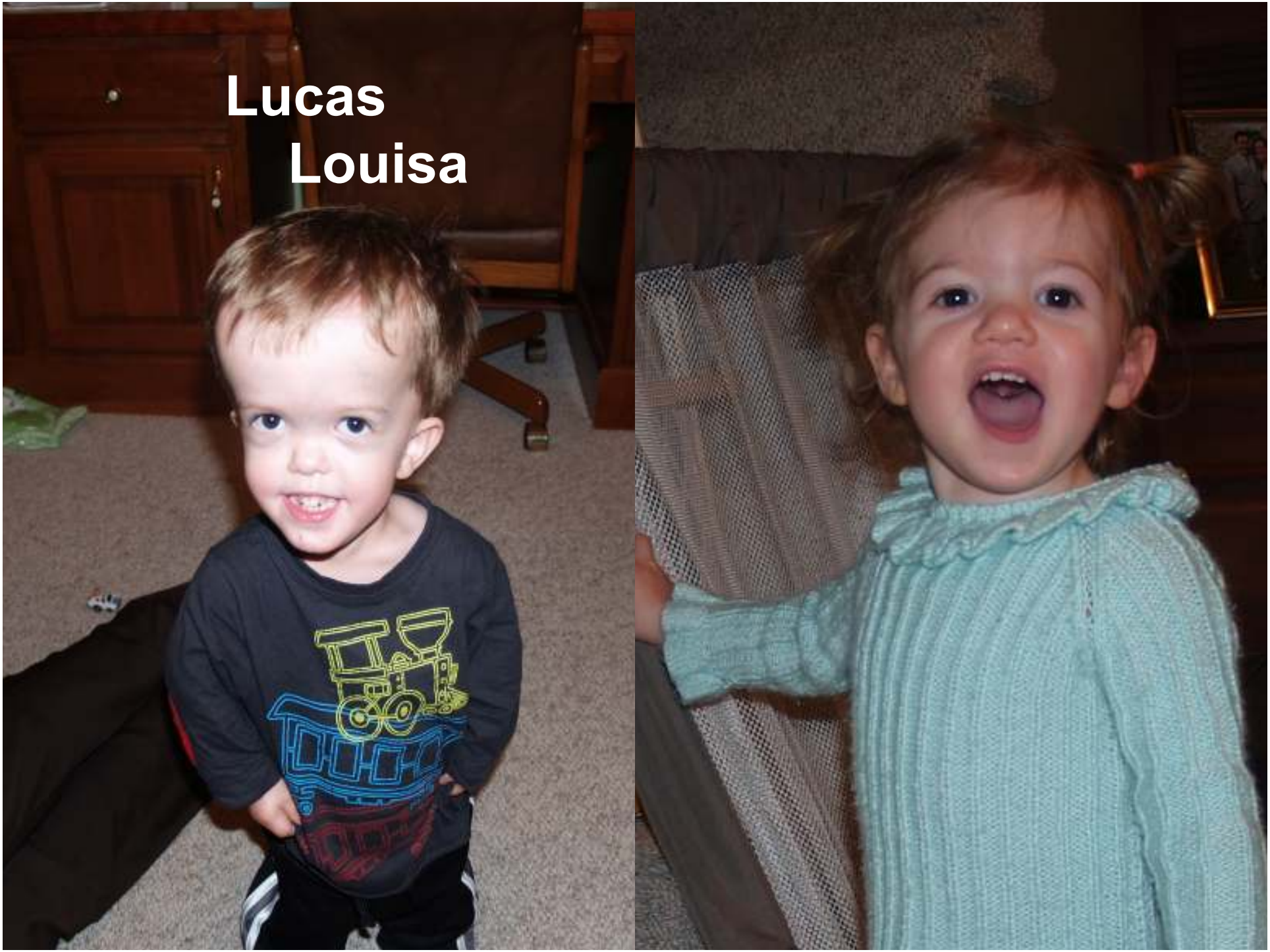
What's Next in Apple Training Systems

Philip Schwallier

MSU District Horticulture Agent

Grand Rapids Michigan

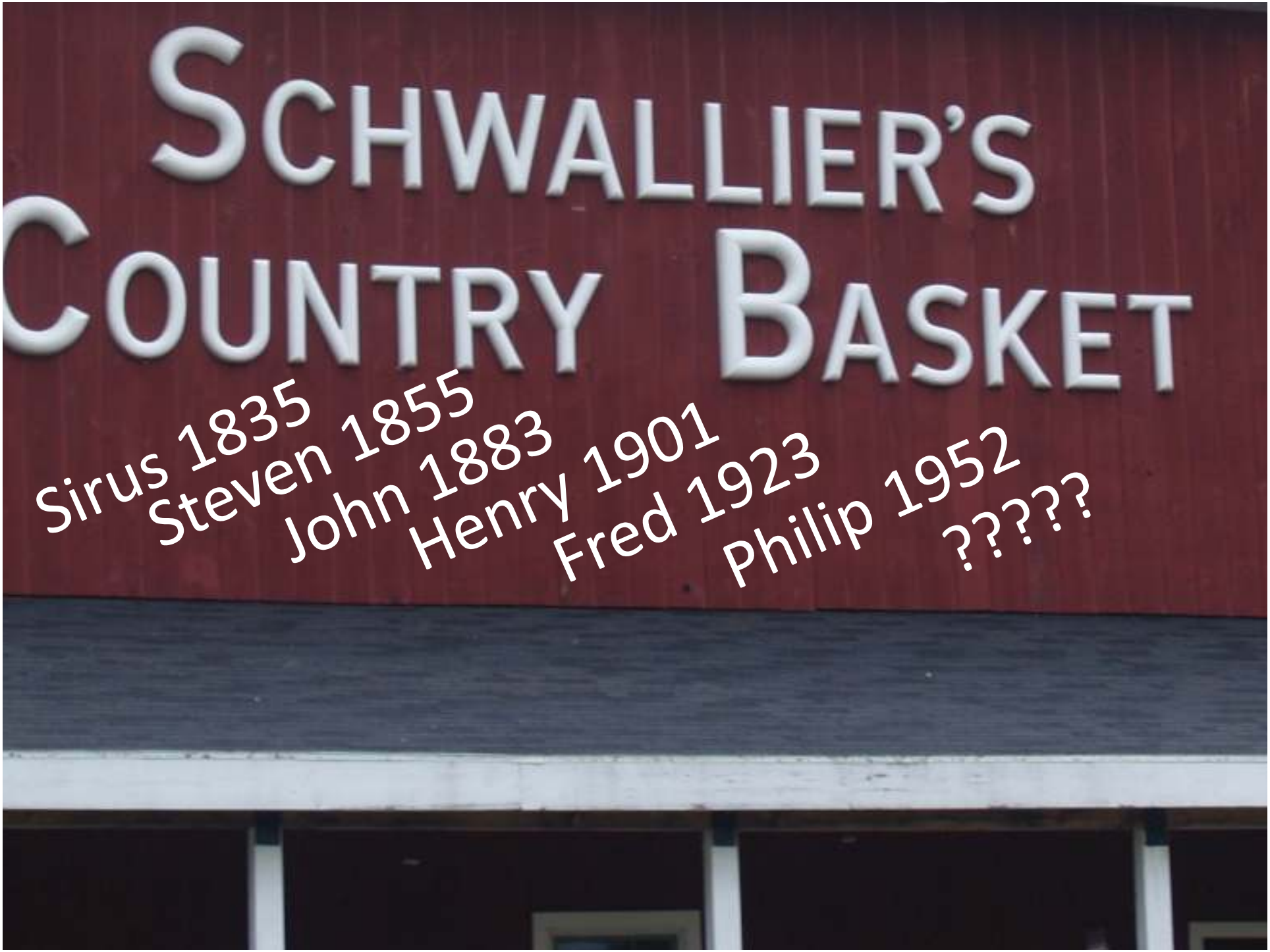
Clarksville Research Center


Lucas
Louisa


THOME
ORCHARDS
Quality Fruit since 1846
HAROLD ⋄ STEVE ⋄ MITCH


SCHWALLIER'S
COUNTRY BASKET


SCHWALLIER'S
COUNTRY BASKET
Sirus 1835
Steven 1855
John 1883
Henry 1901
Fred 1923
Philip 1952
Tim 1987


SCHWALLIER'S
COUNTRY BASKET
Sirus 1835
Steven 1855
John 1883
Henry 1901
Fred 1923
Philip 1952
?????


SCHWALLIER'S
COUNTRY BASKET
Sirus 1835
Steven 1855
John 1883
Henry 1901
Fred 1923
Philip 1952
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V-Trellis
2000 Trees/Acre
2 x 10

