

A photograph of a man wearing a blue cap and a striped shirt, standing next to a large, gnarled cherry tree in a field. The tree has thick, dark bark and green leaves. The man is looking up at the tree. The background shows other trees and a grassy field.

UPDATE ON CHERRY ROOTSTOCKS



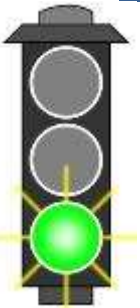
Penn State **Extension**

Evolution of Sweet Cherry Production Systems

- Continuous Evolution
 - Naturally a tall tree
 - Moderate size pruned tree
 - Highly structured fruiting system
- Only since Gisela Rootstocks in 1990's has the system evolved



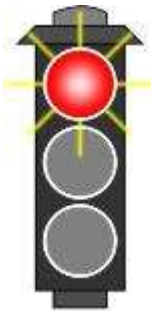
Pluses and Minuses of High Density



- Early bearing
- High yields
- Increased tree efficiency



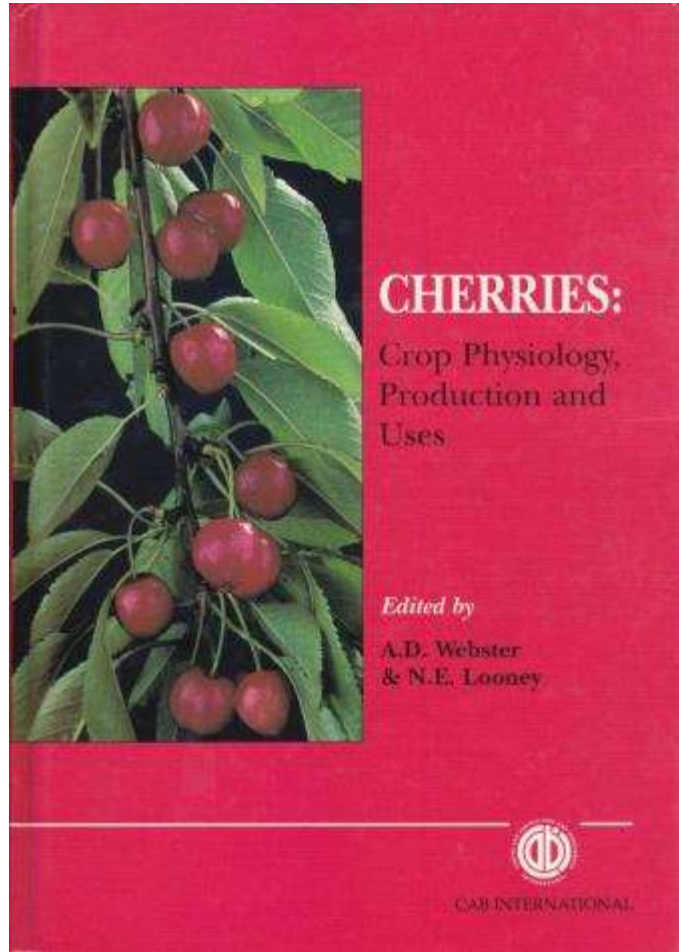
- Fruit quality?
- Early return on investment and breakeven cost



- High establishment cost
- Training and labor
- Level of knowledge
- Frost ?
- Lifespan ?

Slide adapted from Musacchi & Lang

Current Definitive Text, 2005

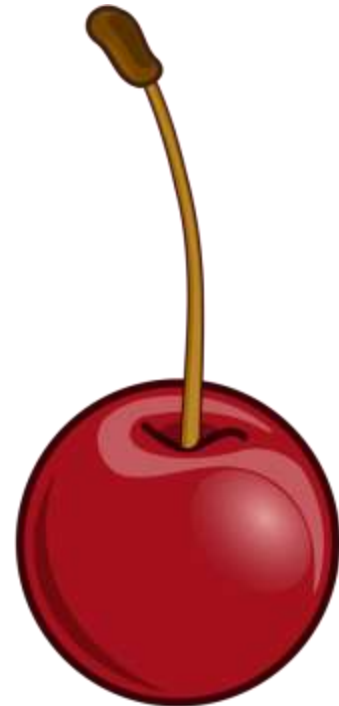


Rootstocks for Sweet
& Sour Cherries,
pages 127-163

No Less than 45 +
Rootstocks or Series of
Rootstocks

Search of 12 U.S. Nursery Web Sites

- Colt
- Gisela 3
- Gisela 5
- Gisela 6
- Gisela 12
- Krymsk 5
- Krymsk 6
- Mahaleb
- Maxma 14
- Mazzard
- MxM 60



