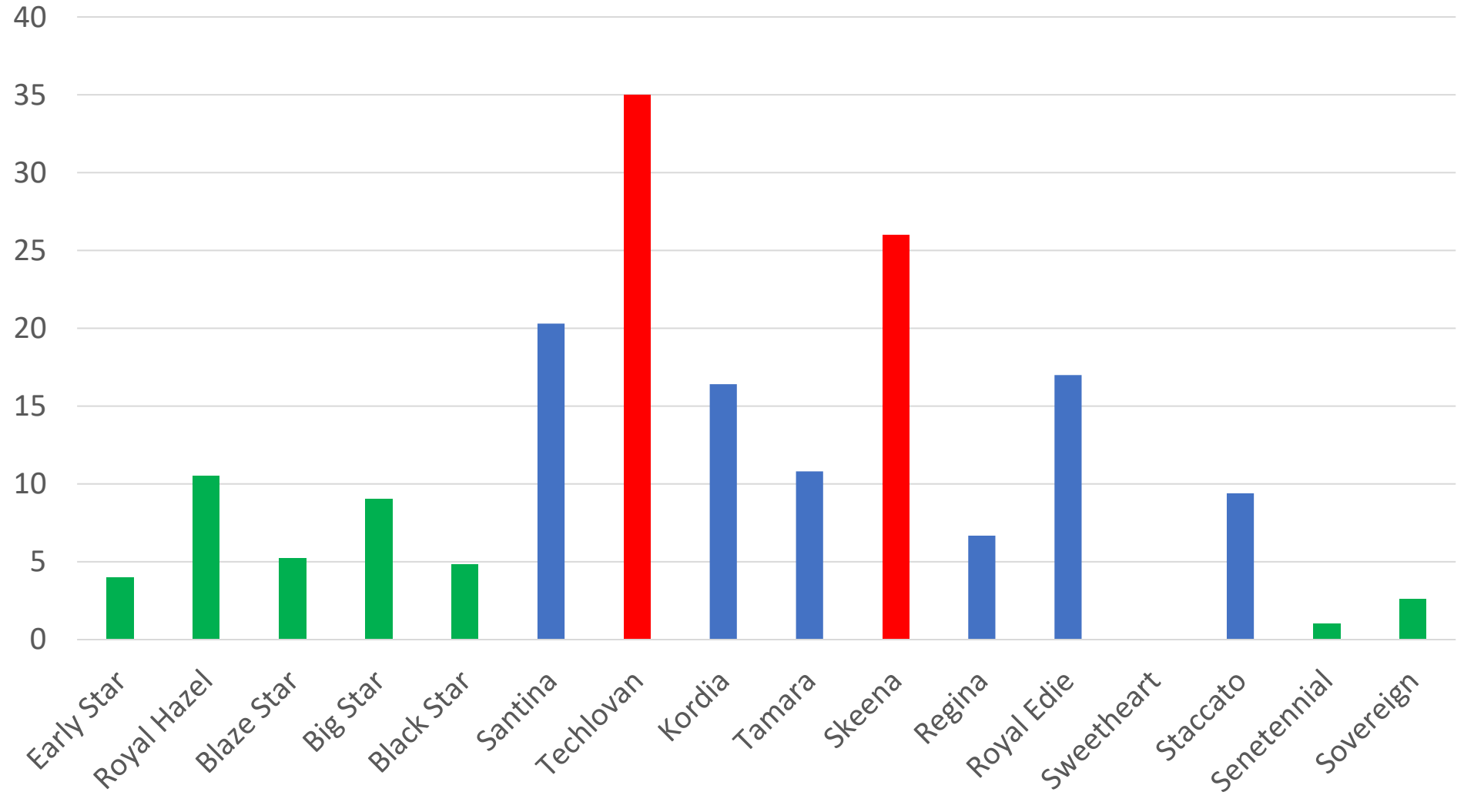
Fruit Cracking of Selected Varieties (% 2 hour soak)



Varieties to Consider for Season-Long Production

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Early Star

- University of Bologna
- Very early: 15 days < Van
- Large: 28-30 mr
- Blooms heavy b
  drop
- Low productivit
- Taste? Not very
  with strong acid
- Self-fertile

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Frisco

Photo by Dalival

- SMS – California
- Very early: 10-15 days < Techlovan
- Susceptible to cracking
- Large – 28 mm
- Medium firm – 75 Durofel
- Precocious & productive
- Somewhat pendant like Kordia
- Sweet flavor – 18 brix
- Self-fertile

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Rocket

- SMS – California
- Very Early – 10-15 < Van
- Very large – 30-34 mm
- Firm – 78 Durofel
- good taste 17 brix
- Some rain cracking resist
- Strong, upright tree growth
- Stores well – 4 weeks
- Self-sterile – early, mid-bloom timing: Frisco, Santina

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Santina

- Summerland, BC Canada
- Very large
- Mid-Early
- Flavor is fair to good
- Tart/sweet but weak
- Very popular in Chile
- Nose end crack accentuated by rain
- Gisela 6 or Gisela 5
- Self-fertile

Harvest timing days +/- Techlovan	Size (mm)	Firm. (g/mm)	PFRF (g)	Cracking potential 2014-2020 (36% Skeena)	Pitting 2013-2020 (Bing 2.7)
-7 days	30.7	318	1125	20%	2.7

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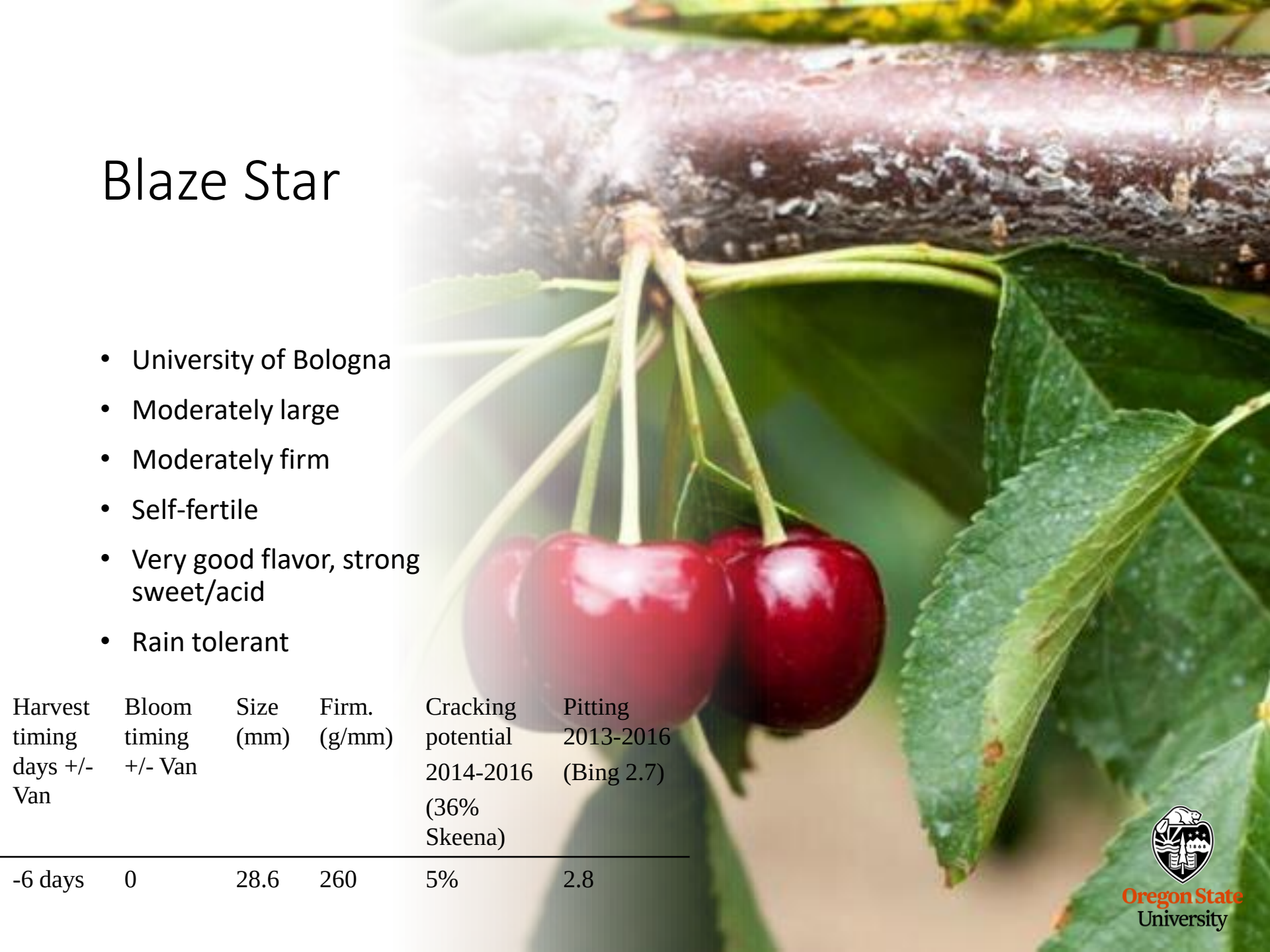
Blaze Star

- University of Bologna
- Moderately large
- Moderately firm
- Self-fertile
- Very good flavor, strong sweet/acid
- Rain tolerant

Harvest timing days +/- Van	Bloom timing +/- Van	Size (mm)	Firm. (g/mm)	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2016 (Bing 2.7)
-6 days	0	28.6	260	5%	2.8



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Big Star

- Early to mid season (5 days < Techlovan)
- Very large (30-32 mm)
- Firmness moderate to good
- Flavor very good, strong tangy flavor
- Productivity low even on Gisela 6
- Self-fertile

Harvest timing days +/- T-van	Bloom timing +/- Van	Size (mm)	Firm. (g/mm)	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2016 (Bing 2.7)
-4 days	1-2	32.1	285	9%	2.4

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Grace Star

- Mid-season (3 days < Techlovan)
- Large fruit (28 mm +)
- Good flavor
- Firmness is marginal for long distance shipping
- Rain cracking susceptibility moderate
- Best on moderate to highly productive rootstocks
- Self-fertile

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Black Star

- University of Bologna
- Self-fertile
- Good flavor
- Moderately firm
- Precocious
- Productive

Harvest timing days +/- Techlovan	Bloom timing +/- T-van	Size (mm)	Firm. (g/mm)	Cracking potential 2014-2020 (36% Skeena)	Pitting 2013-2020 (Bing 2.7)
0	+1 days	30.2	279	4.8%	2.55

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Techlovan

- Czech Republic
- Very pendant
- High Quality mid-season
- Excellent flavor
- Firm
- Cracks in rain
- Pollinizers: Skeena, Santina

Harvest timing days +/- Techlovan	Size (mm)	Firm. (g/mm)	PFRF (g)	Cracking potential 2014-2020 (36% Skeena)	Pitting 2013-2020 (Bing 2.6)
0	31.8	302	952	35%	2.7

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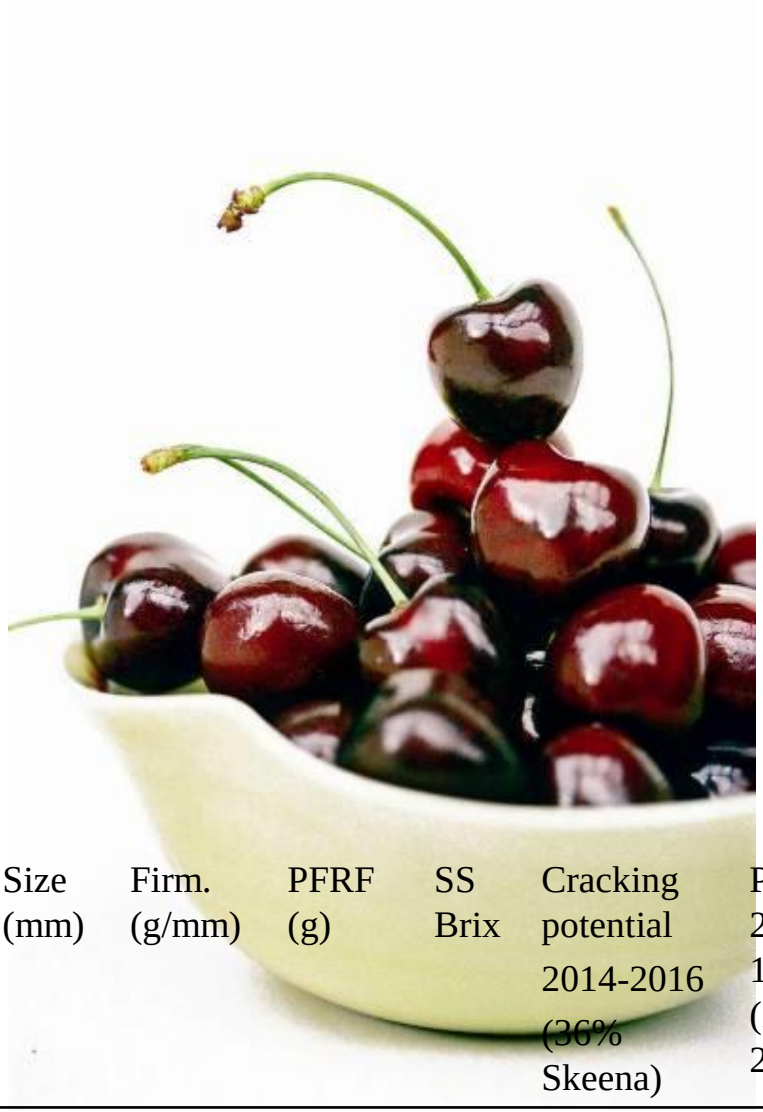
Kordia

- General Impressions
  - Excellent flavor
  - Ships well
  - Rain tolerant
  - Frost sensitive
- Italy – Preferred cherry
- Chile – Highly sought by China
- Best on prod. stock
- Suggested pollinizers
  - Skeena, Regina



Harvest timing days +/- Techlovan	Size (mm)	Firm. (g/mm)	PFRF (g)	SS Brix	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-16 (Bing 2.6)
+ 6 days	29.6	311	907	18.6	12	2.6

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Tamara

- Czech Republic
- About 1 week after Techlovan
- Excellent fruit size
- Excellent firmness – 356 g/mm
- Very good flavor
- Stem pull force?
- S_1S_9 – Skeena, Kordia

