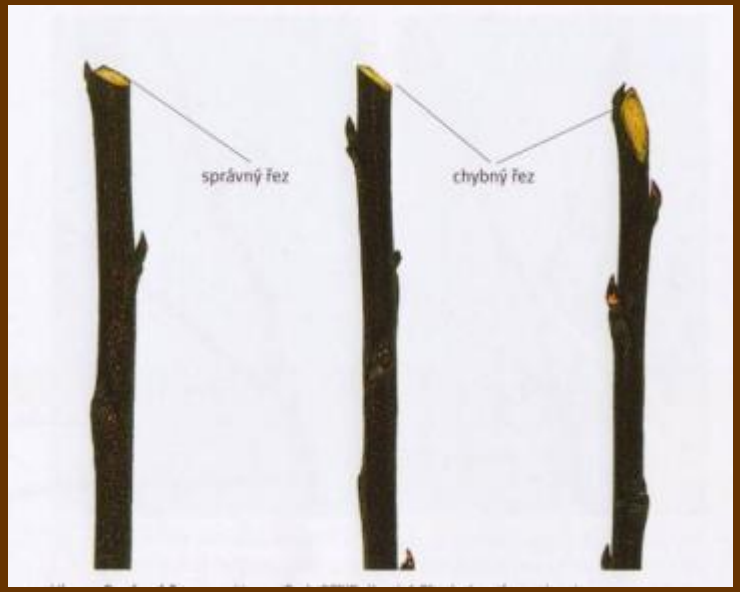
Inovace studijních programů AF a ZF MENDELU směřující k vytvoření mezioborové integrace CZ.1.07/2.2.00/28.0302

Tato prezentace je spolufinancovaná z Evropského sociálního fondu a státního rozpočtu České republiky

Training and Pruning of Fruit Trees
Fruit-growing - Seminar
Stanislav Boček, Assistant Professor
Faculty of Horticulture
MENDELU

Objectives of training
Properly form the tree and structure the scaffold branches
Support early onset of productiveness
Control size and shape of the crown within desired parameters (depends on spacing and type of cultivation)
Secure optimum amount of light and air for all parts of the tree crown
Maintain physiological balance between growth and productiveness
Stabilize annual yield of high-quality fruits
Improve health condition and prolong tree life

Types of Pruning Cuts
-Heading cut
-Bench cut
-Thinning cut
-Drop-crotching cut



correct wrong wrong

Thinning cut

Drop crotching cut

Training: After planting (first year)

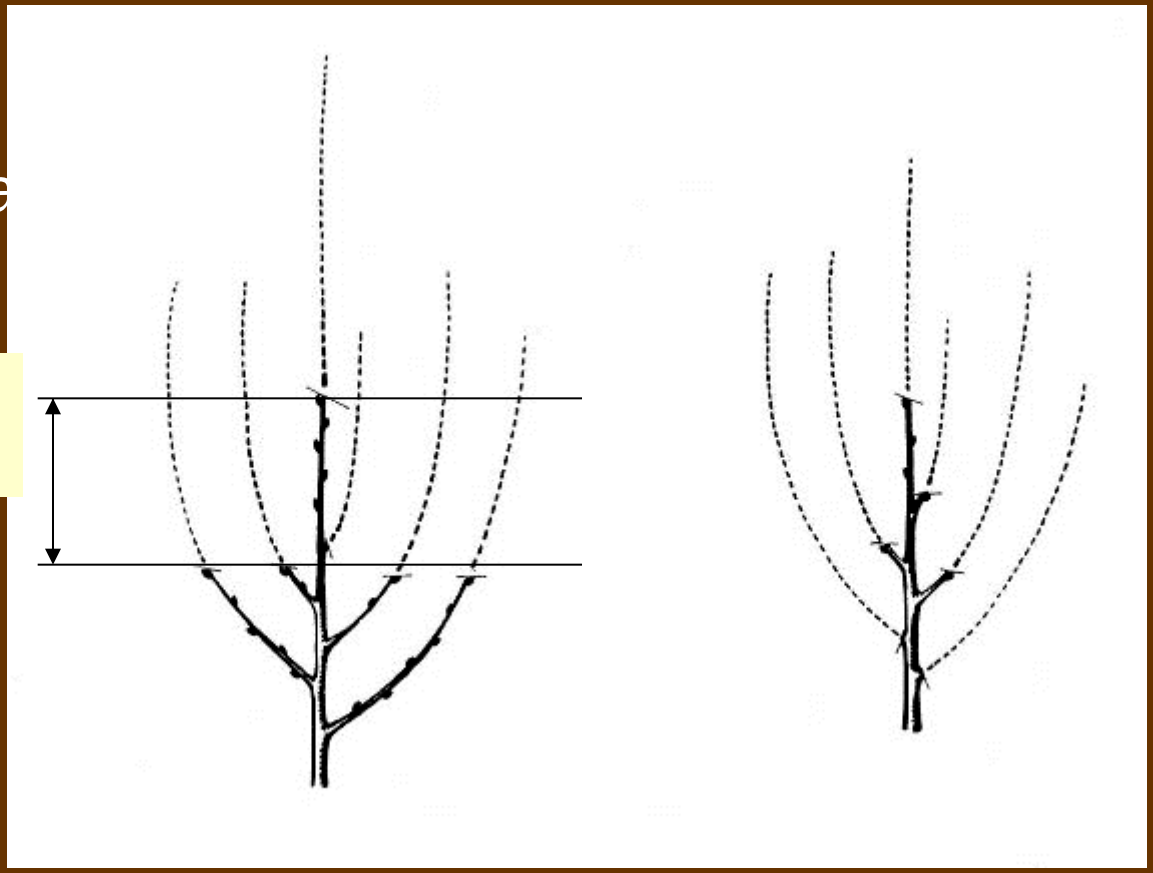
– Necessary for development of vigorous limbs