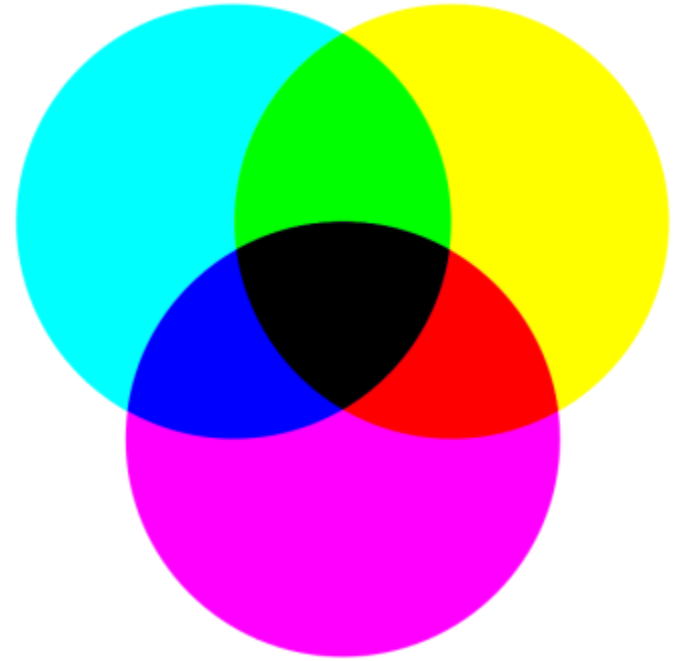


Numerous studies have shown that cherry production is dependent upon localized:

- ✓ **Climate**
- ✓ **Site**
- ✓ **Soils**
- ✓ **Cultivar-Rootstock combination**

Ideal Rootstock

- Compatibility
- Cold hardiness
- Uniformity in size control
- Flowering and fruiting habit
- Lack of root sucker production
- Virus susceptibility



Compatibility with scion

- Mazzard is compatible with all known sweet cherry cultivars.
- Mahaleb has been shown to be incompatible with some cultivars.
 - Tieton, Chelan,
- Weiroot 13 incompatibility problems
- Colt incompatible with Sam or Van