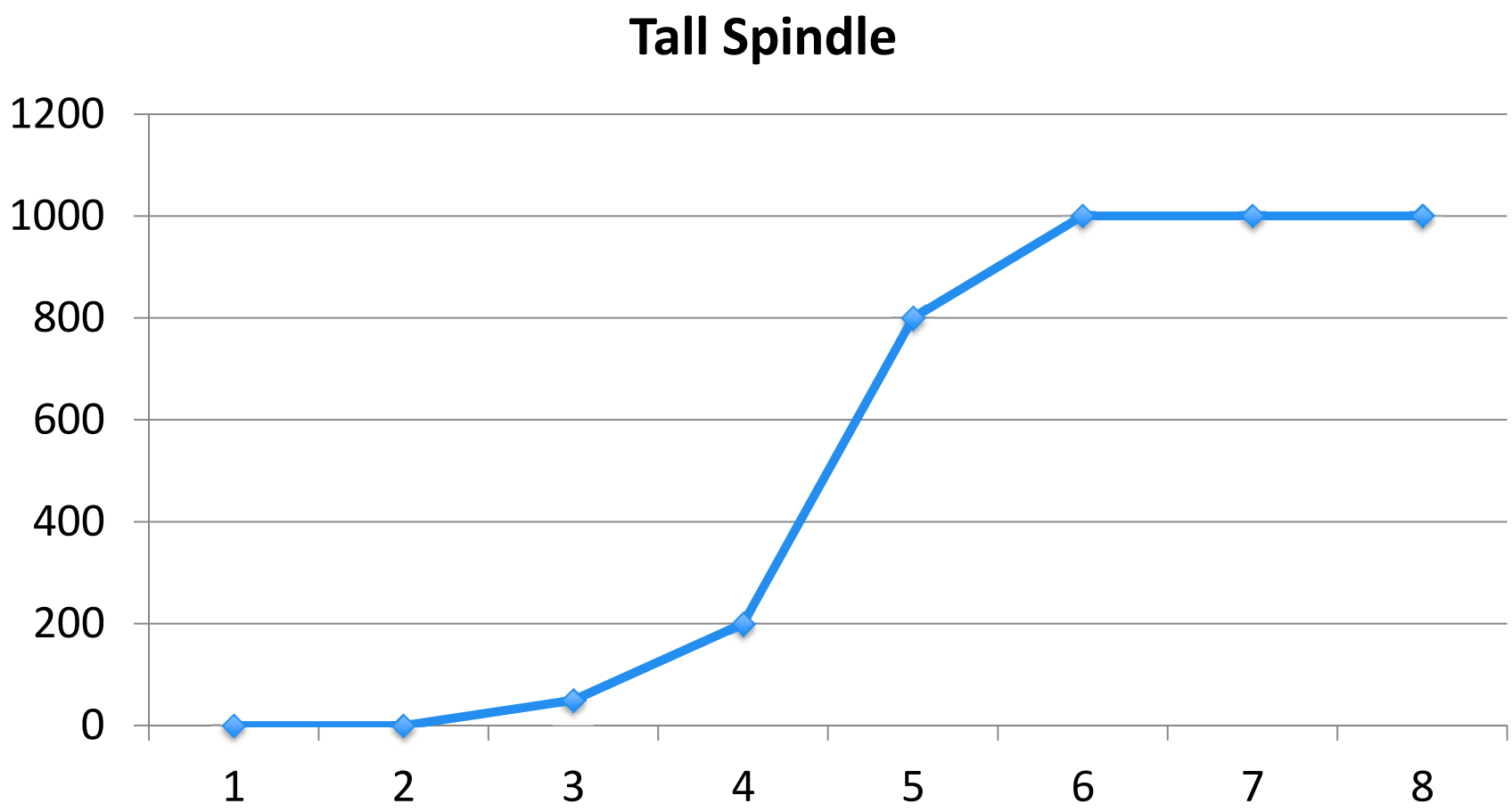

SEP 29 2003


SuperSpindle
B.C. Canada

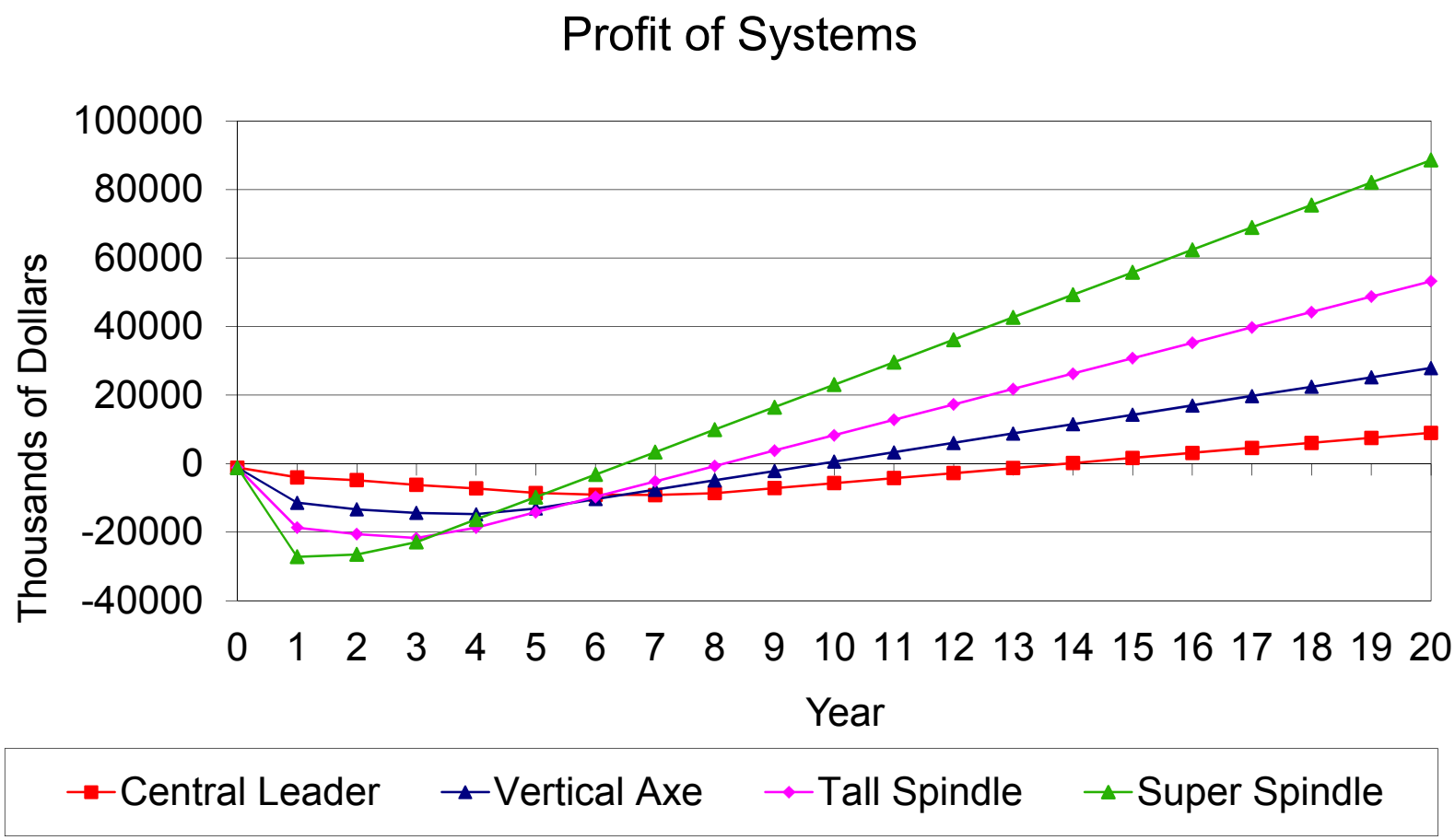
Tall Spindle

- Current world trend is Tall Spindle
- Tall Spindle characteristics.
  - 30-50 bins/acre.
  - High Density.
  - 800 to 1200 trees/acre.
  - Early yields.
  - Simple system.
  - Intensive training, bending laterals, labor.
  - Mechanization, yes, but not perfect.
  - Expensive system

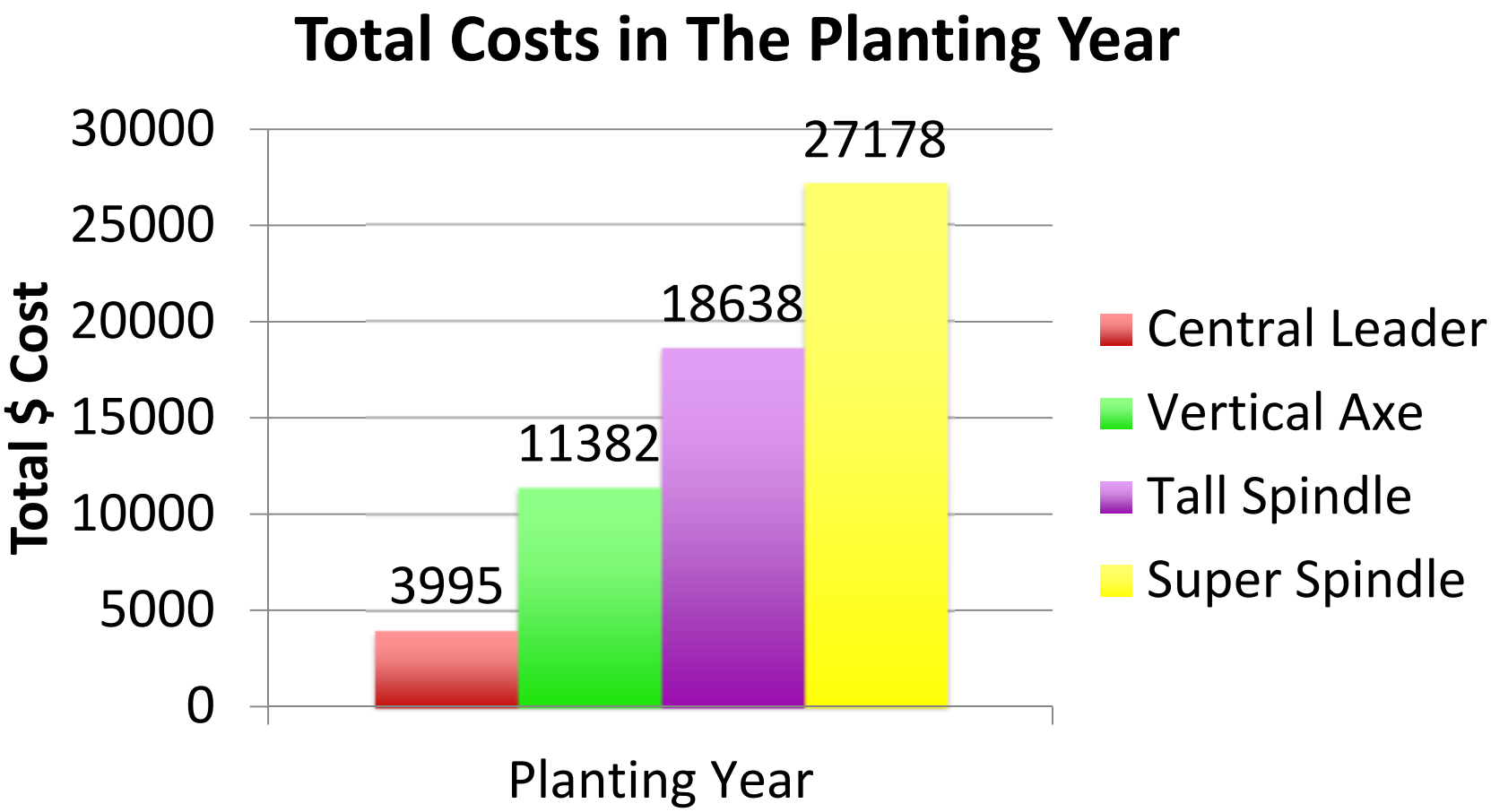
Yields Estimates



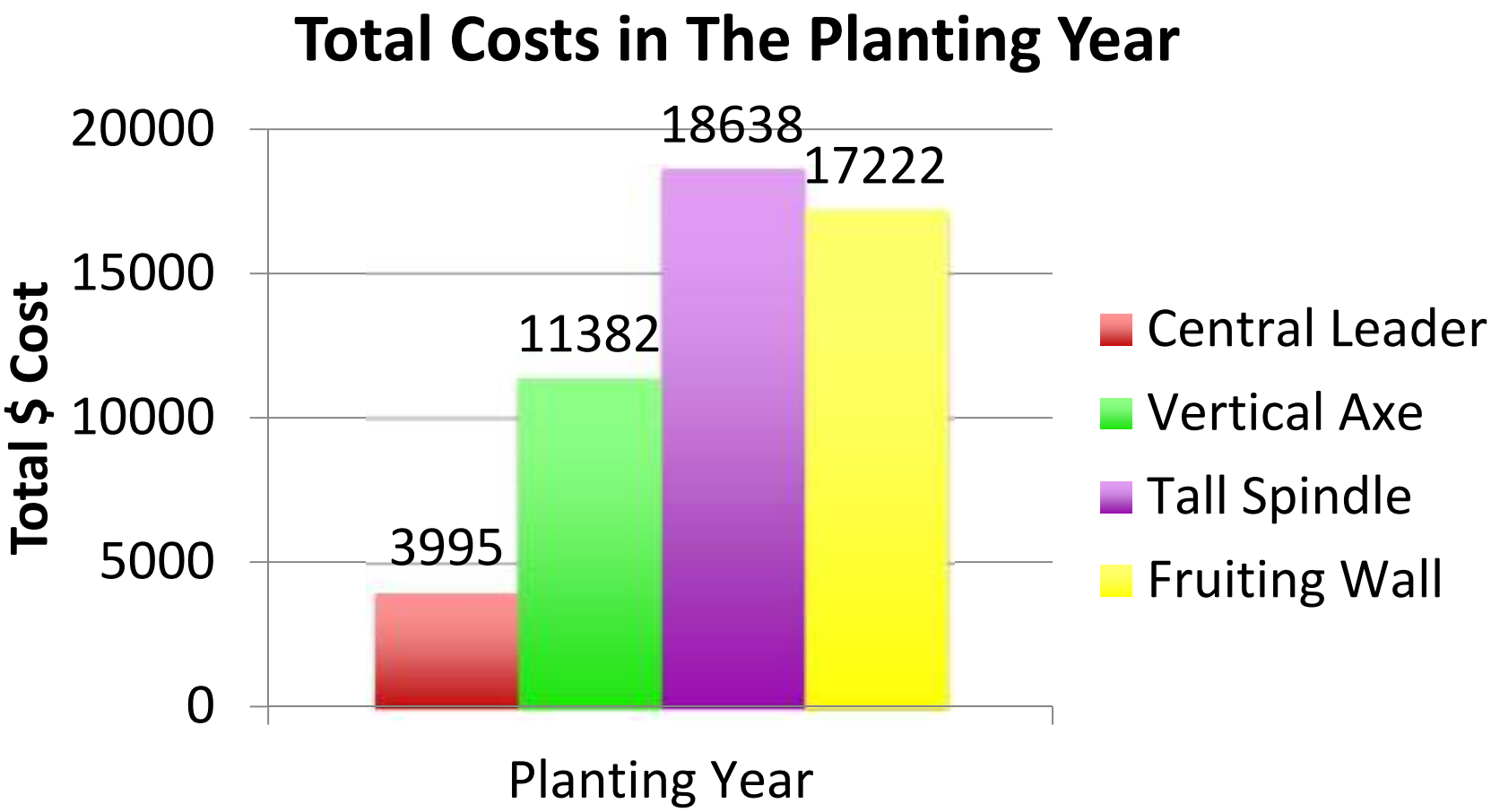
20 year Profit Estimate



Planting Year Costs



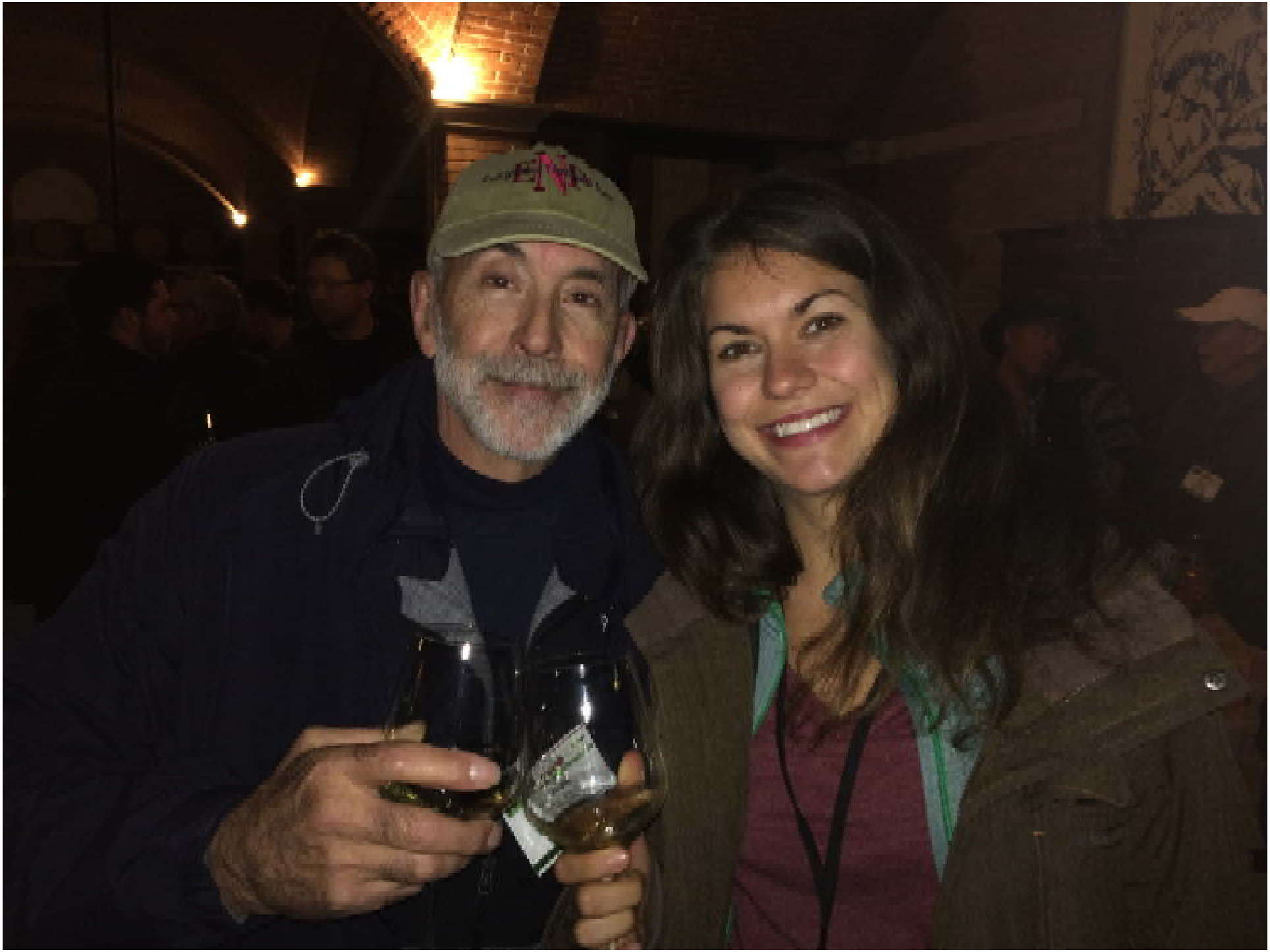
Planting Year Costs



Tall Spindle Characteristics

- Tall Spindle disadvantages.
  - Intensive training, bending laterals, labor.
  - Expensive system
  - Older orchard tops get out of control.
  - Too vigorous.
  - Must grow some tree structure.
    - (Primary and secondary structure).