- Supports successful rooting of the plantings

– Heading cut at the outward facing bud

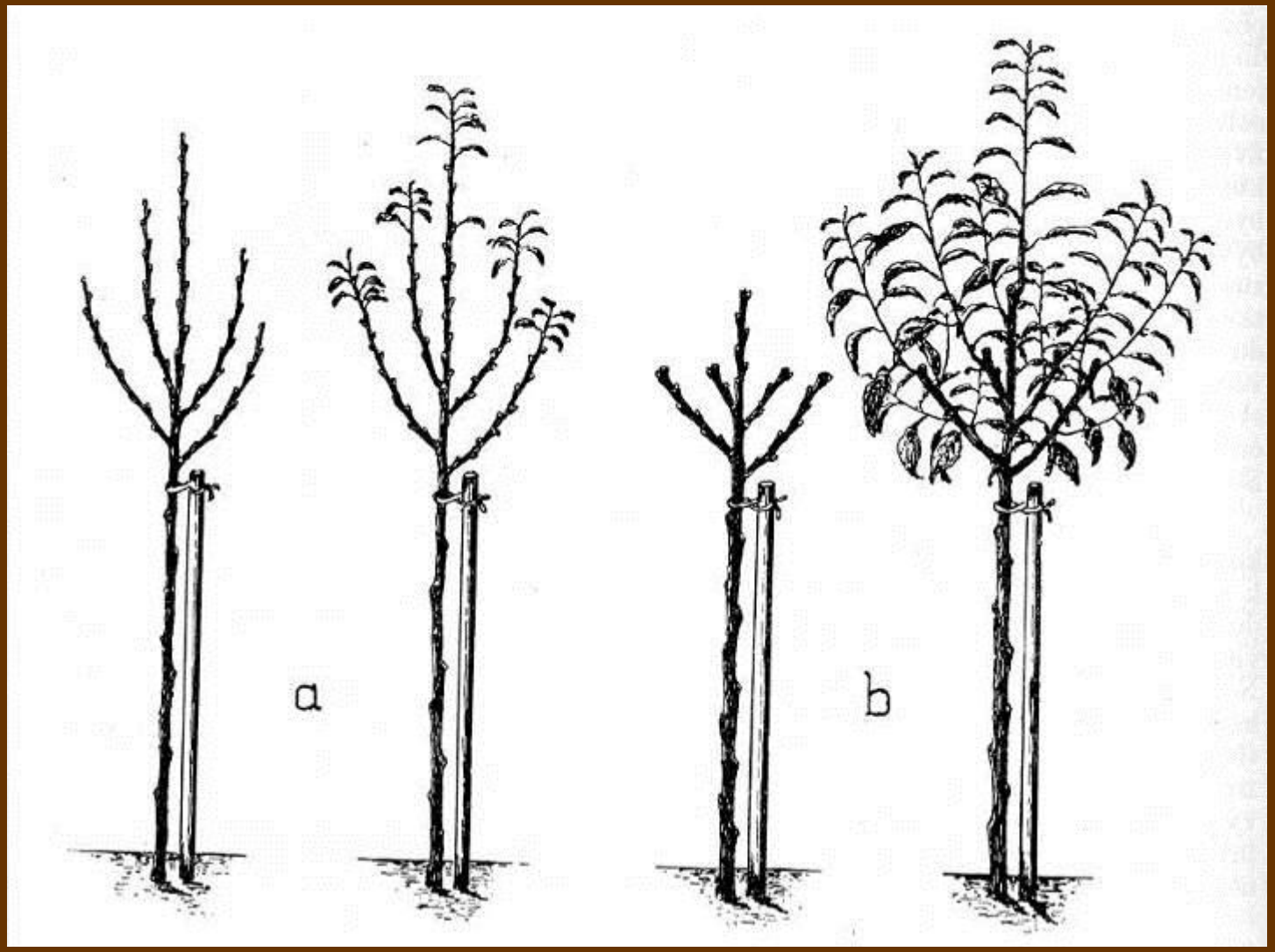
Autumn pla

Spring planti



2/3 of shoots are cut off – shoots are reduced to 2-3 buds

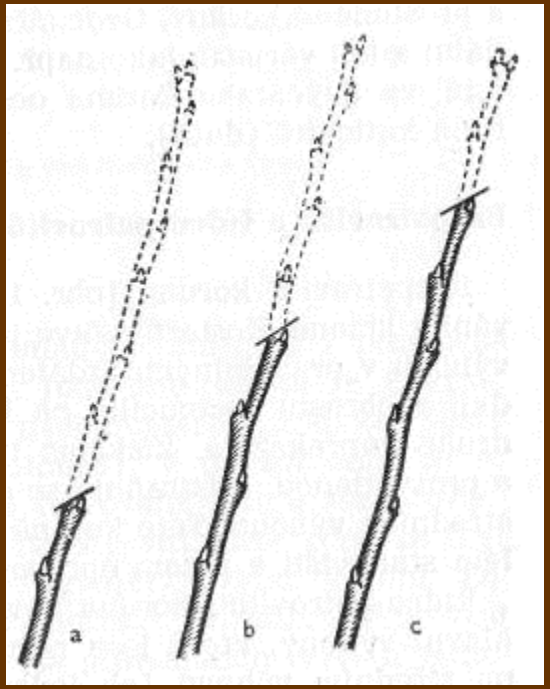
Impact of reduction on branching



No reduction

Reduction

Cuts: Length of remaining limbs
- Training
Short cut: More than half is cut off – promotes branching and growth
Medium cut: Half is cut off - Branching without significant renewal of the tree
Long cut: Less than half of the limbs is cut off – Central and basal parts of the shoots remain without branching

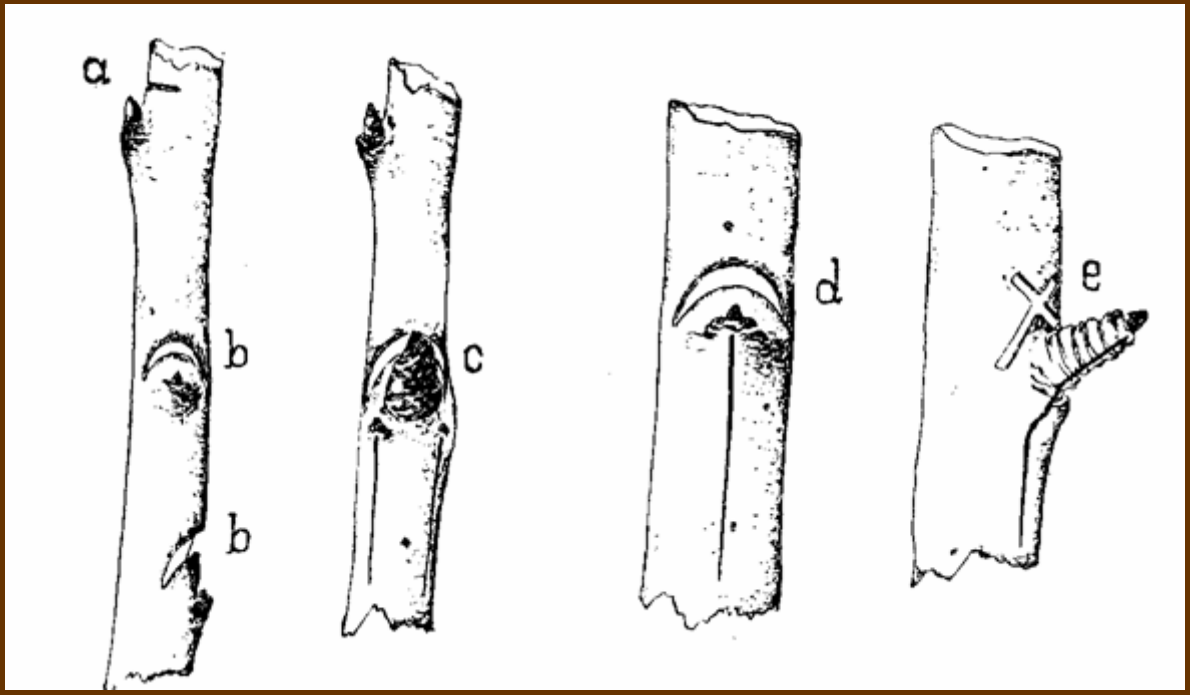


How to enhance branching

Cuts above the buds

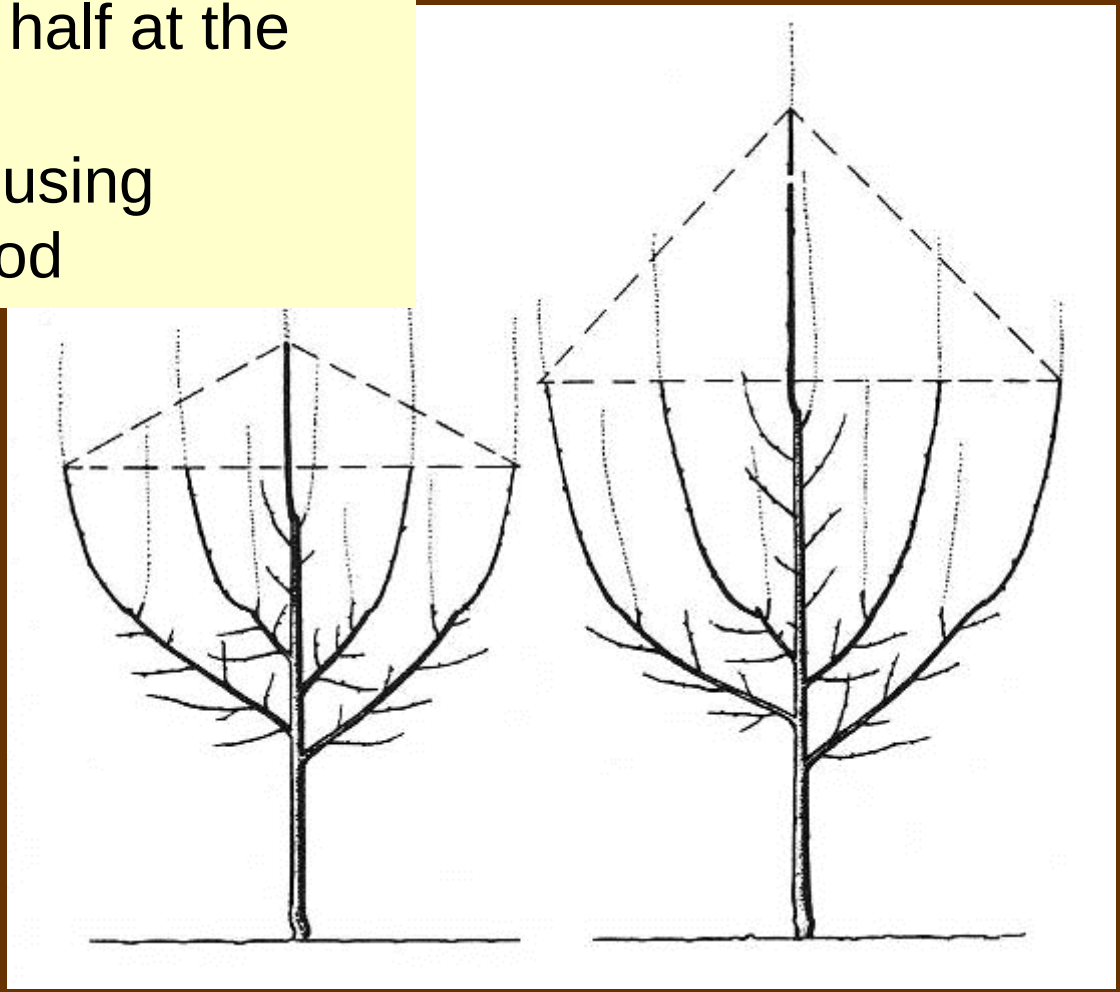
Objective:
Promote vegetative growth
Promote breaking of buds along the whole annual shoot
Invigorate shoot growth