Harvest timing days +/- Techlovan	Size (mm)	Firm. (g/mm)	PFRF (g)	Cracking potential 2014-2017 (29% Skeena)	Pitting 2013-2017 (Bing 2.6)
+ 8 days	32.2	356	532	9%	2.34

Lapins

- Summerland, BC Canada
- 28-30 mm
- Excellent firmness
- Some rain crack resistance
- Very upright growth habit
- Very productive
- Fruit grows in clumps
- MaxMa 14
- Self-fertile

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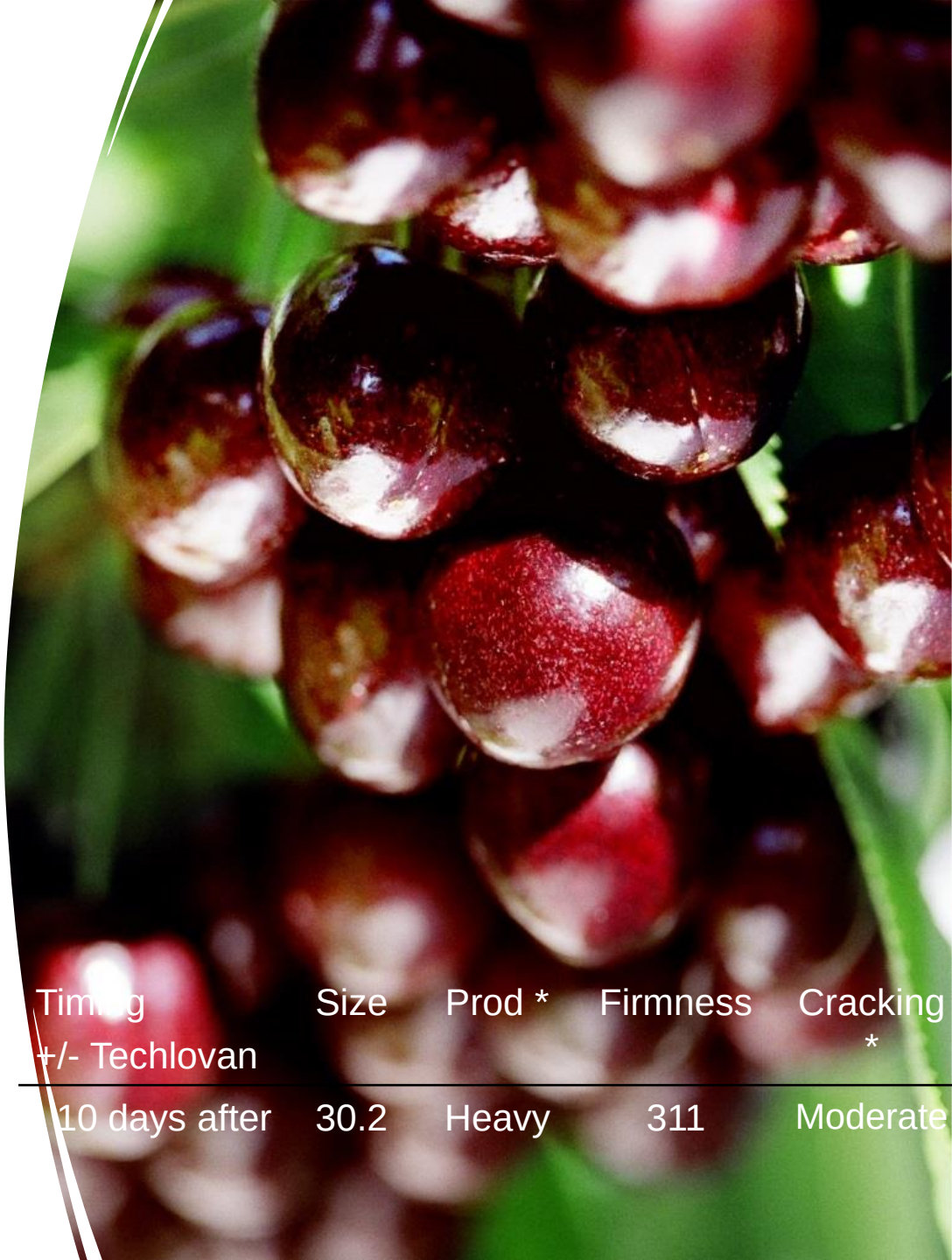

Timing +/- Techlovan	Size	Prod *	Firmness	Cracking *
10 days after	30.2	Heavy	311	Moderate

Skeena

- Summerland, BC Canada
- Mid-Late Ripening
- Easier to grow than Lapins
- Ships very well
- Productive
- Self-fertile
- Gisela 6, MM14
- Sensitive to heat
- Sensitive to rain

Harvest Timing +/- Techlovan	Size	Firmness	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2016 (Bing 2.6)
+ 11	27-32 mm	322 g/mm	36%	2.65

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Regina

- Good resistance to rain
- York, Germany
- Good early frost resistance
- Mild but good flavor
- Lower productivity
- Match with Gisela 6 or 5
- Color when ripe
  - Mahogany to dark Mahogany
- Late bloom
- Suggested Pollinizers
  - Sam, Schneiders, Kordia

Harvest timing days +/- Techlovan	Size (mm)	Firm. (g/mm)	PFR F (g)	SS Brix	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2020 (Bing 2.6)
+11	30.6	315	1191	19.4	5.3	2.58

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Sweetheart

- Summerland, BC Canada
- Late 18-20 days after Techlovan
- 27 mm
- Very firm
- Very productive
- MaxMa 14
- Moderate to high cracking
- Self-fertile

Timing +/- Van	Size	Firmness	Cracking *
+_18	27.3 mm	356 g/mm	High

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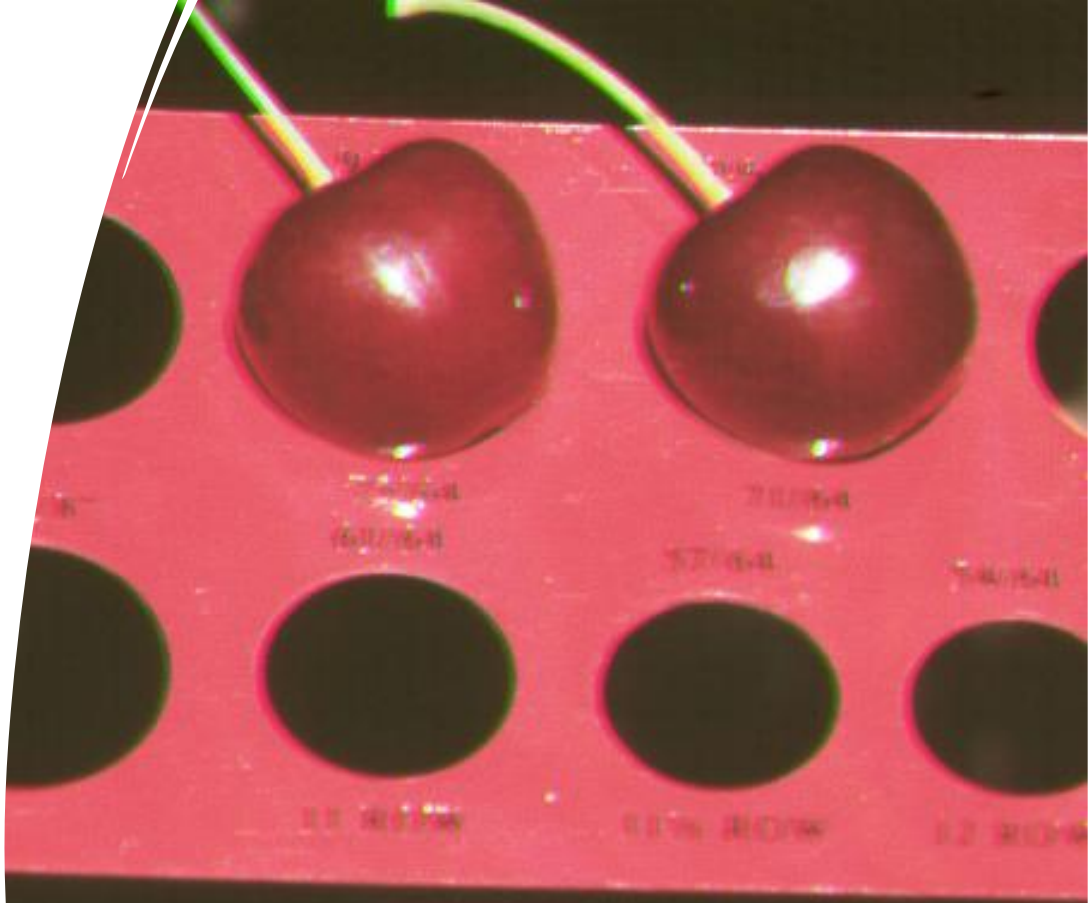
Staccato

- Summerland, BC Canada
- Very late, ~25 days > Techlovan
- Fruit size 31 mm
- Excellent firmness
- Moderate intense sweet/acid flavor
- Rain cracking resistance
- Good productivity
- Gisela 6 or MaxMa 14
- Self-fertile



Harvest timing days +/- Techlovan	Bloom timing +/- Bing	Size (mm)	Firm. (g/mm)	Cracking potential 2014-2020 (36% Skeena)	Pitting 2013-2020 (Bing 2.6)
+ 26 days	+1	31	353	9%	2.7

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Available Cherry Rootstocks

Commonly Available

- Colt
- Mazzard
- Mahaleb
- Gisela 3, 5, 6, 12 (USA & Chile)
- MaxMa 14 & 60 (Chile)
- Cab-6P (Chile)
- Krymsk 5 & 6 (USA)

New Rootstocks

- Gisela 13, 17
- Weigi 1, 2, 3
- Corette Series
  - Cass, Clare, Clinton, Lake, Crawford

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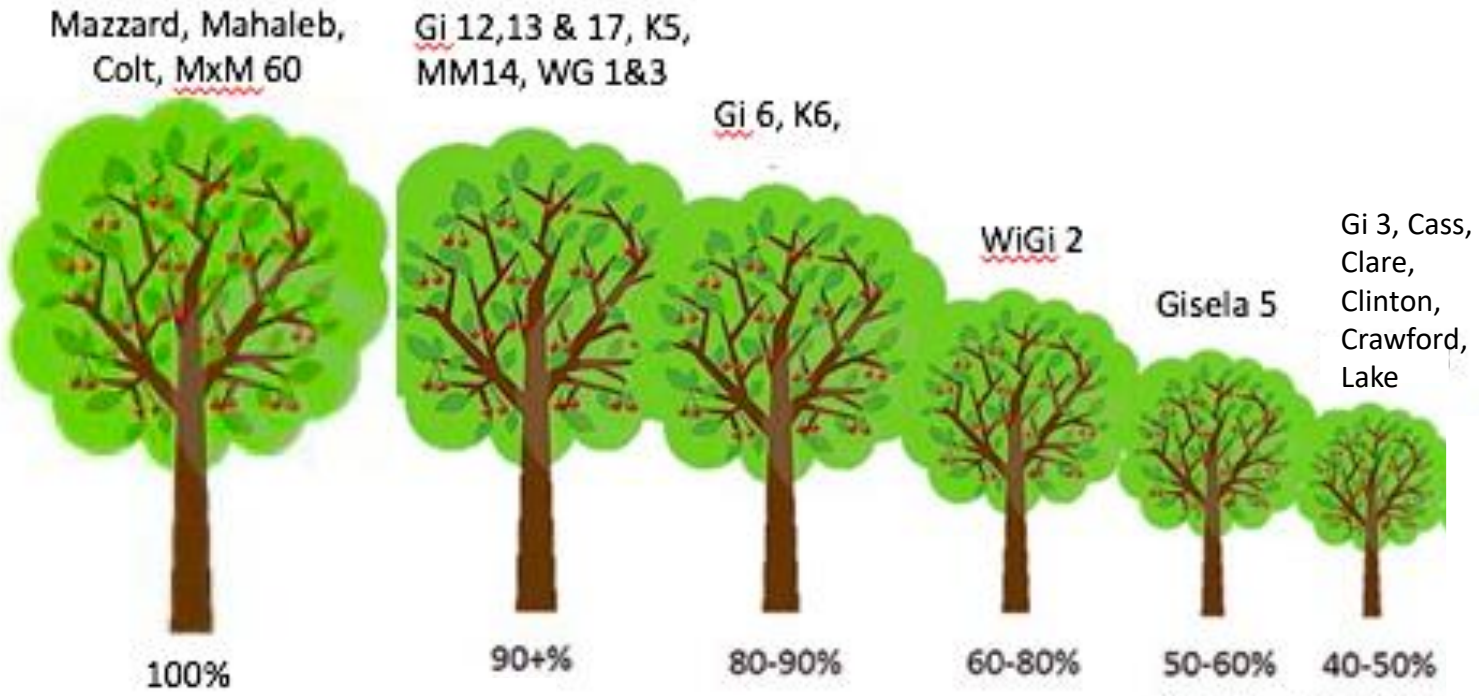
Relative Rootstock Size



Tree size may vary due to location, soils, climatic conditions and scion.

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What Traits are We Looking For?

1. Increase productivity of lower yielding varieties (Kordia & Regina).
2. Provide precocity while moderating oversetting potential of high yielding var. (Lapins, Sweetheart).
3. Rootstocks like apples, good precocity (similar to Gi5), but more forgiving. Consistently good fruit set, without affecting fruit size.
4. Two vigor levels: 1) Precocity with vigor 2) Precocity with size control
5. Precocious, size controlling rootstocks that perform well in poorer soils

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1. Increase productivity of lower yielding varieties (Regina, Kordia, etc.)