IFTA
INTERNATIONAL FRUIT TREE ASSOCIATION
Italy Interpoma 2014

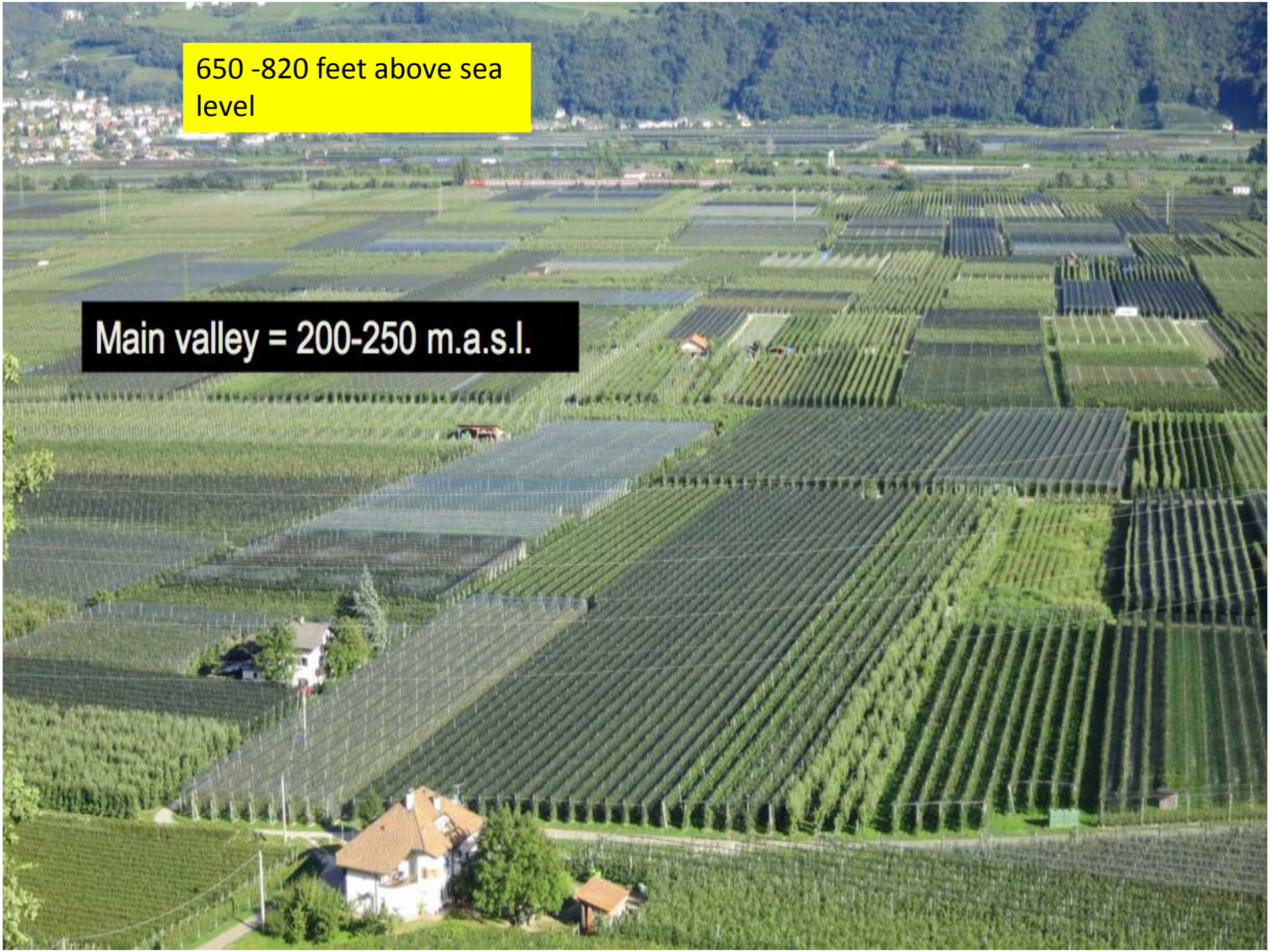



ngenta


SECURITY


evelina
EVELINA.
KISSED
BY NATURE.

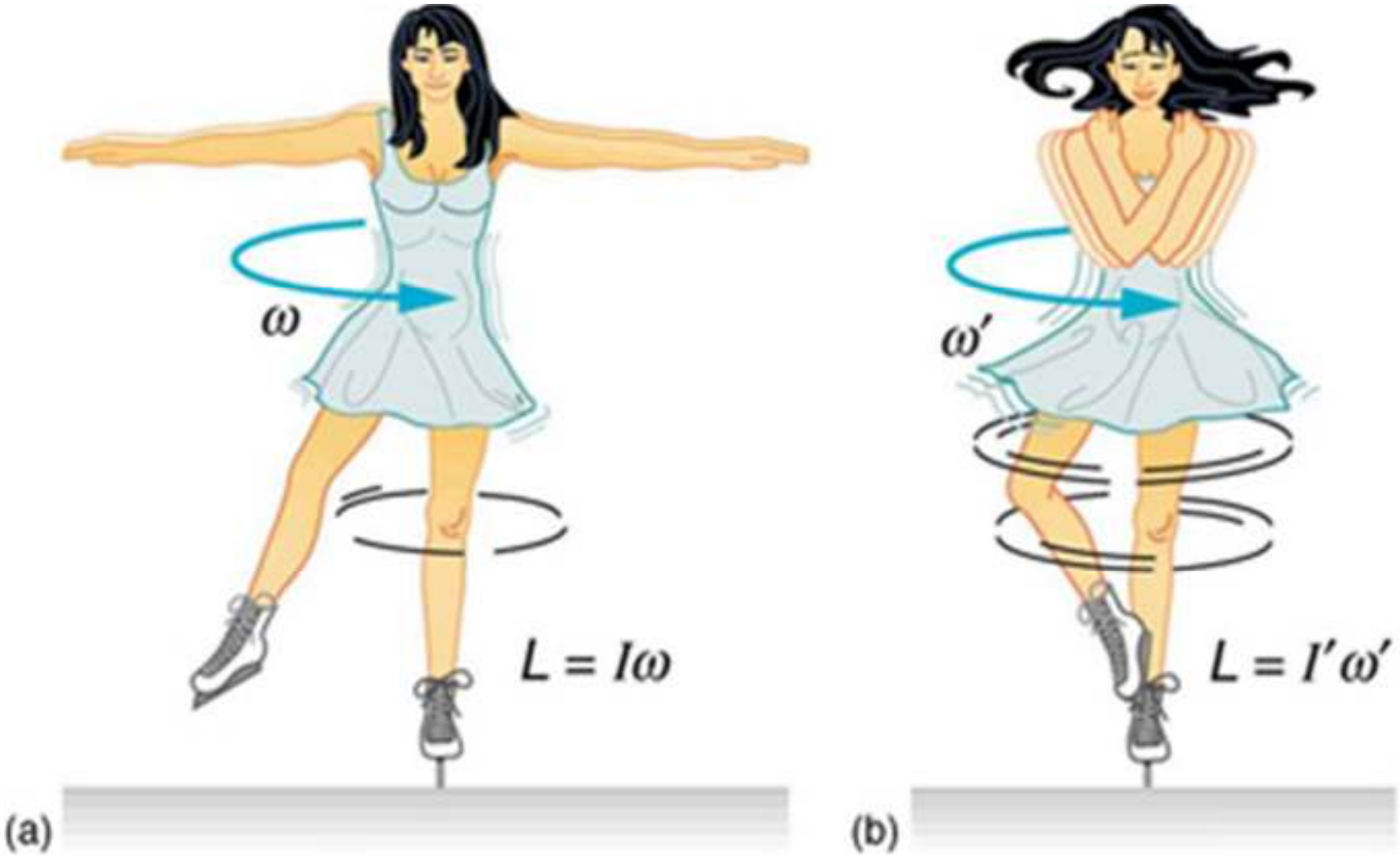

2AC


650 -820 feet above sea level
Main valley = 200-250 m.a.s.l.

Multi Leader Characteristics

- Control tree vigor.
- Uniform fruit quality.
- Better fit for mechanization.
- Simplifies management.
- Natural fit for Fruiting Walls.