Timing: Early spring



Training cuts: Second year

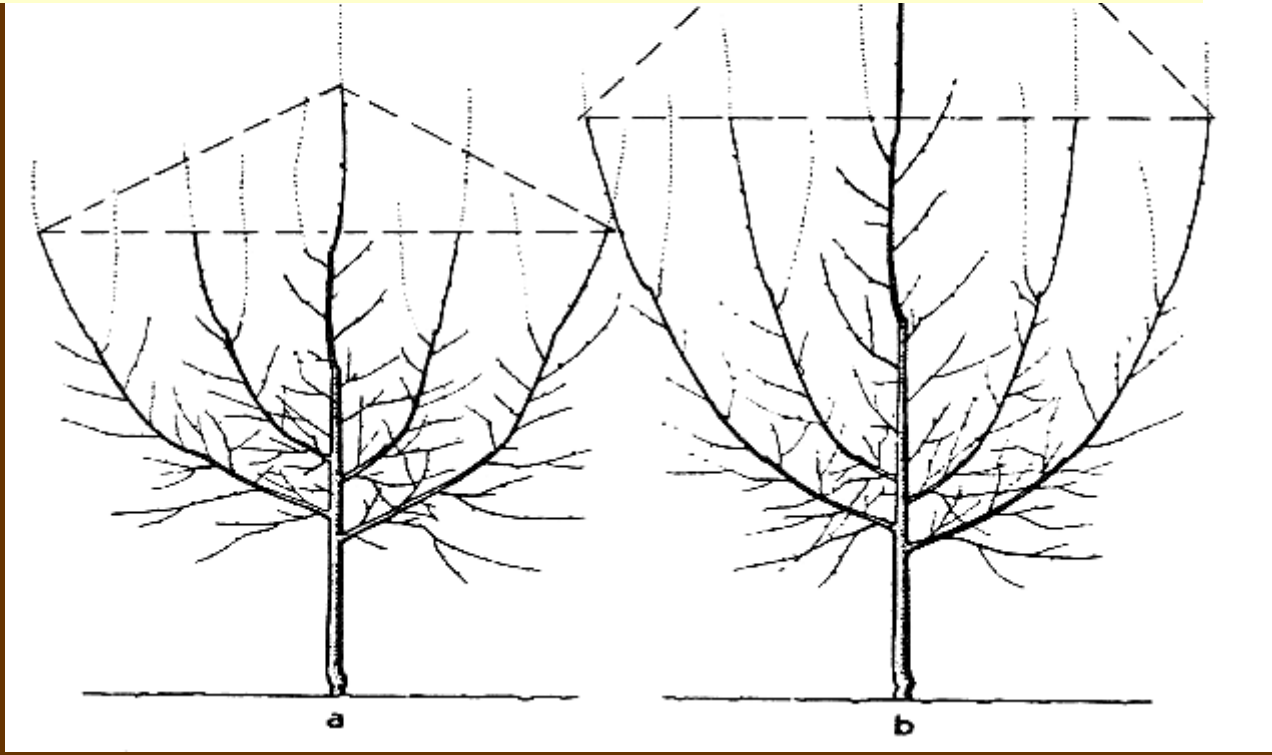
- Removal of competing shoots
- Reduction of shoots by half at the outward facing bud
- Pruning of the terminal using alternating pruning method



Apple tree pear tree

Training cuts: Third year

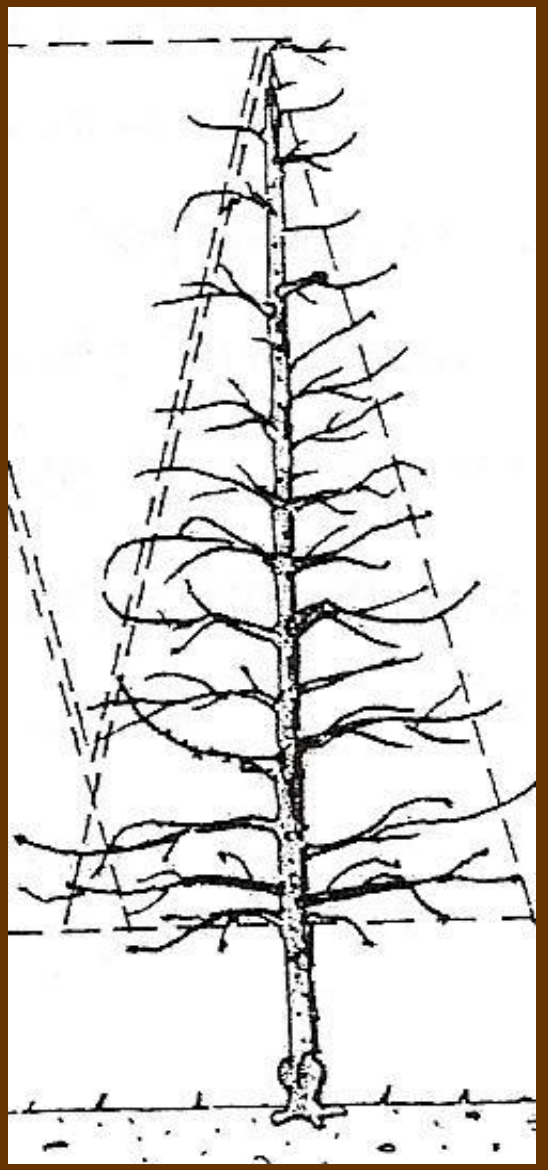
- Removal of competing shoots
- Reduction of one third of shoots
- Pruning of the terminal using alternating pruning method
- Potential development of upper parts of the tree



Apple tree pear tree

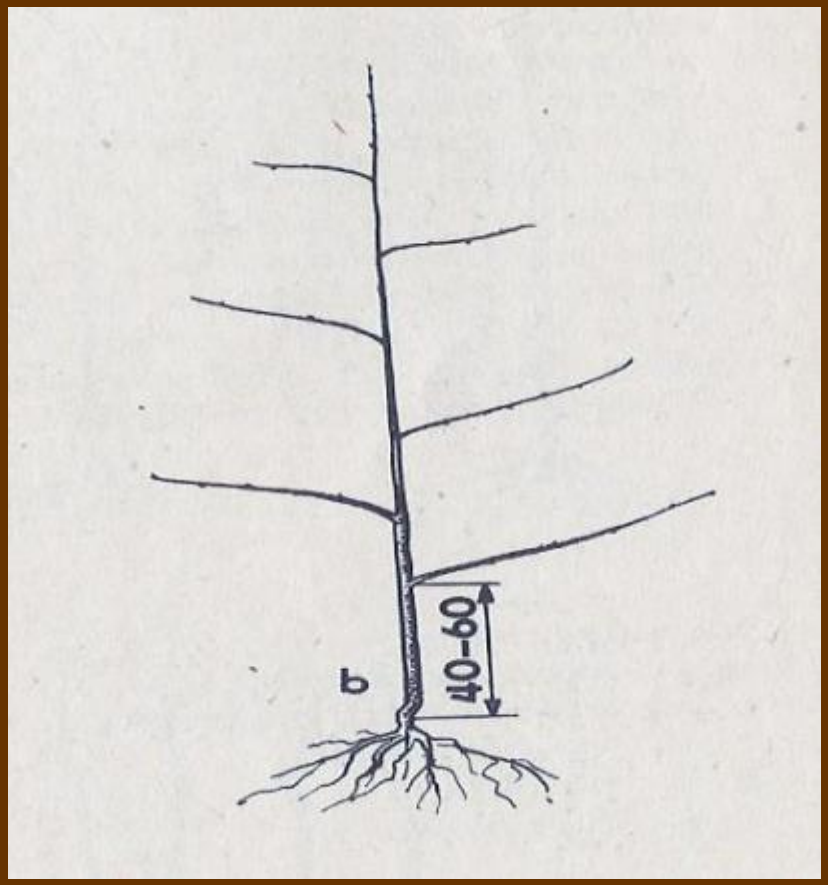
VERY DWARFING (“slender spindle”)

Intensive fruit production
Small size, high density plantings
Weakly growing rootstock (M9), supports necessary
Early and high yield of excellent fruits
Low costs for manual labour, high profit
Pyramidal tree crown
Better utilization of light in the orchard