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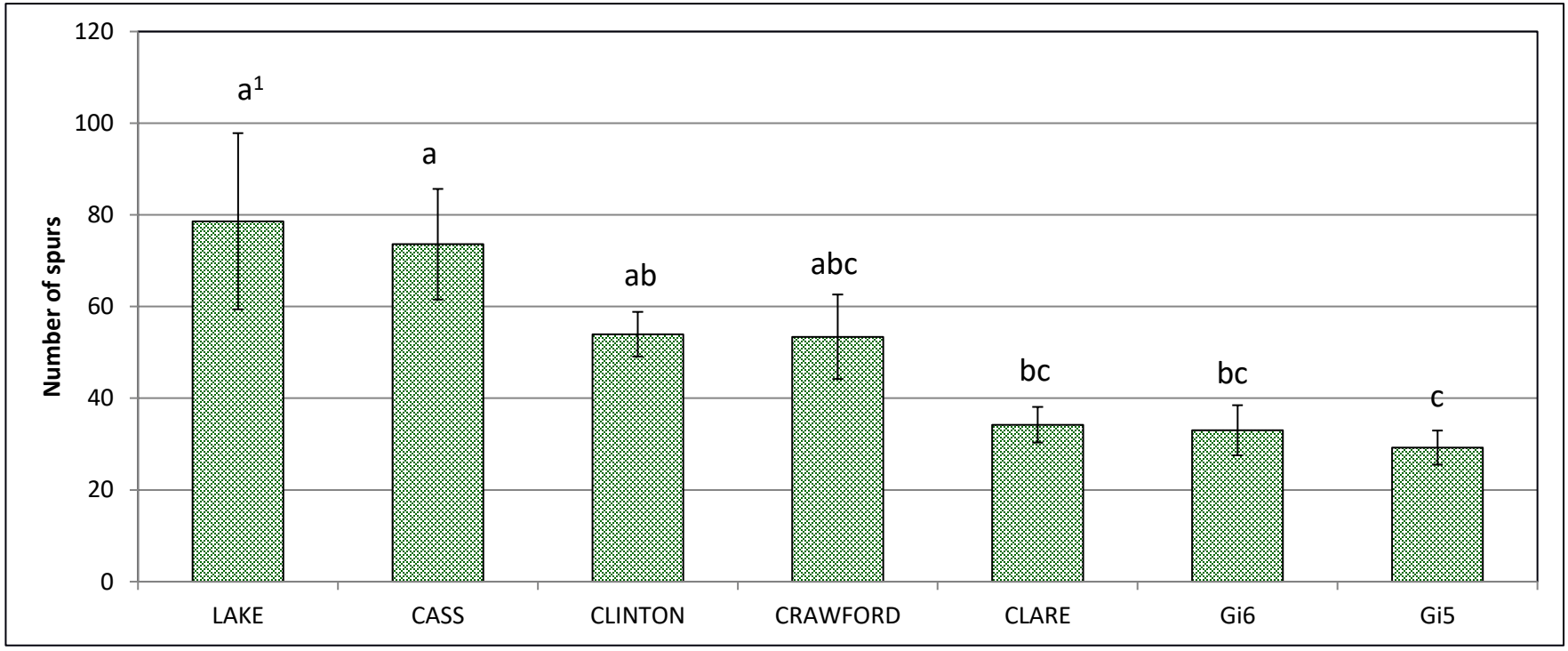
All 5 Corette cherry rootstocks induced scion flowering greater or equal to Gi5 and Gi6 in the third leaf

Average number of spurs on ‘Bing’ trees grafted on Corette rootstocks and Gi5 and Gi6 in 2011



[1]Means that are significantly different ($P < 0.05$) are denoted by different letters.

Regina – Steep Leader
The Dalles, Oregon

Rootstock Selection	4th Leaf		5th Leaf	
	Yield tonnes/ha[1]	Fruit Size mm	Yield tonnes/ha[1]	Fruit Size mm
Gi 5	18.3 a[2]	27.2 ab	3.8 b	28.0 ab
Gi 6	23.2 a	26.8 ab	8.9 ab	29.2 a
K 6	17.0 a	27.5 ab	9.7 ab	27.8 ab
Cass	22.7 a	27.2 ab	24.0 ab	27.9 ab
Clare	13.0 a	28.0 a	15.2 a	29.1 a
Clinton	21.7 a	27.0 b	13.5 a	27.3 b
Lake	14.6 a	27.5 a	8.6 ab	28.4 ab

[1]Yields per hectare were calculated as average yield per tree × number of trees per ha with 1,282 trees/ha (1.8 m × 4.3 m) for K5/K6 and Gi6; 1,536 trees/ha (1.5 m × 4.3 m) Gi5 and Clinton; and 1,922 trees/ha (1.2 m × 4.3 m) for Clare, Cass, and Lake.
[2]Means that are significantly different ($P < 0.05$) are denoted by different letters.

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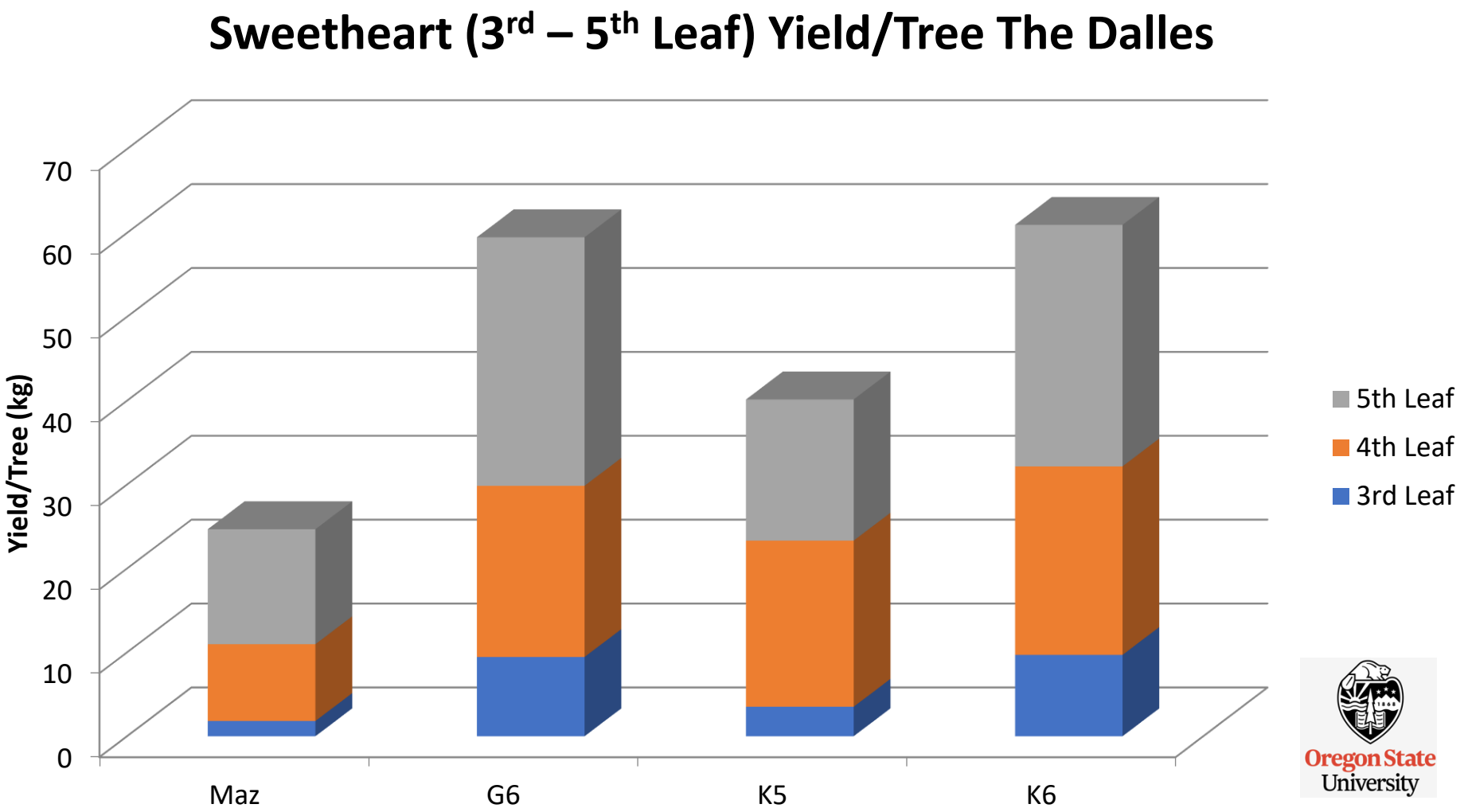
2. Provide precocity while moderating oversetting potential of high yielding varieties (Royal Dawn, Sweetheart, Lapins).



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3. Rootstocks like apples, good precocity (similar to Gi5), but more forgiving. Consistently good fruit set, without affecting fruit size

Weigi 1, 2, 3

- Total of 5 rootstocks
- Weiroot x Gisela
- Peter Stoppel
- Weigi 1, 2, 3

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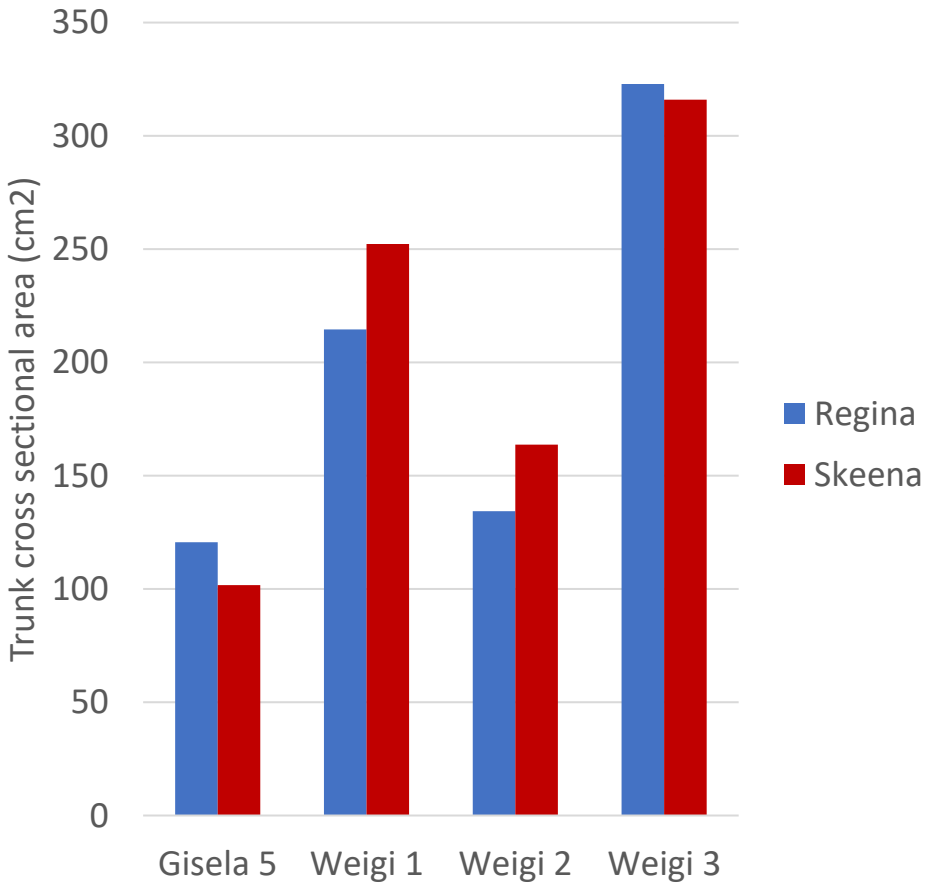
Relative Tree Size at La Tapy France

- SARA PINCZON DU SEL
- Domaine Expérimental La Tapy



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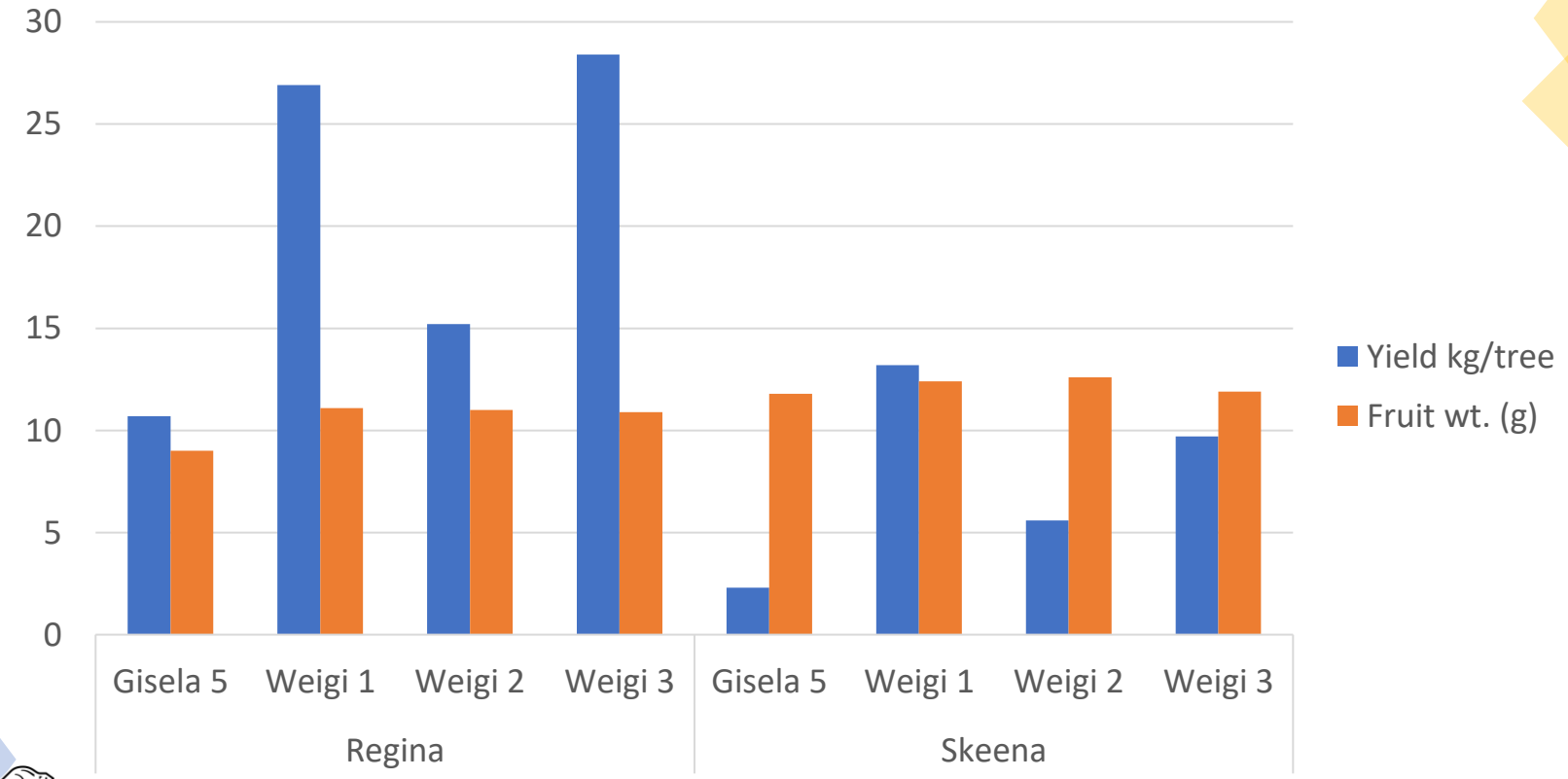
Weigi Per Tree Yield and Fruit Weight - 2012



