Opportunities in Stone Fruits

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Cherry Production in the US

1. Washington – 193,000 t
2. California – 91,000 t
3. Oregon – 47,000 t
4. Idaho – 3,000 t
5. Montana – 2,500 t

1. Michigan – 23,000 t
2. New York – 2,000 t

Sweet Cherry Production in Cold and Humid Climates

- Tree mortality. "Cherry trees love to die".
- Bacterial canker
- Fruit cracking due to rain
- Inconsistent fruit set
- Large trees
- Low yields
- Small, soft cherries
- Bird predation
- Poor shelf life

The introduction of dwarfing and precocious rootstocks and new varieties and new management strategies offer new opportunities to grow cherries for a large local market.

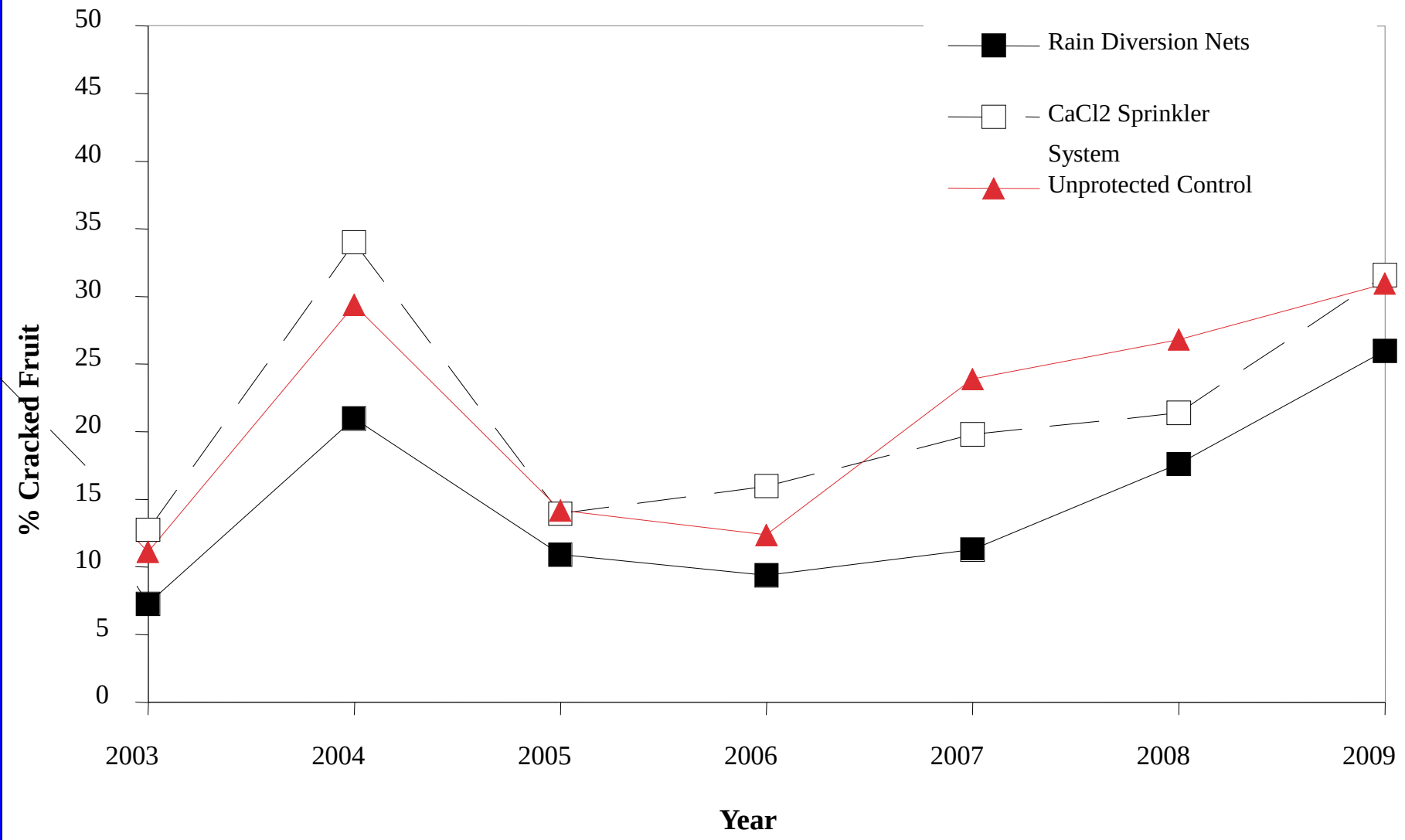
1. Strategies for keeping trees alive in humid cold climates

- Plant on large berms
  - Berms should be 30cm high.
  - Berms provide improved root zone oxygen.
  - Berms prevent water logging of root system.
  - Berms reduce winter injury associated with excess water.
  - Trees on berms require irrigation.
- Control bacterial canker.
  - Intensive Copper spray program
    - Two sprays in the fall 20% leaf fall and 80% leaf fall
    - Two sprays in the spring (bud swell and immediately after pruning.
  - Never cut flush on the trunk. Leave a 15-20cm stub whenever removing branches on the trunk.
  - Make major pruning cuts after harvest.

2. Control Rain Cracking

- Berms and tile drainage down each row alley to remove surface water and excess soil moisture can help reduce soil moisture induced rain cracking
- Rain shields provide good protection against rain cracking but there is still some damage
  - Open shelters when first cherries turn pink.
  - Divert Rain water to alley between rows.
- Manage soil moisture with a constant high water content using daily trickle irrigation..