Nursery products

Very suitable



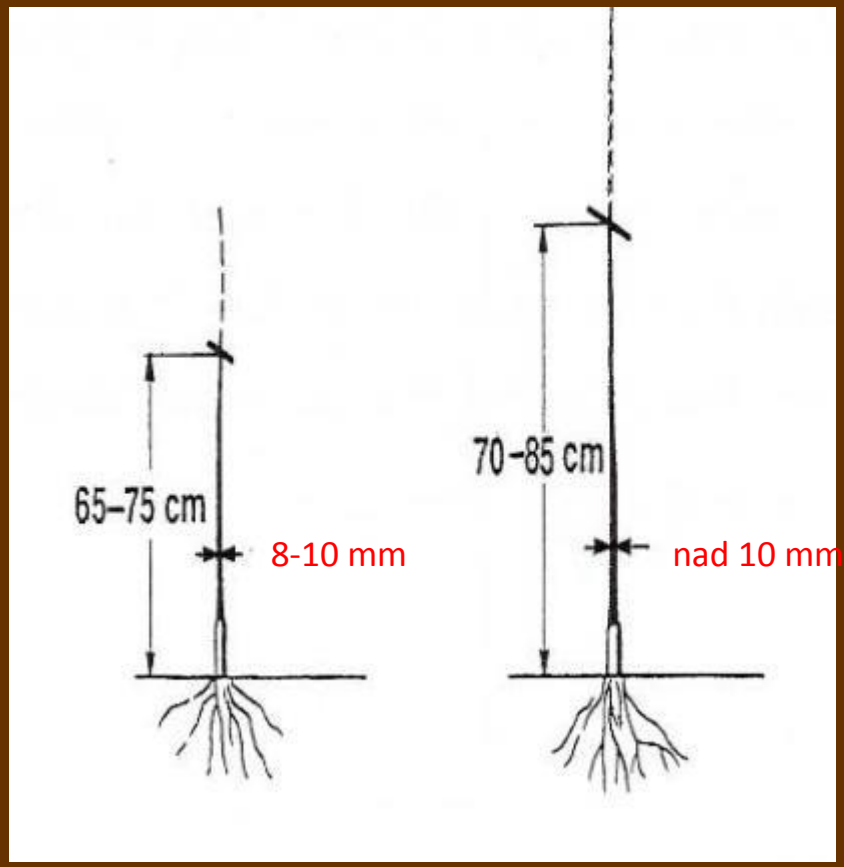
Less suitable

Two-year old whip: knip-boom tree

Conventional nursery product with a

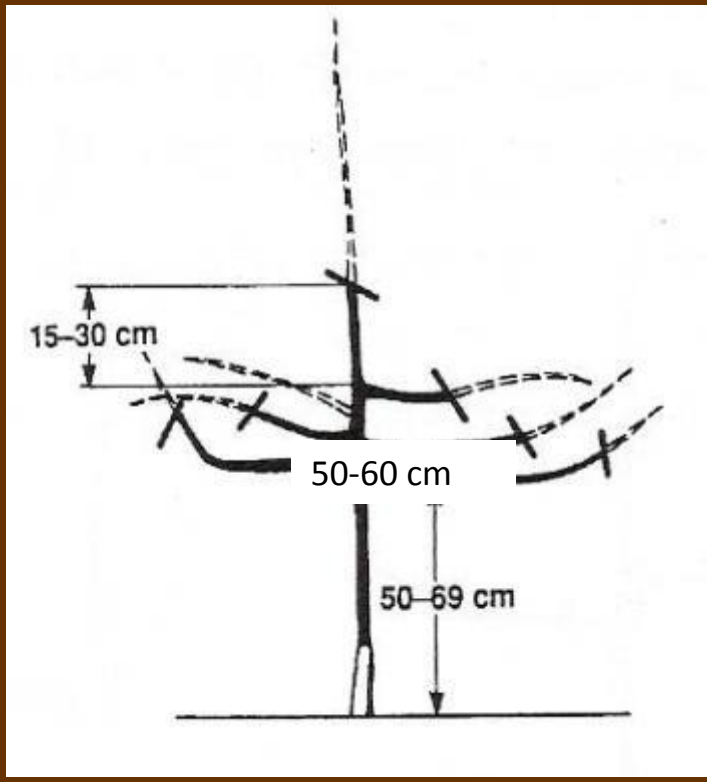
Cultivation of very dwarfing trees

First year
A. One-year old unbranched grafted plant
Cut to 65-85 cm (depends on tree vigour)



B. Plantings with enough shoots

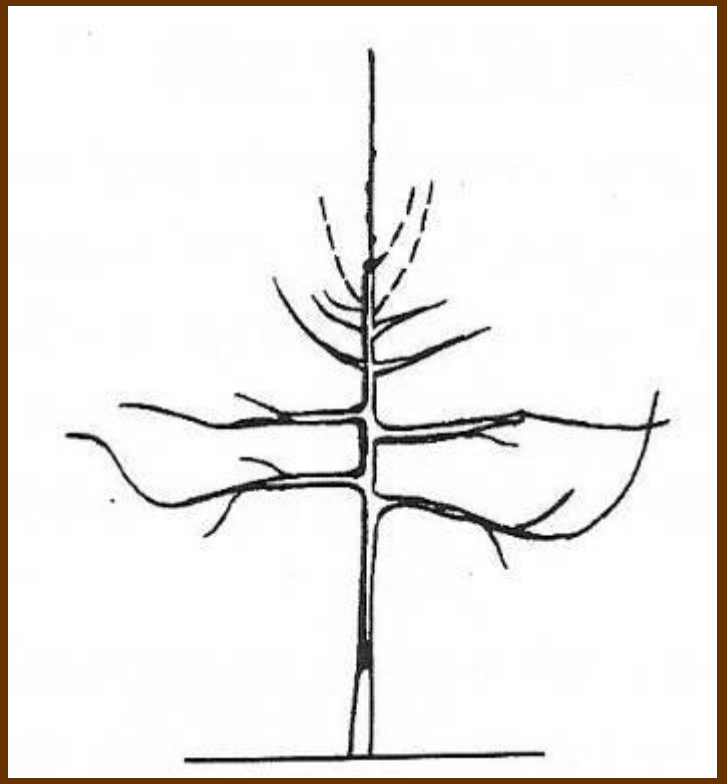
Remove any growths on the stem to 50-60 cm height
Lower parts: 3-5 shoots
Reduce shoots longer than 50 cm
Upper shoots must be reduced more (pyramidal shape)
Do not reduce shoots shorter than 30 cm
Reduce terminal shoot:
a) Larger than 10 mm in diameter: 30 cm above the last branch
b) Smaller than 10 mm in diameter: 15 cm above the last branch



Second year

annual shoots growing below the point of cutting are the most vigorous growths thanks to the removal of the terminal
Lower-growing annual shoots are weaker and less robust in the horizontal direction
15 cm long shoots: Thinning out of young vigorous top shoots

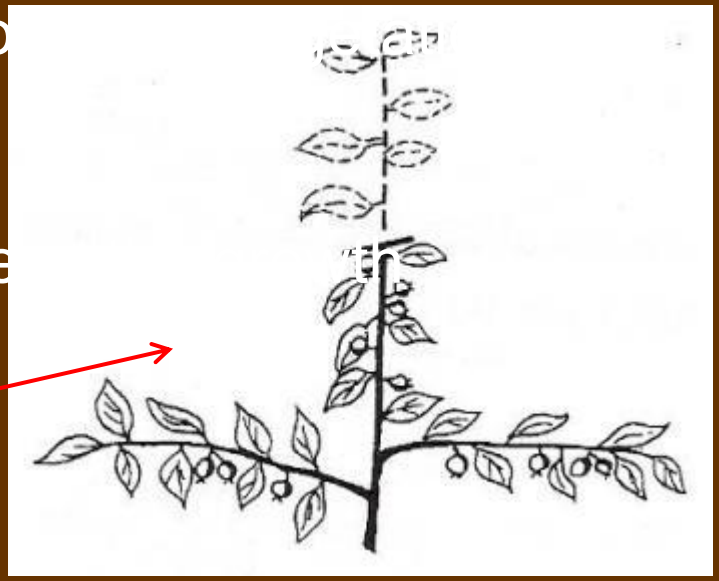
Competing annual shoots:
Remove or perform bench cut if shoots are 10-15 cm long
Development of short annual shoots which will form fruit-bearing wood



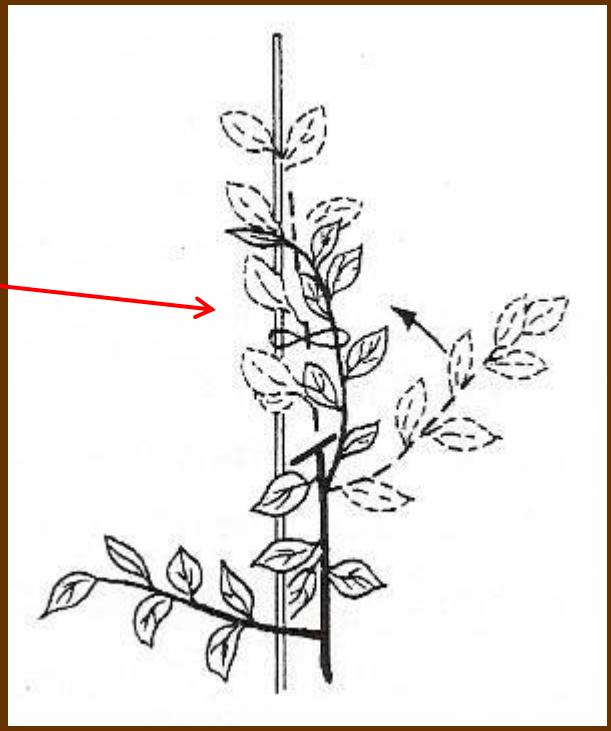
If shoots are longer than 50 cm -bend (spreading, weights, etc.)

