



Training Young Peach Trees

Rich Marini

Plant Science Department

Penn State University

Orchard Systems

- Combination of rootstock, variety, spacing, and training system
- Spacing and training system are linked
- Four types of training system: open-vase, trellis hedgerow, central leader, V-shape
- Tree shape is not important. In mid-Atlantic region want about 400 – 600 trees per acre

First year tree growth is important

- Good site preparation
- Good nursery trees

Evaluating growth of young peach trees (Blake 1913)

- **Year 1: Good = 600-800" total linear length**
Excellent = 800-1,000"
- **Year 2: Good = 3,000-4,000"**
- **Trees with good growth produce small crop in year 3**

Quality of Nursery Stock

Savage & Cowart (UGa 1955)

‘Elberta’ trees of 4 sizes

- V. large: 5-6′, 11/16-7/8″**
- Large: 4-5′, 9/16-11/16″**
- Medium: 3-4′, 7/16-9/16**
- Small: 2-3′, 5/16-7/16″**

Total linear growth for 2 years (in)

At planting

yr 1

yr 2

68

1969

6608

44

1500

5478

41

1223

5266

30

1356

5479

Average yield at 5 & 6 years (lbs)

Size	yr.5	yr.6	Avg.
V. Large	193	164	152
Large	211	197	163
Medium	210	165	158
Small	186	191	149

Sometimes Nursery Trees Are Too Big With Few low Usable limbs!

**Can head high – above a good limb, but
often results in higher than desired scaffolds**

**Can head very low to promote
vigorous watersprouts!**

Heading height for large trees

Variable	4"	30"
Tree survival (%)	90	100
Yield (lbs/tree)	43	52
Crop value (\$/tree)	94.85	113.42

Objectives of Tree Training

- **Develop strong framework to support heavy crops**
- **Develop tree architecture for light interception and distribution**
- **Proper placement of branches**
- **Terminology to describe branching**

Apical Dominance

The shoot apex prevents the growth of lateral buds so the plant grows vertically. The terminal bud produces auxin that inhibits growth of lower buds.

This definition works for annual plants, but too simplistic for woody plants where apical control varies depending on the age of the wood.

3 Components of Apical Dominance

Correlative inhibition – growing shoots suppress lateral shoot growth on current season shoots

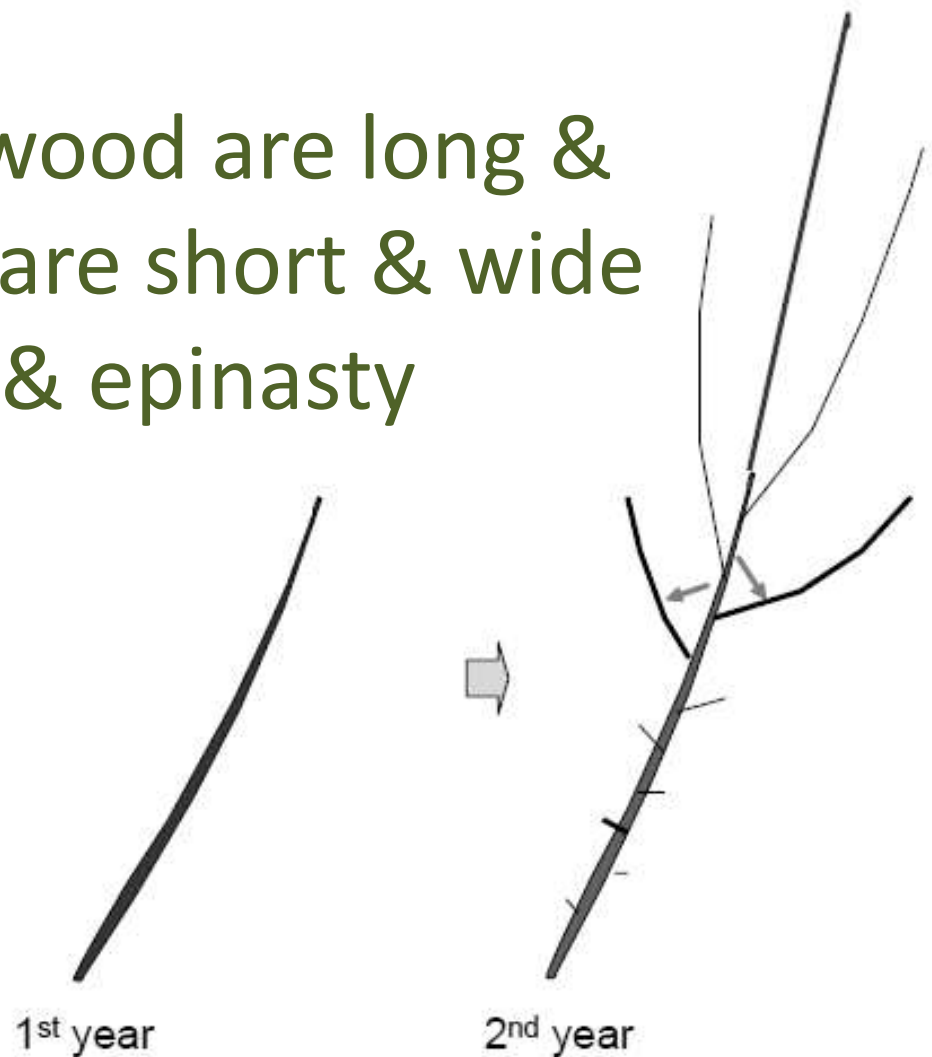
Apical control – basal shoot length is suppressed on 2-yr-old wood

Shoot epinasty – upper-most shoots are longer with narrower angles than lower shoots

Apical Dominance:

1st-yr shoot has no lateral shoots due to correlative inhibition

Top 2 shoots on 2-yr wood are long & narrow
lower shoots are short & wide due to apical control & epinasty



Branches develop from 3 types of buds

- **Sylleptic branches** don't have a dormant period and develop while the terminal shoot is growing (branches on water sprouts)
- **Proleptic branches** develop from buds that have a dormant period (moderate length shoots developing from buds on 1-yr-old shoots)
- **Epicormic branches** (watersprouts) develop from pre-emptitious buds which are dormant within the bark (1 or 2 per node)