Control of Rain Cracking of Fruit

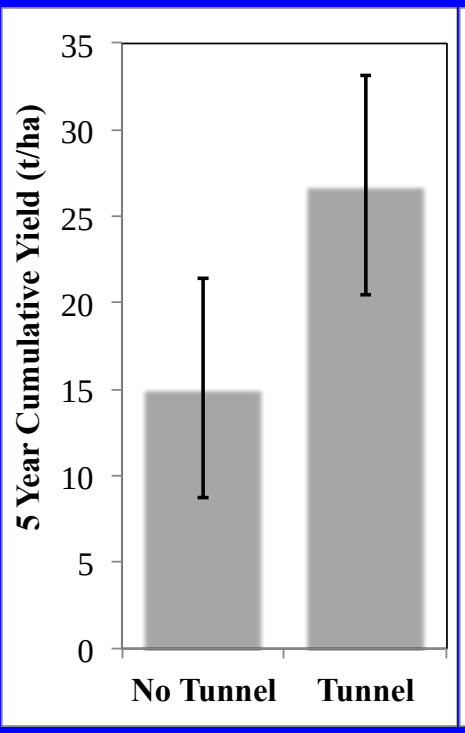


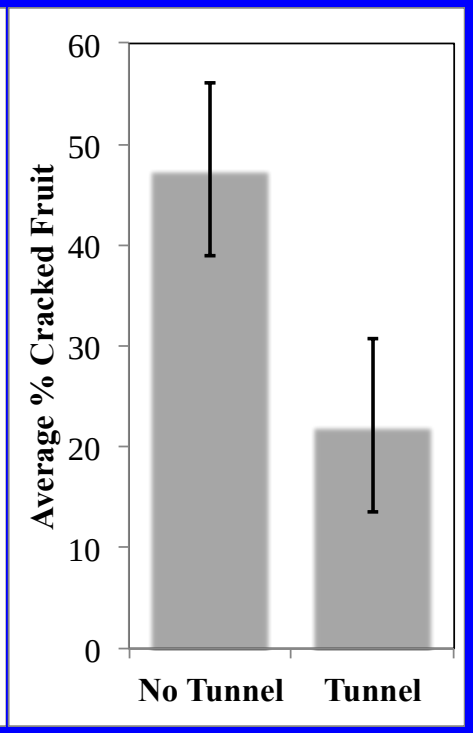
Cherries under Plastic Tunnels

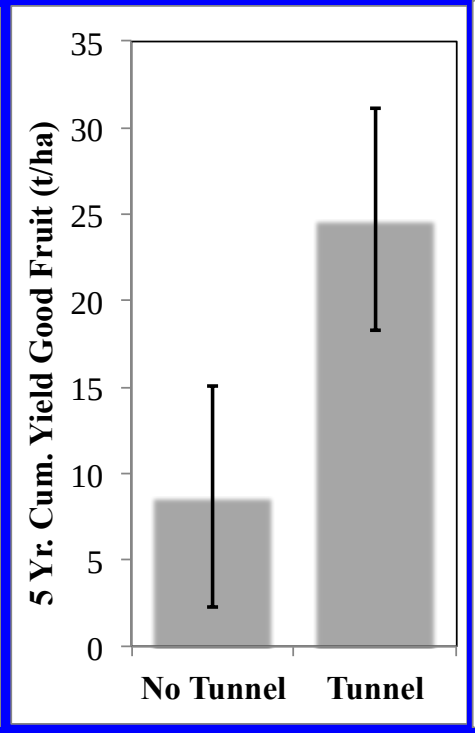
Tall Spindle trees- pick with ladders or platforms

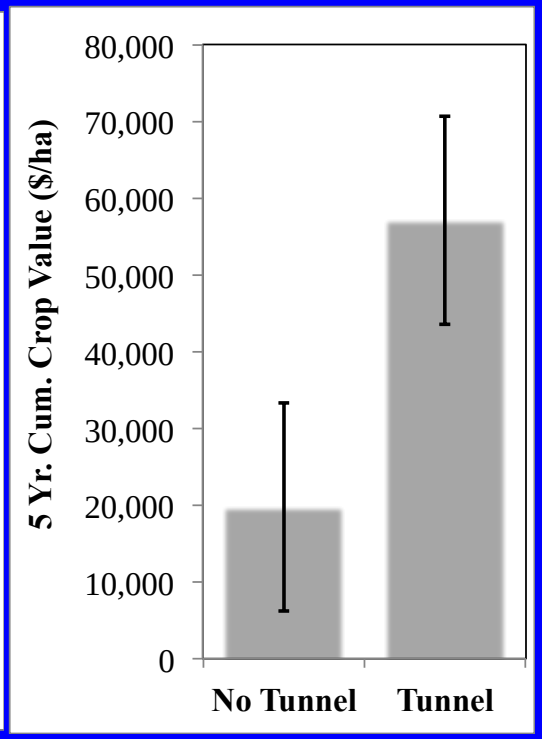
Bush trees (KGB) – pick from the ground

Effect of the Tunnel







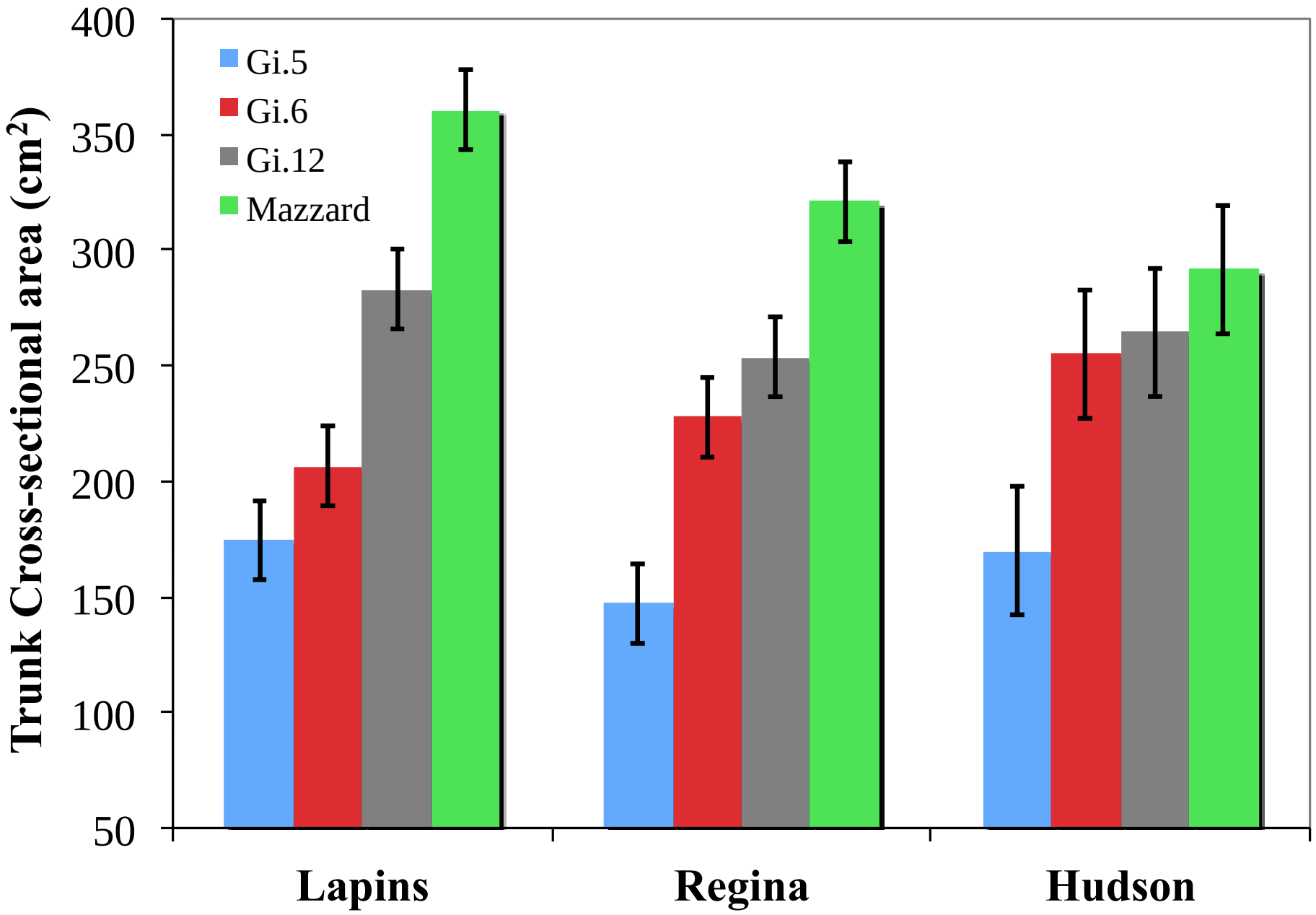


- The tunnel increased yield, reduced fruit cracking and improved cumulative crop value.
- The tunnel has not paid for itself in the first 3 cropping years.