Third and fourth year
Reduction of the terminal and bending of vigorous side annual shoots, removal of competing annual shoots
Important: Pay special attention to the terminal and upper layers of the crown – Control balance between upper and lower parts of the crown

a) Weak or short terminal (5 mm thick or max. 30 cm long)
Reduced by half in the spring before o
Invigorates the growth
b) Vigorous terminal
Reduced after blossom loss → Weake



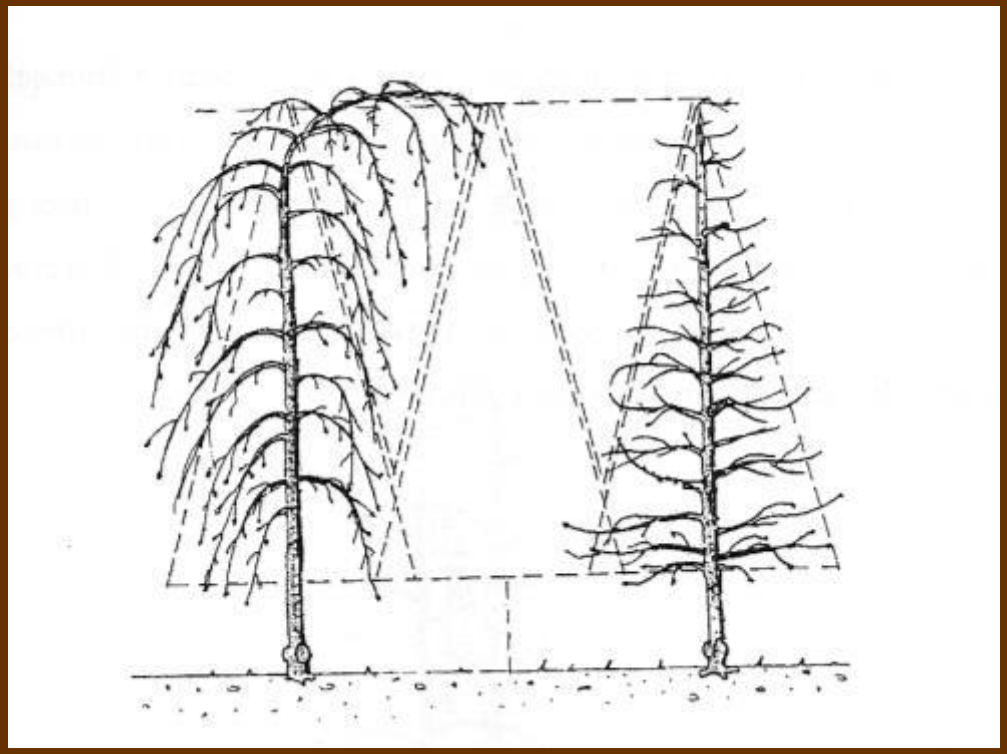
Alternative solution:
Remove the terminal
After the blossom loss, bend the highest positioned annual shoot like a bow upward
This annual shoot will take over the role of the terminal as a central leader
Suppresses growth of upper parts of the crown
Invigorates growth and productiveness of lower parts of the crown



- Do not reduce one-year old shoots in the upper parts of the crown starting the second year of the tree growth; this would cause development of undesired strong shoots – cut these shoots when they are 2 years old, and already developed flower buds

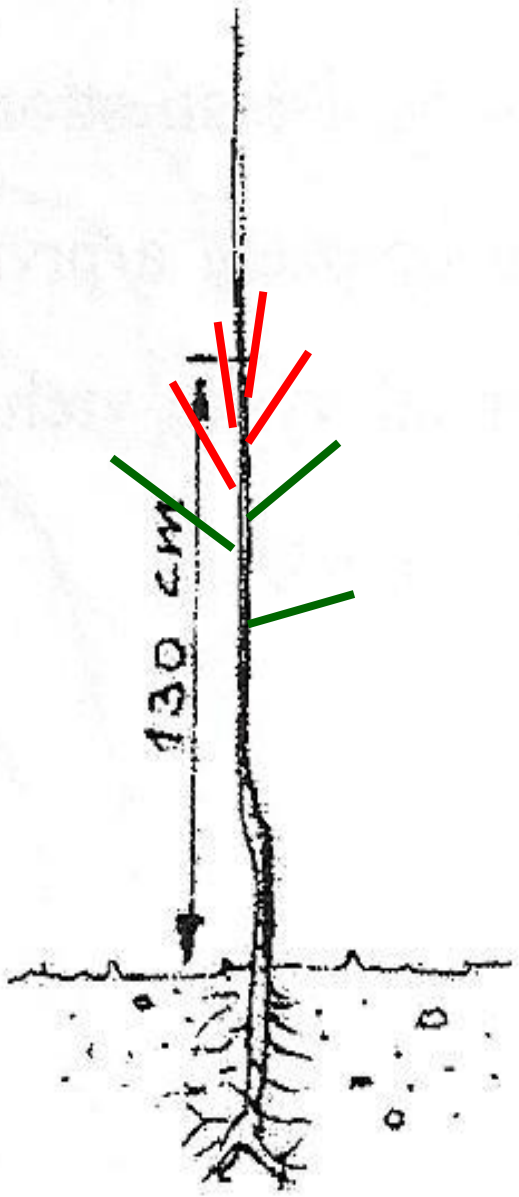
SOLAX

Author: Dr. Lespinass, France
“Sun axis”: Cultivated apple tree shape
Weak-growing rootstock (M9), support, 2.5-3.5 m tree height, 80-100 t/ha yield