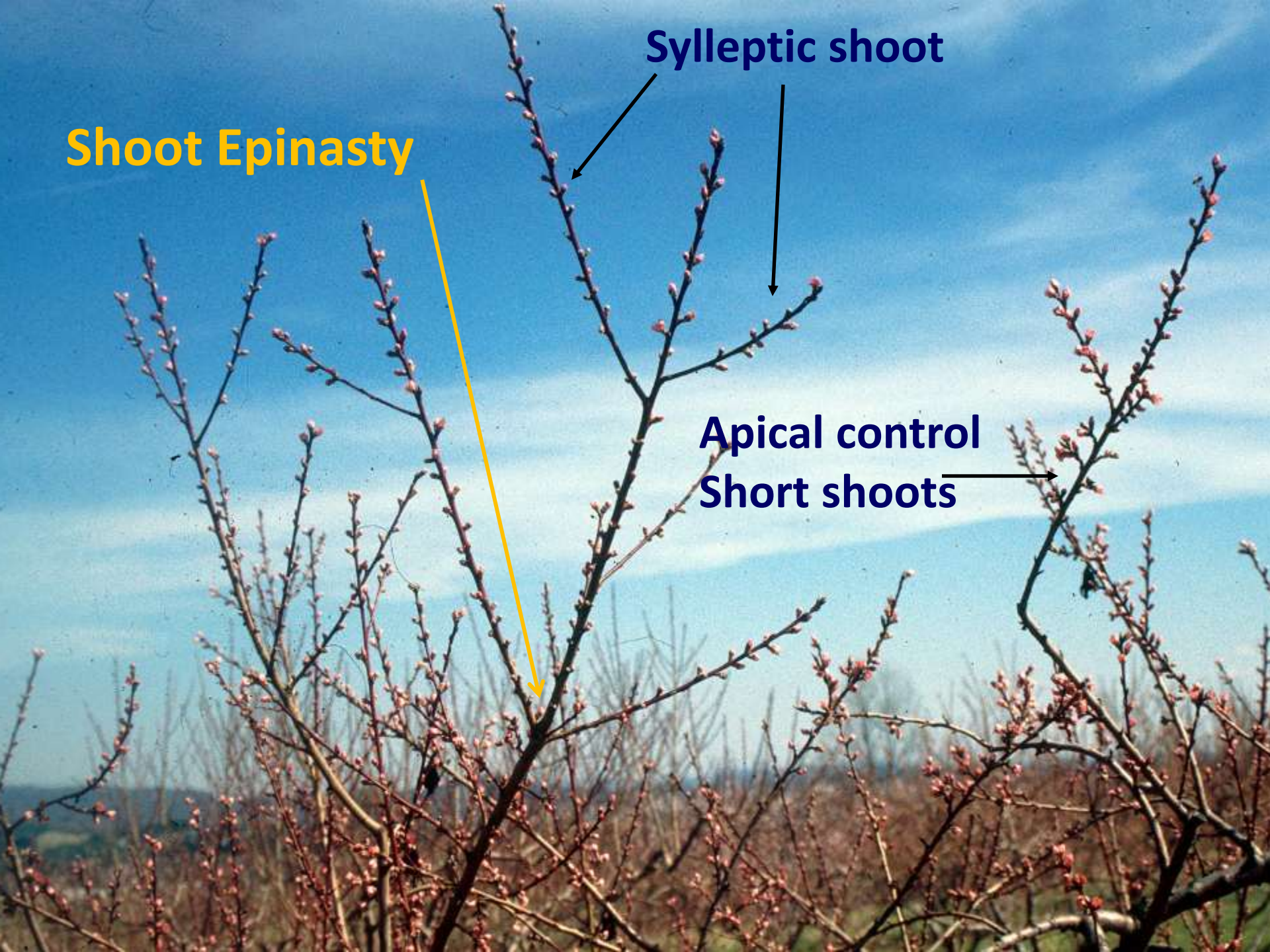
Correlative inhibition in
1-yr-old peach shoot



Shoot Epinasty

Sylleptic shoot

**Apical control
Short shoots**



Reiteration

- The process whereby architectural units are replicated within a tree. Usually results from a trauma to produce epicormic branching.
- Any shoot that repeats the basic form of the tree. Watersprouts are similar to young trees.

Using These Concepts For Tree Training

In the nursery, the shoot developing from the single bud behaves like an epicormic shoot or water sprout with low correlative inhibition. The vigorous shoot produces many sylleptic branches and grows late into the season and is 4 to 6' tall.

First Summer In The Orchard

Trees are headed to 18 – 30". This stimulates a reiteration response and several shoots develop below the heading cut. These shoots develop from preterminal buds and are epicormic and grow late into the season.

Second Year In The Orchard

The open-vase system involves selecting 3 or 4 scaffolds and they are headed to about 2 to 3' long. The perpendicular-V involves selecting 2 vigorous water sprouts and heading them to about 2 – 3' long.

Response To Heading Scaffolds

Stimulates reiteration and produces new water sprouts. With the vase system this is repeated in the second year to establish 2 tertiary scaffolds on each secondary scaffold. After 3 years the tree has a strong structure, but water sprouts are too vigorous and need removal or shortening.





**Summer prune to direct
growth into Secondary
scaffolds**



Conclusion

Under vigorous conditions this heavy pruning results in a non-productive cycle of pruning and excess growth responses. We need to develop more physiologically and horticulturally efficient pruning practices to reduce water sprout development.

Dwarfing rootstocks will also help.

The Pruning of Young and Bearing Peach Trees in the Orchard

M. A. BLAKE



PEACH TREE TRAINED TO A BROAD BASE AND A LARGE VOLUME
OF FRUITING SURFACE NEAR THE GROUND

EXTENSION SERVICE

NEW JERSEY STATE COLLEGE OF AGRICULTURE
AND

AGRICULTURAL EXPERIMENT STATION
RUTGERS UNIVERSITY, NEW BRUNSWICK, N. J.