Centrifugal vs Centripetal

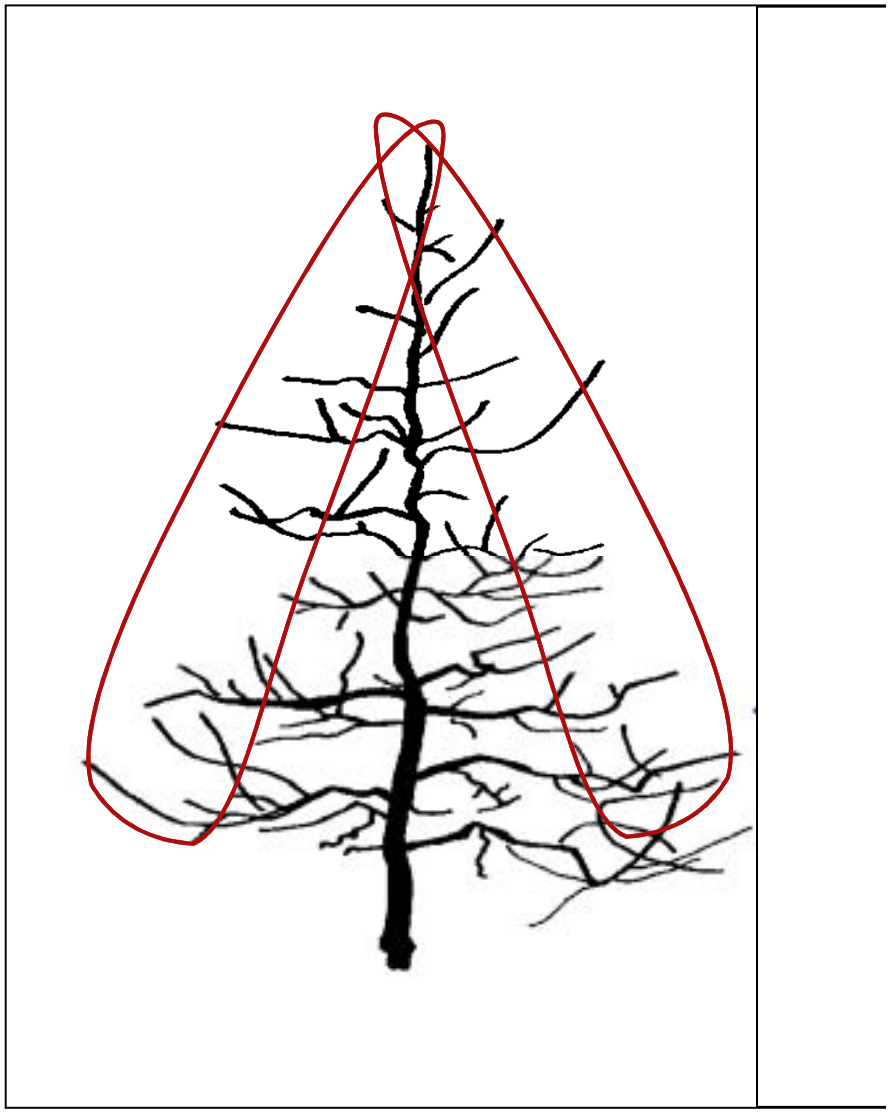


Tree Architecture

- Primary Fruiting Canopy
- Centrifugal

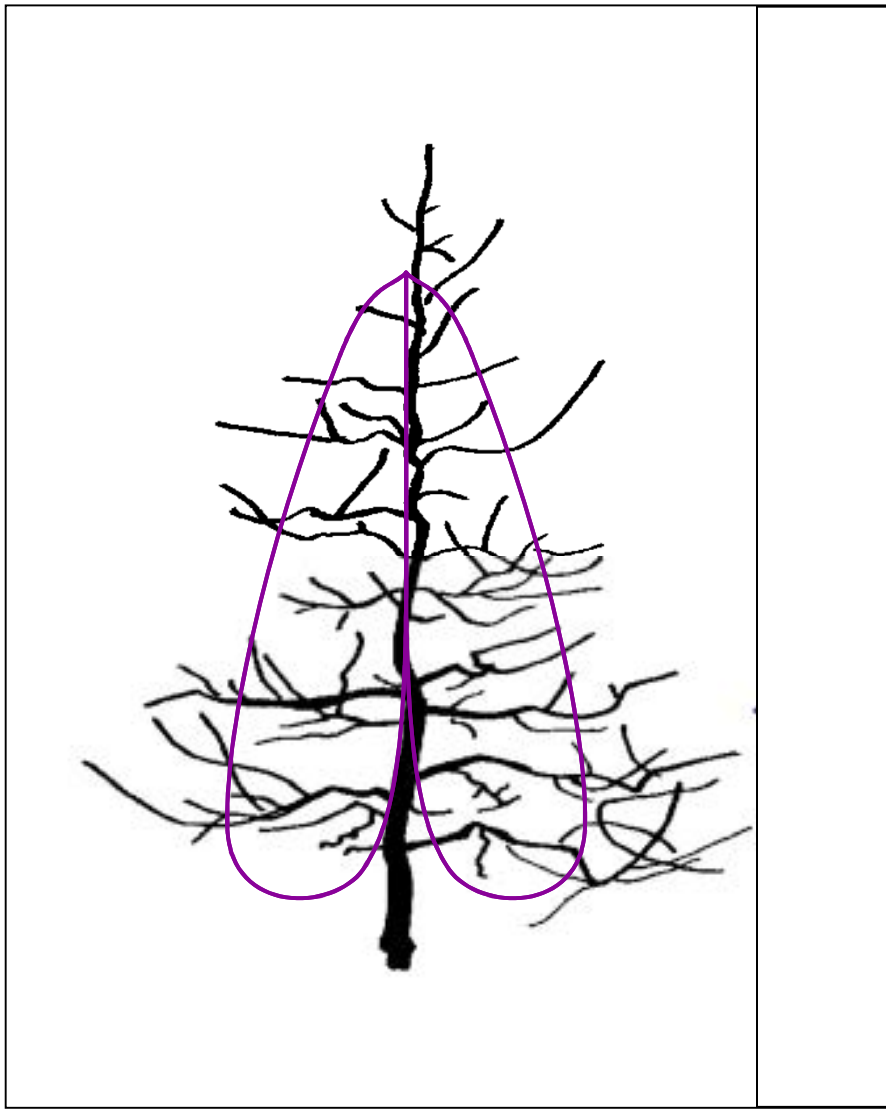
  (Long pruning)

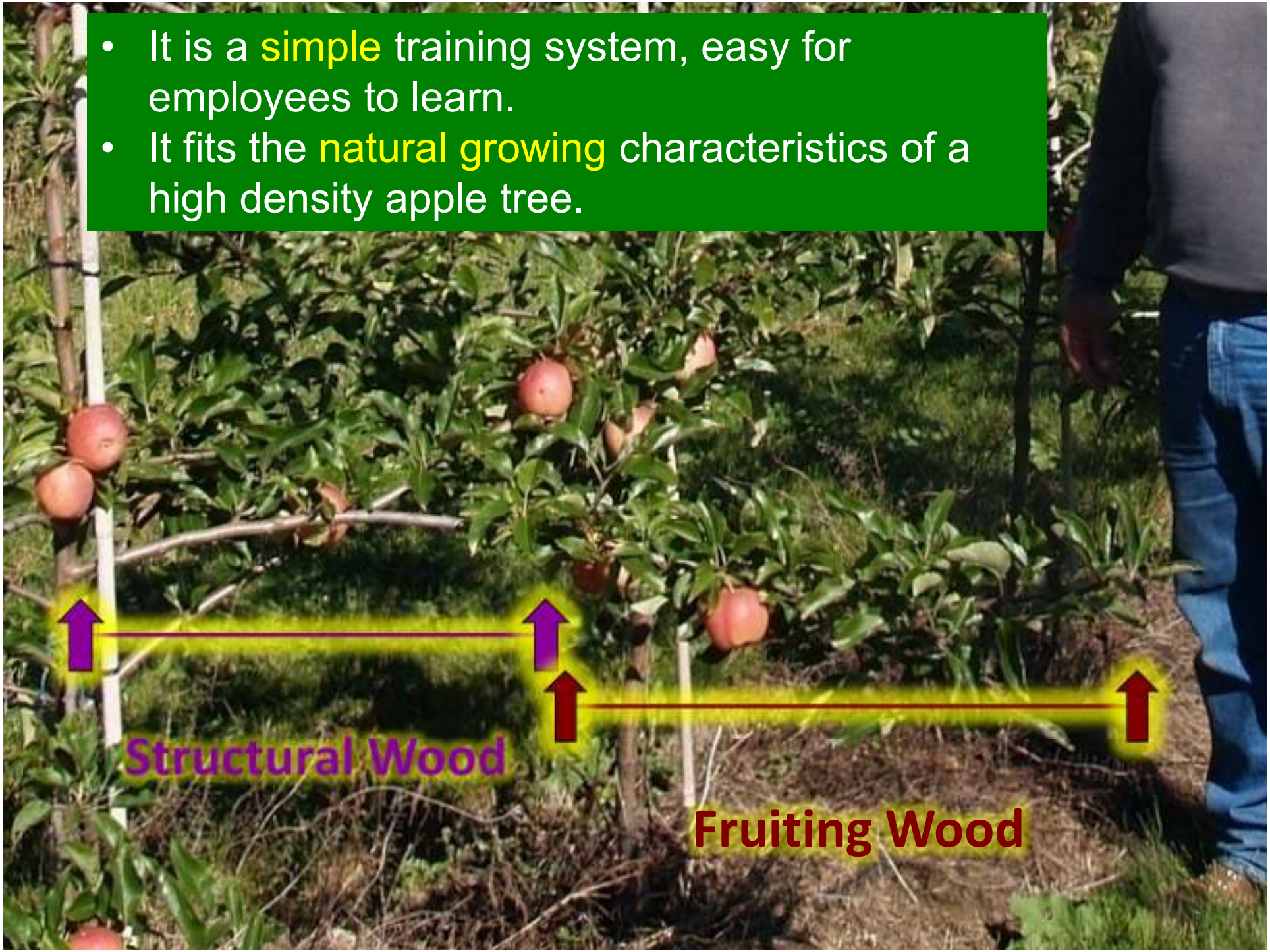
  (Outward).



Structure

- Secondary structure wood
- Supports fruiting wood.
- Unproductive canopy
- Few, small, green fruit.
- Basically non-bearing wood.




It is a simple training system, easy for employees to learn.
It fits the natural growing characteristics of a high density apple tree.
Structural Wood
Fruiting Wood

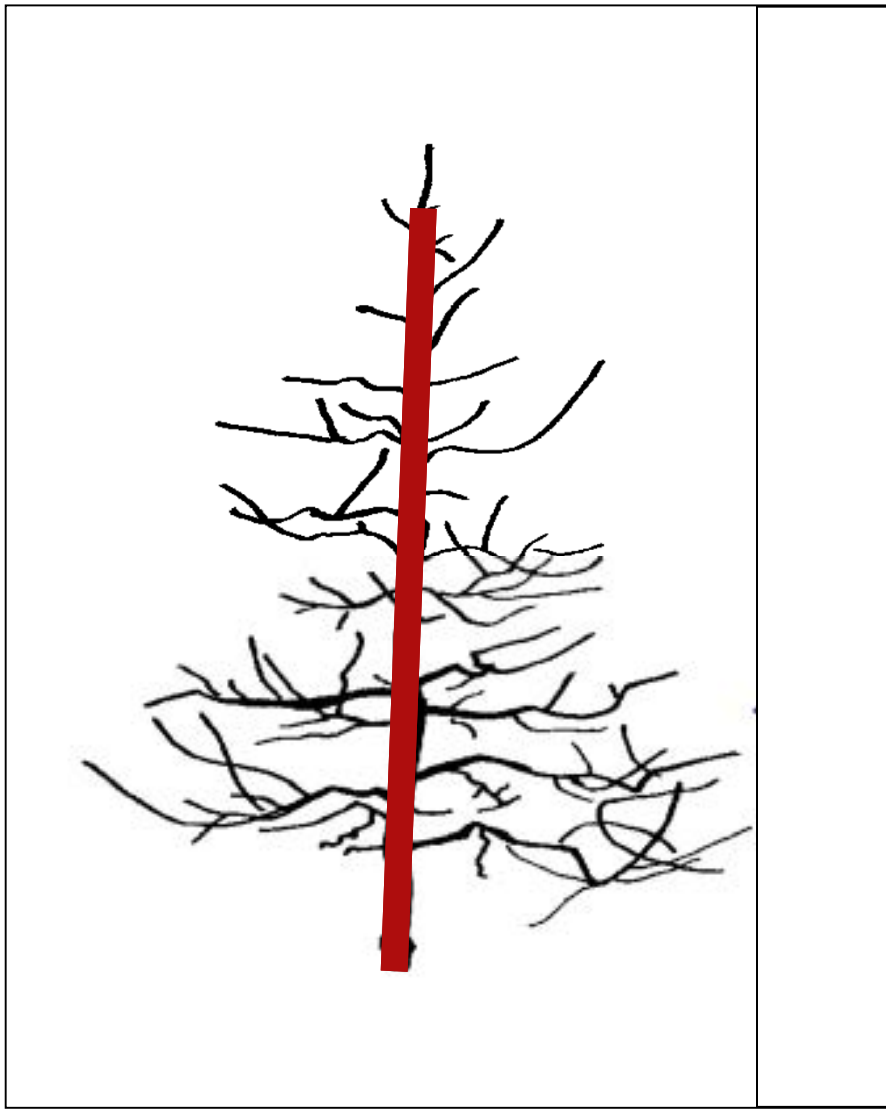
Fruiting Wall Characteristics

- CENTRIPETAL, (Fruiting near leader).
- Fruit on the outside of canopy.
- No inside fruit, No green fruit.
- Easy hand pruning.
- Hand thinning, (Precision thinning).
- No limb bending.
- Mechanization, pruning, training, harvest, etc.
- Less costly?
- High quality fruit.
- Uniform fruit.
- Better spray coverage.


Mur Fruitier (Fruiting Wall)
2000 Trees/Acre
2 x 10

Structure

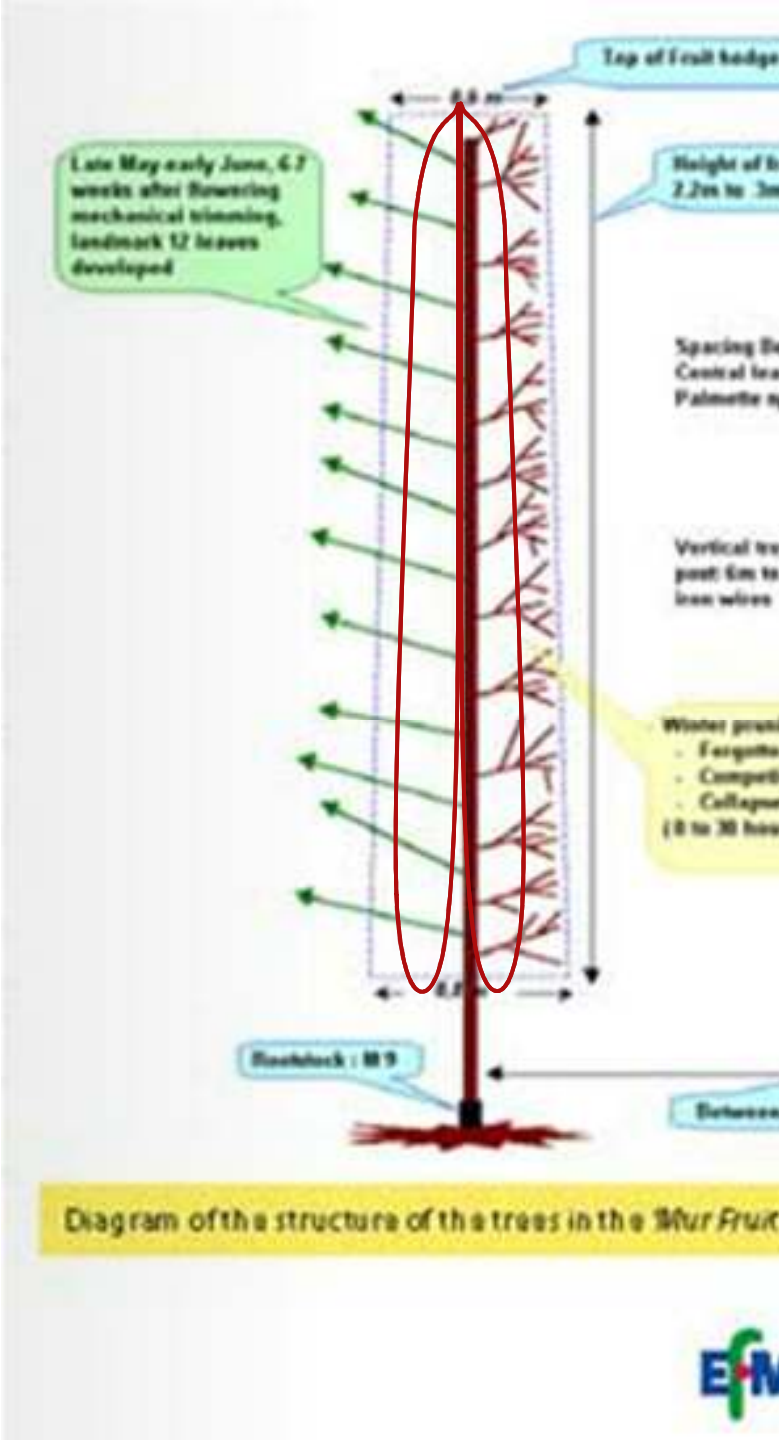
- **Primary Structure Wood (Leader).**
- Supports tree.
- Required minimal amount of wood.