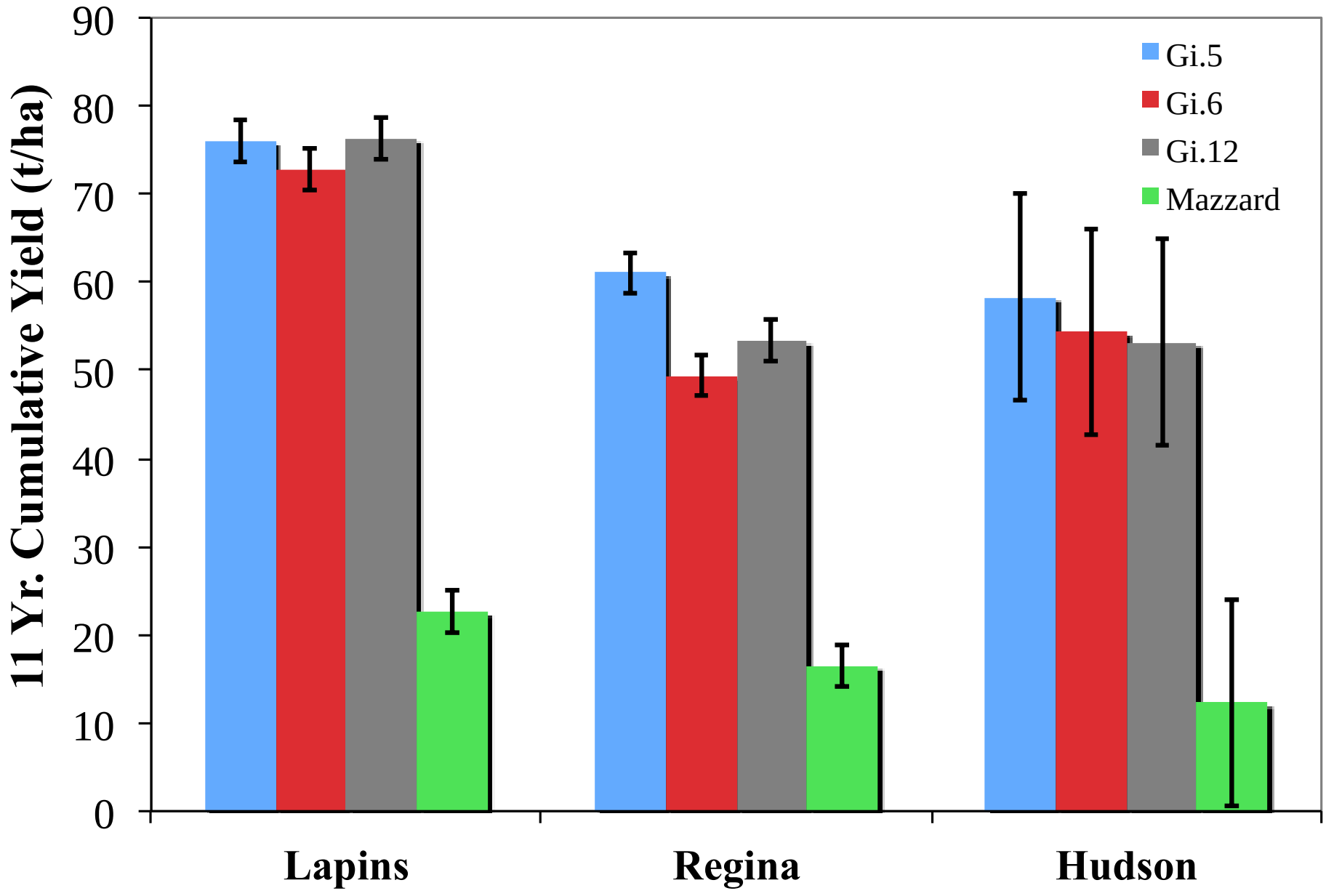
3. Control Tree Size with Dwarfing and Precocious Rootstocks and Renewal Pruning

- Gisela series
  - Gi.3 (in most cases too dwarfing)
  - Gi.5
  - Gi.6
  - Gi.12
- Weiroot series
  - Wi.72 (suckers badly)
  - Wi.158 (suckers badly)
- Edabriz
- PiKu series
  - PiKu.1
  - PiKu.3
  - PiKu.4
- Krymsk 86