Vase Form



FIG. 1. LOW-HEADED OLD TYPE VASE-FORM PEACH TREE WITH
LIMITING FRUITING SURFACE AT THE BASE

**Trained with thinning
out cuts only**



FIG. 2. FIVE-YEAR-OLD BANNER PEACH TREE 20 FEET HIGH
WHICH RECEIVED THINNING-OUT PRUNING ONLY



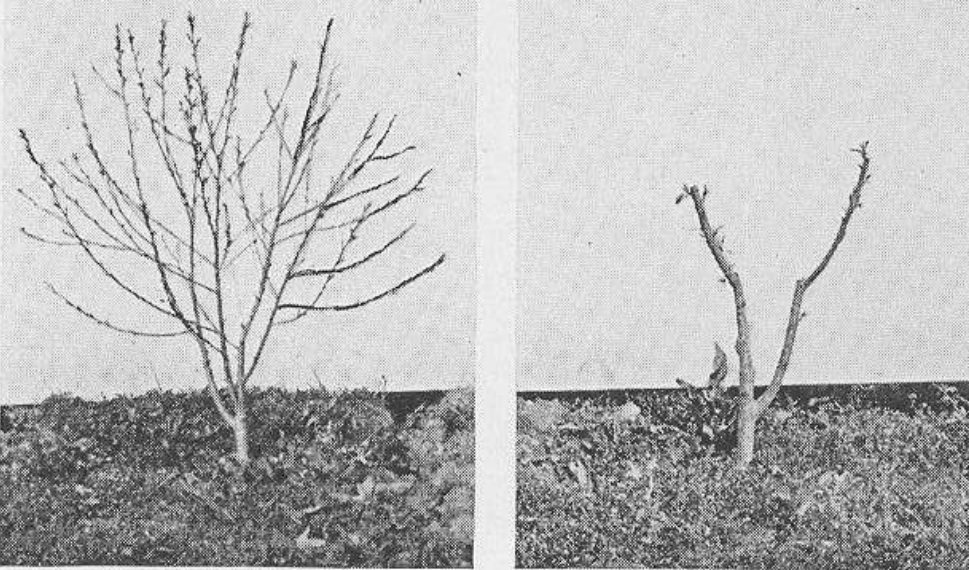


FIG. 5 AND 6. WELL DEVELOPED ONE-YEAR-OLD TREE CUT-BACK VERY SEVERELY TO DEMONSTRATE EFFECT

**Severe pruning results
in overly vigorous
growth**

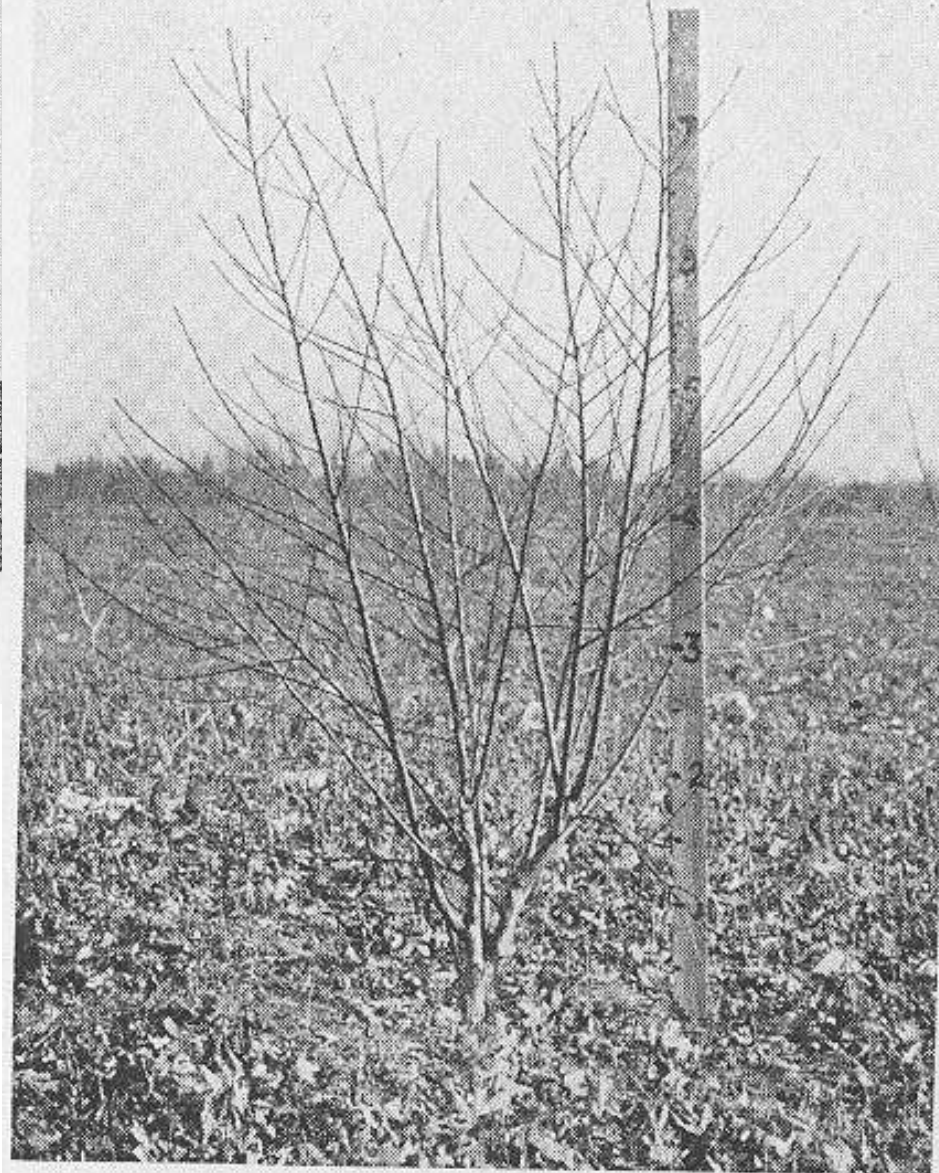


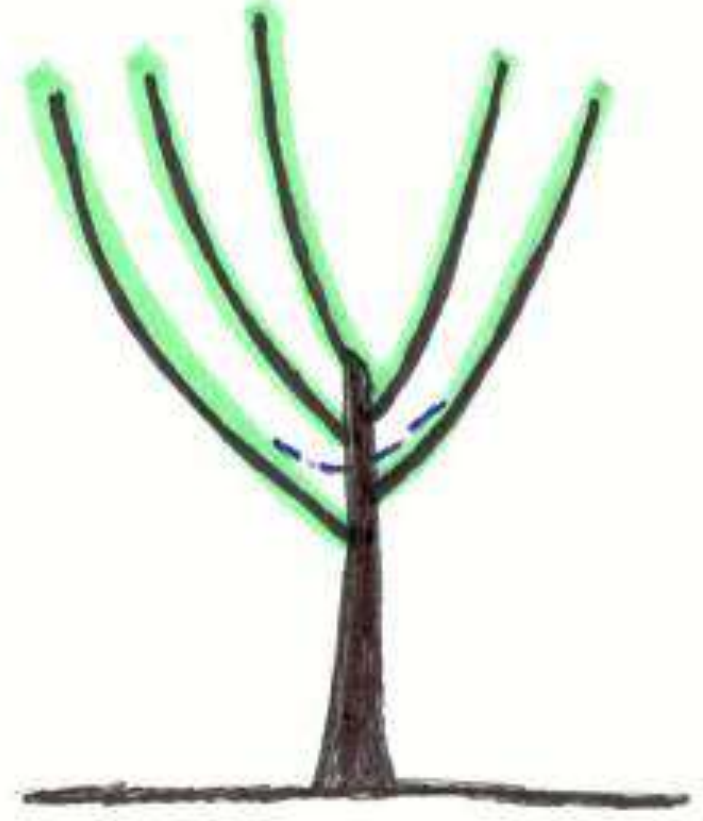
FIG. 7. LONG POLE-LIKE GROWTHS ON TWO-YEAR-OLD TREE RESULTING FROM TOO SEVERE PRUNING ILLUSTRATED IN FIGURES 5 AND 6



Annual severe cutting back

FIG. 8. EFFECTS OF TOO SEVERE ANNUAL CUTTING-BACK PRUNING
Same tree as in Figures 5 and 6 at close of fourth season