Fruiting Wall Structure

- Primary fruiting canopy close in to primary wood (leader).
- Centripetal

  (Short pruning).
- No secondary structure.




Bi-Axe
1200 Trees/Acre
3 x 12


Narrow
trees
capture
more
sunlight.

The Lorette System of PRUNING

Louis Lorette

Rodale Press Emmaus, Penna.

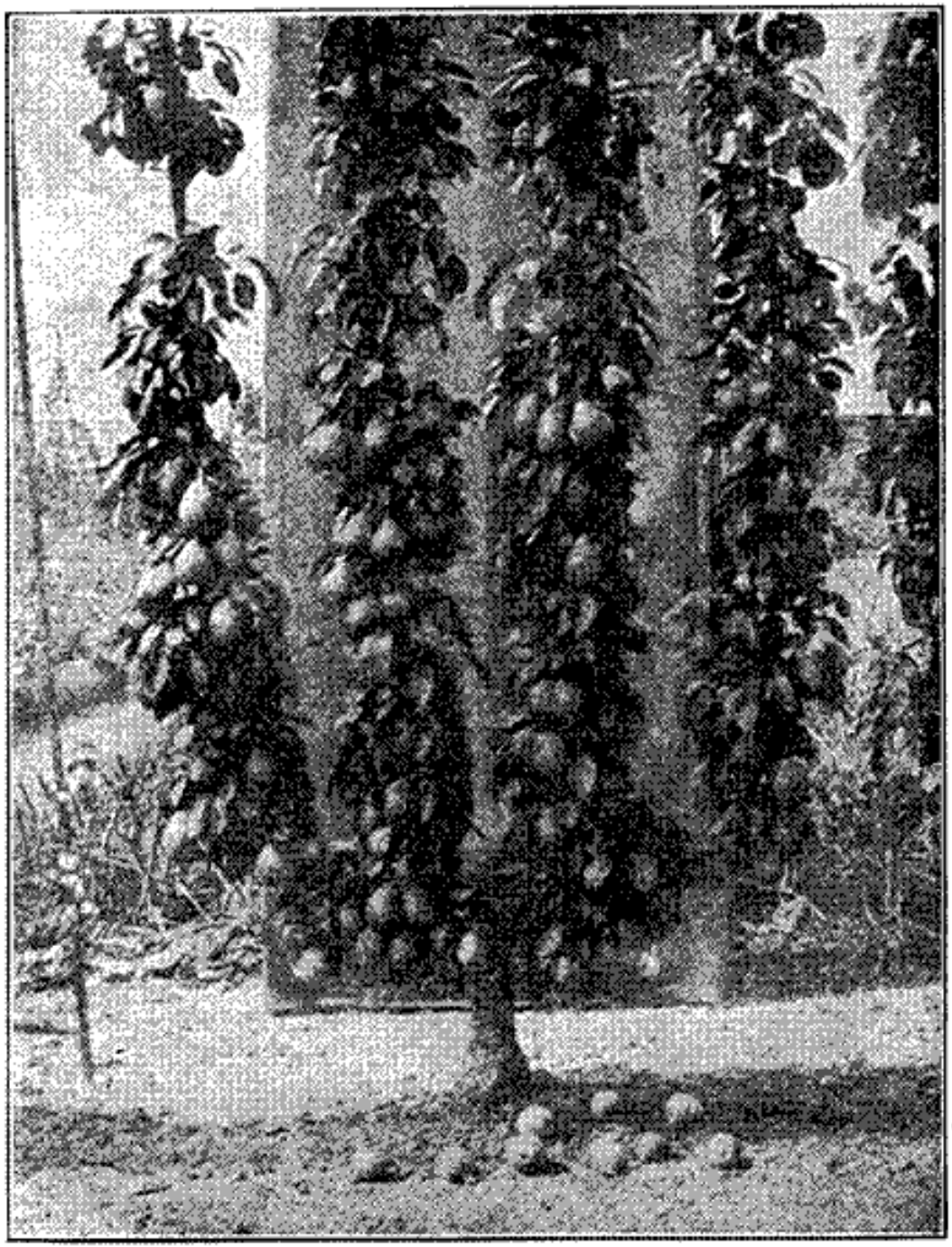


Fig. 26. A full-grown double U pear tree, "Bonne d'Ezée."

E M

nal, will be pre-
ned back to the
oot, in order to
ew symmetrical
their appointed
g is obtained by
he vase is thus
ertically all the
along rods 16
years a vase can
as many as 500

ny well-rooted
in position for
ack to 2 feet
d out in April,
ive best-placed
, will be fixed
ise and sloping
ed for the time
e of the winter
replaced by a
owing: (1) An
or a stake

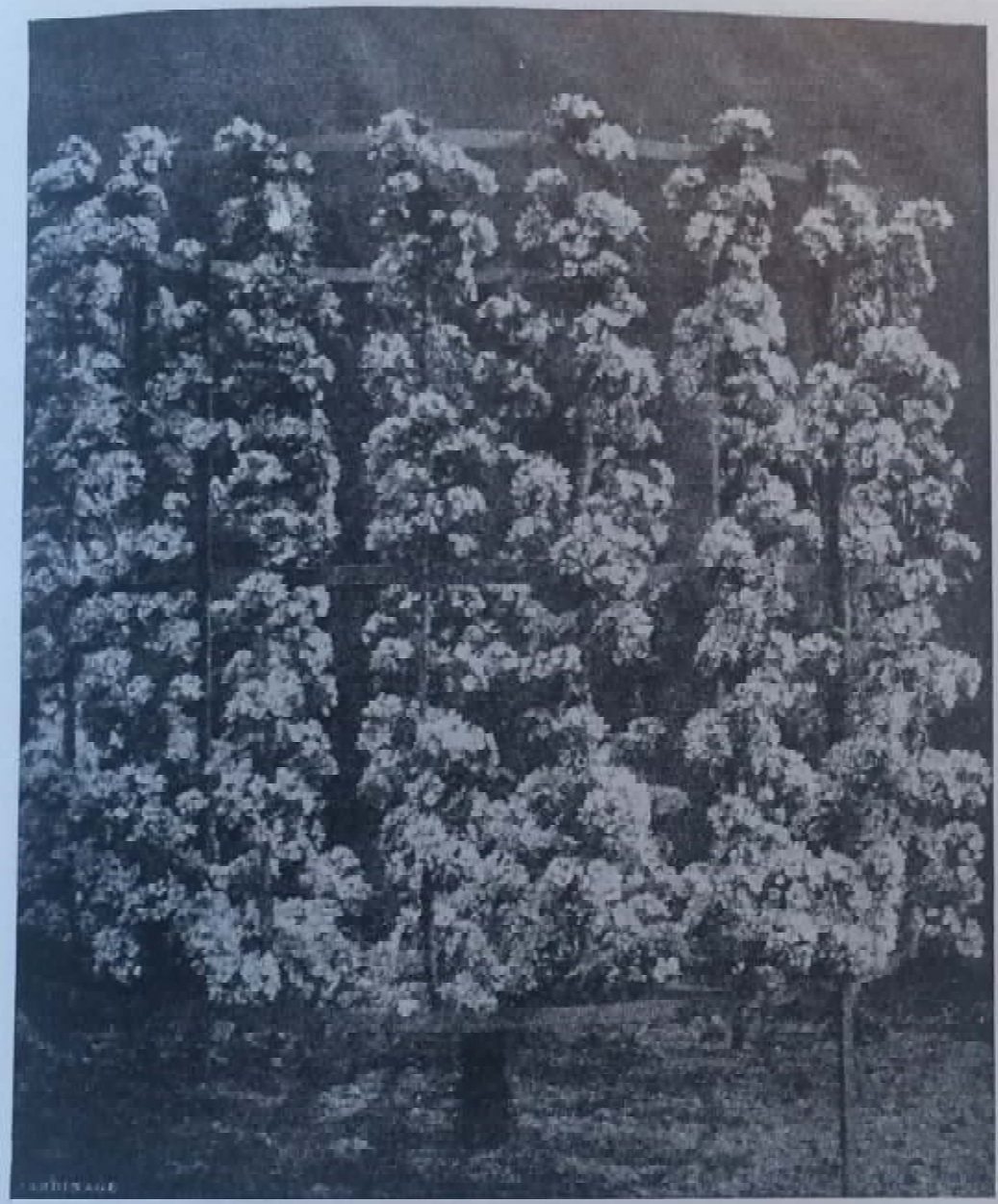
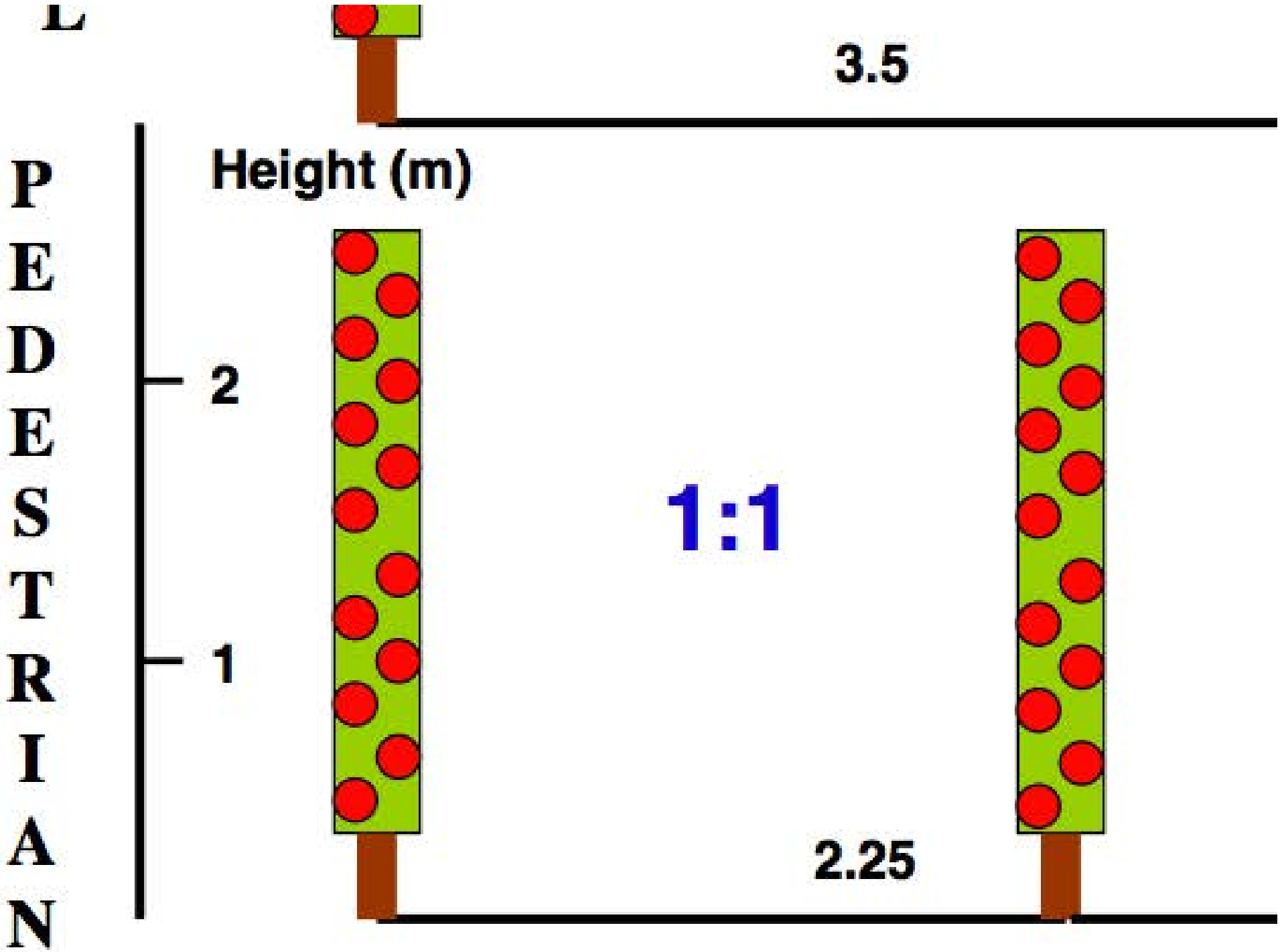
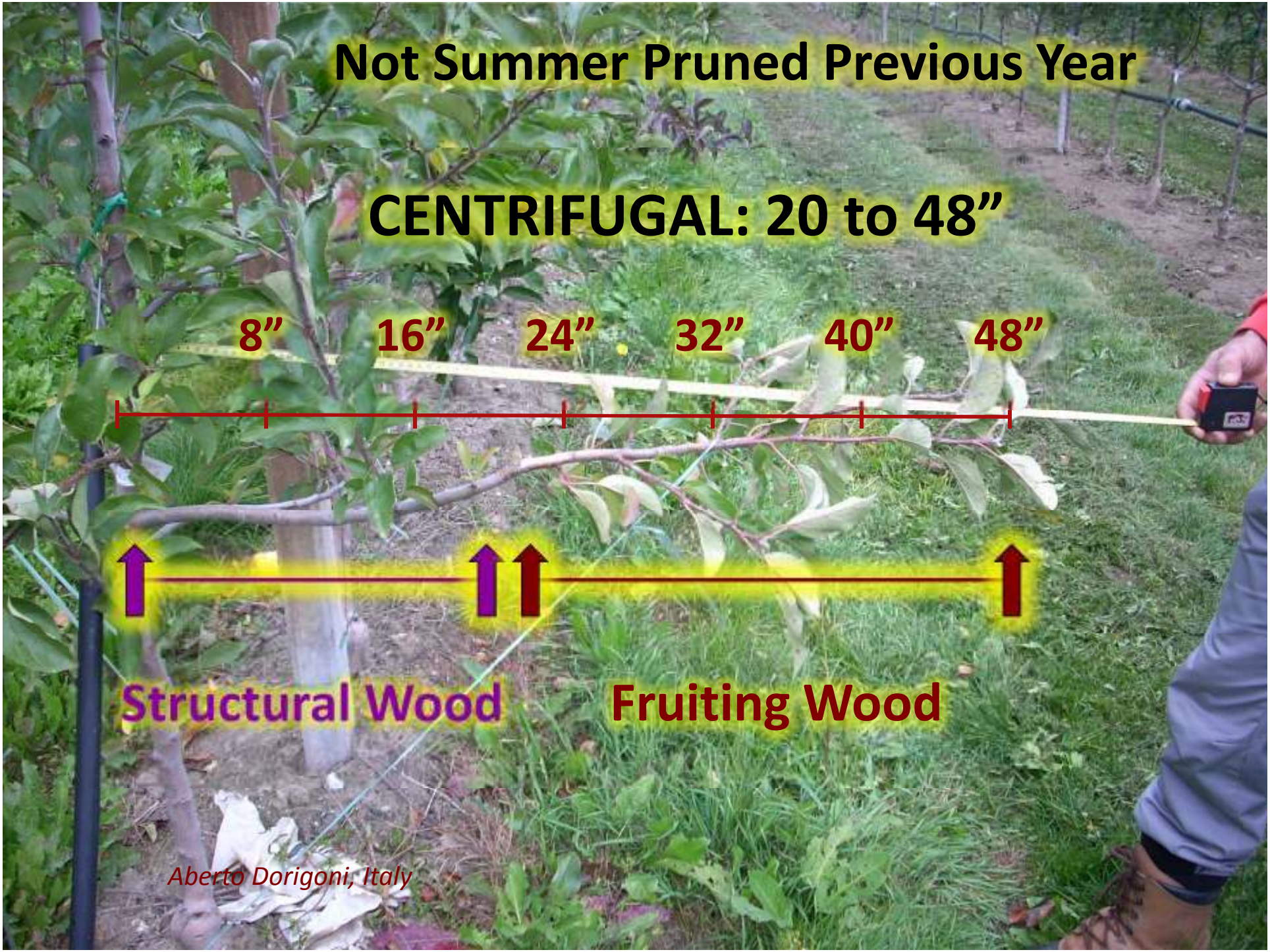
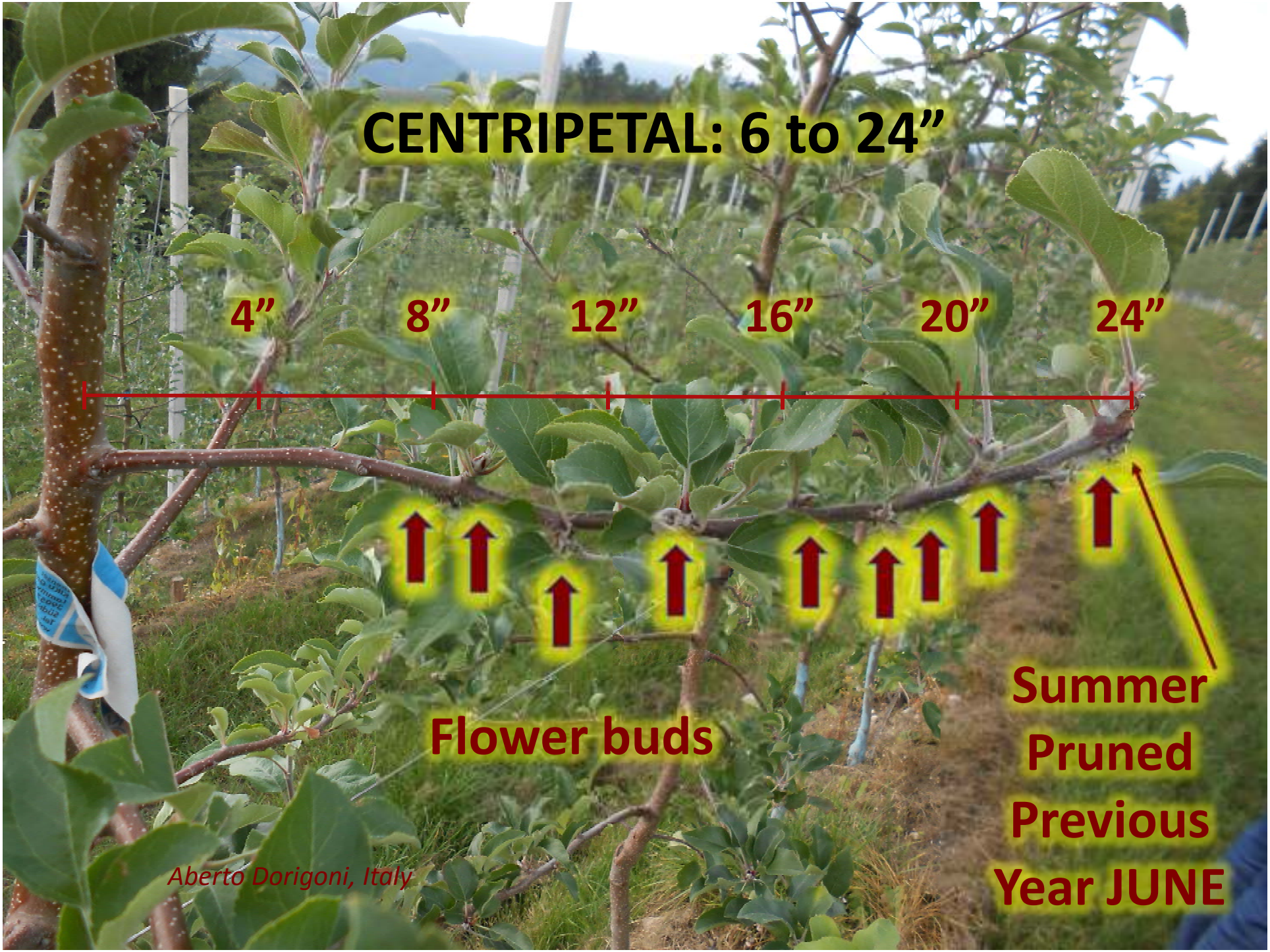