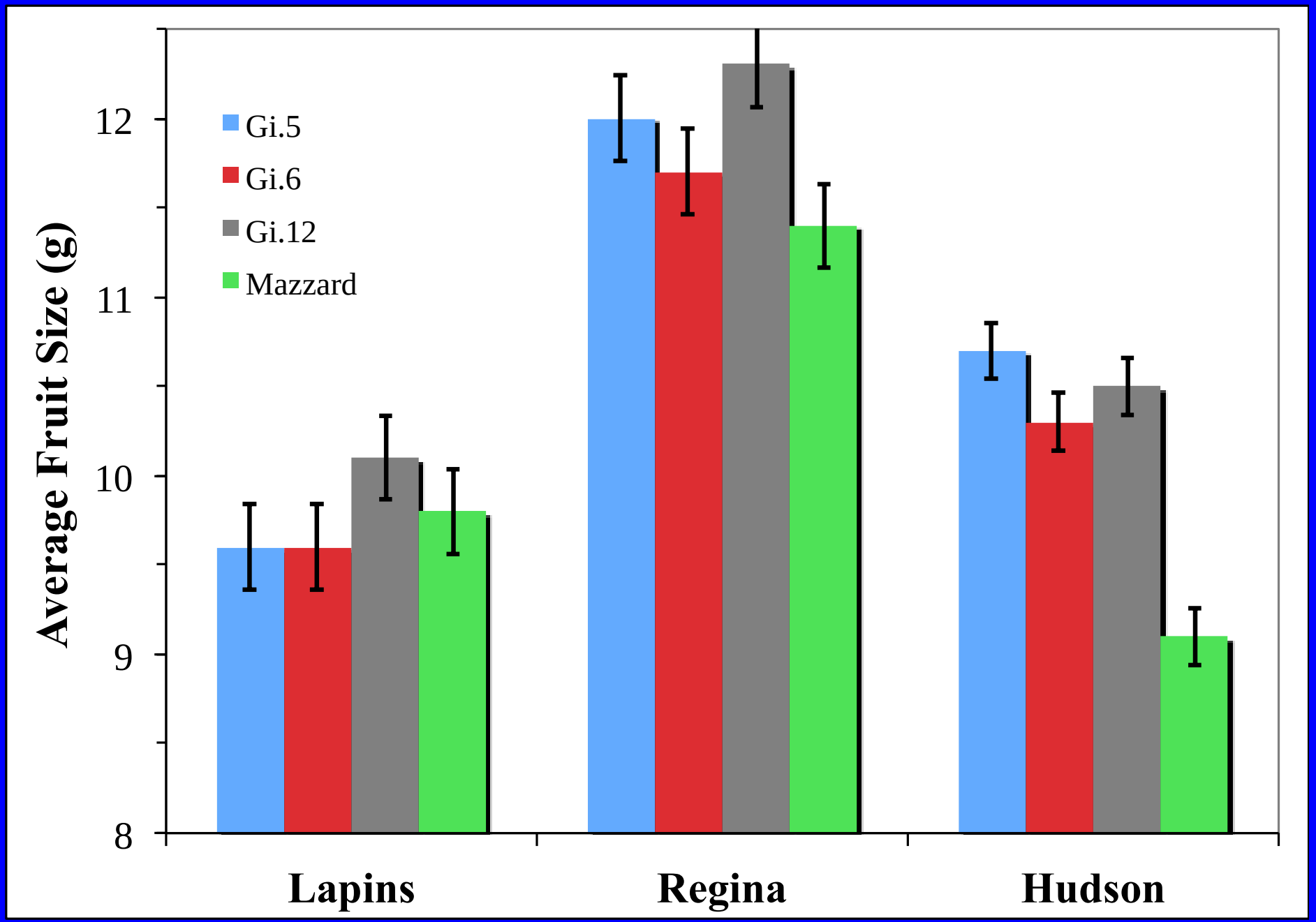
Tree Size


Trunk Cross-sectional area (cm²)
400
350
300
250
200
150
100
50
Gi.5
Gi.6
Gi.12
Mazzard
Lapins
Regina
Hudson

Production


11 Yr. Cumulative Yield (t/ha)
90
80
70
60
50
40
30
20
10
0
Gi.5
Gi.6
Gi.12
Mazzard
Lapins
Regina
Hudson

Fruit Size


Average Fruit Size (g)
12
11
10
9
8
Gi.5
Gi.6
Gi.12
Mazzard
Lapins
Regina
Hudson

Conclusions on Dwarfing Rootstocks

Gisela 5

- Trees on Gi.5 are about 45-50% the size of trees on seedling rootstocks
- Trees on Gisela 5 are 3.5-4.5 times as productive as trees on seedling stocks
- Trees on Gisela 5 should be planted at densities from 1500-2000 trees/ha
- Irrigation is essential
- Aggressive crop load management is required

Gisela 6

- Trees on Gi.6 are about 60-70% the size of trees on seedling rootstocks
- Trees on Gisela 6 are 3-4 times as productive as trees on seedling stocks
- Trees on Gisela 6 should be planted at densities from 1000-1500 trees/ha
- Slightly smaller fruit size

Gisela 12

- Trees on Gi.12 are about 75-80% the size of trees on seedling rootstocks
- Trees on Gisela 12 are 3.3-4.3 times as productive as trees on seedling stocks
- Trees on Gisela 12 should be planted at densities from 750-1200 trees/ha
- Productive with good fruit size