Shoot tipping during the first summer



Avoid whorls of branches

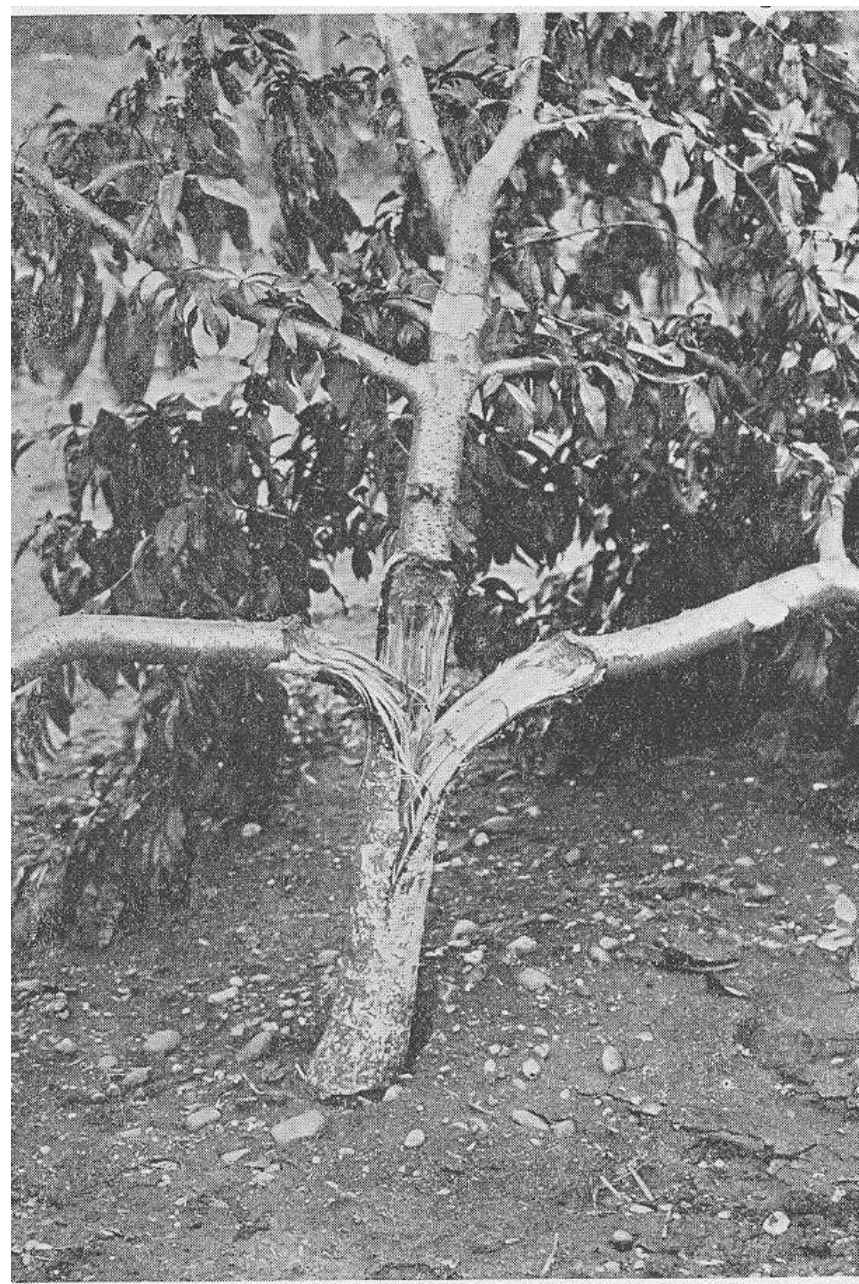


FIG. 10. TREES SHOULD HAVE STRONG MAIN CROTCHES AT THE START OR THE FIRST HEAVY CROP WILL BREAK THEM DOWN

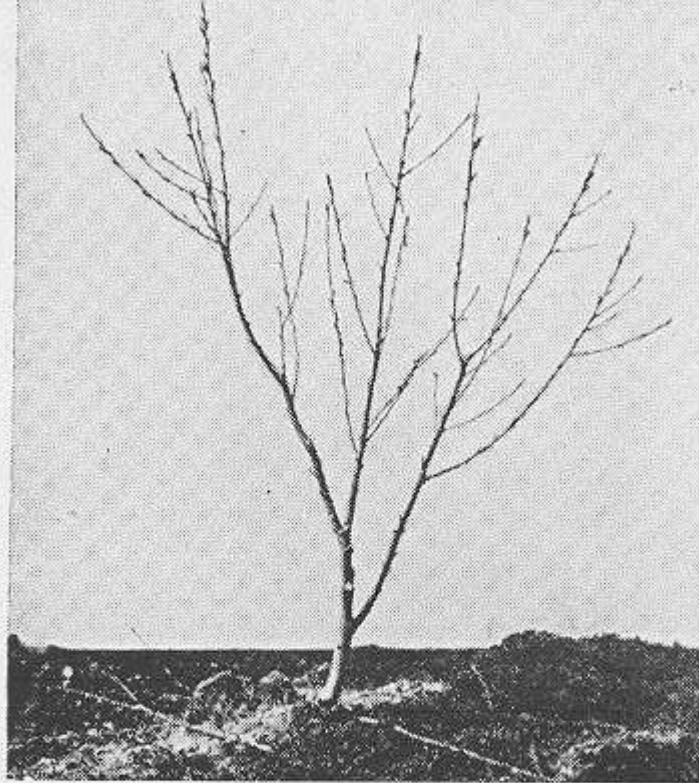


FIG. 11. ONE-YEAR-OLD TREE
WITH WEAK MAIN CROTCHES
Such faults should be corrected
at the start