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SARA PINCZON DU SEL, Domaine Expérimental La Tapy

4. Two Tree Vigor Levels

Precocity with vigor

- Gisela 6 and 12
- Gisela 13 & 17
- Krymsk 5 & 6
- Weigi 1 and 3
- MaxMa 14 & 60

Precocity with size control

- Gisela 3 & 5
- Clinton, Lake, Cass, Crawford, Clare
- Weigi 2

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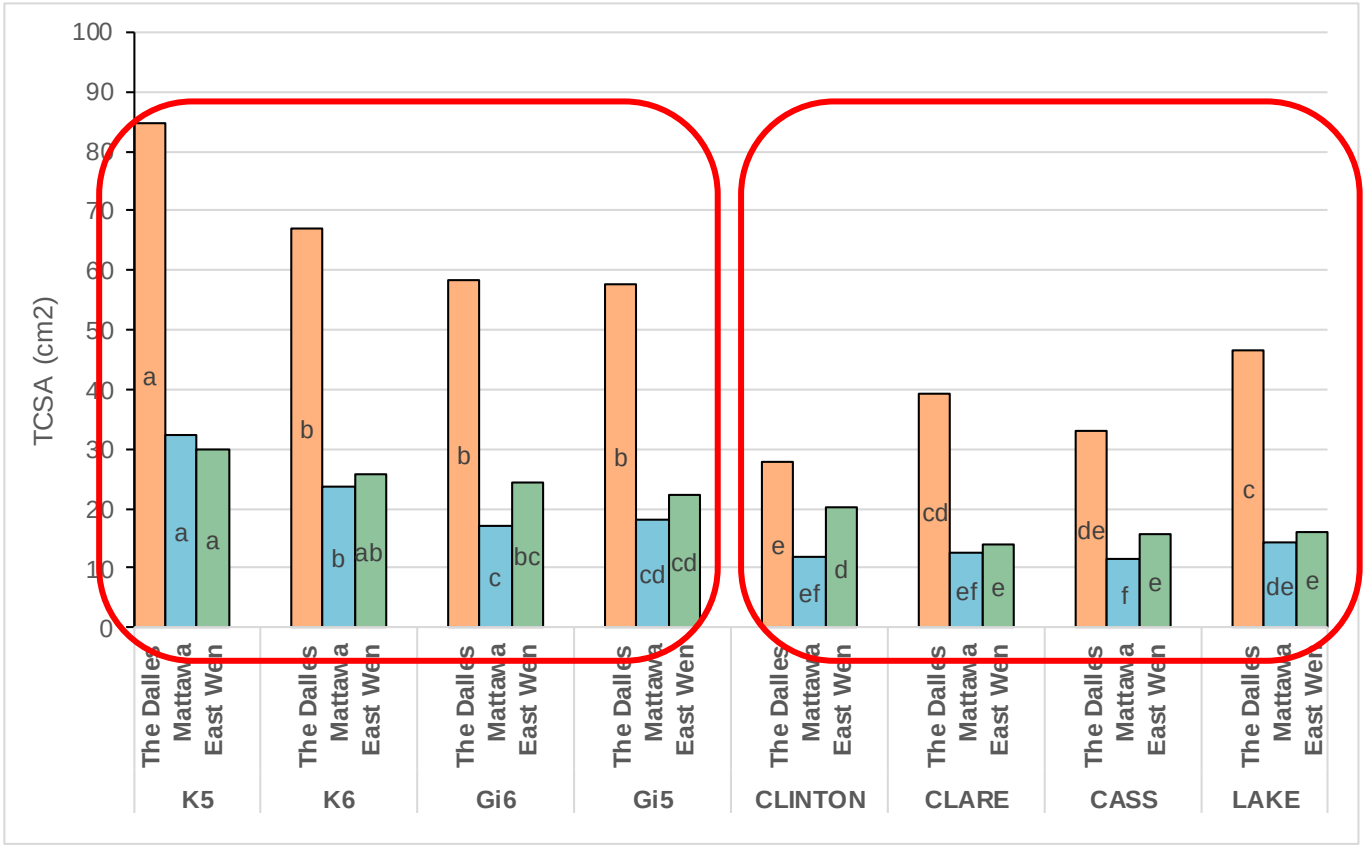
TCSA - E. Robin, Regina, Sweetheart

A. Iezzoni, B. Sallato & L. Long



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5. Precocious, size controlling rootstocks that perform well in poorer soils

Gisela 13

Similar size to Gi6	Flat branch angles
No suckering	Precocious
Same parentage as Gi 5&6	In 4 trials yields after 6-13 years similar or > Gi5

"High yields & good quality under less favorable conditions"

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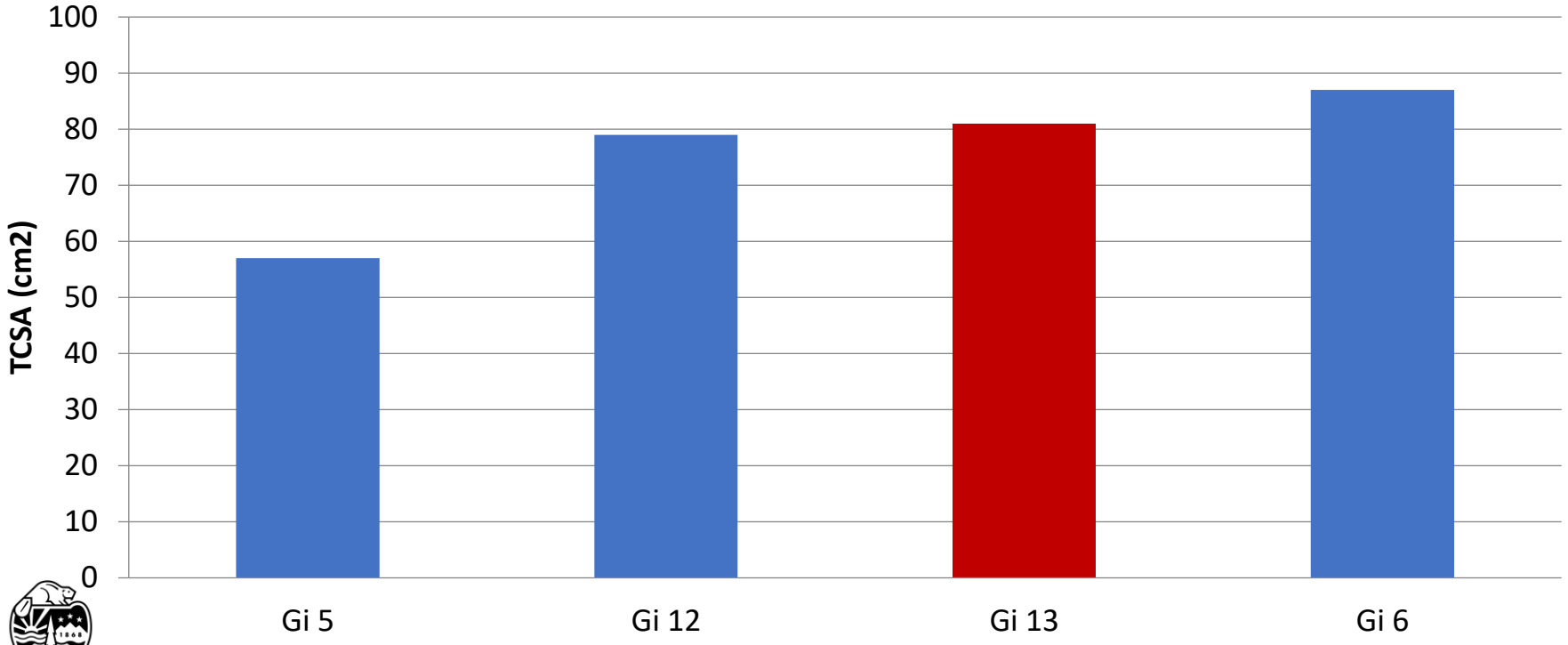
Year 7 TCSA Witzenhausen, Germany



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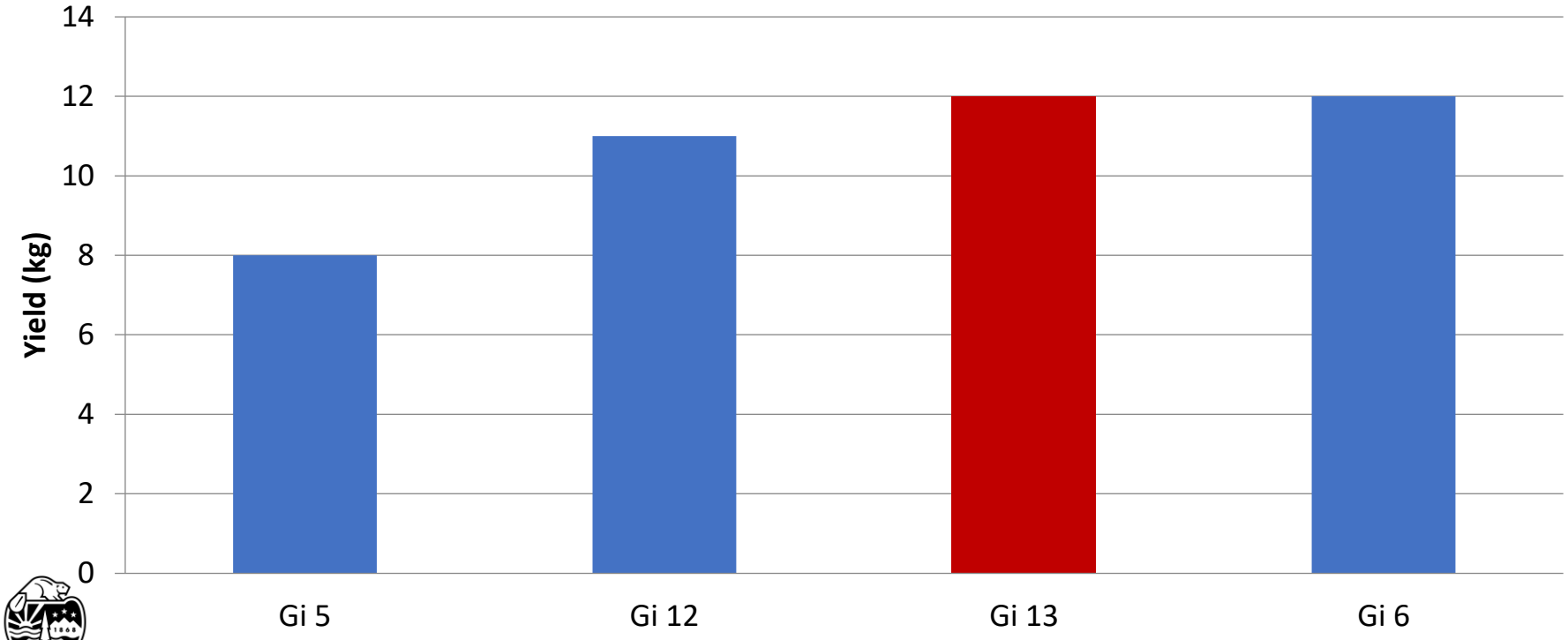
Year 6 Yield Witzenhausen, Germany



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5. Precocious, size controlling rootstocks that perform well in poorer soils

Gisela 17

- Most vigorous of all Giselas
  - Similar size to MxM 14
  - More precocious
- *Prunus canescens x P. avium*
- Less potential for overcropping than Gi 5 or 6
- Combine with more productive cultivars
- “Less demanding of soil, climatic and cultural conditions than Gi5”

Photo by Nicola Dallabetta, EMF

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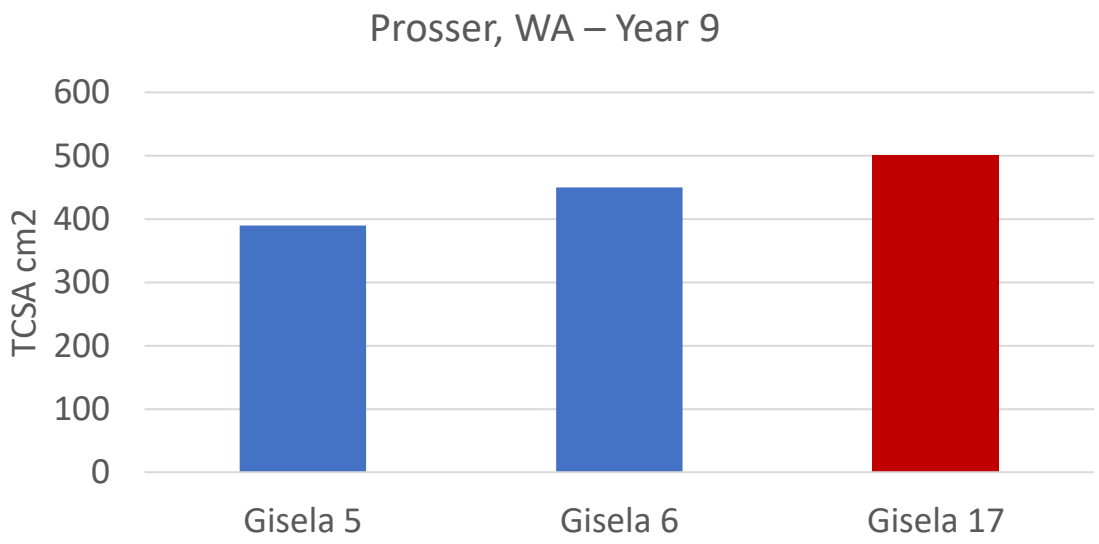
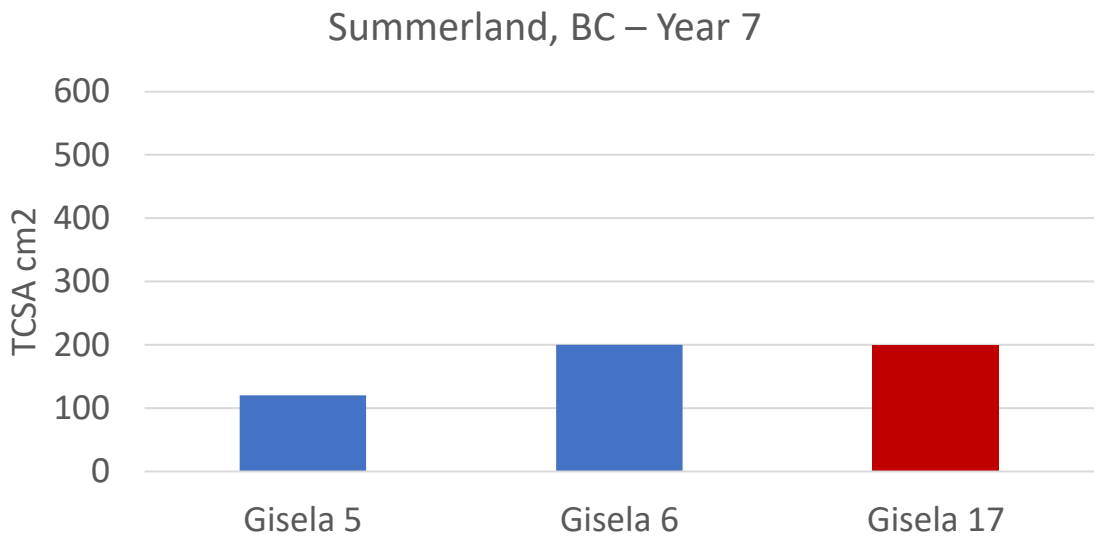
Bing - TCSA