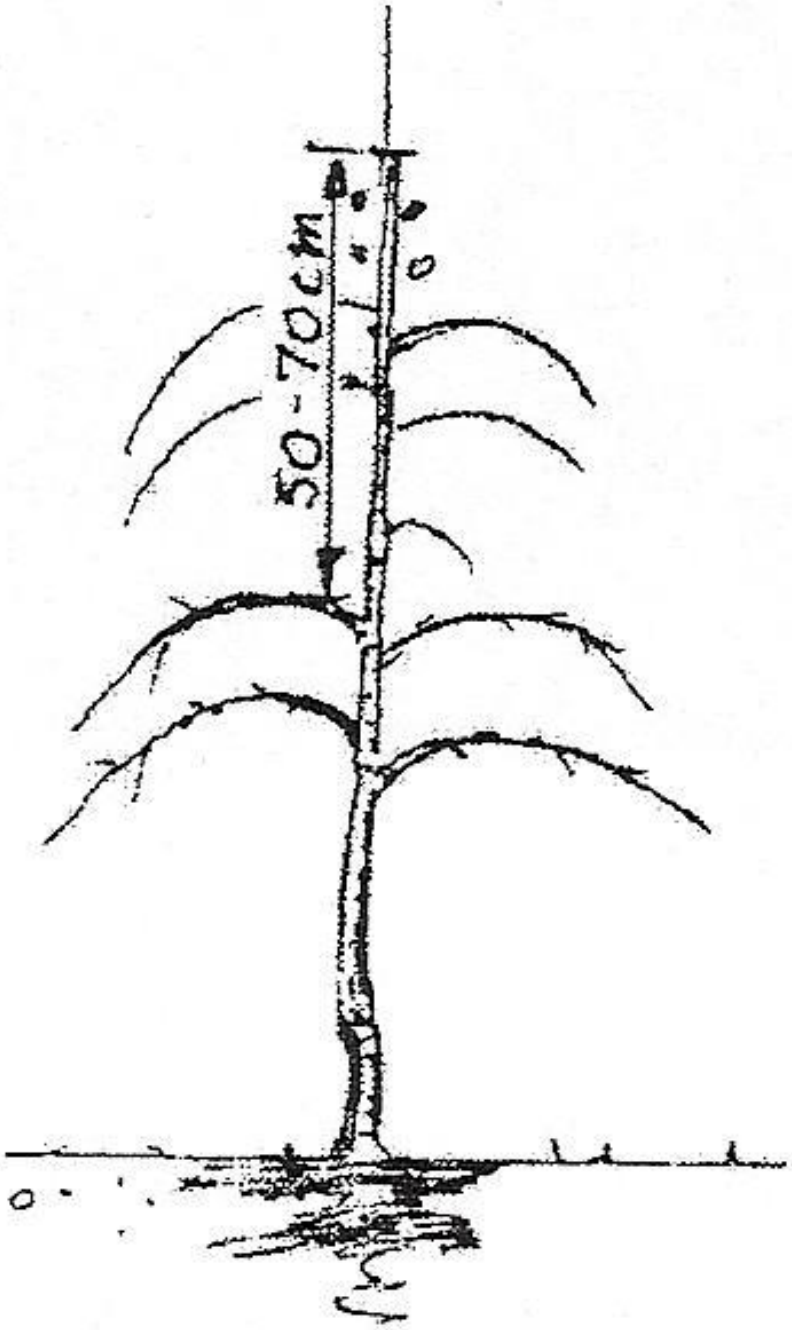


solax slender spindle

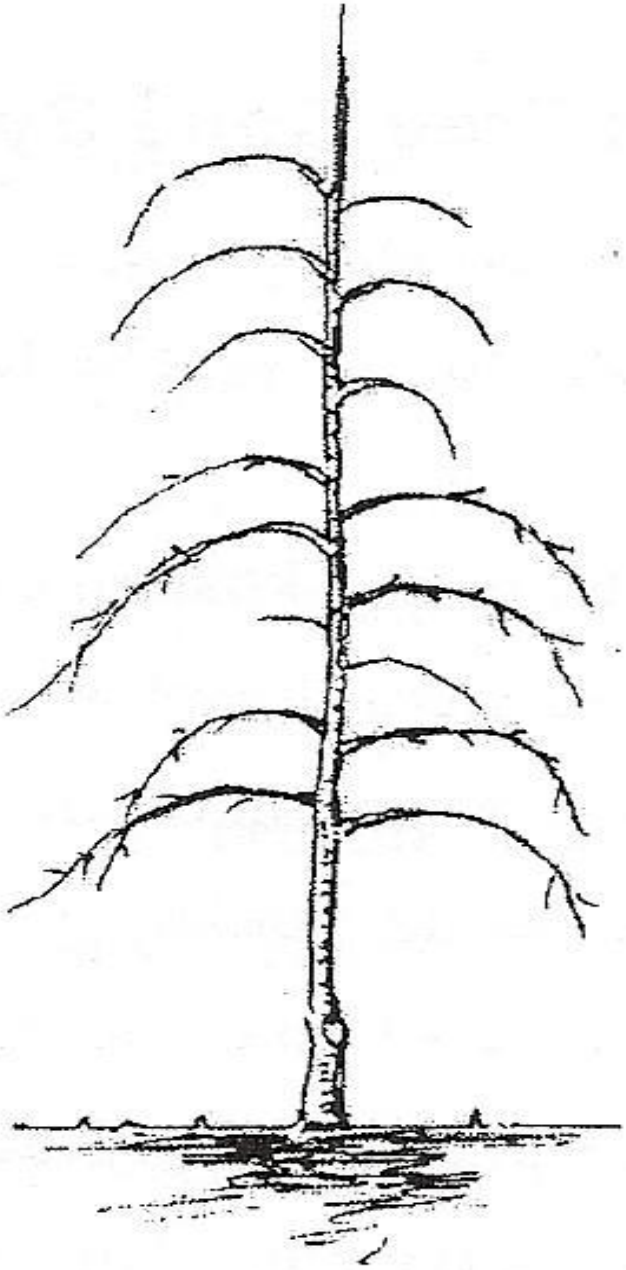
SOLAX



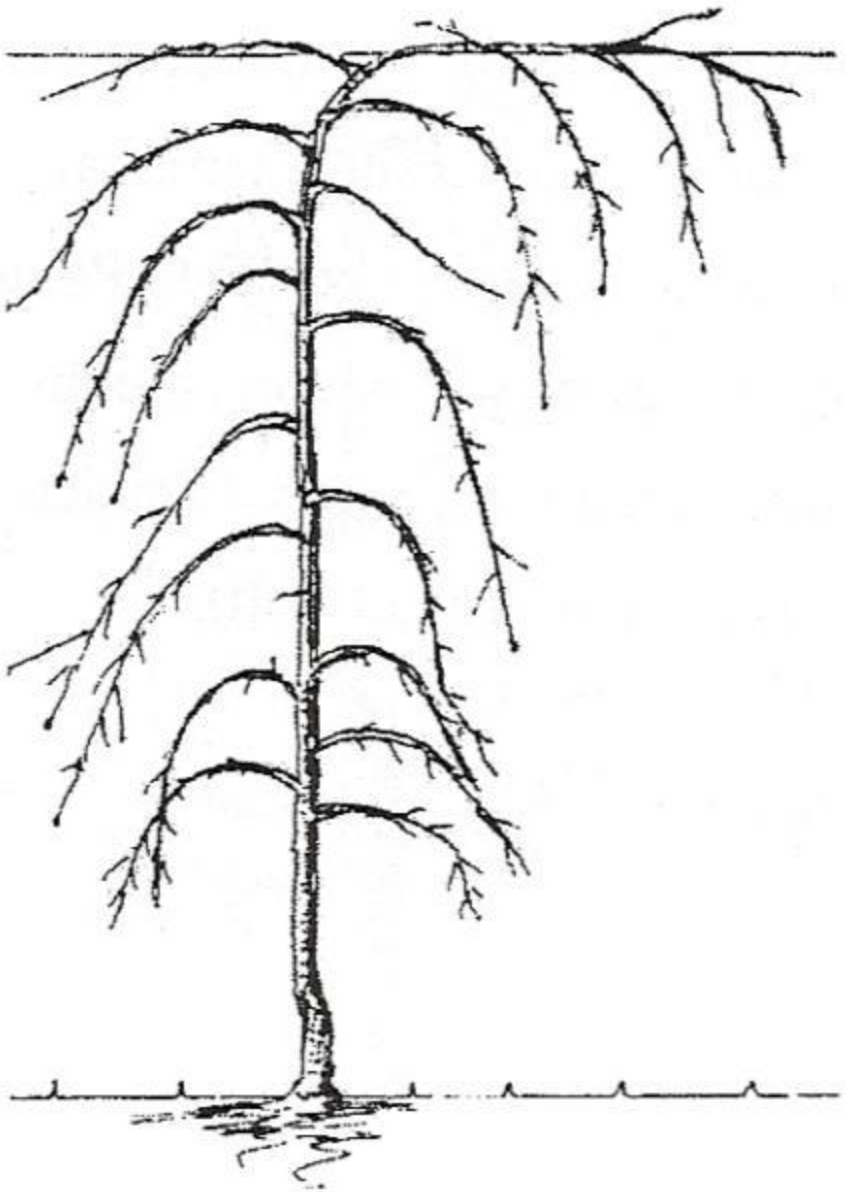
First year
Plant a one-year old whip (i.e. unbranched tree) with min. 1.3 m heigh
Reduce to 1.3 m
Terminal bud breaks below the cut – let it grow, and remove 4-5 buds breaking below the terminal one
Lower shoots grow in an obtuse angle and do not compete with the terminal