**Poor crotch will
break with crop**

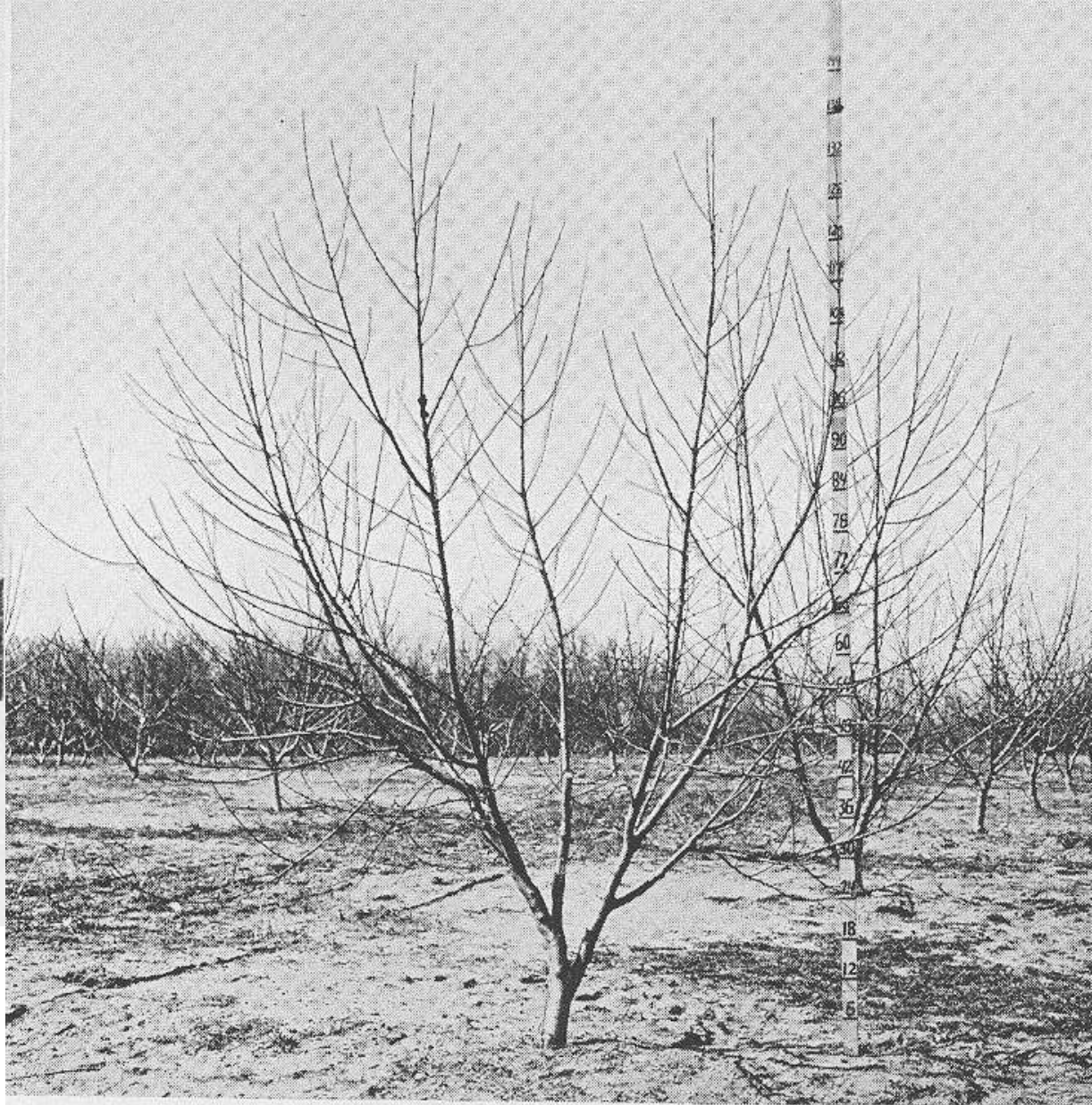


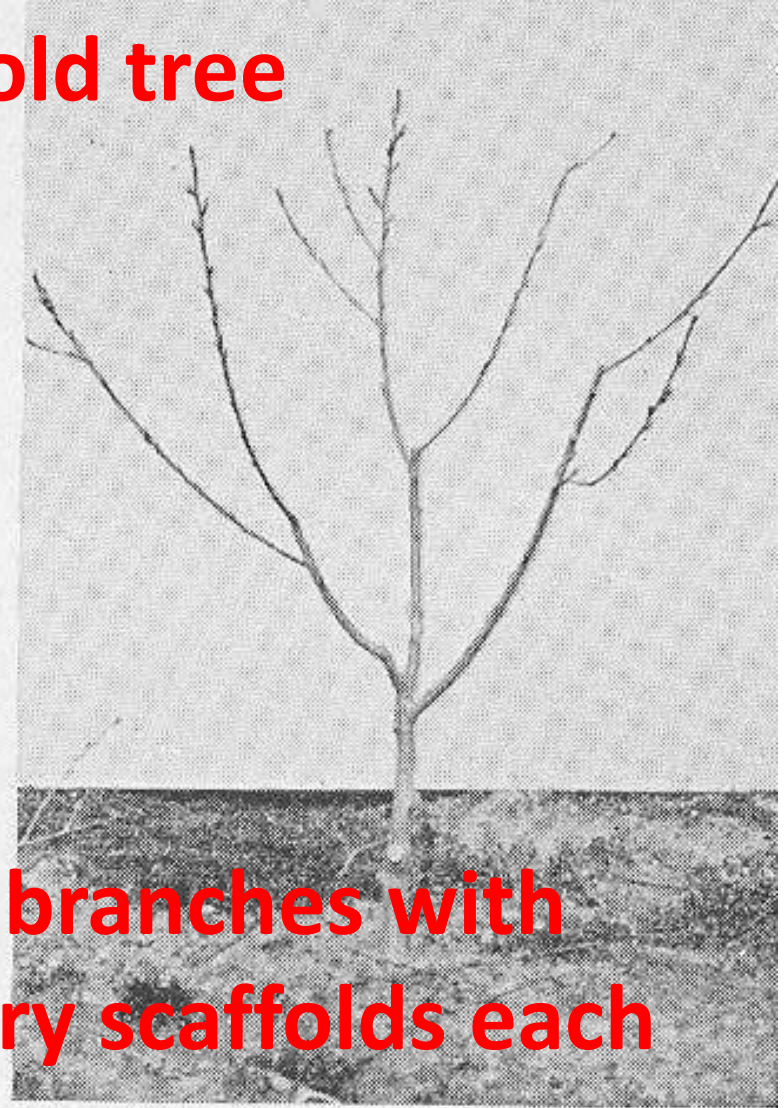
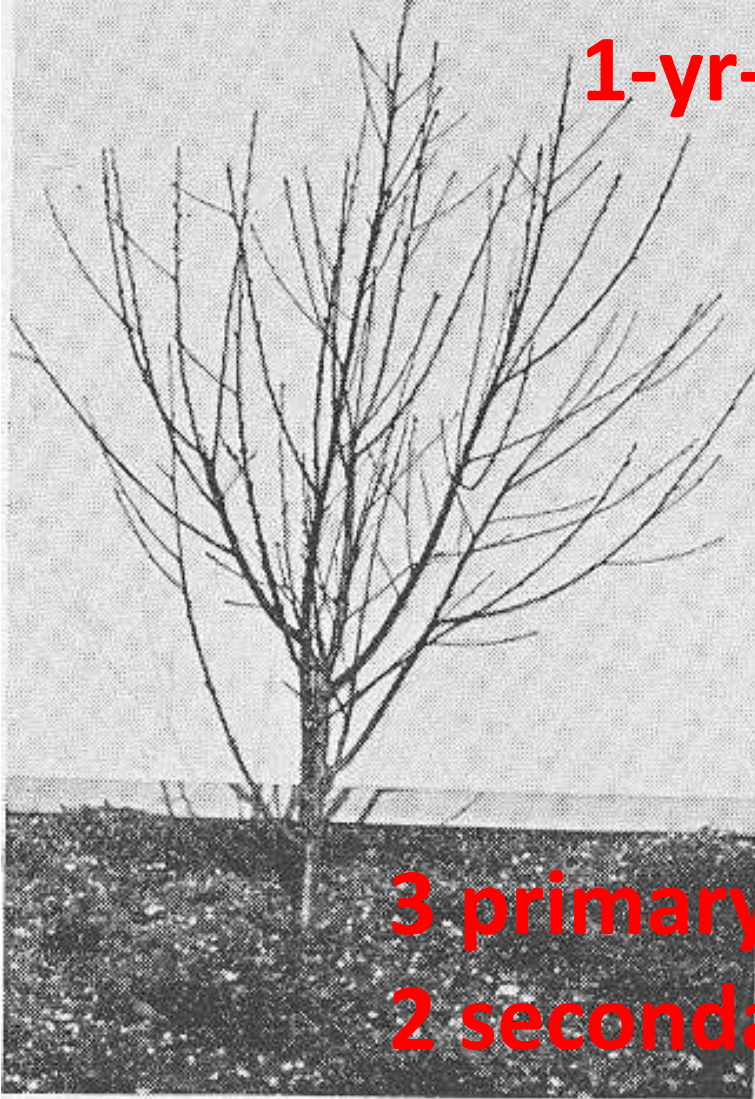
FIG. 12. SAME TREE AS IN FIGURE 11 AT CLOSE OF THIRD SEASON
AFTER RECEIVING ONLY THINNING-OUT PRUNING
The first good crop on the long pole-like main branches will
split down the weak crotches



Limb Spreading?



1-yr-old tree



**3 primary branches with
2 secondary scaffolds each**

FIG. 13 AND 14. ONE-YEAR-OLD STUMP TREE BEFORE
AND AFTER PRUNING

Three main branches and six secondaries secured
at the start. Tree lightly cut-back



QUESTIONS?



Choosing a Training System

- In California, DeJong showed that increasing tree density with Perpendicular-Vertical had short lived benefits (3 years) due to tree crowding.
- Robinson et al. reported optimum is about 500 trees/acre in New York.
- Marini & Sowers reported that 300 trees/acre was about 22% more profitable than 150 trees/acre in Virginia.