4. Productive Orchard Systems
Group 1. Open Center

Quad Axis
3.0 X 5.4m = 598 trees/ha

Spanish Bush
2.4x5.4m=748 trees/ha

KGB
1.5x4m=1,666 trees/ha

Group 2. Central Leader Systems

Central Leader Spindle
2.4 X 5.4m = 748 trees/ha

Vertical Axis
1.8x4.5m=1235trees/ha

Tall Spindle
1.5X3.5m=1905 trees/ha

Super Spindle
0.75x3.5m=3810trees/ha

Group 3. Angled Systems

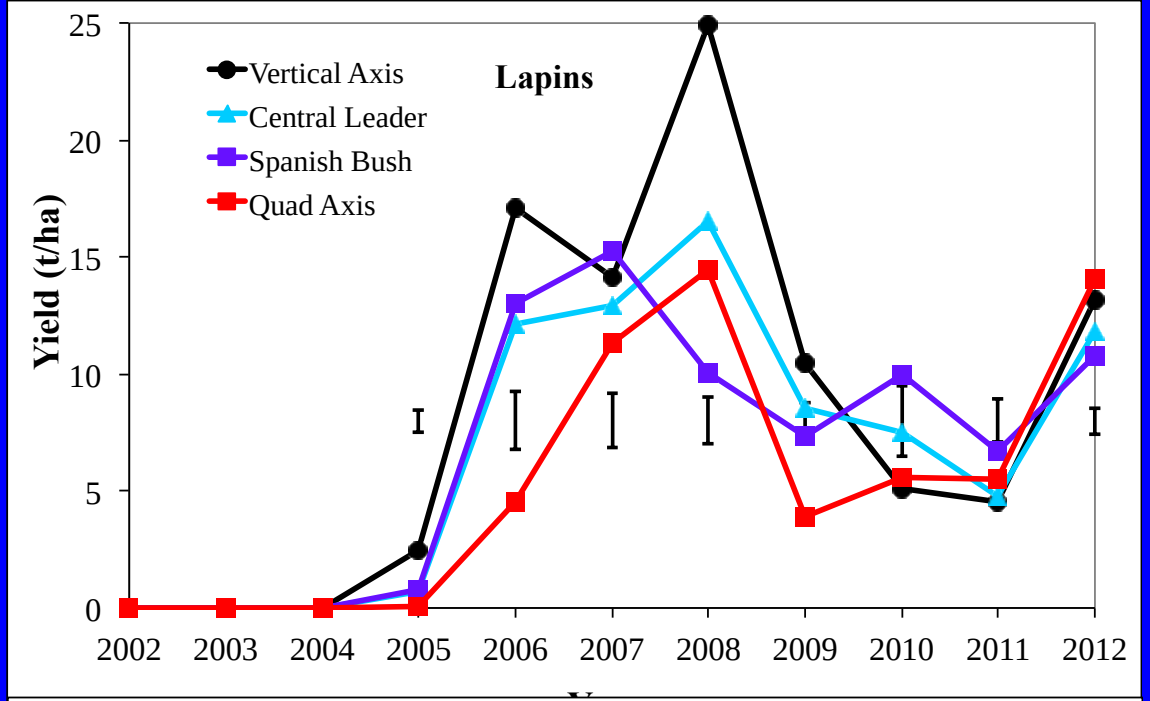
V System