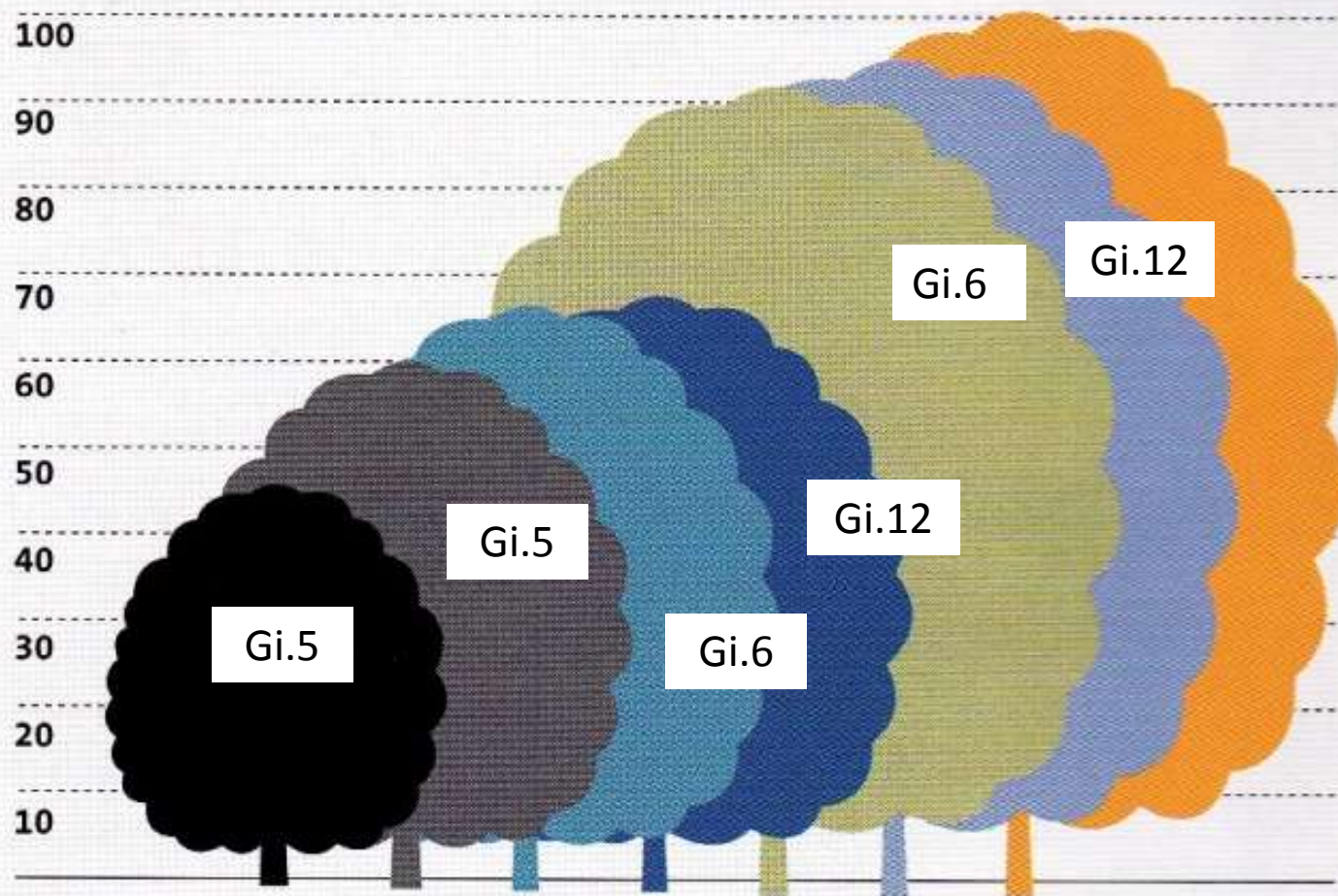
Cold Hardiness

- Concern mainly with late fall or early winter freezes
- Mahaleb acclimates earlier than Mazzard
- Gisela parents are both hardier than Mazzard

CHERRY ROOTSTOCK SIZE COMPARISON

*Gisela® rootstock sizes are different for East Coast and West Coast.

- Mazzard
- Mahaleb
- MxM® 60
- Gisela® 12 (West)
- Gisela® 6 (West)
- Gisela® 12 (East)
- Gisela® 6 (East)
- Gisela® 5 (West)
- Gisela® 5 (East)



Relative Size Differentials

- Degree of growth control may vary by cultivar
 - Bing/Gi.12 < Bing/Gi.6
 - Regina/G.12 > Regina/Gi.6
- Location
 - Gi.6 in East ~ 60% seedling
 - Gi.6 in West ~ 90% seedling

Mazzard

- *Prunus avium*
 - The ORIGINAL rootstock
 - Largest of those available
 - Susceptible to crown gall & bacterial canker
 - Tolerance to *Phytophthora*
 - Not precocious
 - F 12/1 clone ?
 - Vegetatively propagated seedlings



Mahaleb

Prunus mahaleb

More sensitive to wet soils

Better for calcareous soils

More cold hardy than Mazzard

Withstands drought better

Works well with all sweet varieties

Seedling selections



Gisela® Series

- Developed at Justus Leibig University in Giessen Germany
- Gi.3, Gi.5, Gi.6, Gi.7, Gi.12 were released
- Size control ranges from 45 to 90% of Mazzard

Gisela®3

- Most dwarfing ~30-35% Mazzard
- Only for best soils + irrigation
- Best suited for very high density
- Initial growth is vigorous then slows once fruiting begins
- Use in protected culture
- Does not sucker
- Must be supported



Gisela 5

- 40 – 50% of Mazzard
- Initially there were problems because it was not handled properly and stopped growing
- Can set excessive crop load resulting in small fruit on heavy yielding cultivars
- Sensitive to replant problems
- Does not like heat