Choose a training system with about 400 to 500 trees per acre

- V-shaped trees are more profitable than Pyramid-shaped trees. Could use perpendicular-V, Quad-V, or Tri-V
- $16 \times 6 = 454$ trees/A
- $14 \times 6 = 519$ trees/A
- $16 \times 5 = 544$ trees/A

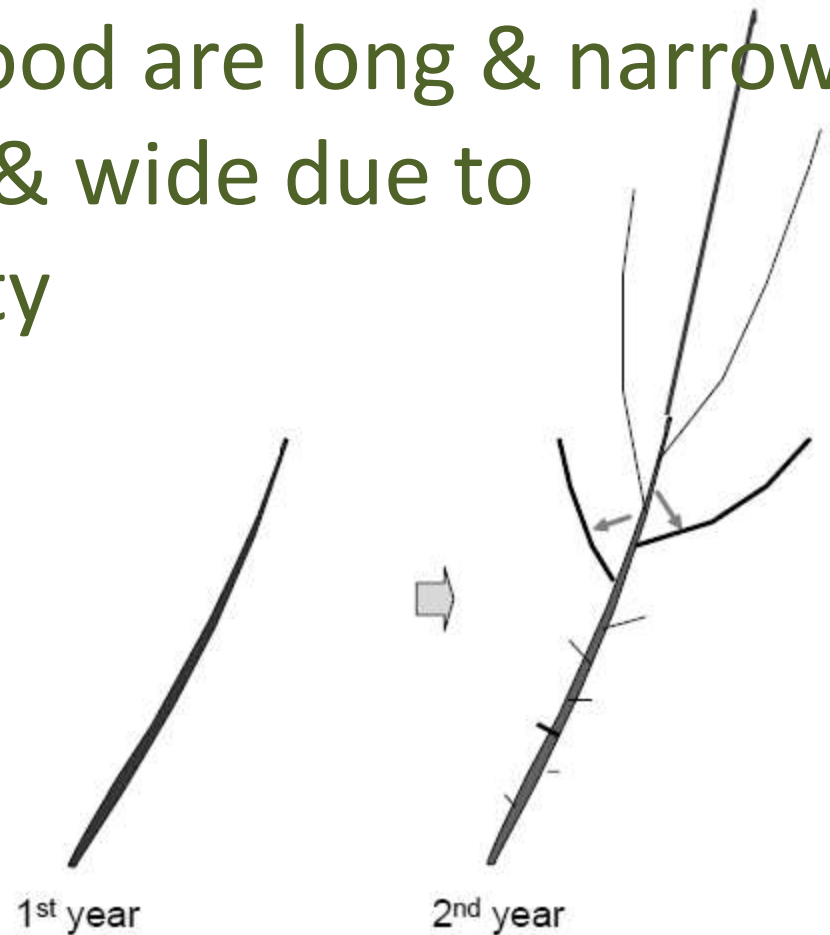
High Density reduces fruit size

Robinson		Marini	
Trees/A	FW	Trees/A	FW
155	240	150	146
218	228	300	128
366	200		
641	178		
778	175		

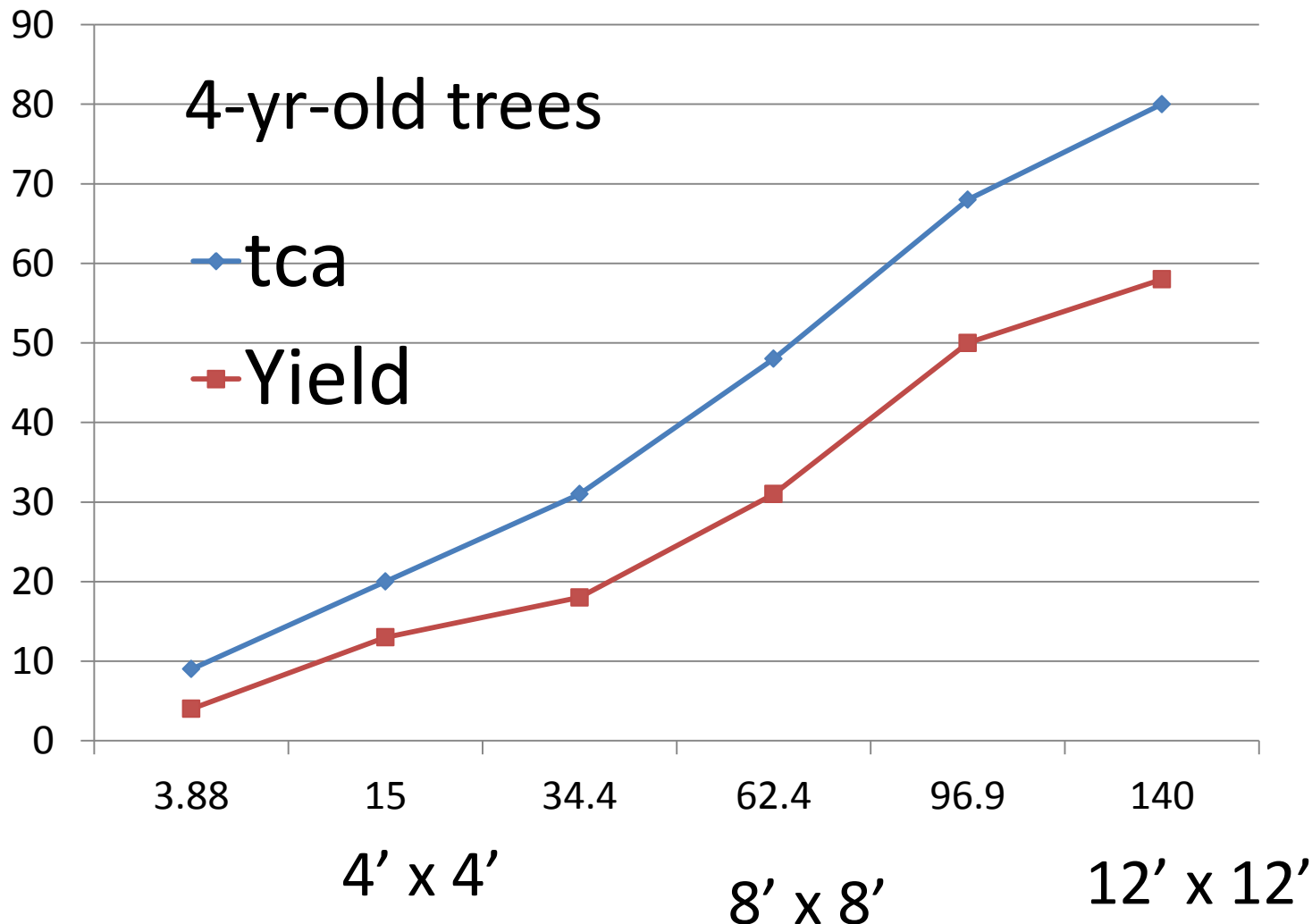
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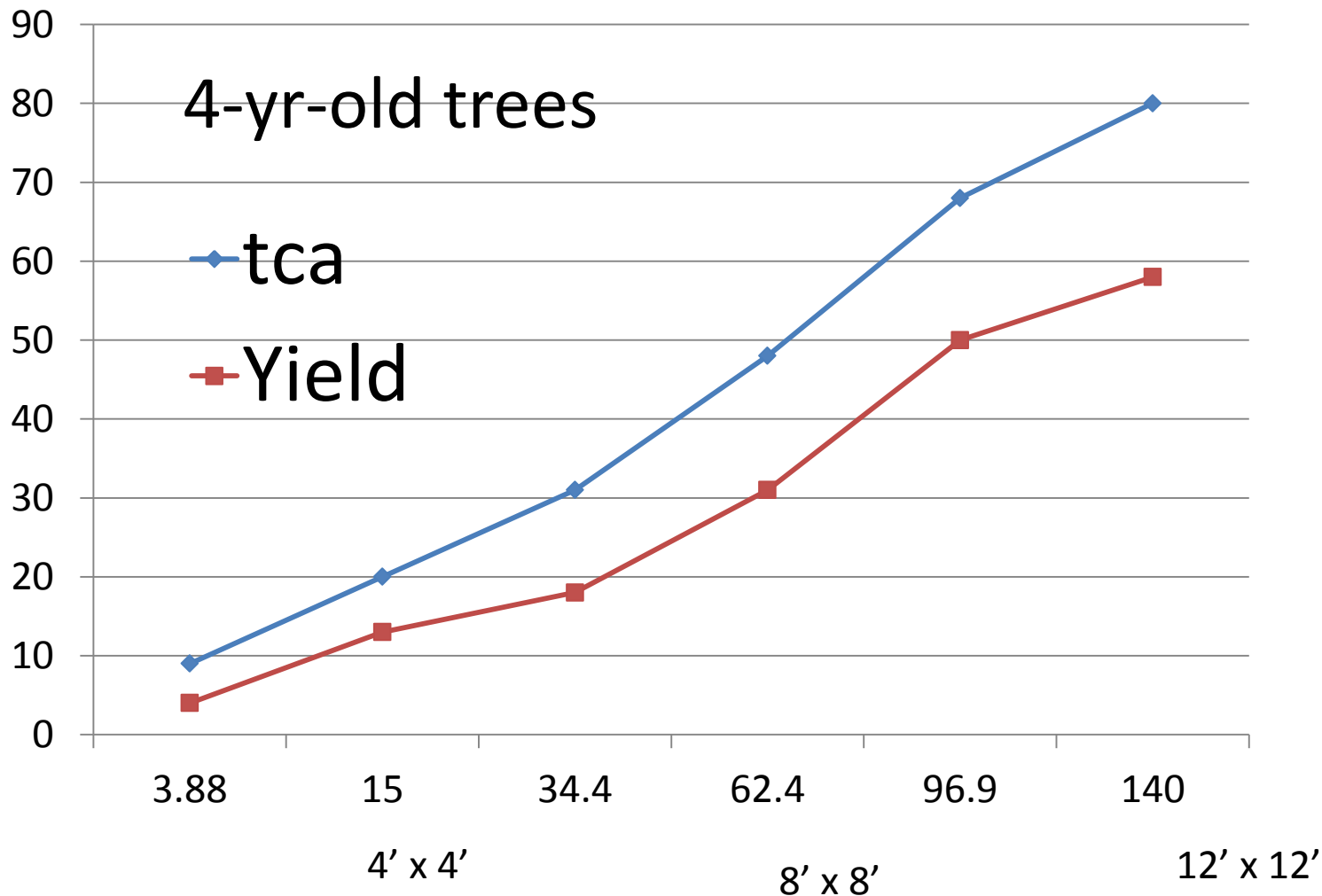
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Effect of weed-free area (ft²) on TCA and Yield (Welker & Glenn 1989)