1.8X5.4m=1029
trees/ha

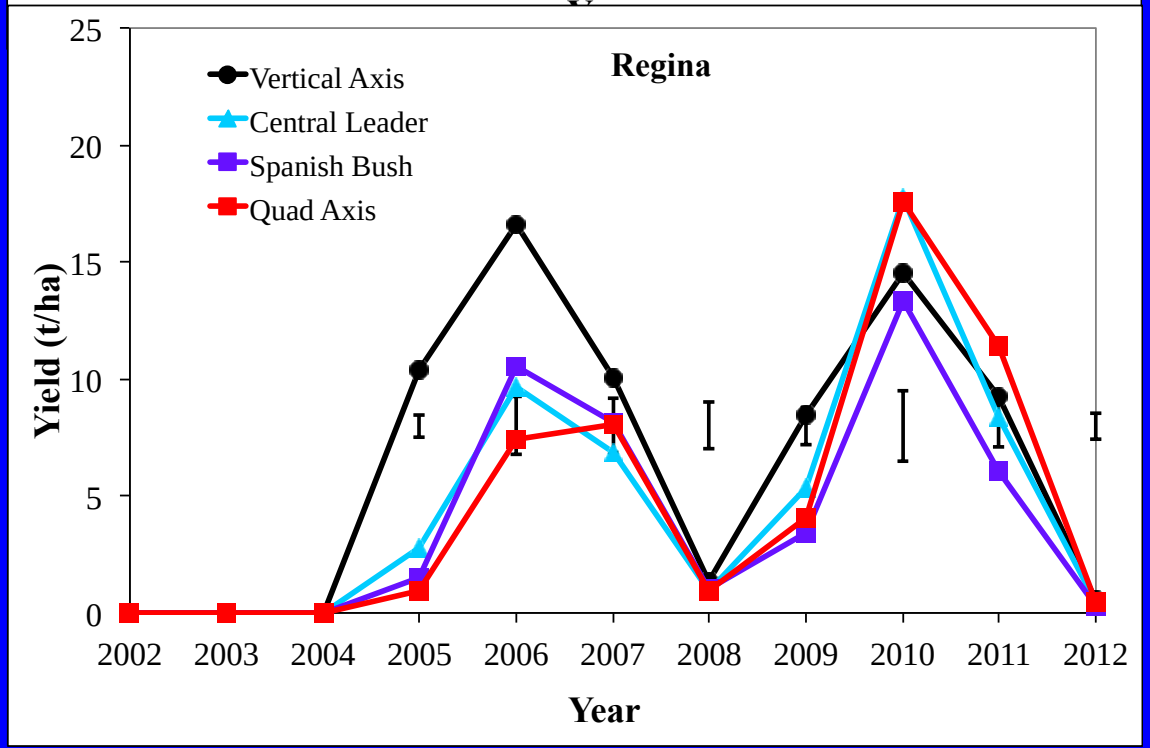
V-Spindle System
0.75x4m=1,666
trees/ha

Marchant System
(Angled tree system)
2.4 x 3.5 m
1190 trees/ha

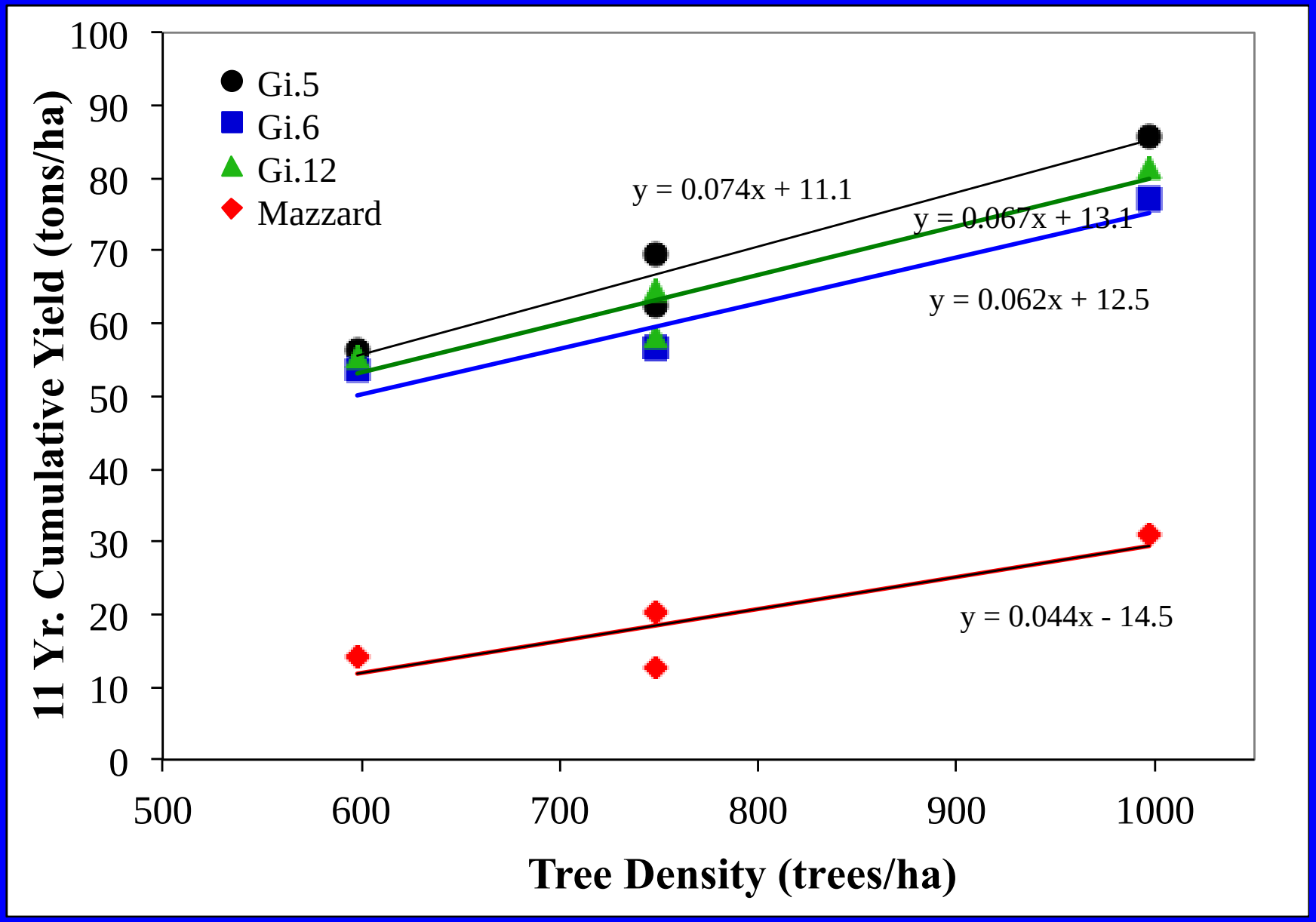
UFO
1.5 X 3.0m = 2,223
trees/ha

Yield Performance of 4 Orchard Systems



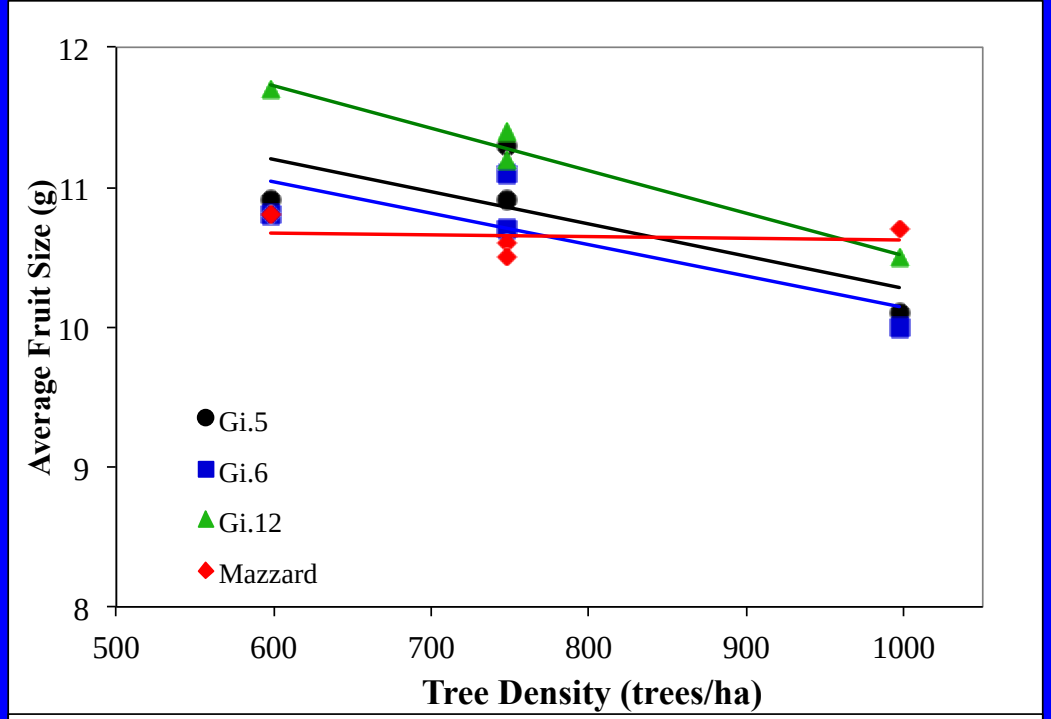


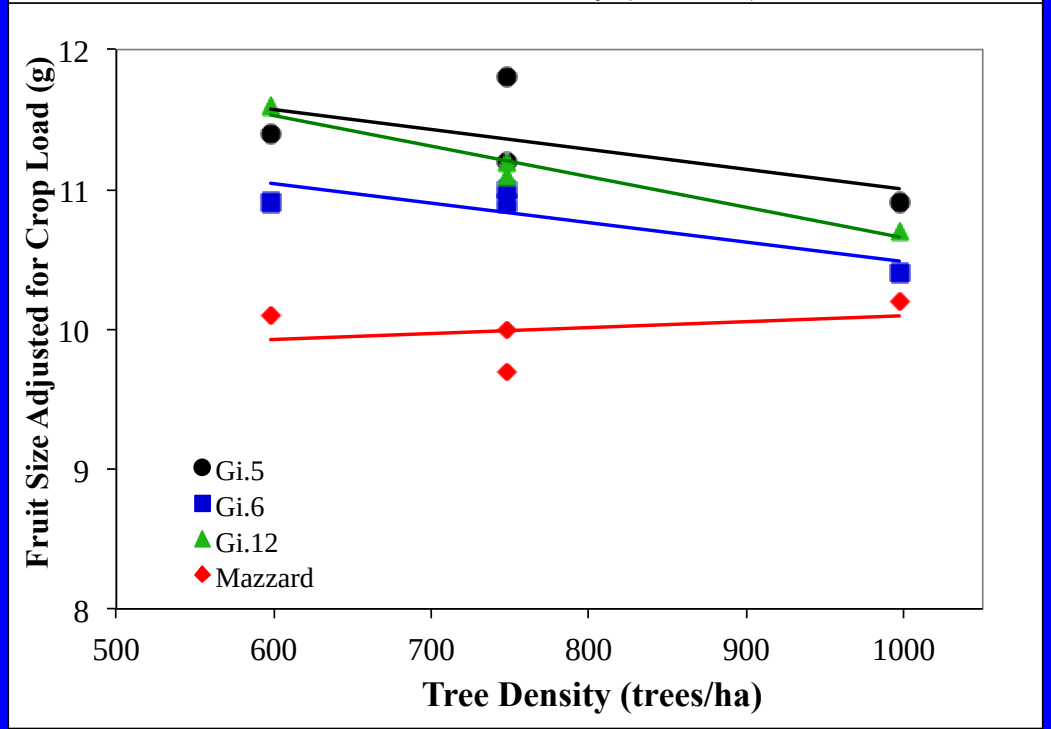
Increasing Tree Density Improves Cumulative Yield