Gisela 6

- Approximately 80% to 90% of Mazzard in West ~60% of Mazzard in East
- Forms new shoots easier than Gi.5
- Susceptible to bacterial canker?
- Suitable for 300 – 500 trees/A
- May need support

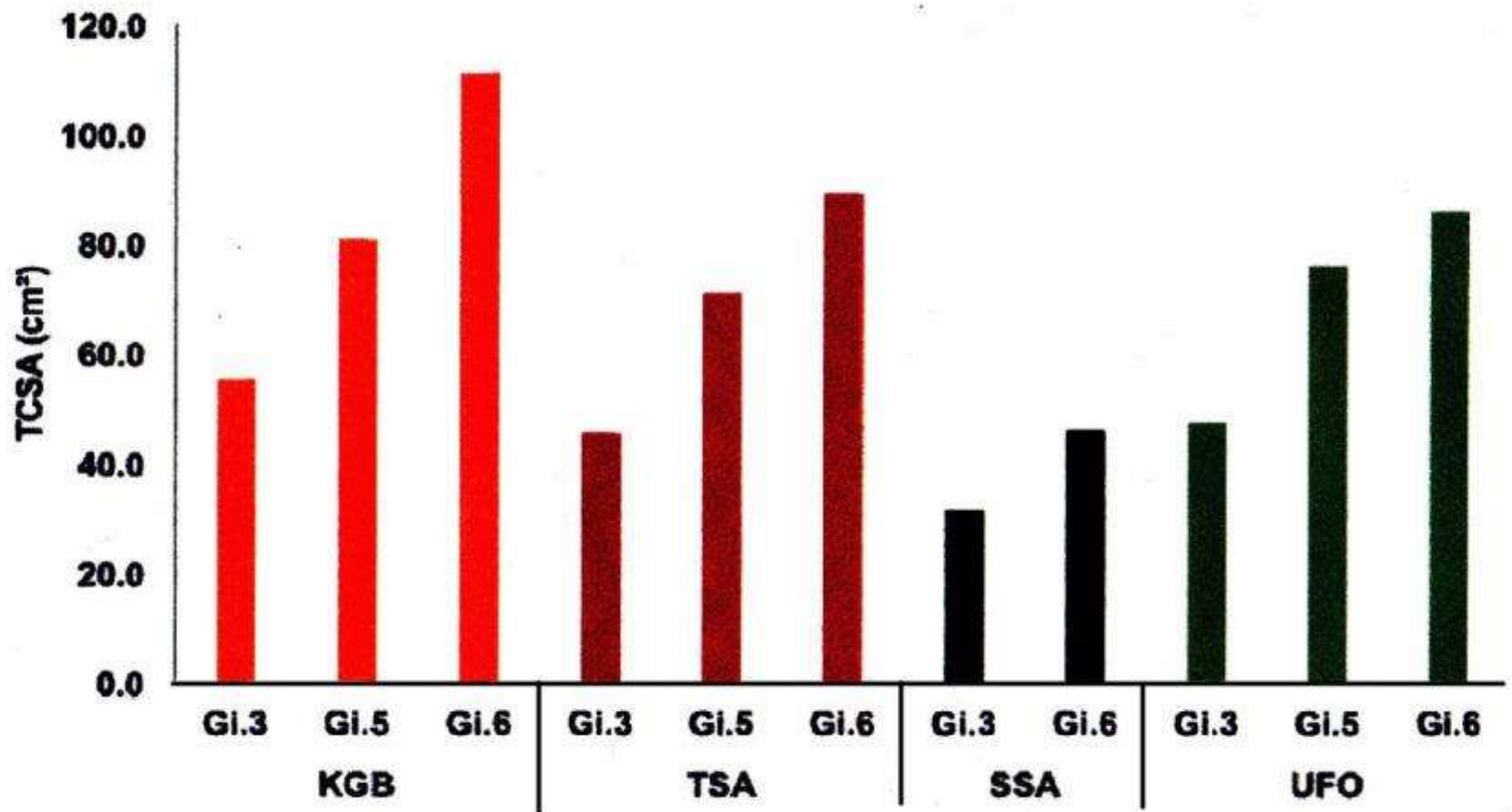


Gisela 12

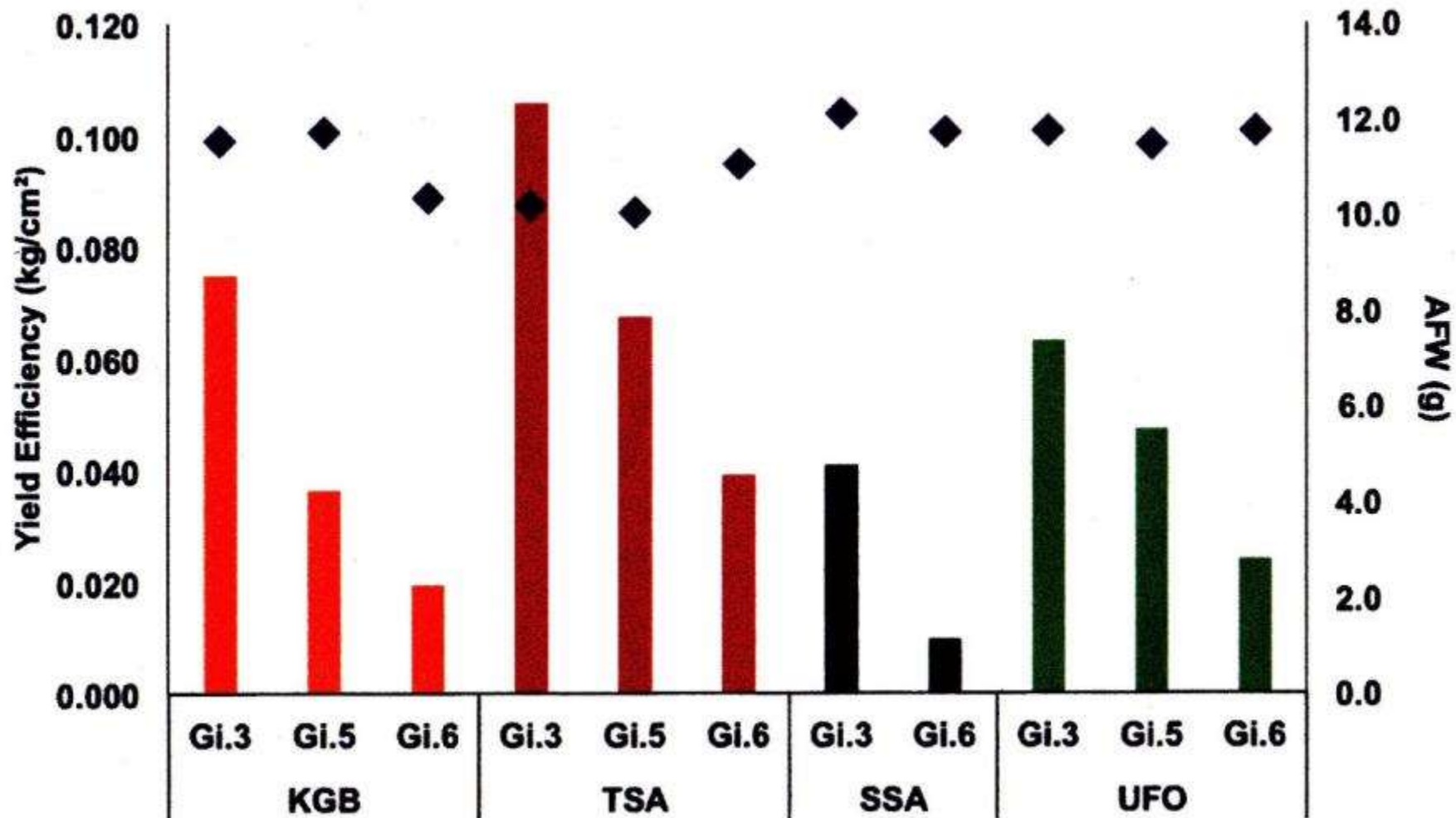
- Tested as Gi.195/2
- About 50 – 60% of Mazzard in East
- Good virus resistance
- Of Gisela series has the best anchorage
- Does not sucker