Fig. 33. A full-grown, vase-trained apple tree.

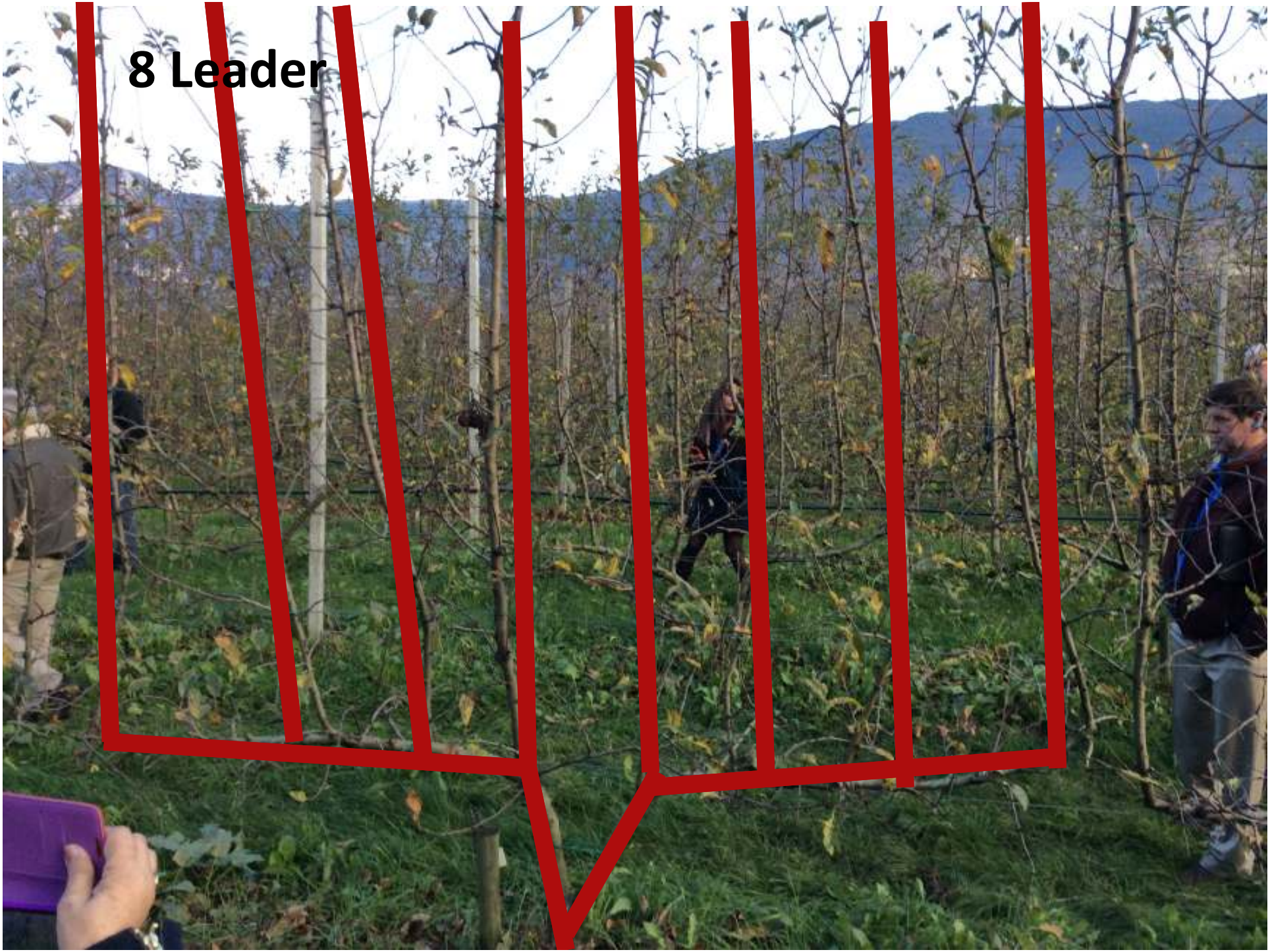

L
3.5
PEDESTRIAN
Height (m)
2
1
1:1
2.25


Not Summer Pruned Previous Year
CENTRIFUGAL: 20 to 48”
8”
16”
24”
32”
40”
48”
Structural Wood
Fruiting Wood
Aberto Dorigoni, Italy


CENTRIPETAL: 6 to 24”
4”
8”
12”
16”
20”
24”
Flower buds
Summer Pruned Previous Year JUNE
Aberto Dorigoni, Italy

4 Leader

8 Leader


8 Leader

Why Multi-Leader?
Characteristics

- CENTRIPETAL.
- Natural Fruiting Wall system.
- Uniform ripening.
- Less biennial bearing.
- No bending branches.
- Less cost.
- Lower number of trees/acre.
- Produce uniform fruit quality.
- Uniform branches.
- Even vigor from top to bottom.
- Good uniform color from top to bottom.
- No inside fruit.

Multi-Leader System
Characteristics

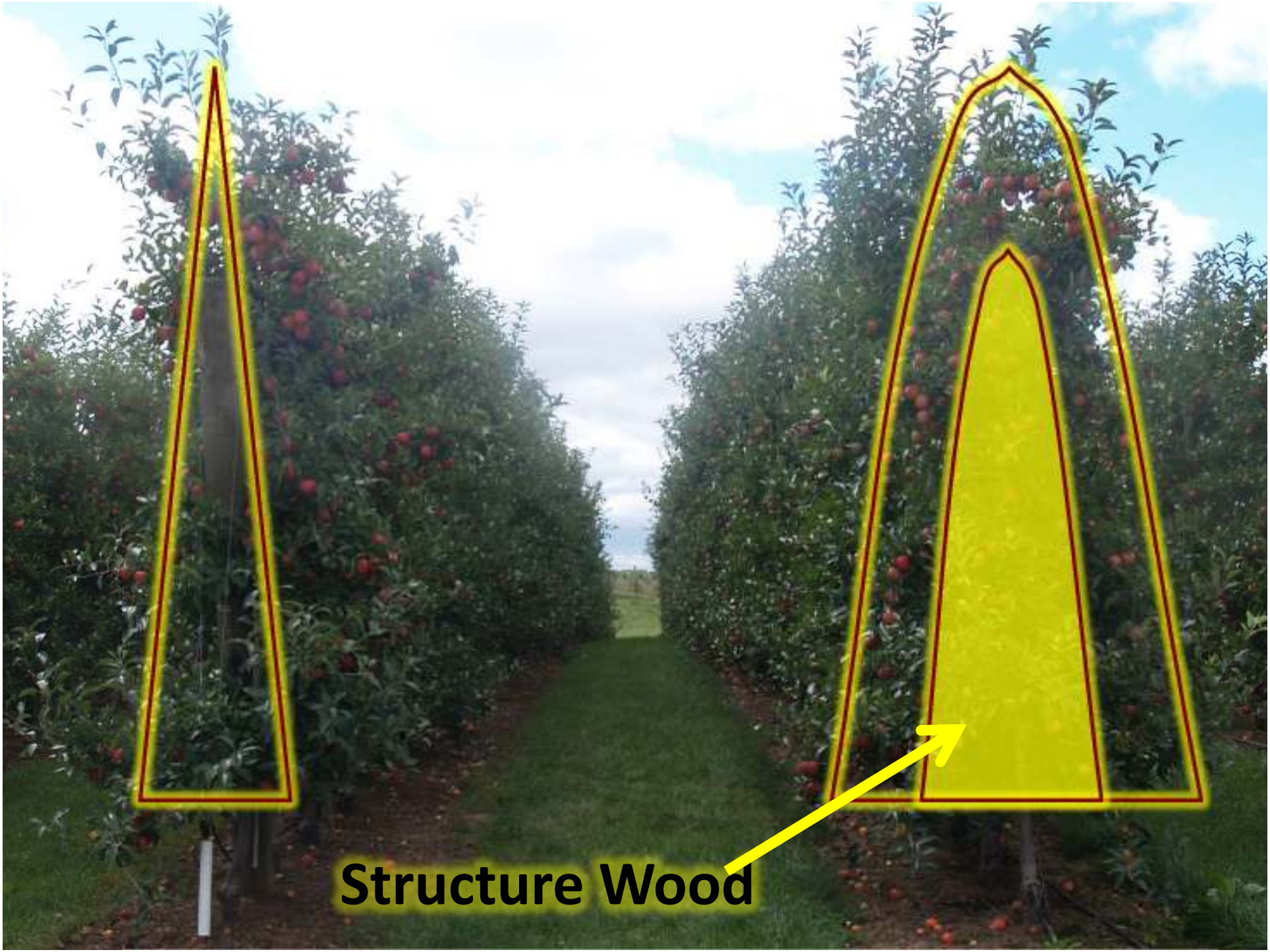
- Reduce tops vigor.
- Simple cultural practices.
- Better spray coverage.
- Use highly efficient vigorous rootstocks.
- Perhaps shorter trees.
- Less biennial bearing.
- Reduced pruning.
- No secondary structure.
- Very narrow trees.
- More leaders, more dwarfing.
- Can be mechanized.