44-74 kg of fruit/additional tree

Effect of Tree Density on Fruit Size

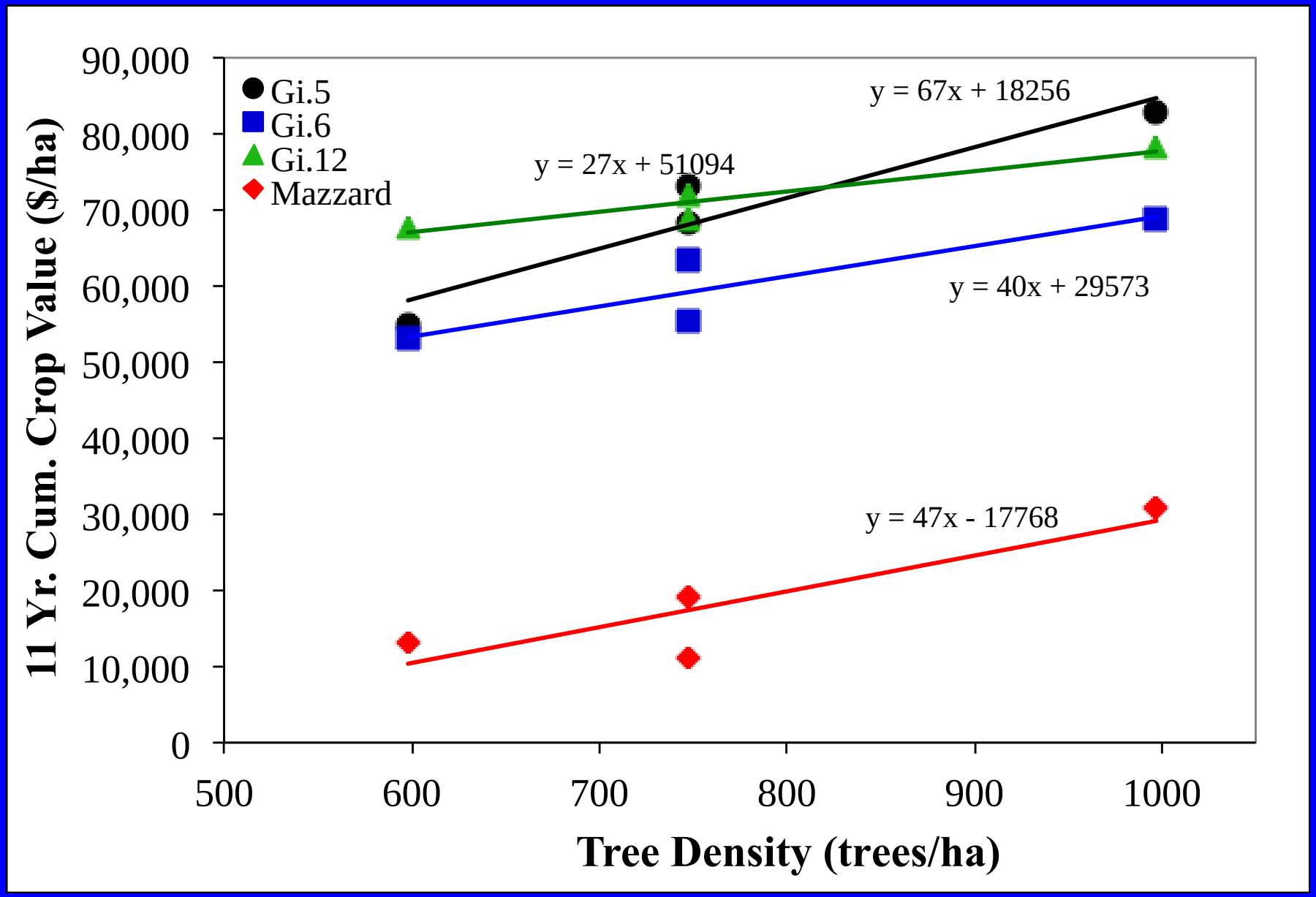




5. Produce Large Fruit Size with Dwarfing Stocks

- Manage crop load
  - Aggressive pruning.
    - Remove small diameter twigs (<25cm long).
    - Remove whole branches.
    - Stub shoots by 1/4 on self fertile varieties.
  - Spur Pruning
    - Remove spurs on underside of branch.
  - Chemical thinning (ATS)
- Additional Nitrogen fertilizer to keep vigor up.
- Planting on berms has given good continued vigor with Gisela stocks in NY
- Irrigation is especially important from straw color until harvest

6. Increasing Tree Density Improves Cum. Crop Value



$27-67/additional tree

6. Improving Fruit Set

- With some varieties like Regina the flower ovule dies before pollen tube reaches it. Thus fruit set is often low.
- Retain applied at popcorn stage improves ovule longevity and improves fruit set
- Apply 1-2 pouches per acre when first flower opens but 98% of flowers are at popcorn stage

The Integrated System for Producing Sweet Cherries in the East

- High Tree Densities (>500)
- Dwarfing Rootstocks (Gi.5 for Regina, Gi.12 for self fertile's).
- Minimal pruning during first 4 years and bud removal to obtain branching
- New varieties (e.g. Regina, Black Pearl)
- Rain Protection (Nets or Tunnels)
- Berms and Tiling
- Copper spray programs
- ReTain to improve fruit set
- Irrigation
- GA sprays
- Bird Protection - Bird Nets
- Hydrocooling and
- MAP bags for season extension

Peach Opportunities

Systems
Rootstocks
Thinning

BiAxis-Vee

- High tree density (300 to 600 trees/acre)
- Suggested Spacings
  - 4-6 feet inrow X 14-16 feet between rows
- Training System
  - Do not use a trellis in NY due to fungal canker problems.
  - Use 2 scaffold branches.
  - Use columnar pruning of scaffolds (No secondary scaffolds).
  - Fruiting branches should originate on main scaffold.
  - Fruiting branches renewed back to main scaffold.
  - Tree height should be 10-12 feet.

QuadAxis-Vee

- Suggested Spacings
  - 8-10 feet inrow X 16-18 feet between rows
- Training System
  - Use columnar pruning of scaffolds (No secondary scaffolds).
  - Fruiting branches should originate on main scaffold.
  - Fruiting branches renewed back to main scaffold.

Central Leader/Vertical Axis

- This system is common in France
- Moderate tree densities (180 to 350 trees/acre)
- Suggested Spacings
  - 8-12 feet inrow X 16-20 feet between rows
- Training System
  - Permanent bottom tier of branches.
  - Renewal of upper branches back to central leader.
  - Tree height should be 10-12 feet.

Slender Spindle/Fusseto

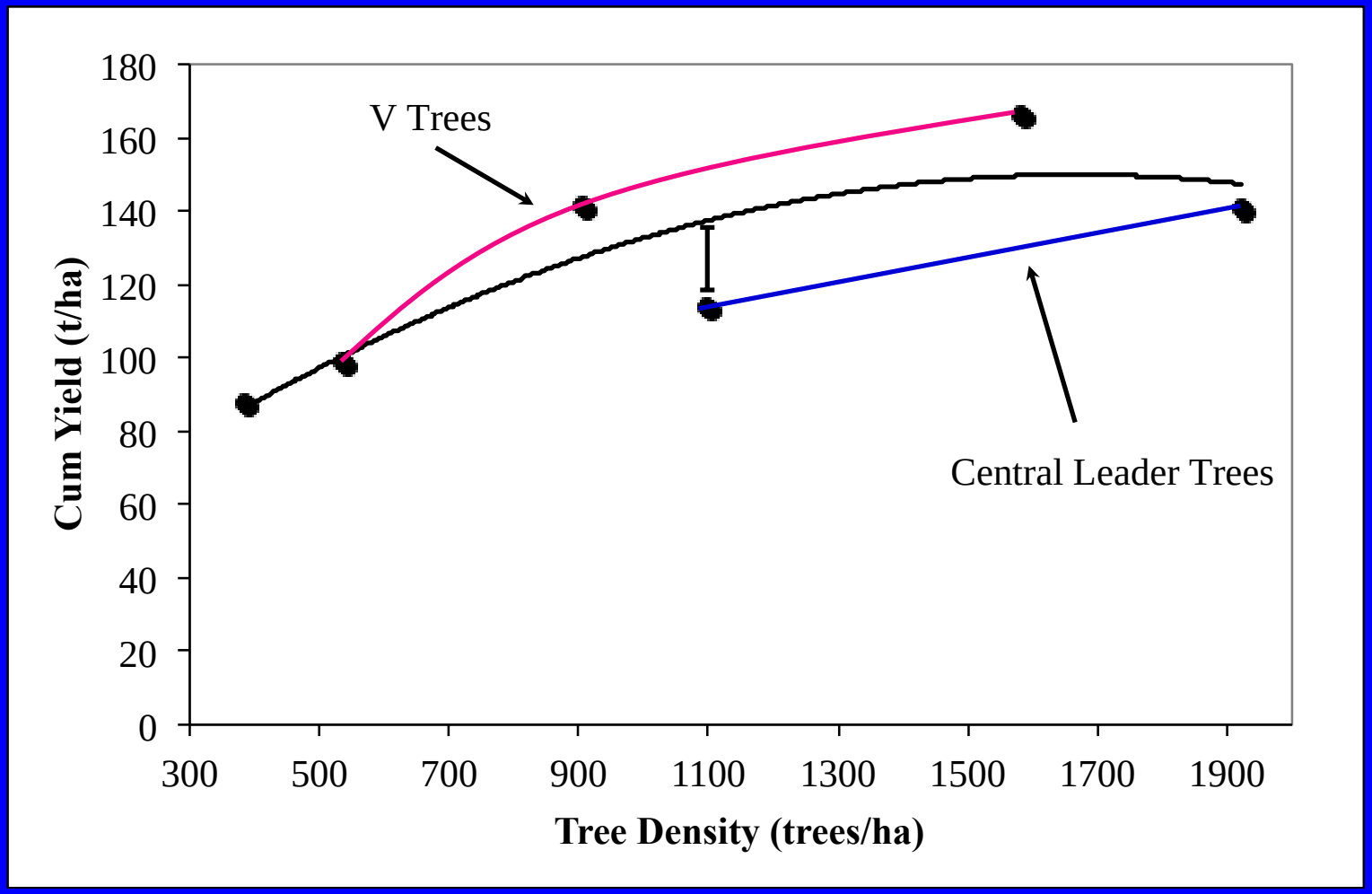
- This system is common in Italy.
- High tree densities (400 to 800 trees/acre).
- Suggested Spacings
  - 4-7 feet inrow X 14-16 feet between rows.
- Training System
  - No permanent branches.
  - Renewal of all branches back to central leader.
  - Tree height should be 9-10 feet