Hedelfingen tree size , number of rootsuckers and percent size of Mazzard 7th leaf

Rootstock	TCSA Fall 04 (sq cm)	# Suckers	% of Mazzard
GI 209-1 (Gisela 3)	28.9a	4.0ab	24.4
GI-148-2 (Gisela 5)	40.4a	0.0a	34.2
GI-148-3 (Gisela 7)	48.5ab	19.5 c	41.0
Weiroot 53	50.8abc	1.0ab	43.0
Wieroot 72	55.2abc	2.0ab	46.7
Edabriz	69.0abc	2.4ab	58.4
GI 195-20	78.7abc	0.6ab	66.6
GI-148-1 (Gisela 6)	80.9abc	0.6ab	68.4
Weiroot 13	108.7 bc	6.5ab	92.0
Weiroot 158	111.7 bc	10.5 bc	94.5
Mazzard	118.2 bc	0.3ab	100.0
Mahaleb	140.5 c	0.0a	118.9
Weiroot 10	142.0 c	11.2 bc	120.2
P-value	0.0001	0.0001	



NC-140 Rootstock x System Trial



NC-140 Rootstock x System Trial

Krymsk Rootstocks

- Originated near Black Sea in Russia
- Should be cold hardy (?)
- Propagated by softwood cuttings
- Krymsk 5 & 6 suitable for cherry
- Virus sensitivity issues
- Semidwarfing
 - K.5 ~ Gi,6 or Gi.12
 - K.6 ~ Gi.5

Krymsk cont.

- Krymsk 5 aka VSL-2
- Krymsk 6 aka LC-52
- May do better in heavier or wetter soils
- Needs more testing