Long term effect of long pruning of spindle in fertile soils

Fruiting Walls are very narrow.

Better light.

Narrow trees = closer row spacing.


Structure Wood


INNOVATIVE ERZIEHUNGSSYSTEM
THE ULTIMATE TRAINING SYSTEM
LA FORMA DI ALLEVAMENTO
PIÙ EVOLUTA

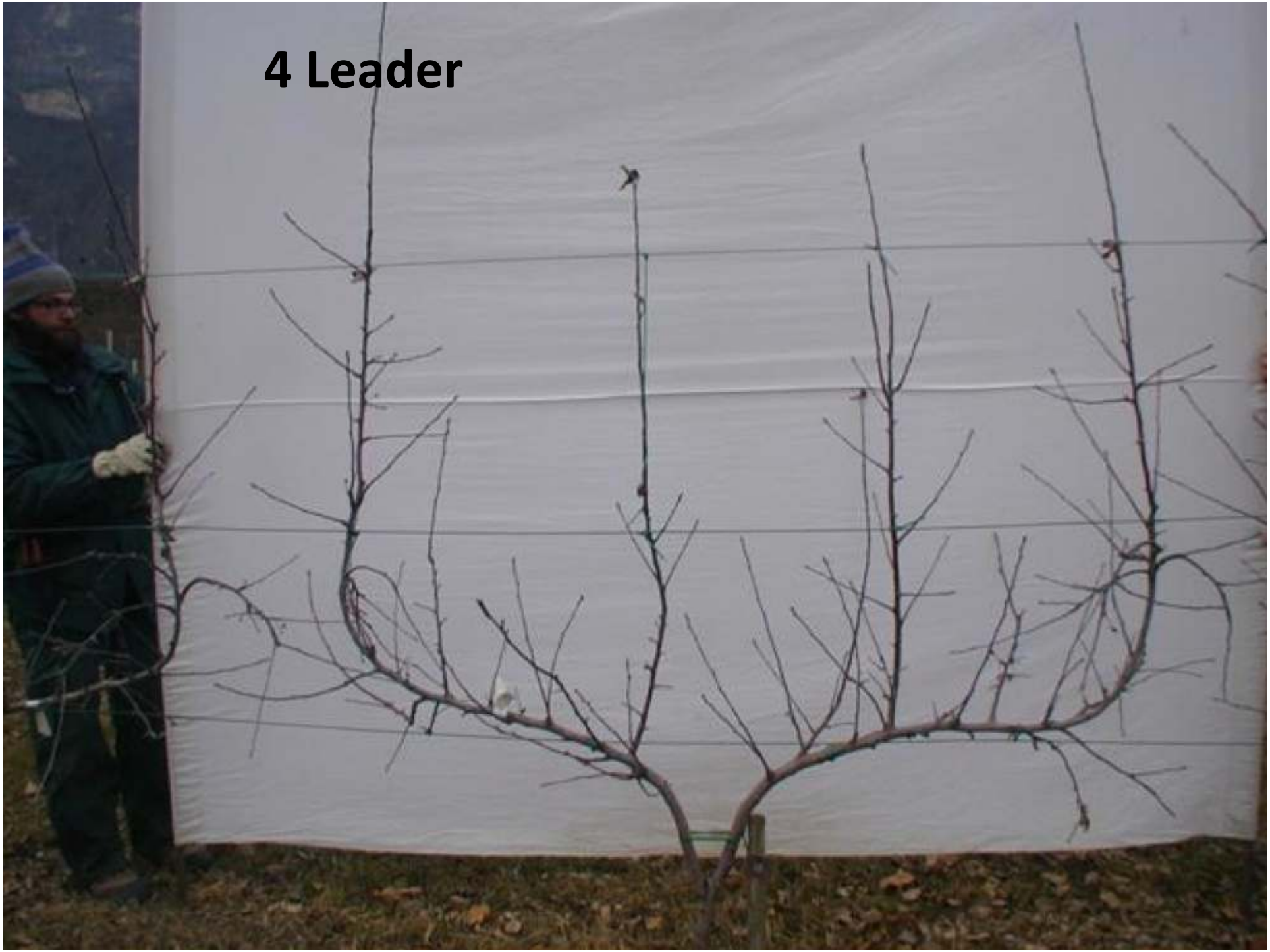

1st leaf

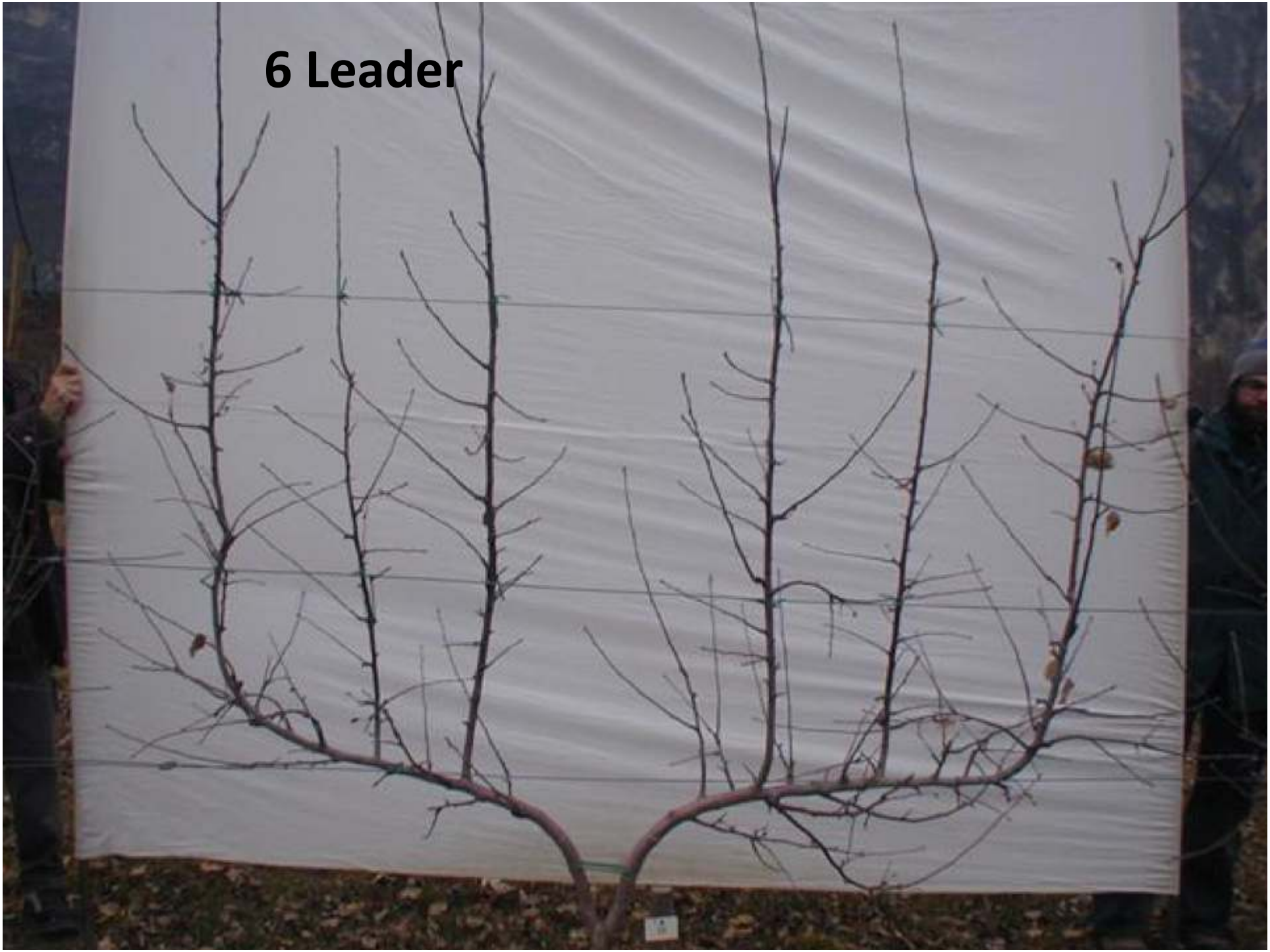

2nd leaf


3th leaf


5th leaf

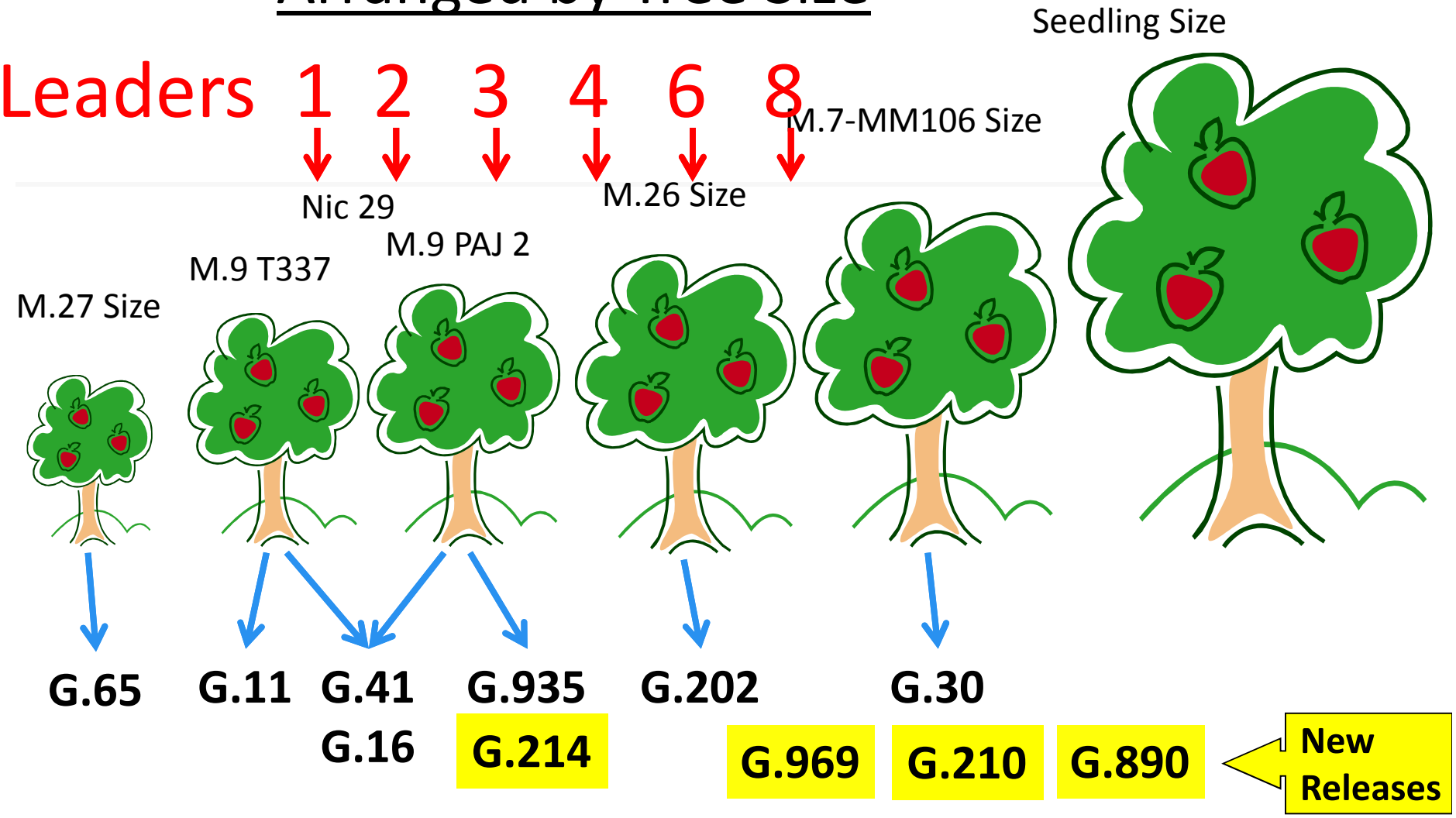

6th leaf


4 Leader


6 Leader


8 Leader

Released Geneva® Apple Rootstocks
Arranged by Tree Size

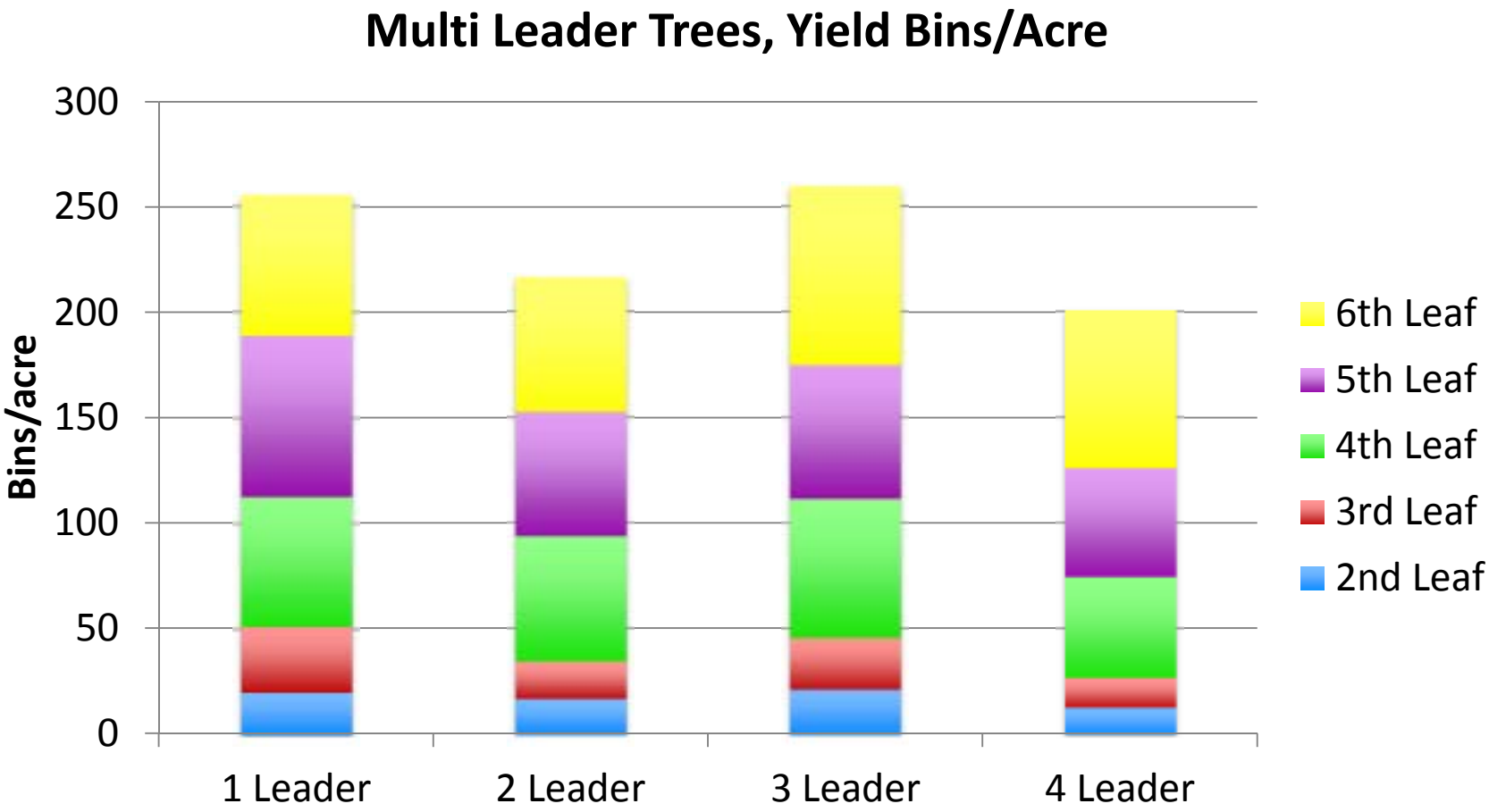


How to Control Vigor

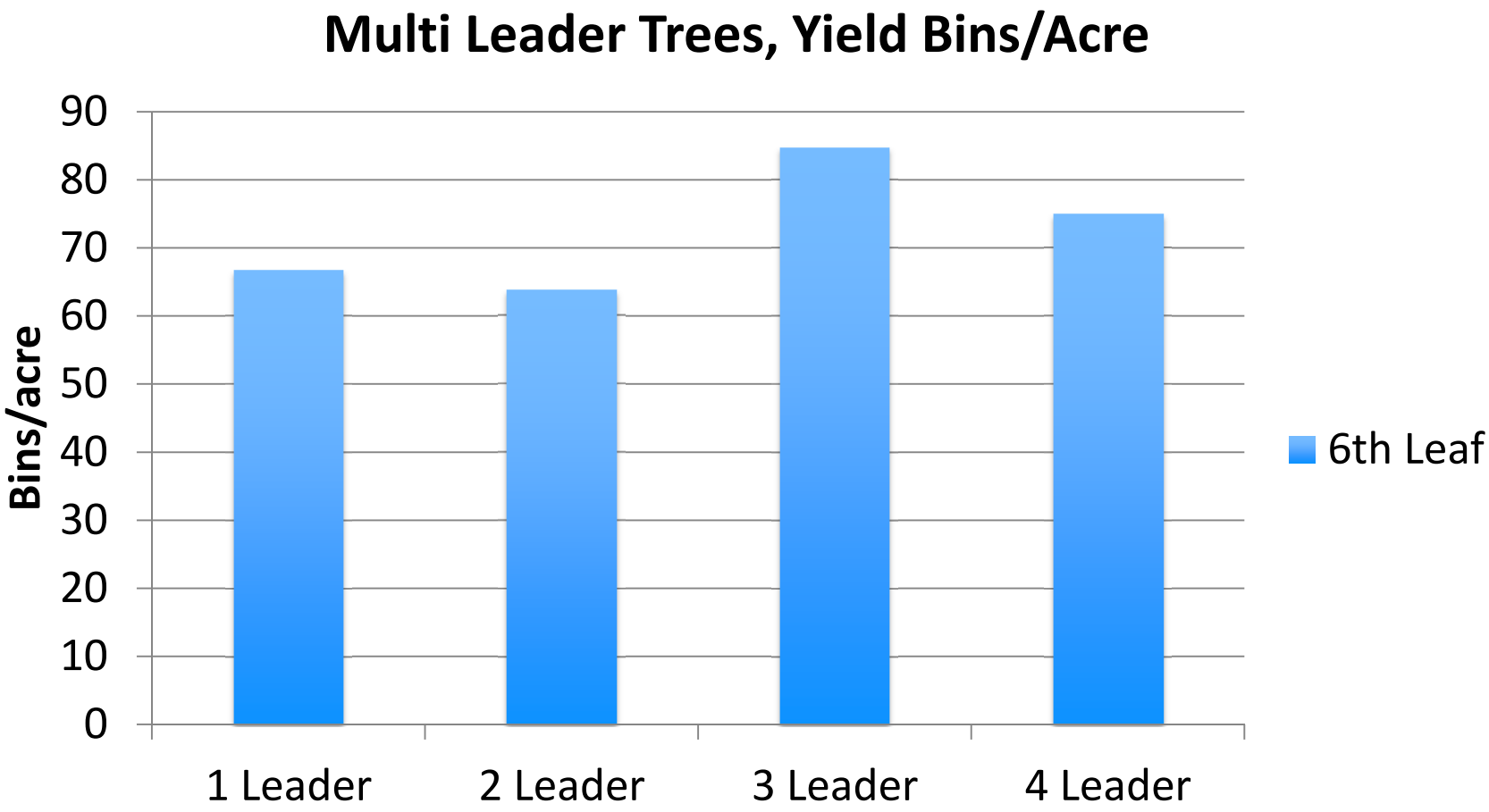
- Scion/rootstock.
- Summer pruning.
- Root pruning.
- PGR’s
- Union planting height.
- Increase leader numbers.


Goodfruit Grower

Bins/acre Yield of ML Trees



6 Year Old Yield of ML Trees

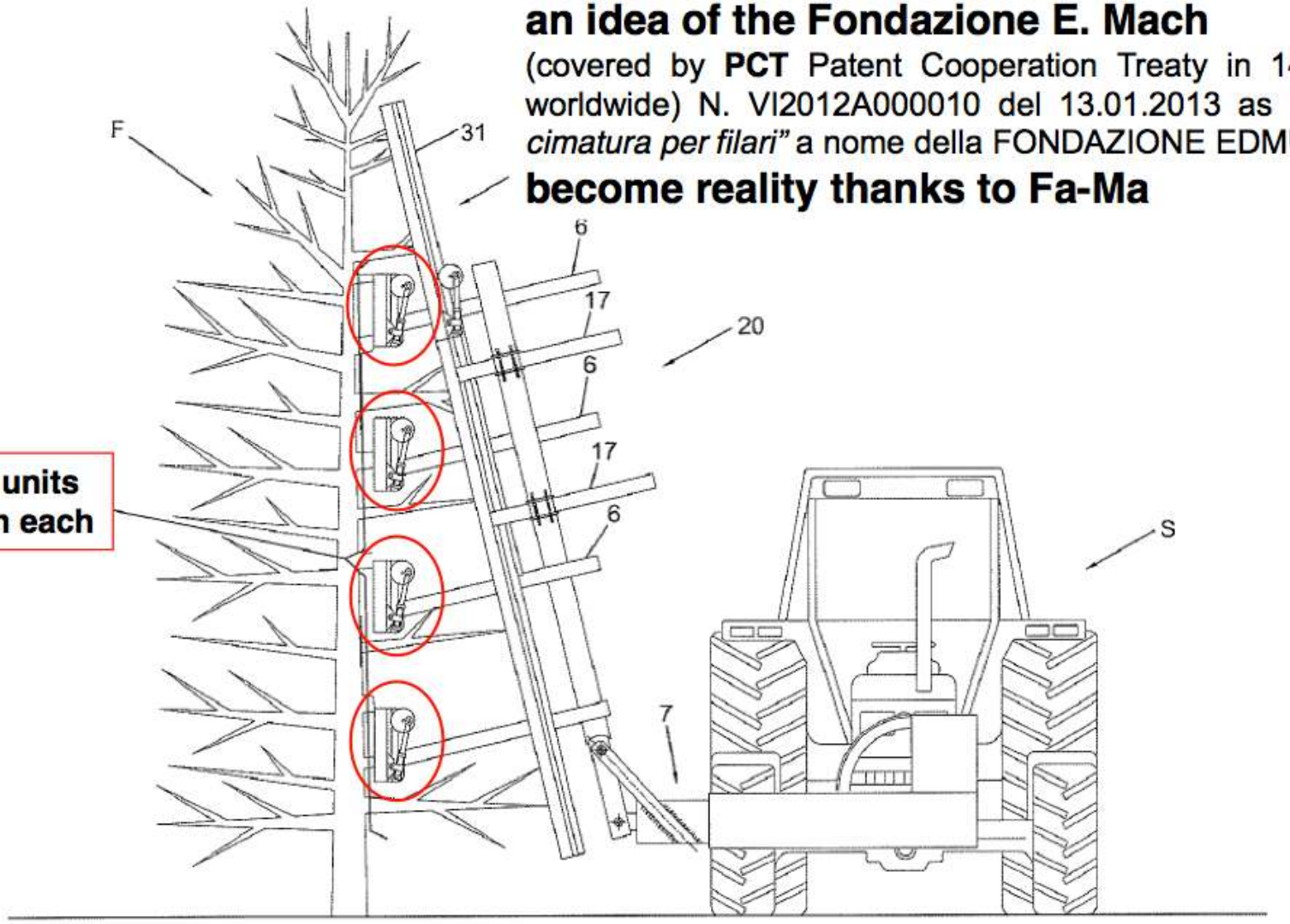


Window pruning machine:

an idea of the Fondazione E. Mach

(covered by **PCT** Patent Cooperation Treaty in 140 countries worldwide) N. VI2012A000010 del 13.01.2013 as *"Apparato di cimatura per filari"* a nome della FONDAZIONE EDMUND MACH)

become reality thanks to Fa-Ma



Cutting units of 36 cm each

Fig.7


FAIMA

3rd Leaf


5th leaf


Golden Delicious - 14th leaf (Spain) Bi-axis at 1.5 m

Multi Leader Disadvantage

- Slower to establish, lower early yields.
- Difficult to buy good biaxis tree.
- Unbalanced vigor.
- Dwarfing effect.

Multi Leader Advantage

- Natural Fruiting Wall.
- Less expensive and intensive, very little bending and tying.
- Greater yields
- Higher quality.
- Lower tree density, less expensive.
- Mechanization, pruning, harvesting thinning
- When full bearing, better than spindle.
- Simplifies orchard management
- Most HD training works on Multi Leader.

What's Next

- Higher Densities
- Fruit Walls, Super Spindle
- Hedging
- Mechanization
- Platforms, Harvest Machines, etc


SuperSpindle
B.C. Canada


2nd leaf


ACE

58th Annual Conference & Orchard Tours 2015

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February 21-25, 2015

IFTA

INTERNATIONAL FRUIT TREE ASSOCIATION

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Pre-Conference Intensive Workshop on Honeycrisp

- Rootstocks
- Planting Densities
- Balancing Growth and Productivity
- Maintaining Annual Bearing
- Thinning Program
- Harvest Management
- Storage Protocols

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Orchard Tour with Focus on Honeycrisp

- High Density Plantings
- Bud Density Management for Optimal Crop Load
- Training Systems, including Slender Spindle and Vertical Axe
- Orchard Mechanization

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