Effect of weed-free area (ft²) on TCA and Yield (Welker & Glenn 1989)



Base

Apex

Mostly blind nodes

Vegetative and flower buds, flower density
highest in center

Blind nodes or single flower buds

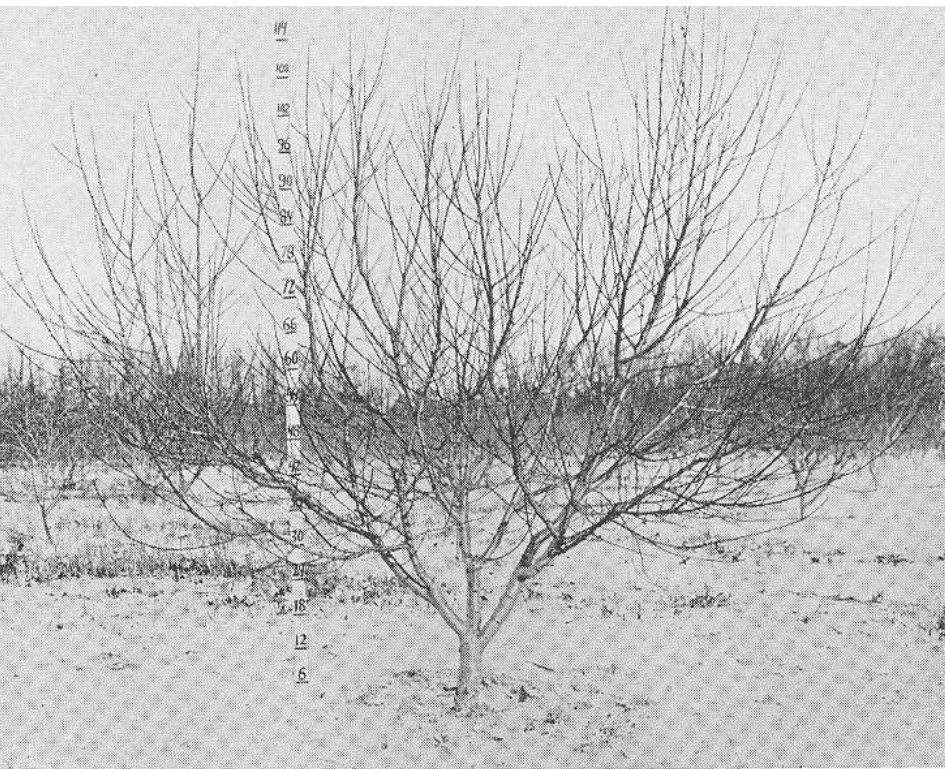


FIG. 15. SAME TREE AS IN FIGURES 13 AND 14 AT CLOSE OF THIRD SUMMER AND BEFORE DORMANT SEASON PRUNING