Rootstock trial Regina



Gisela 5



Krymsk 5

From J. Vercammen, Belgium

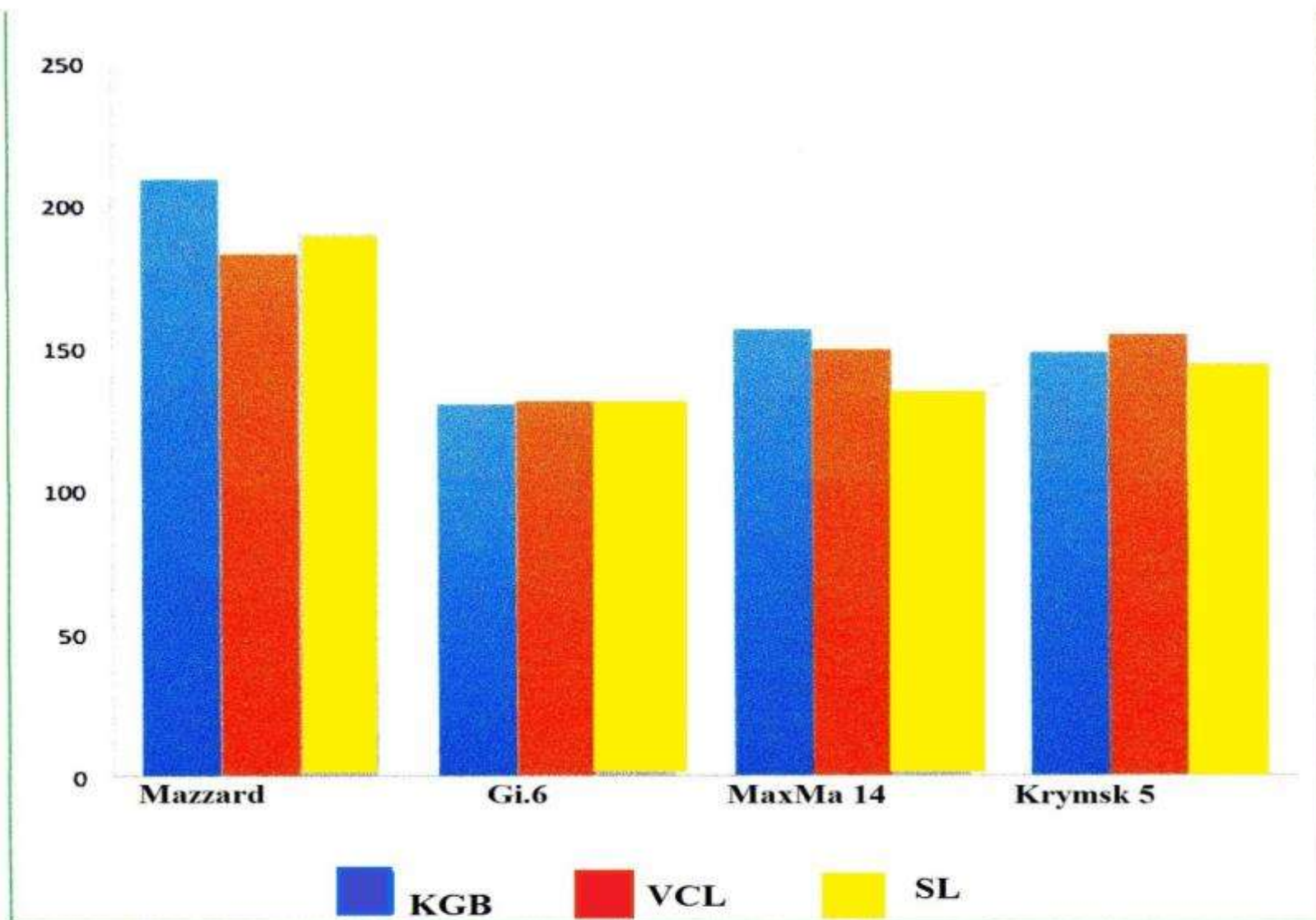


FIGURE 1 – RELATIVE TREE SIZE OF SWEETHEART GROWN ON FOUR ROOTSTOCKS AND TRAINED TO THREE SYSTEMS AS EXPRESSED BY TRUNK CROSS SECTIONAL AREA (CM²).