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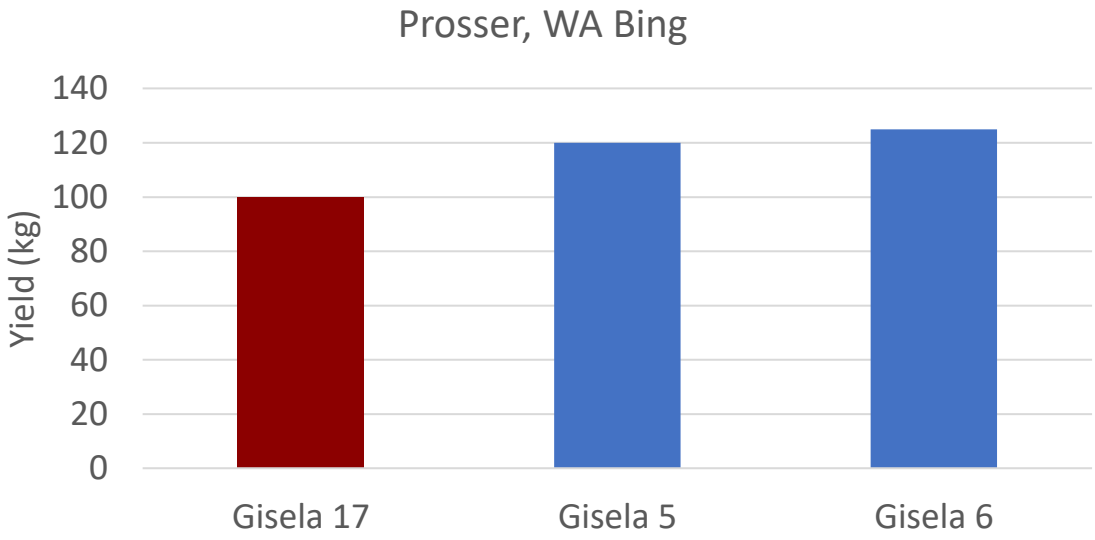
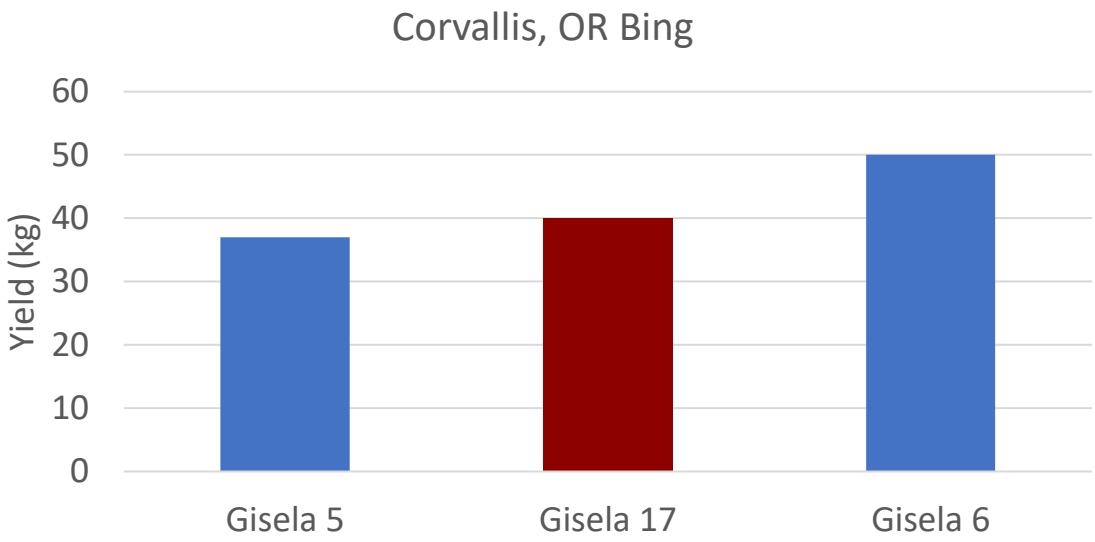
Bing Yield – 3-7 Leaf





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Training System Options

Historic

- Open Vase
- Natural (no training)

Now

- Steep Leader
- KGB
- UFO
  - Vertical
  - Y trellis
- SSA
- TSA
- Tatura trellis
- Bibaum
- Palmatte

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KGB

UFO

SSA

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Training Systems - Labor Savings

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Traditional Systems

- Large trees
- Full size rootstocks
- Labor intensive
- Expensive to manage
- Difficult to prune
- Low early yields
- Lower yields at maturity

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Training System Evolution

KGB, UFO and SSA examples of science-based systems

Simplified training and pruning

Created totally replicatable system

Every tree treated identically

Good yields of high quality

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Why Science-based Orchards Important

- Harvest Productivity
- We are losing our labor force
- Large Trees
  - 45 kg/hour
- Pedestrian Orchard
  - 78 kg/hour

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Why UFO, KGB in Washington

Labor

Dr. Matthew Whiting Lab, WSU

Cultivar	Training System	Mean Harvest Rate (kg/min)
Cowiche	UFO	***0.81***
Tieton	UFO	***0.73***
Sweetheart/Mazzard	KGB	***0.72***
Tieton/Gi5	Central leader	***0.64***
Bing/Mazzard	Traditional open center	***0.63***
Bing/Mazzard	4-5 leaders	***0.47***

Provided by Dr. **Yiannis Ampatzidis**

Why Science Based Systems are Important

- Pruning
  - Advantage of Science Based Systems
  - Every tree can be treated exactly alike
  - Teach to prune in 15 minutes
  - Each person given one task
  - Reduces complexity
  - Reduces mistakes
  - Makes pruning easier
  - Makes pruning faster

KGB

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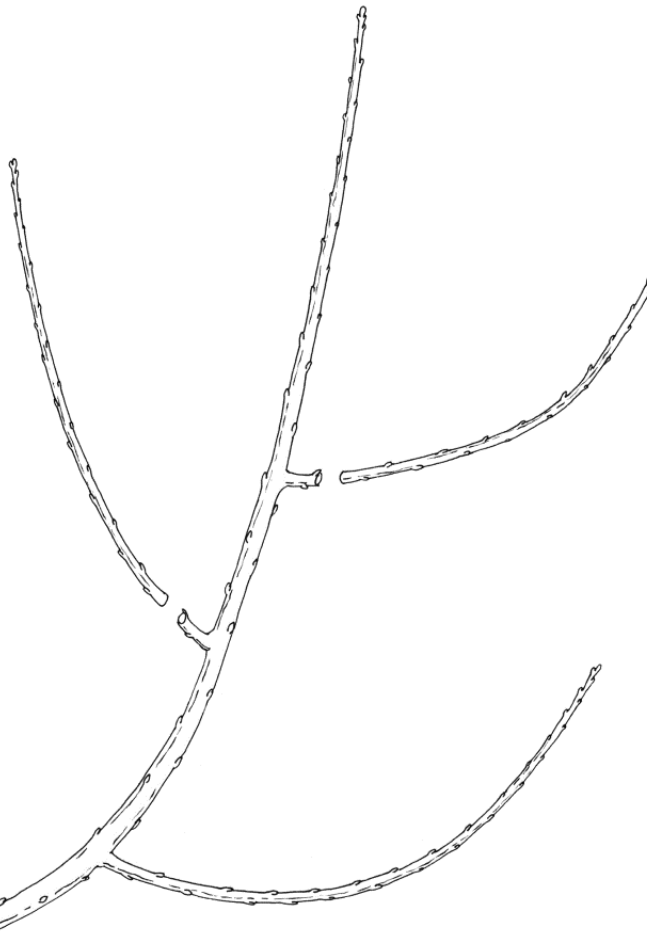
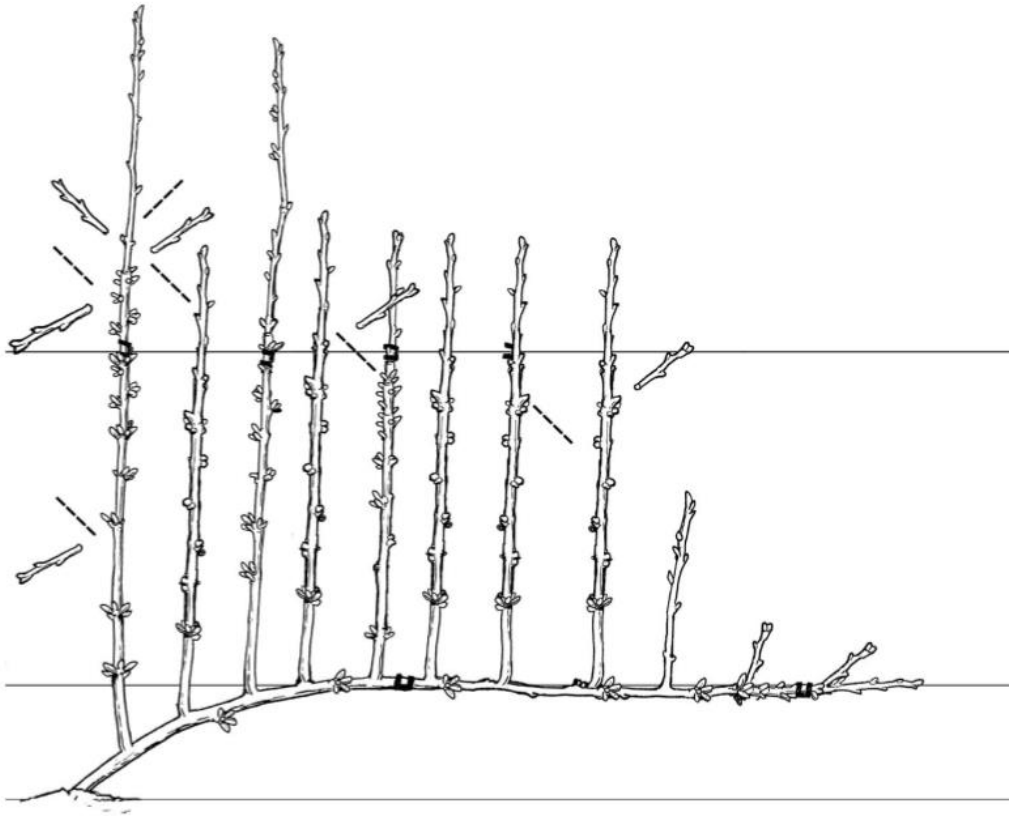
One Year Old Laterals Removed

Only 2 steps to pruning



KGB



UFO

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Why Pedestrian Orchards Important

- Pruning
  - SSA
    - At maturity
    - 1 pruning step

SSA

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Why Science Based Orchards Important

Oregon Grower 1

- Since planting KGB and other science based systems
- Cut labor force by ½
  - Hire fewer workers
  - Less paperwork
  - Fewer accidents

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Why KGB in Australia

Kym Green

Labor

- High labor cost - $25/hr
- Labor efficiency
  - Pruning from ground
    - 1-2 minutes/tree
    - 1777 trees/ha
  - Picking from ground
  - Ease of application
    - Bird net
    - Rain covers

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Why KGB in Australia

Grower Yield Experience

- 2012 Yields
  - Lapins: 26.67 tons/ha
  - Summit: 25 tons/ha
  - Regina: 24.99 tons/ha
  - Kordia: 10 tons/ha

Kym Green

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Why UFO in Washington State

Mark Hanrahan

Labor

Picking	Pruning
Picking productivity 3x more efficient • 1500 boxes UFO in same time • 500 boxes steep leader	Pruning efficiency • About same as steep leader • Could increase UFO efficiency with platform