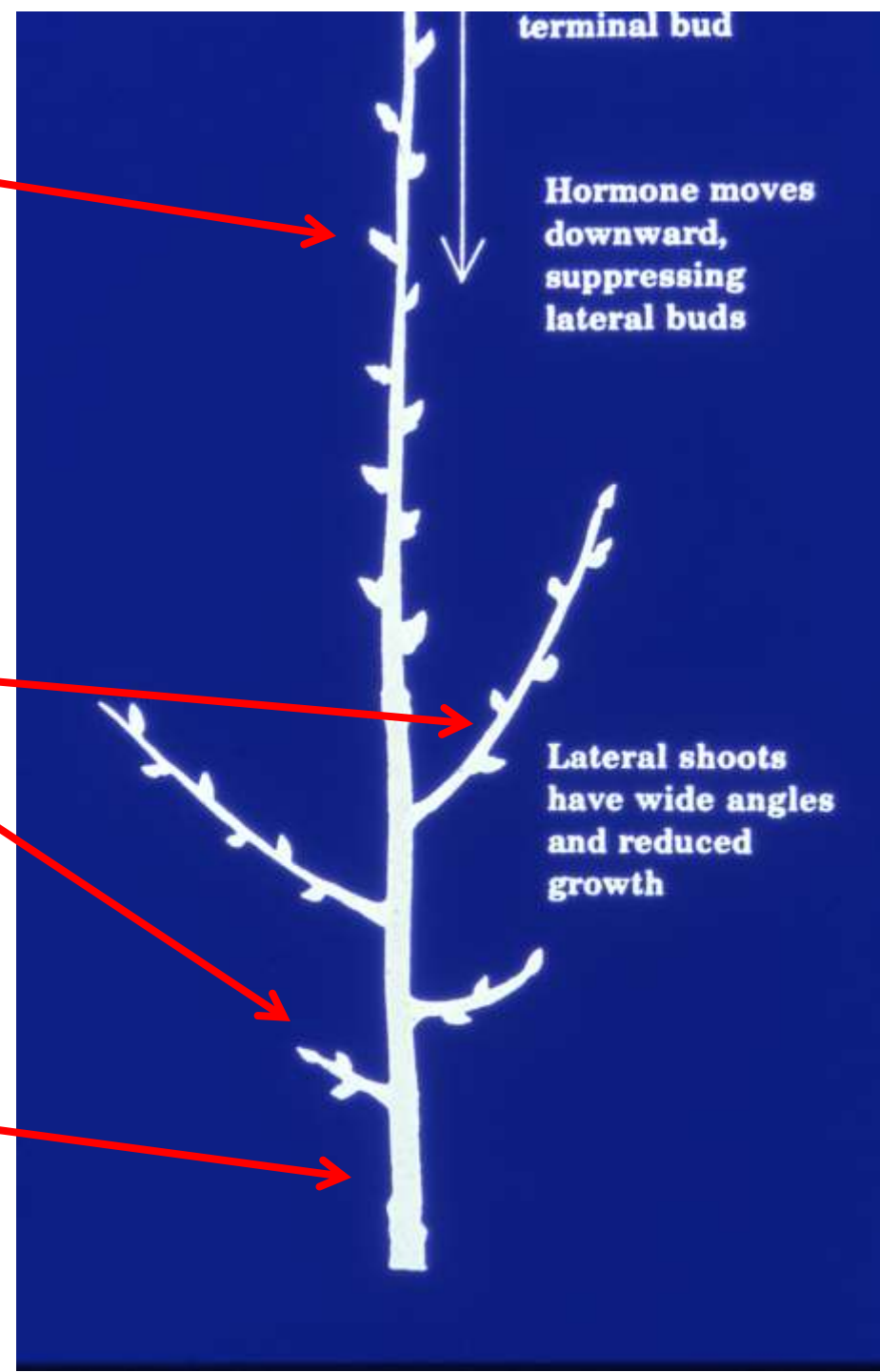
FIG. 16. THREE-YEAR-OLD STUMP TREE AFTER THINNING AND LIGHT CUTTING-BACK PRUNING TO TWIGS GROWING IN AN OUTWARD DIRECTION

**Same tree after 3 years
before and after pruning**

Correlative inhibition

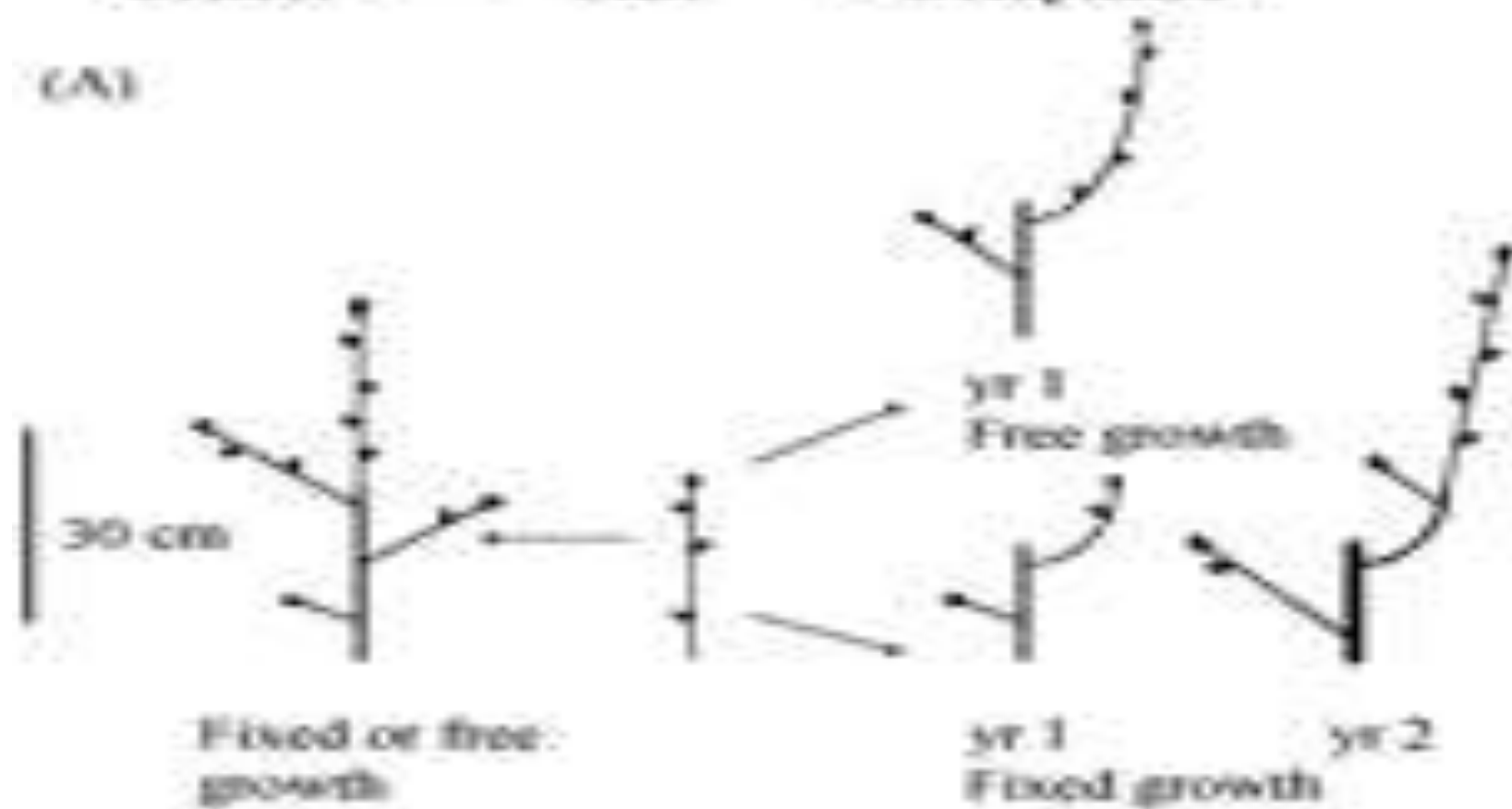
Shoot epinasty

Apical control



Control ← Start → Decapitated

(A)



(B)





Terminal