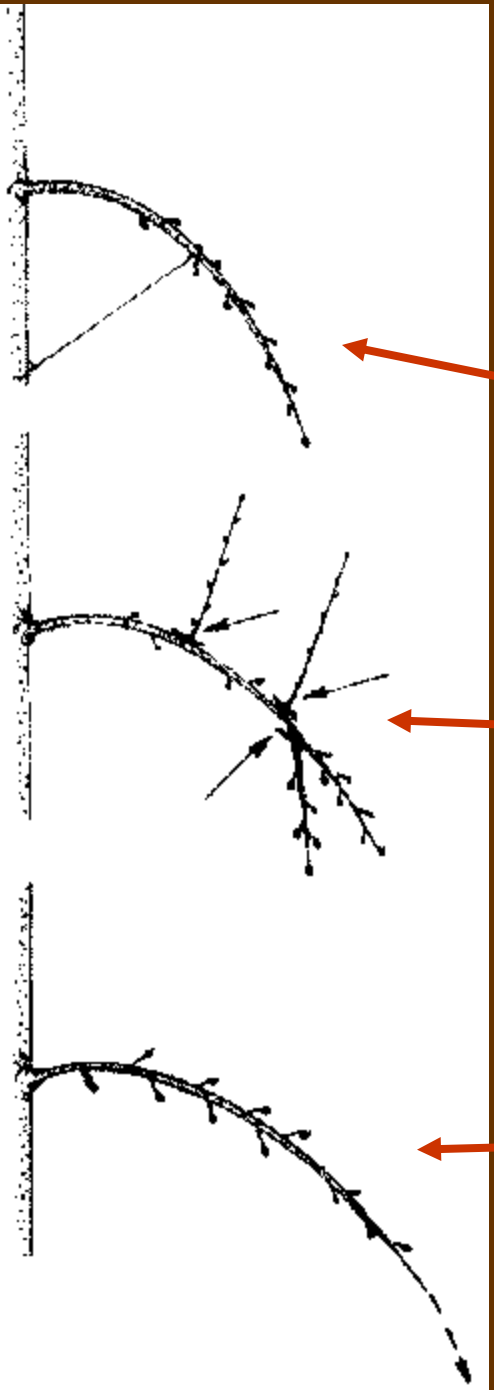
Second year
Lower branches develop blossoms and form 4-8 fruits
Branch start to bend due to the fruit weight
4-8 new annual shoots growing in an obtuse angle develop on the u
part of the terminal leader
Tie the tree to a support
Short fruiting wood (cluster base) develops where the fruit was



Third year
Terminal is reduced, if necessary
4-5 buds below terminal bud are removed
Branches bend under the weight of fruits
Terminal higher than top wire is bent in a horizontal direction in August



Fourth year and succeeding years
Low branches are removed
Terminal is bent and grows in the direction of the rows
Fruiting branches are renewed and high density fruiting branches are pruned
Perpendicularly growing, thickened branches may be thinned



FRUITING BRANCH CUT
One-year old shoot is bent or bends under its own weight

Water sprouts and high density shoots are removed (thinning cut)

Main axis of the fruiting branch starts to develop short growths

Maintenance pruning

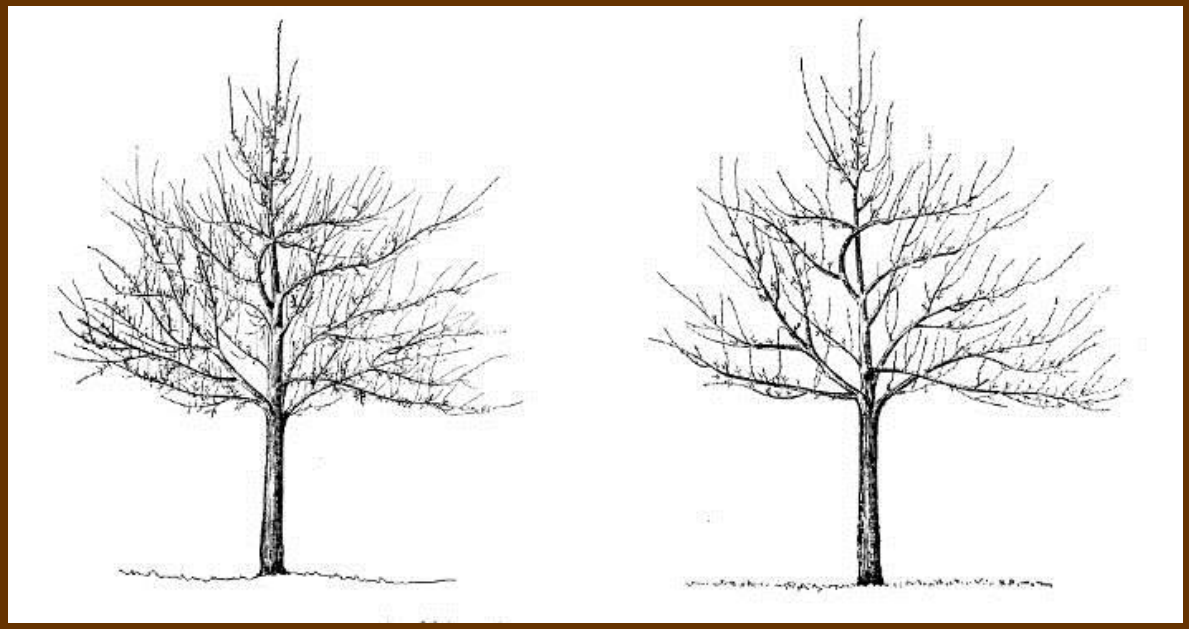
Aspects to consider:
- Shape of the tree (trunk shape, dwarfing tree, very dwarfing tree)
- species and variety (various types of growth patterns and productiveness)
- Aging
- Quality of previous training

Individual approach is a must

Guidelines for maintenance pruning:

More light penetration Remove poorly growing (and high density) parts

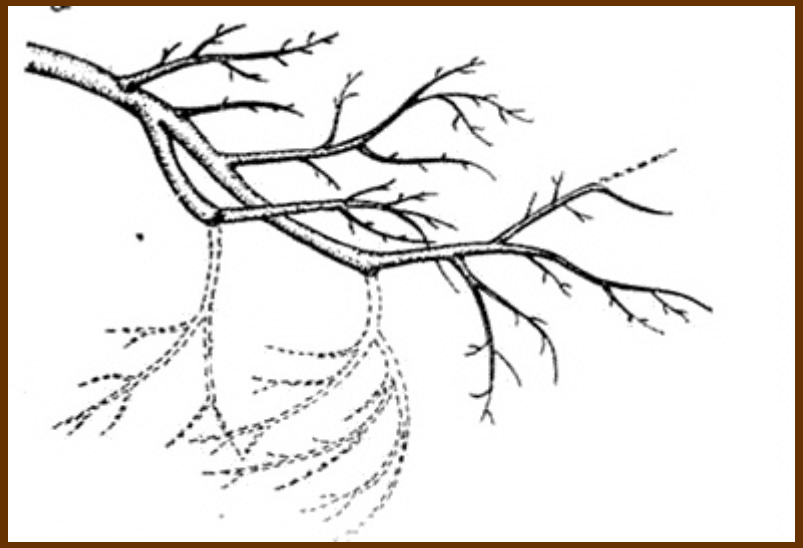
Removed diseased and damaged branches and shoots



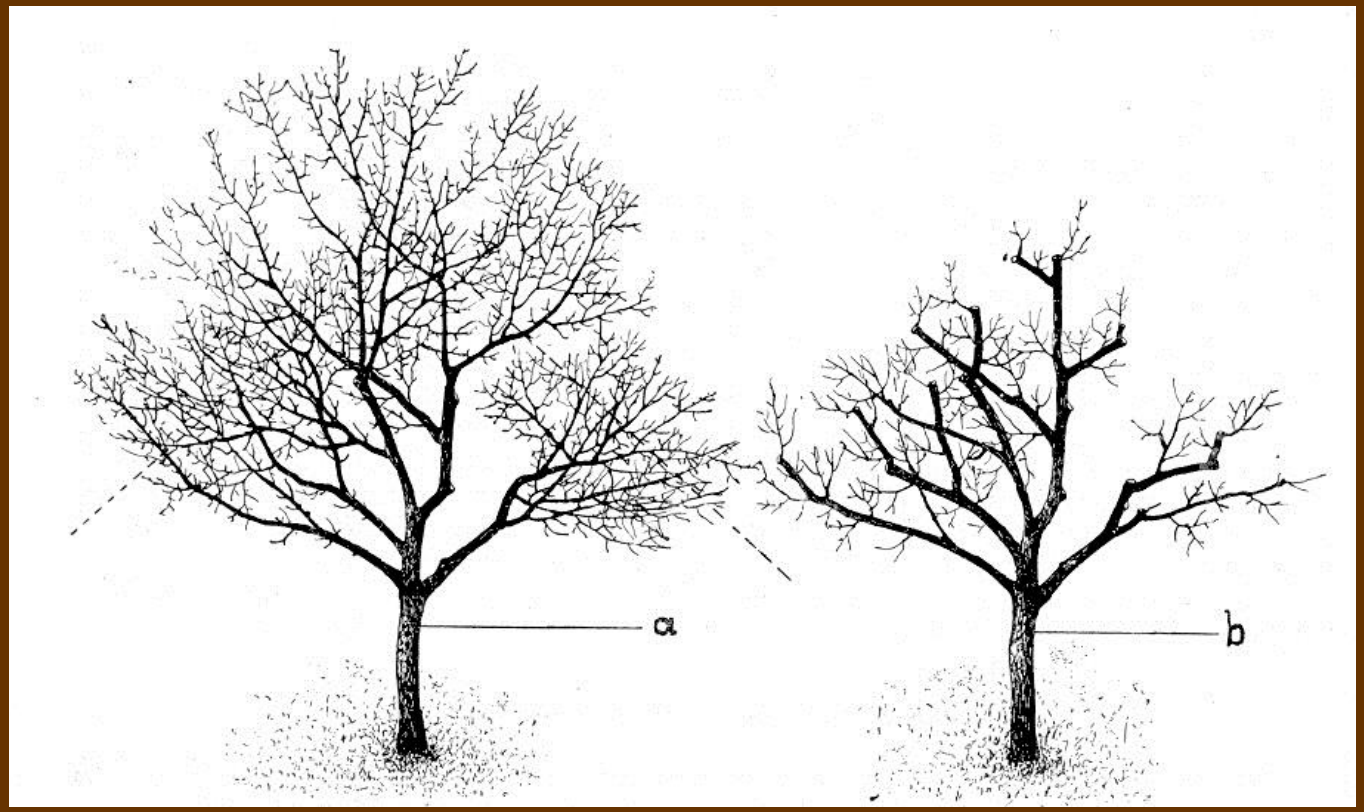
Renewal pruning
- Prolongs growth and productiveness
- Prolongs tree life by roughly 30 %
- Major branch reduction (even renewal of a crown)