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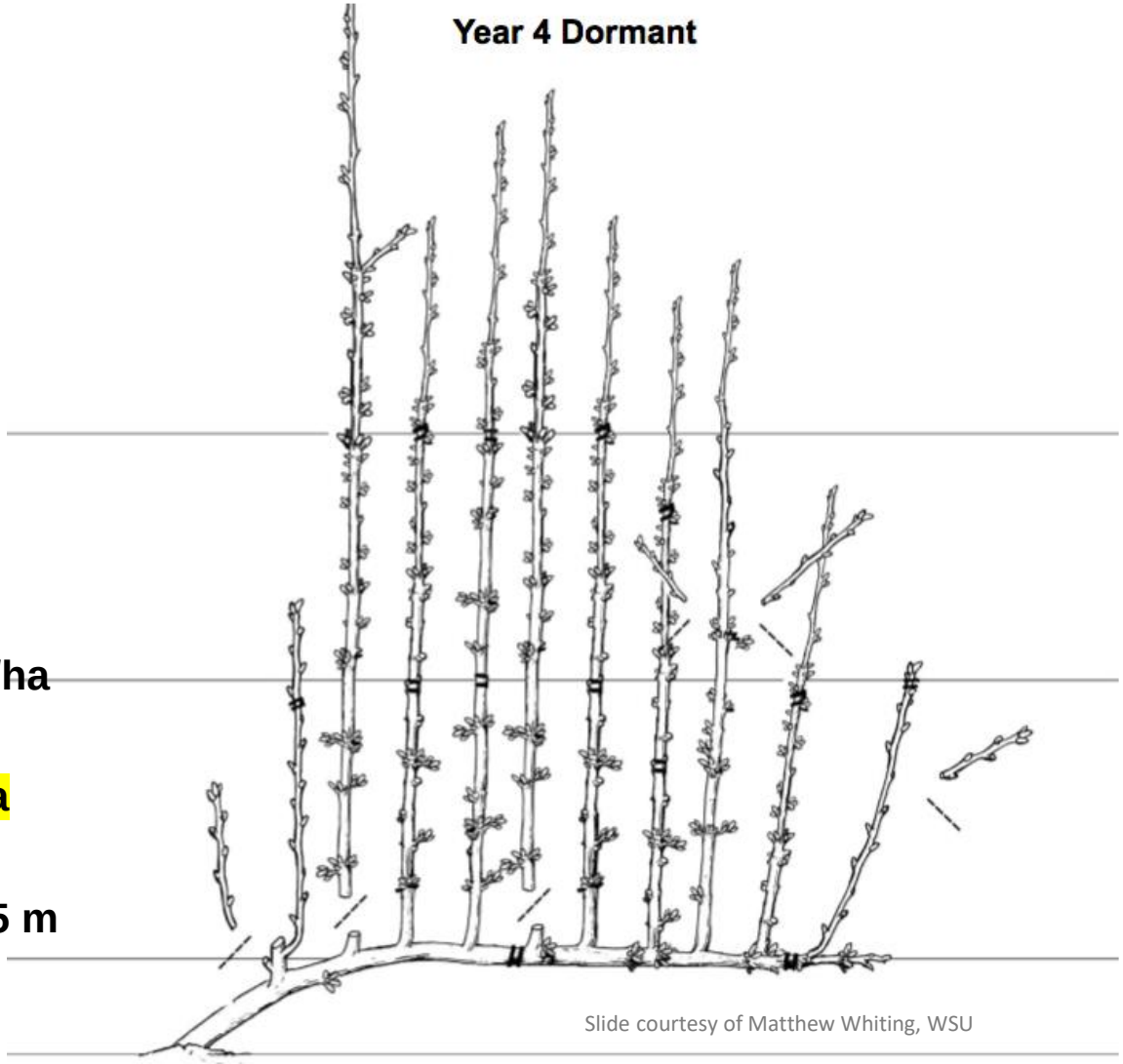
Fruiting potential:

2m x 3m = 1667 trees/ha
10.5 uprights/tree = 17,500/ha
8,077 fruiting uprights/ha
2.2 kg/upright for 17.77 t/ha
200 fruit/upright (11g)
3 fruit/spur = 66 spurs = 2.5 m



Slide courtesy of Matthew Whiting, WSU

UFO

5th leaf fruit quality – Matthew Whiting, WSU

Variety	Yield/tree (kg)	Yield (m.tons/ha)	28mm+ (m.tons/ha)	25.4mm+ (m. tons/ha)
'Skeena'/Gi12	18.1	23.9	23.3	23.8
'Bing'/Gi12	28.7	38.1	15.9	34.7
'Tieton'/Gi5	12.6	16.3	15.2	16.3
'Skeena'/Gi5	10.5	13.8	13.2	13.8
'Chelan'/Gi12	10.5	13.8	6.5	12.5

Super Slender Axe (SSA) Yields

50-100 cm

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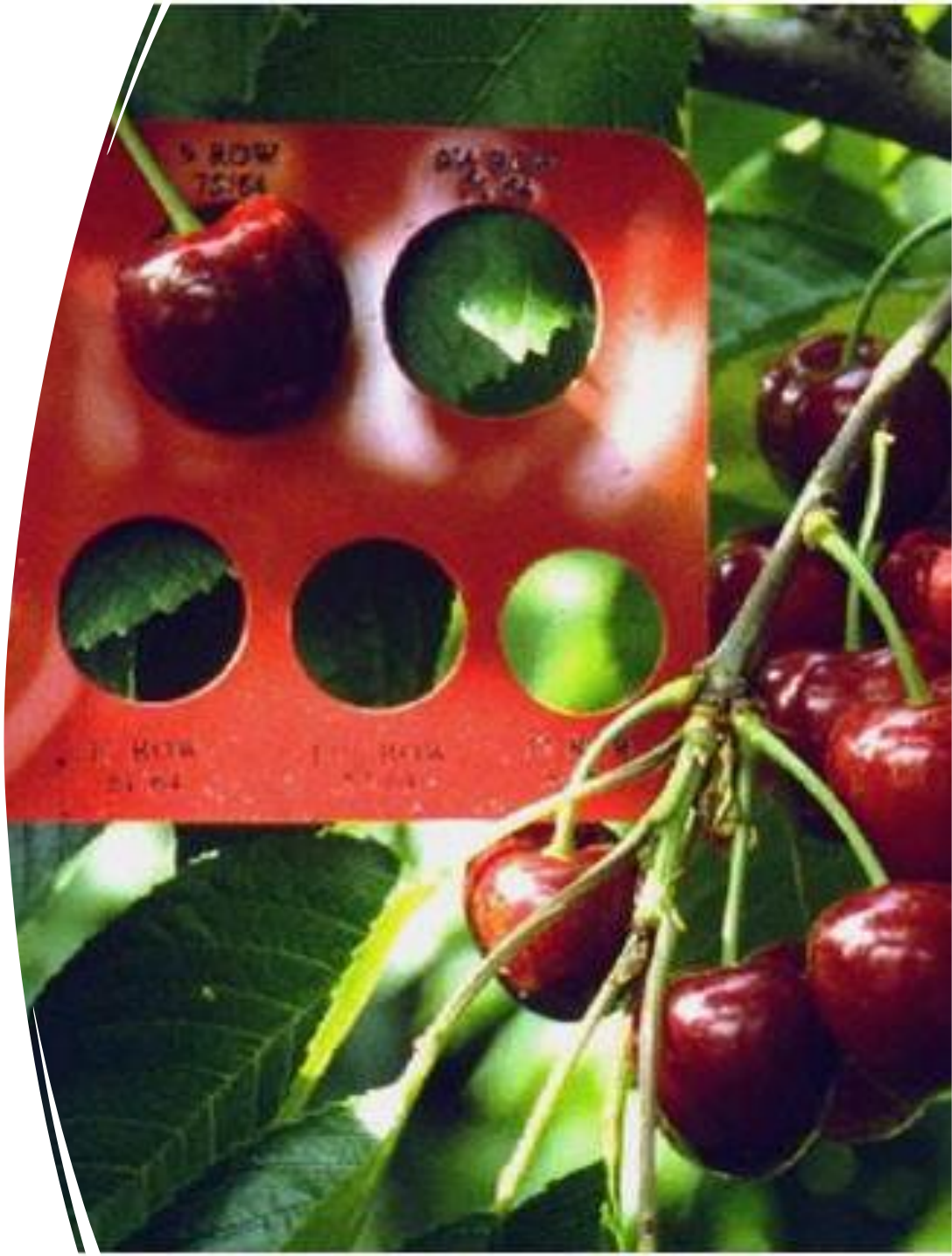
SSA Cropping on basal buds of year-old shoots

SSA Fruiting Wood

- All fruit borne at base of one year old wood
- Highest quality fruit on tree



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SSA Systems Trials (4 to 7 years old)

Italy (2007):

0.5 x 3.5 m	Gi5 with Early Bigi; Sweet Early; Early Star; Grace Star; Black Star; Summit; Sylvia; Ferrovia; Kordia; Regina
0.7 x 3.5 m	Gi6 with Sweet Early; Giorgia; Grace Star

Michigan (2009, 2010, 2011):

0.6 x 2.2 m	BlackPearl/Gi12, Kordia/Gi5, Selah/Gi5
0.75 x 3.5 m	Benton/Gi3, Benton/Gi6
0.75 x 2.5 m	Gi5, Gi6 with RadiancePearl; EbonyPearl/Gi5

New York (2010):

0.75 x 3.5 m	Gi3, Gi5, Gi6 with Regina

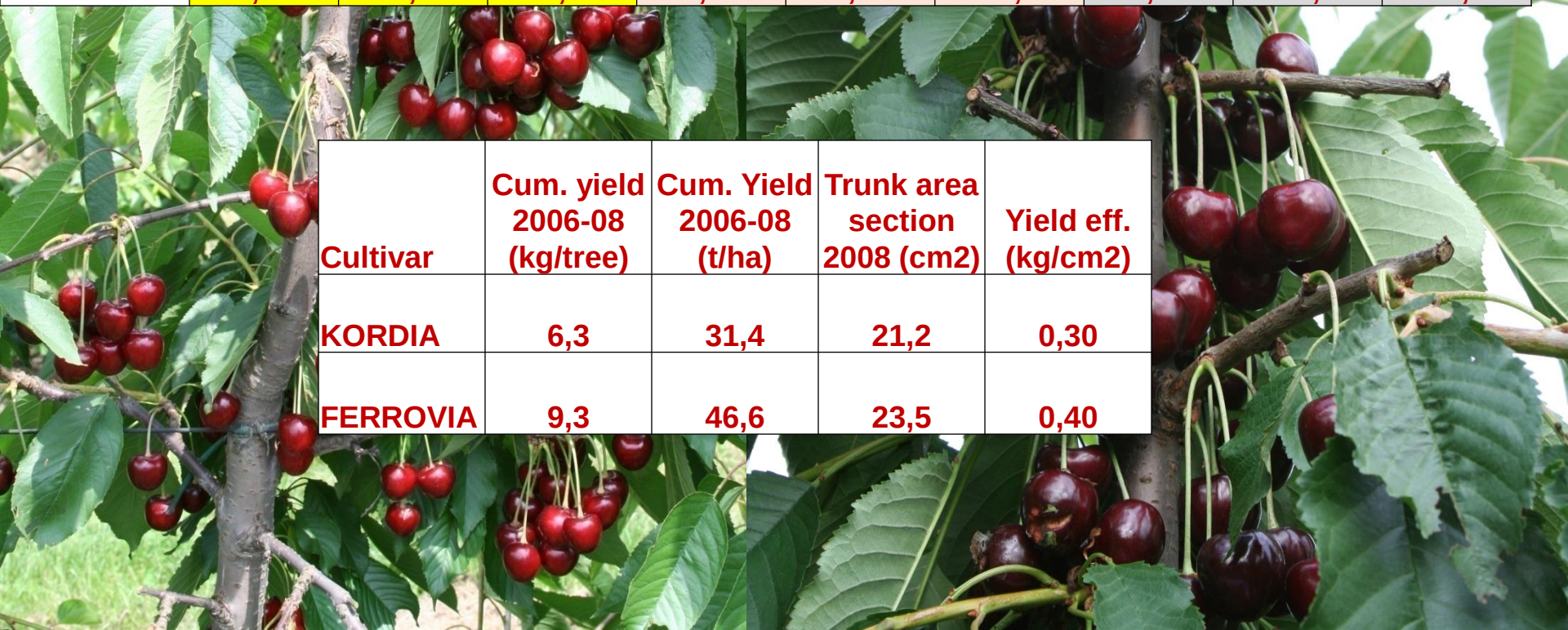
Greg Lang, Michigan State University

Green = good yields, Red = poor yields, white = moderate yields or insufficient data

Second trial (Beltrami farm)- Vertical axis. Planting distance 4.0 x 0.5 m – Planting density 5,000 alb./ha. Year of plantation 2004 – Productive data 2006-2008

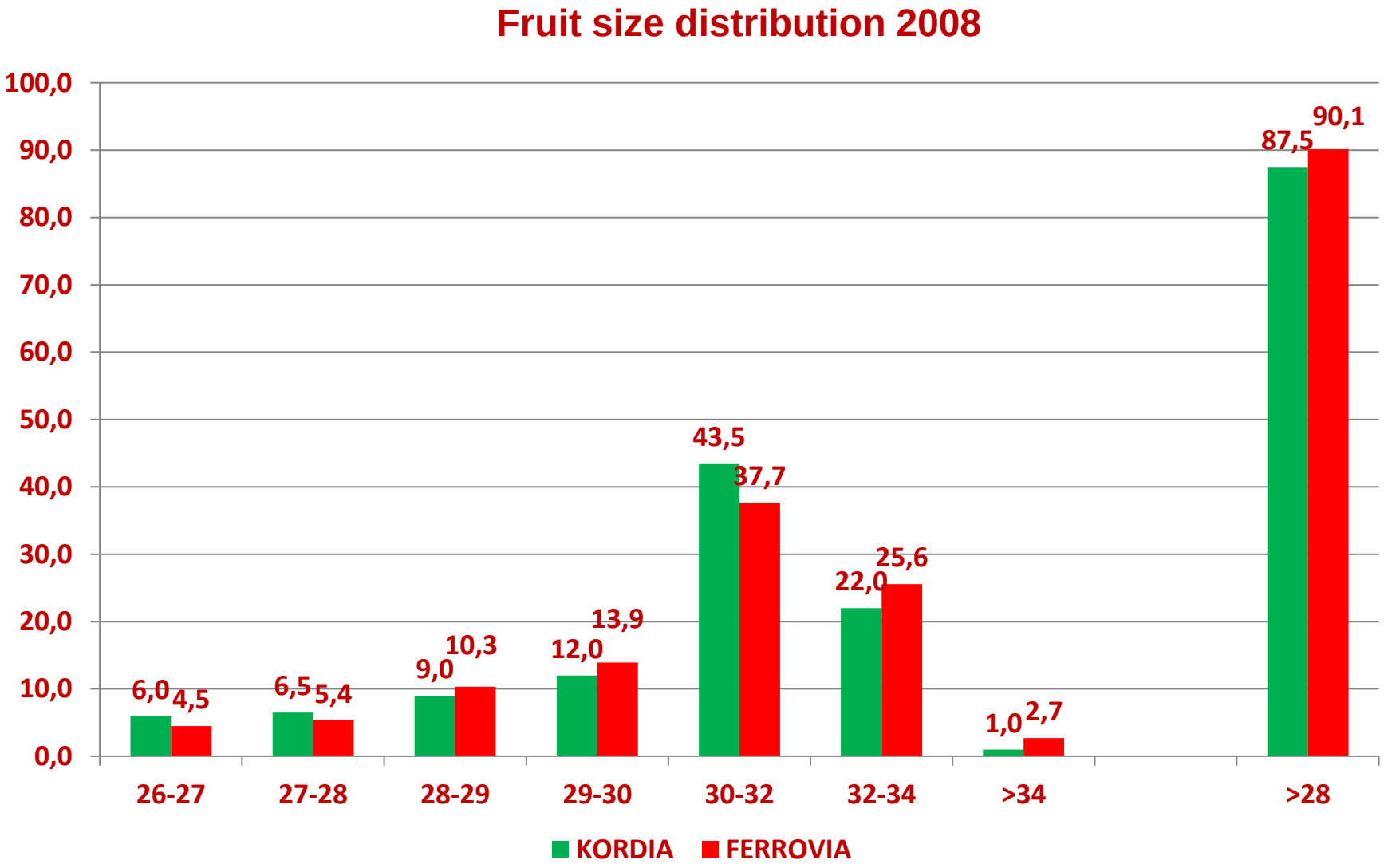
Slide courtesy of Stefano Musacchi

	2006 (year3)			2007 (year 4)			2008 (year 5)		
Cultivar	Weight/tree. (kg)	Fruit weight(g)	Calc. Yield (t/ha)	Weight/tree. (kg)	Fruit weight(g)	Calc. Yield (t/ha)	Weight/tree. (kg)	Fruit weight(g)	Calc. Yield (t/ha)
KORDIA	1,05	11,24	5,3	3,60	10,21	18,0	1,64	14,7	8,2
FERROVIA	1,64	11,32	8,2	4,70	9,30	23,5	2,97	13,6	14,9