New Peach Rootstocks We are Testing

Stock	Tree Survival (%)	TCA 2014 (cm^2)	Cum Sucker No.	Cum. Yield (kg)	Av Size (g)	Cum Yield Eff (kg/cm^2 TCA)
Controller5	100	69	2	58.55	157.5	1.07
Krymsk1	75	97	1.8	68.4	170.7	1.16
KV010123	88	123	0.4	77.18	150.6	0.96
Fortuna	25	129	0.7	27.92	174.1	0.64
Imperial	25	137	4.2	29.87	143.8	0.56
Empyream	88	144	1.9	82.44	152.2	0.76
American	75	153	52.2	78.11	152.4	0.78
KV010127	63	154	0	78.83	144.8	0.75
Mirobac	100	166	3.5	102.7	142.4	0.77
HBOK32	100	181	0	108.5	147.3	0.73
Viking	100	171	0	84.5	145.4	0.57
BH-5	63	185	0.3	64.07	163.9	0.62
HBOK10	100	180	0	105.4	156.3	0.7
Guardian	75	193	2	96.84	153.7	0.75
Krymsk86	100	200	0.5	104.7	147.9	0.69
Lovell	100	207	0.1	107.3	138.6	0.67
Atlas	100	214	0	105.9	148.9	0.61
LSD $P \leq 0.05$	32	40	10.4	27.8	18.4	0.24

The V- shaped systems are more productive than the vertical systems

- the Quad Vee system works well with current vigorous rootstocks
- the Bi Vee system works well with semi-dwarfing rootstocks like Krymsk 1



Pruning Concepts for V trained peaches

- Select 2, or 4 semi erect scaffolds in second year

Bench cut each of the 2 or 4 scaffold branches to an outside bud each year to create the steep angled V

Cut back lateral branches to first live bud

Keep top of each scaffold narrow

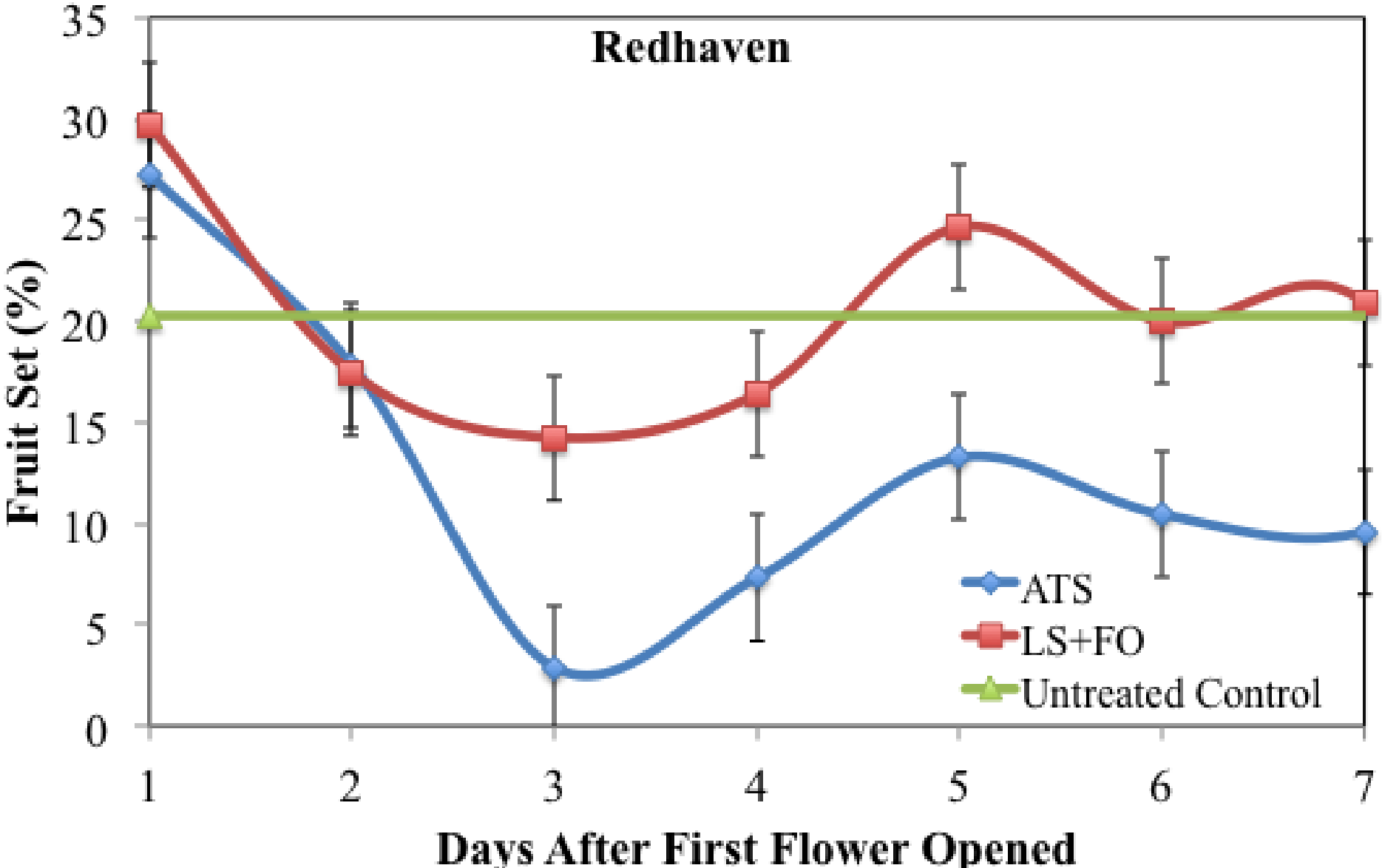
Renewal pruning with peach

Peach Thinning with the Darwin Machine

Thinning with ATS

2 Applications during bloom at 30 and 90% bloom

Rate=3-4%



Recommended Peach Systems

QuadAxis-Vee

Rootstock=Bailey, Lovell or new HBOK10 or HBOK32
Spacing= 8 X 16 feet
Tree Height=10 feet
Scaffolds=4
Pruning= Renewal pruning on each of 4 scaffolds
Thinning= Darwin with follow-up hand thinning
Harvest= Multi-level platform

BiAxis-Vee

Rootstock=Krymsk1
Spacing= 4 X 14 feet
Tree Height=10 feet
Scaffolds=2
Pruning= Renewal pruning on each of 2 scaffolds
Thinning= Darwin with follow-up hand thinning
Harvest= Multi-level platform