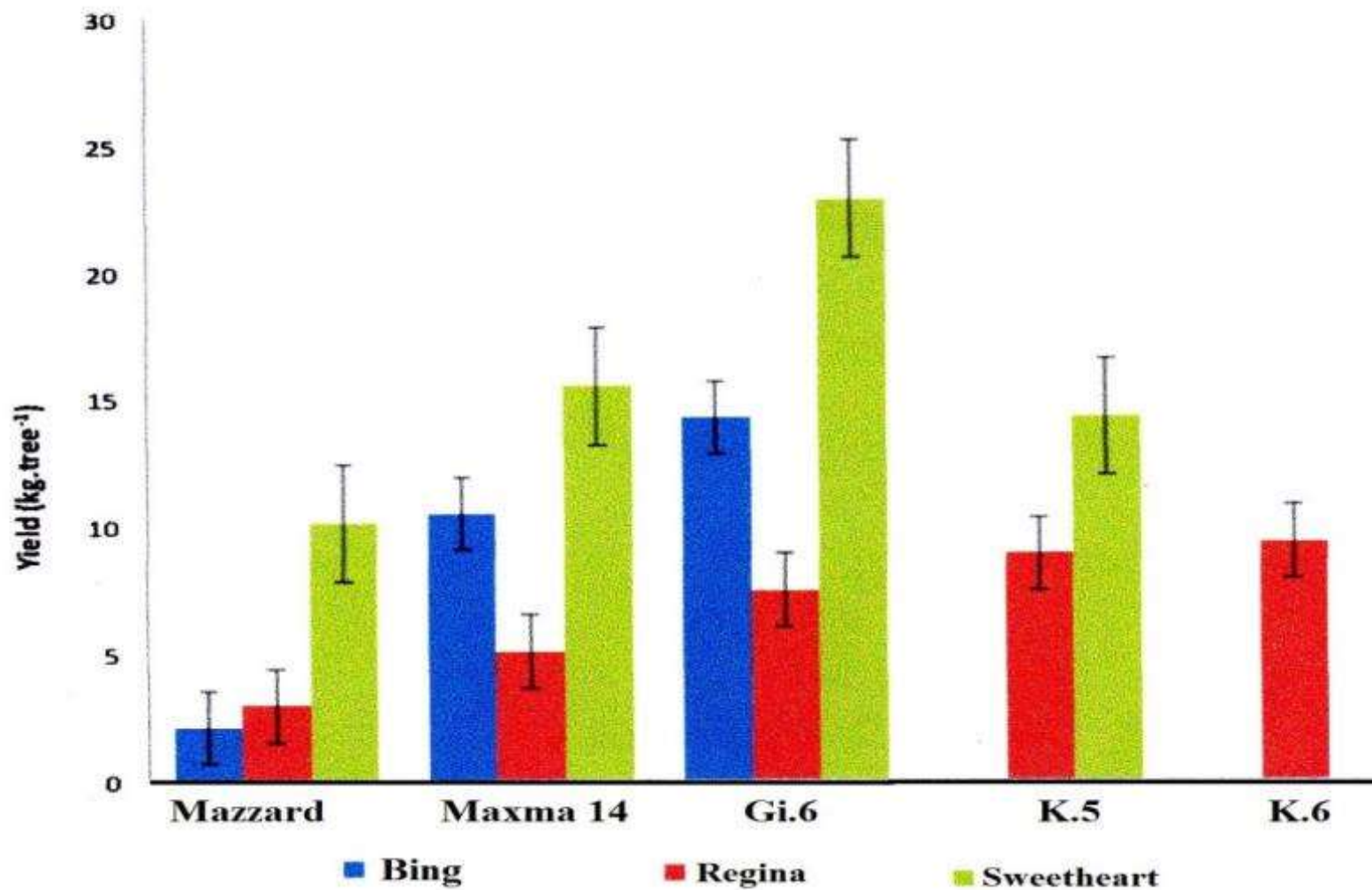


FIGURE 3 – AVERAGE PER TREE FOURTH THROUGH SIXTH LEAF YIELD OF THREE VARIETIES COMBINED WITH FOUR ROOTSTOCKS.

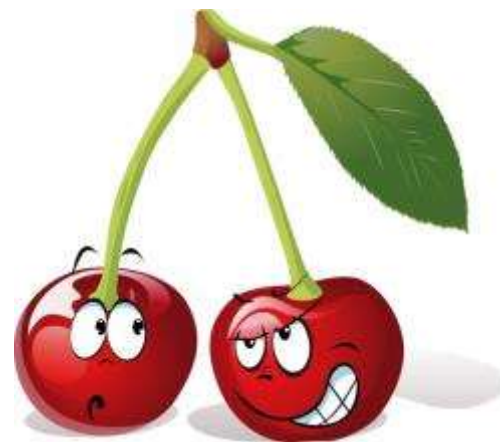
Maxma 14

- Open pollinated Mahaleb seedling
 - Mahaleb x Mazzard ► Ma x Ma = Maxma
- Semidwarf ?
 - Depending upon soil strength
- More popular in France
- Needs annual appropriate pruning
- Some resistance to *Phytophthora*



MxM 60

- Mahaleb x Mazzard
- Resistance to *Phytophthora*
- Not precocious
- Very vigorous
- Not much planted in eastern U.S.



F 12/1

- Vegetatively propagated selection of Mazzard
- Preferred in western OR due to bacterial canker
- Rootstock usually forms the trunk from the branch union down and the cultivar is budded onto each lateral branch
- Susceptible to crown gall
- More vigorous than Mazzard

Weiroot Series

- Wild tart cherry seedlings growing in Bavaria
- Propagated by softwood or semi-hardwood cuttings
- Some incompatibility with sweet cultivars
- Original releases were W.10, W.13, W.14
- Later releases were W.53 & **W.72**
- Require support



On the Horizon

- WeiGi series
 - Cross of Gi.5 with Weiroot 720
 - WeiGi.2, 1, 3, 4 (smallest to largest)
- Michigan State series
 - Tart cherry

Relative tree sizes for 9 commercial cherry rootstocks & the 5 MSU candidate cherry rootstocks

Gi 12, Mazzard, Colt
Maxma 14, Mahaleb

Gisela 6
Krymsk 5

Krymsk 6

Gisela 5

90+%

80-90%

60-80%

50-60%

40-50%

35-40%

Clinton

Lake, Cass
Crawford

Clare



Image courtesy A. Iezzoni



Penn State **Extension**

Hedelfingen Tree Size by Rootstock in 5th Leaf