Cultivar	Cum. yield 2006-08 (kg/tree)	Cum. Yield 2006-08 (t/ha)	Trunk area section 2008 (cm2)	Yield eff. (kg/cm2)
KORDIA	6,3	31,4	21,2	0,30
FERROVIA	9,3	46,6	23,5	0,40

Second trial (Beltrami farm)- Vertical axis. Planting distance 4.0 x 0.5 m – Planting density 5,000 alb./ha. Year of plantation 2004



Slide courtesy of Stefano Musacchi

- Lynn Long pruning Gisela trees

PNW 592 • January 2007

Four Simple Steps to Pruning Cherry Trees on Gisela and Other Productive Rootstocks

L.E. Long

Pruning and training trees on productive rootstocks, such as Gisela® 6 or 12, requires techniques that are completely counter to pruning trees on Mazzard rootstock. When producing cherries on Mazzard rootstock, orchardists must constantly think about how to encourage precocity and productivity in the tree, whereas when producing cherries on productive rootstocks, they must focus on reducing crop load and increasing vigor.

Corianne Damian

Tree vigor is important because more leaves mean more carbohydrate production and larger cherries. The production of high-quality cherries requires a gross canopy leaf area-to-fruit (LA:F) ratio of at least 200 cm^2 of leaf area per fruit, which roughly translates to five leaves per fruit (Whiting and Lang, 2004). Trees with a lower LA:F ratio are unable to manufacture enough carbohydrates to produce premium cherries.

Pruning strategies for trees on productive rootstocks should focus on the following:

- Thinning cuts to remove pendant (downward-hanging) and weak wood and to improve light penetration into the tree
- Stub cuts to reduce crop load and renew spurs
- Heading cuts to encourage branching (leaf production) and reduce crop load

Thinning cuts

Each year, begin by removing any pendant or small-diameter wood at the point of its origin. Typically, these branches overset and produce small cherries. Removing these branches in the dormant season can eliminate a significant amount of small cherries before they develop.

Also reduce branches in the top of the tree and on the perimeter to a single shoot.

These thinning cuts will allow light to reach the inner and lower portions of the tree. Only leaves in full sunlight can photosynthesize at maximum capacity.

Stub cuts

The current season's crop can be reduced by heading with stub cuts. Stub cuts also replace branches and renew old spurs.

The highest quality cherries grow at the base of last year's growth and on young spurs. Therefore, no spur should be older than 5 years old. To keep spurs within this age range, stub back and renew 20 percent of all fruiting branches each year.

Adequate light must reach the area around the cut in order for a new branch to form. For this reason, cut branches located near the tree base to a longer stub than those near the tree top. Stubs can range from 3 inches to 2 feet in length, depending on the position of the branch in the tree.

Lynn E. Long, Extension faculty (horticulture), Wasco County, Oregon State University.

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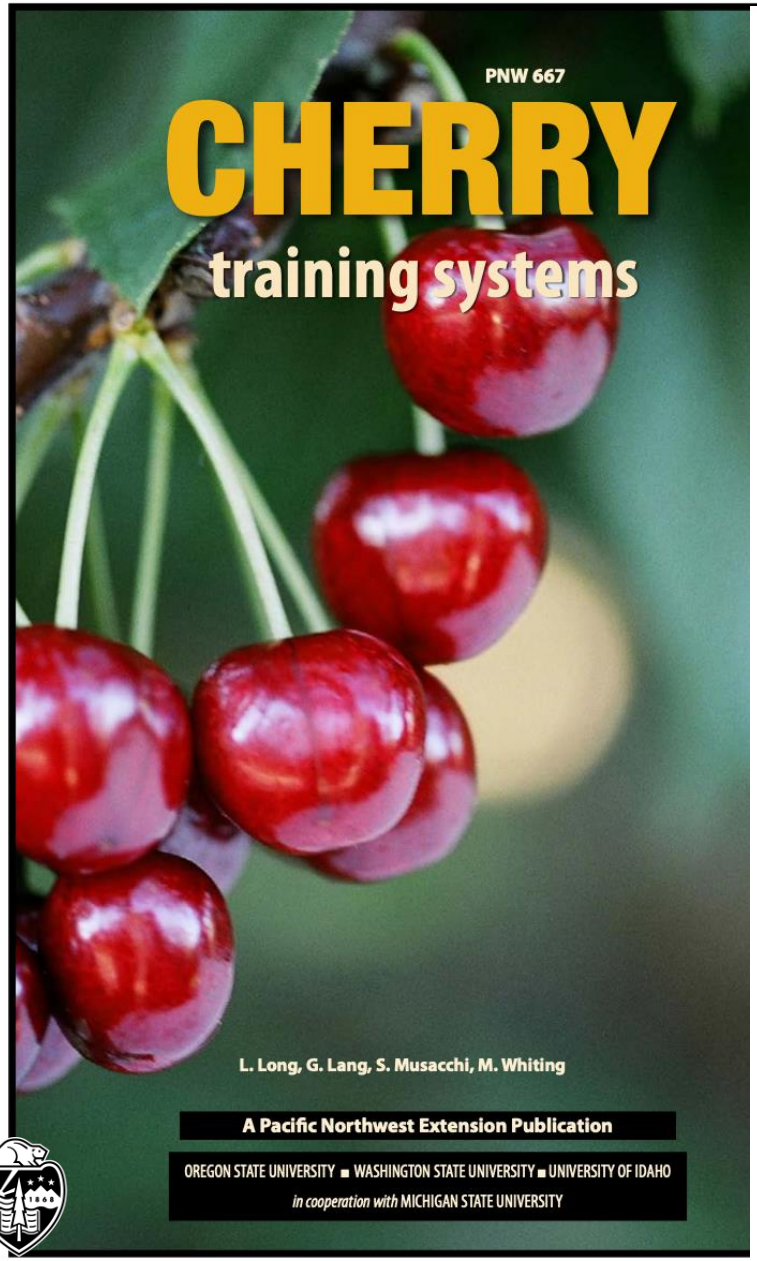
Lynn Long

Greg Lang

Lynn Long Cherry Training Systems App Store: Cherry Pruning



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TRAINING SYSTEM: **SUPER SLENDER AXE**

STAGE: *First dormant season*

GOALS

- **Impose bud-activation techniques to stimulate additional extensive lateral shoot formation on leader.**
- **Begin "short-pruning" of existing lateral shoots to simultaneously balance leaf area with second-year crop load and renew or initiate new fruiting laterals.**

Figure 46a

Figure 46b

SYSTEM DEVELOPMENT

- SSA "short-pruning" is done by removing the majority of the length of each 1-year-old (previous season) shoot, retaining only the basal flower buds plus at least two vegetative buds for new shoot formation (Figure 46a). Lower branches can be left slightly longer than upper branches.
- Short-pruning may be accomplished best during bud swell, when it is easier to differentiate between the rounded flower buds and the more pointed vegetative buds (Figure 46b).
- When leader extension has been moderate, bud activation steps can be taken (as described above) to induce another 10 or more lateral branches on this leader growth, repeating as needed until the full tree height is achieved.

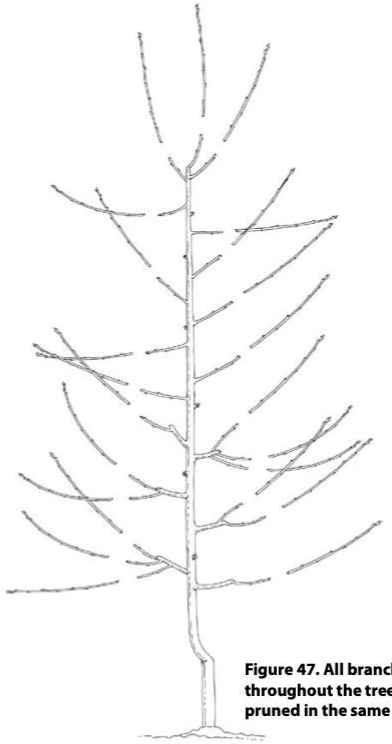

Figure 47. All branches throughout the tree are short pruned in the same manner.

SWEET CHERRIES

Lynn E. Long, Gregory A. Lang and Clive Kaiser

CROP PRODUCTION SCIENCE IN HORTICULTURE

www.cabi.org/bookshop/book/9781786398284/

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Why UFO in Washington State

Grower Fruit Quality Experience

Mark Hanrahan

- Yield & Fruit Quality
  - Hand thinning may be necessary on some varieties
  - Especially in 4th to 5th leaf
  - Other systems prune to reduce crops
  - Costing $2500/ha

Oregon State OSU UNIVERSITY

Nimba

- SMS Genetics – California
- Very early
- Good size ~ 30 mm
- Moderate firmness
- Flavor sweet/weak
- S_2S_3 Pollinizer: Pacific Red, Royal Hazel
- Moderate cracking
- Productivity good

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Pacific Red

- SMS – California
- Very early
- Good size – 28-30 mm
- Excellent firmness
- Moderately strong but pleasant flavor
- S_4S_9 Pollinizer – Nimba, Royal Hazel
- Productive

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Royal Tioga

- Zaiger Genetics – California
- Early
- 28-30 mm
- Good firmness
- Sweet/good flavor
- Blooms early
- Self-fertile

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Photo by International Plant Selection

Royal Hazel

Zaiger Genetics

500 Chilling hours

First bloom 7 days before Bing

Fruit set - 2013-2016 Heavy

Excellent, strong sweet/acid flavor

Very early bloom S_4S_6 - Royal Lynn or Royal Tioga as pollinizers

Harvest timing days +/- Techlovan	Size (mm)	Firm. (g/mm)	PFRF (g)	Cracking potential 2014-2020 (36% Skeena)	Pitting 2013-2020 (Bing 2.6)
-10 days	30.24	335	1294	10.5%	2.75

Royal Dawn

- Very Early: 10 to 15 days before Techlovan
- Popular in Chile & Spain
- Best at 18-20 brix
- Large 28 mm
- Tree is precocious & productive
- Storage > 30 days problematic
- Fruit cracking high
- Self-sterile: Black Star, Samba, Bellise, Earlise

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Royal Bailey

- Zaiger Genetics- California
- Early ripening
- 30-32 mm
- Moderate firmness
- Susceptible to cracking
- Early bloom
- S_1S_3 Pollinizer - Frisco

Photo by International Plant Selection

Oregon State University

Royal Edie

- Zaiger Genetics - California
- Very large
- Very firm
- Regina timing
- Somewhat mild flavor
- Very meaty
- Crunchy
- Moderate susceptibility to rain
- Self-fertile

Harvest timing days +/- Techlovan	Bloom timing +/- Bing	Size (mm)	Firm. (g/mm)	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2016 (Bing 2.6)
+ 13 days	+2	31.5	371	15%	2.71

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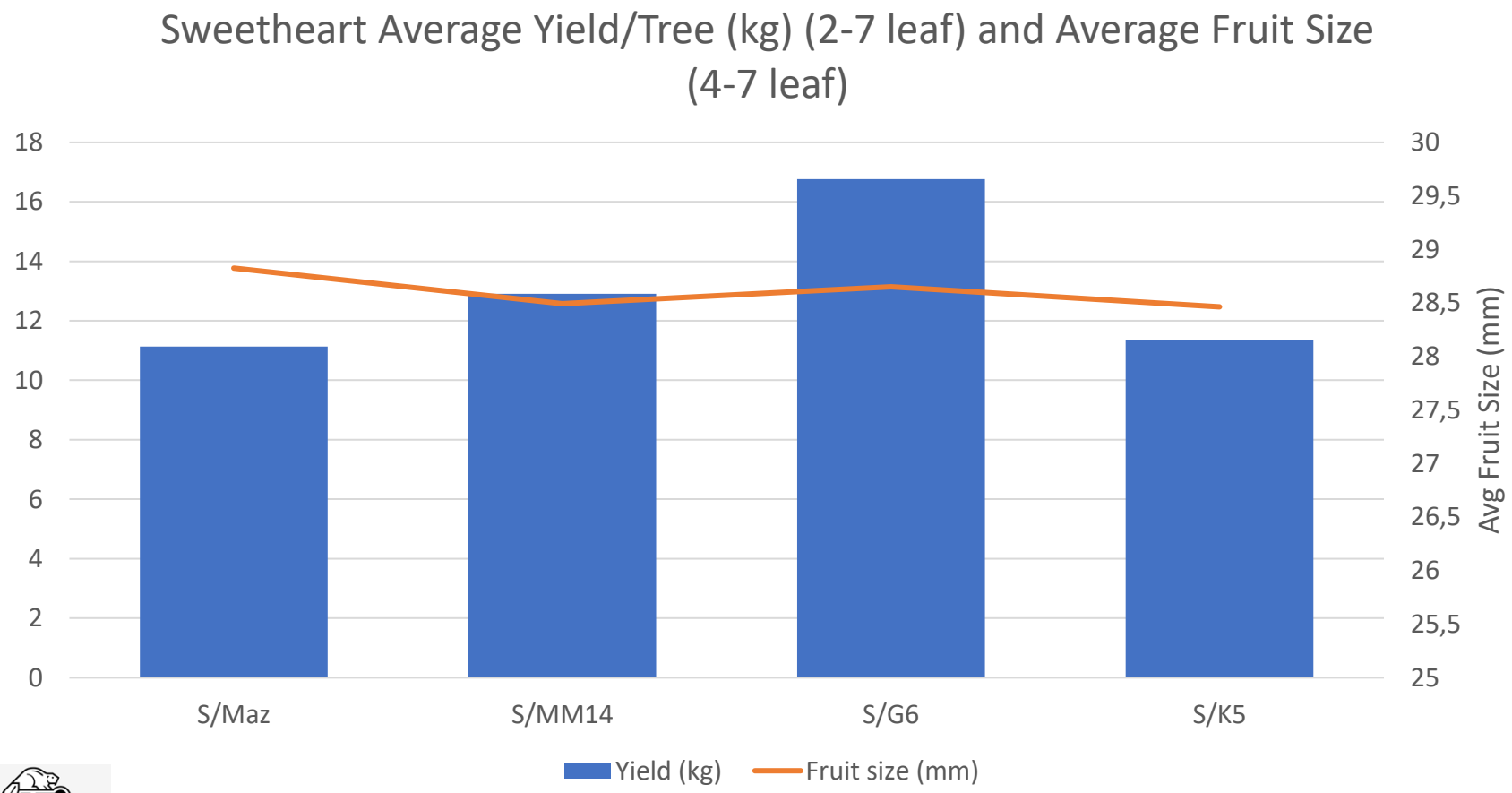
Sweetheart average per tree yield and fruit size – The Dalles



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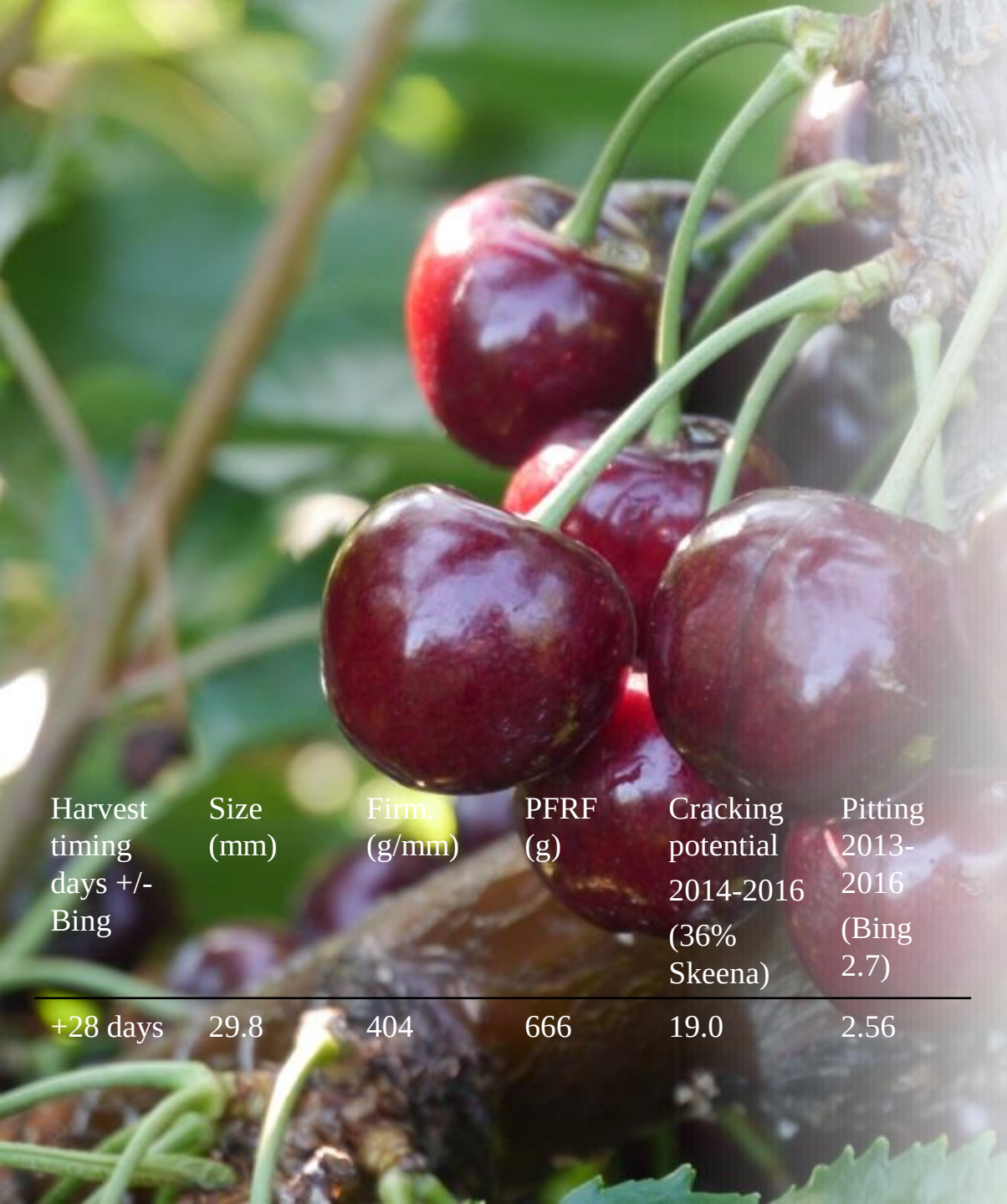


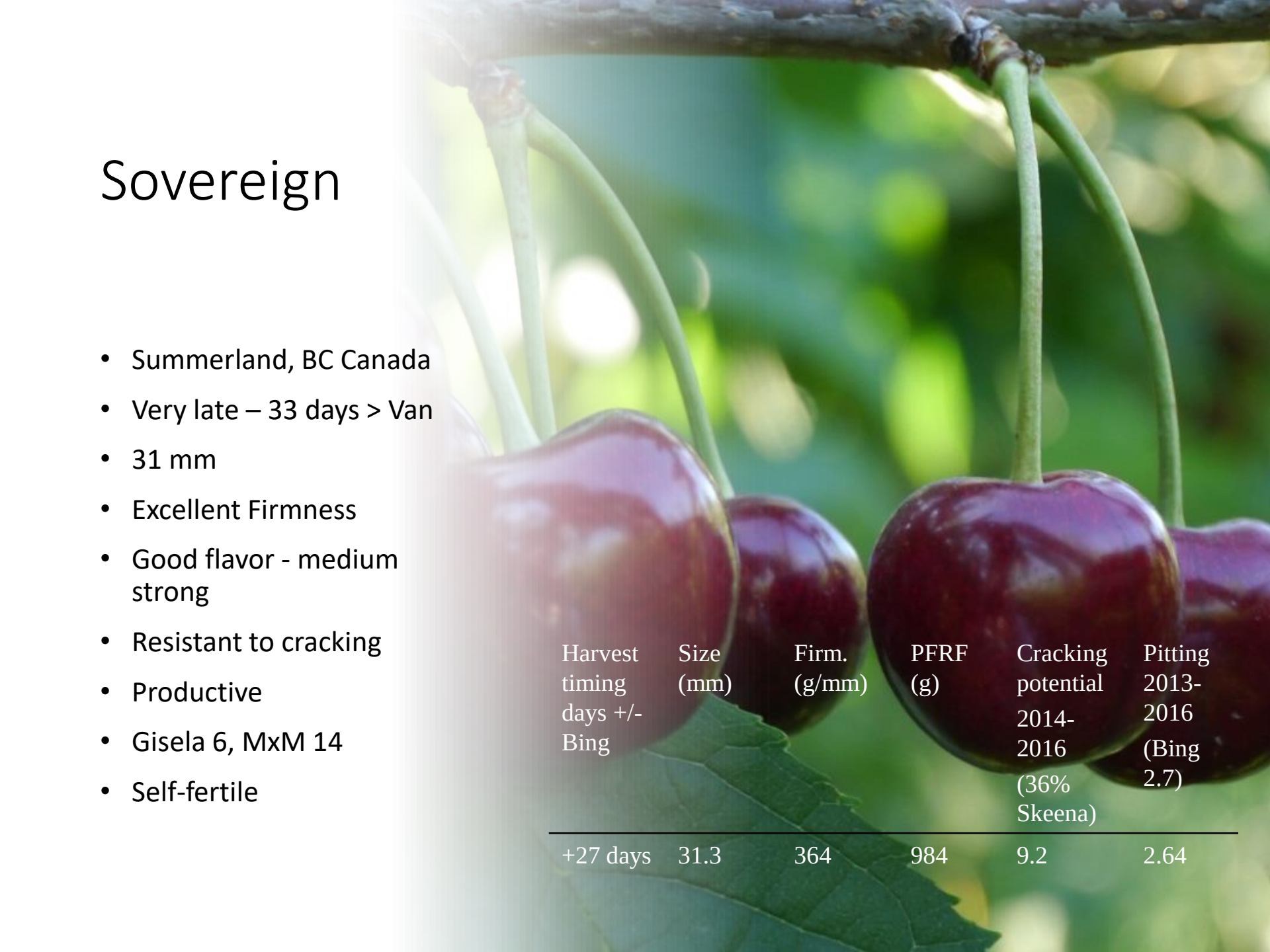
Sentennial

Harvest timing days +/- Bing	Size (mm)	Firm. (g/mm)	PFRF (g)	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2016 (Bing 2.7)
+28 days	29.8	404	666	19.0	2.56

- Summerland, BC Canada
- Very late – 28-30 days > Van
- Somewhat mild flavor, but good
- Excellent firmness
- 29-30 mm
- Moderate cracking
- Heavy producer on Gisela 6
- Self-fertile

Sovereign

- Summerland, BC Canada
- Very late – 33 days > Van
- 31 mm
- Excellent Firmness
- Good flavor - medium strong
- Resistant to cracking
- Productive
- Gisela 6, MxM 14
- Self-fertile

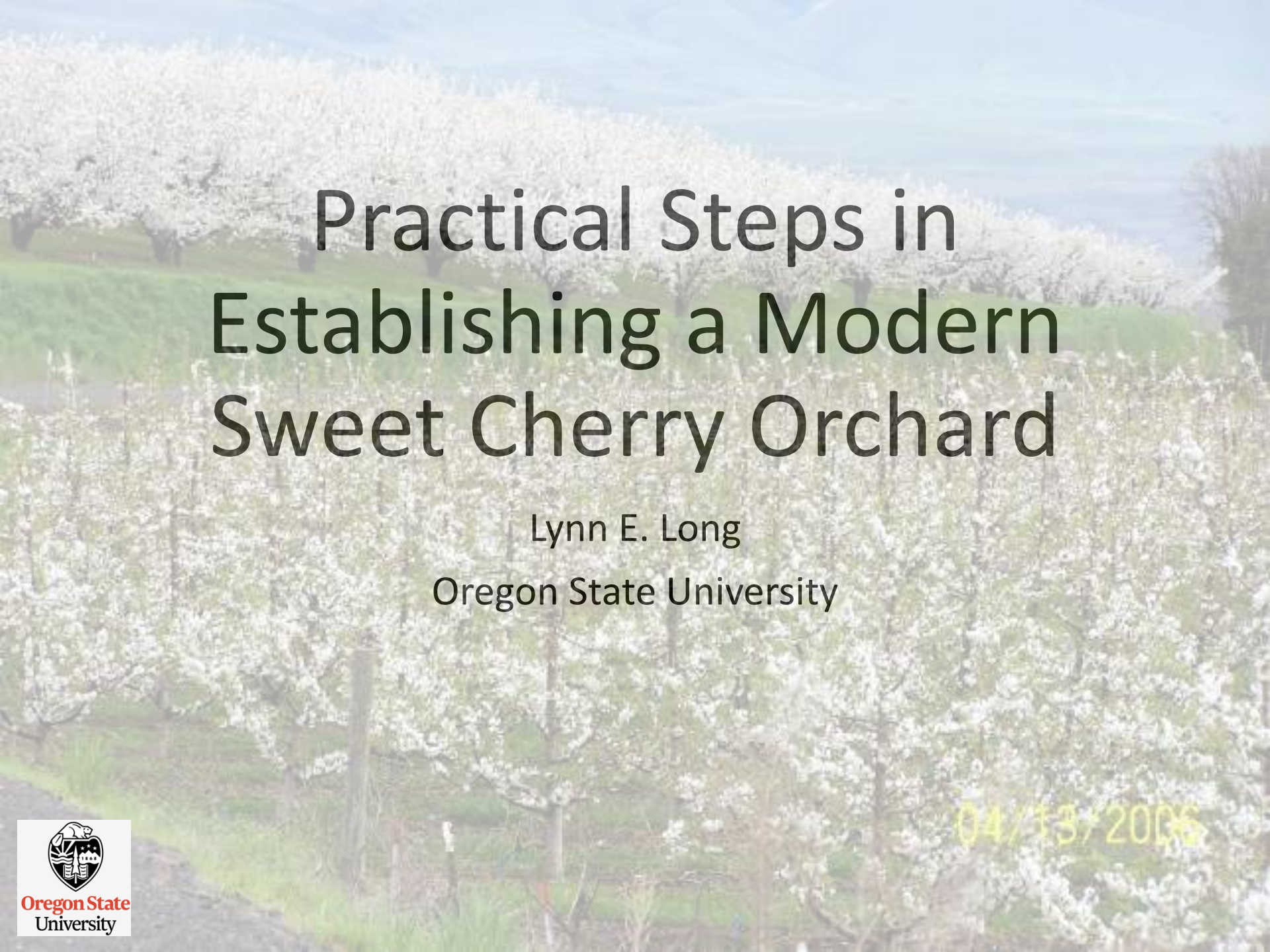


Harvest timing days +/- Bing	Size (mm)	Firm. (g/mm)	PFRF (g)	Cracking potential 2014-2016 (36% Skeena)	Pitting 2013-2016 (Bing 2.7)
+27 days	31.3	364	984	9.2	2.64

Practical Steps in Establishing a Modern Sweet Cherry Orchard

Lynn E. Long

Oregon State University



Sweet Cherry Varieties, Rootstocks and Training Systems for the Modern Sweet Cherry Orchard

Lynn E. Long

Oregon State University