Classification according to extent of renewal
1. Mild renewal: 2- to 3-year old wood
2. Medium renewal: 4- to 6-year old wood
3. Major renewal: Even older wood, scaffold branches may also be reduced

Mild renewal: 2- to 3-year old wood
Reduce or fully remove overmature and less vigorous parts



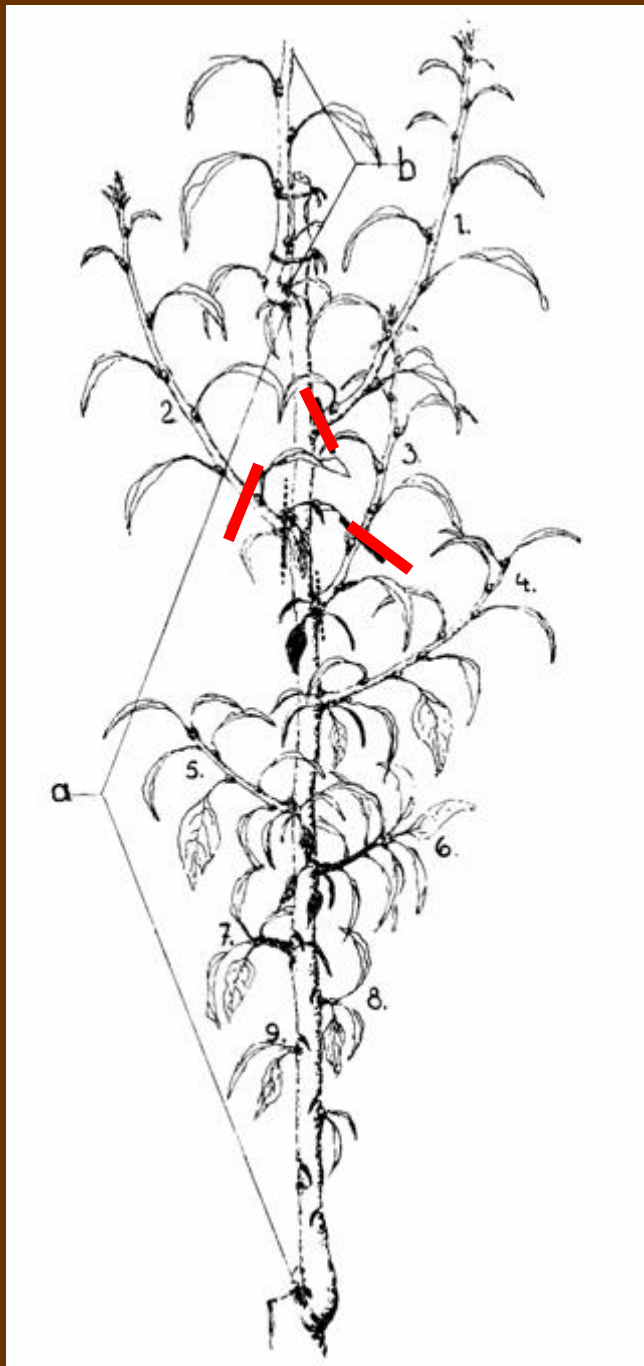
Major renewal
- More than 6-year old woods
- Scaffold branches may also be reduced



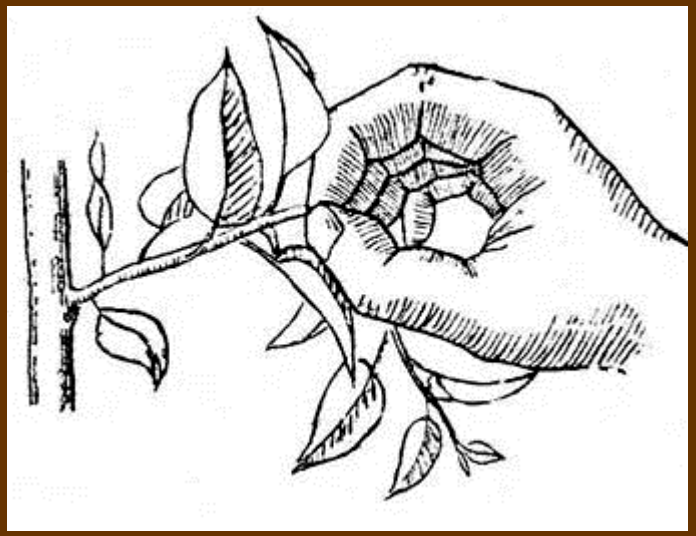
Season-dependent pruning
-Dormant (winter) pruning: During dormancy season (winter, early spring) – in general: Promotes vegetative growth, controls productiveness – shaping of the crown
-Summer pruning: During vegetation period - in general: Suppression of vegetative growth – Reduction of annual shoots – Promotion of development of fruiting growth – More light penetration for the crown – Better ripening of the fruits

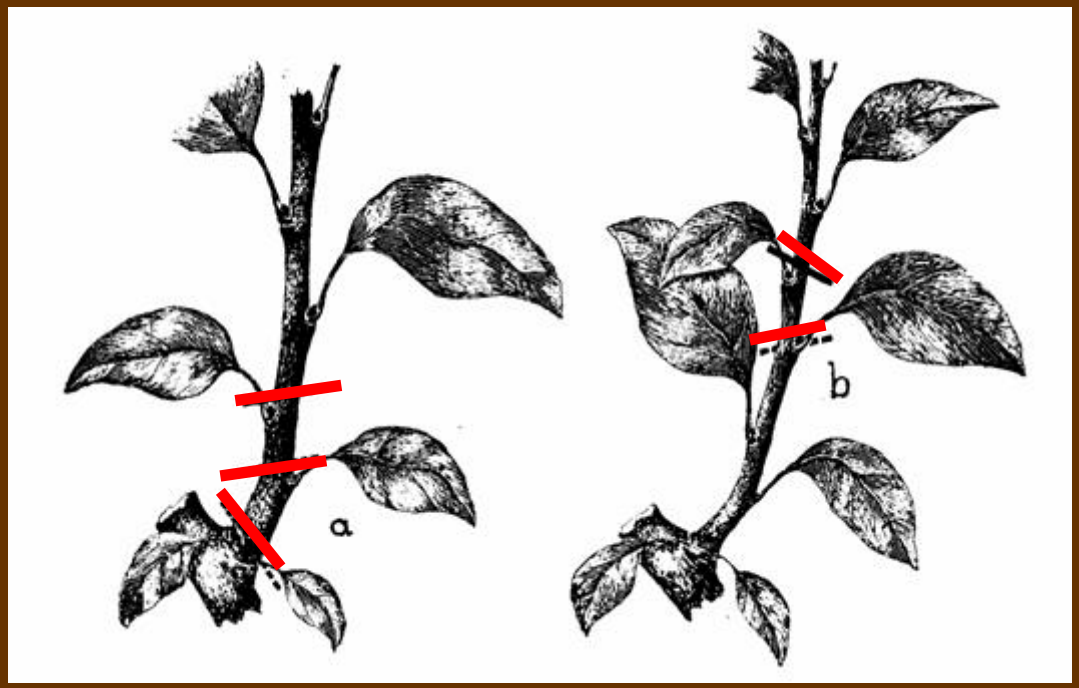
Development of fruiting shoots

Summer pruning and topping
- Weak annual shoots – Development is finished (spontaneous change into cluster bases)
- Vigorous growth – topping (promotes development of flower buds)



Topping: 15-20 cm long – width of the annual shoot (thinning cut, 1-2 leaves, 3-4 leaves)





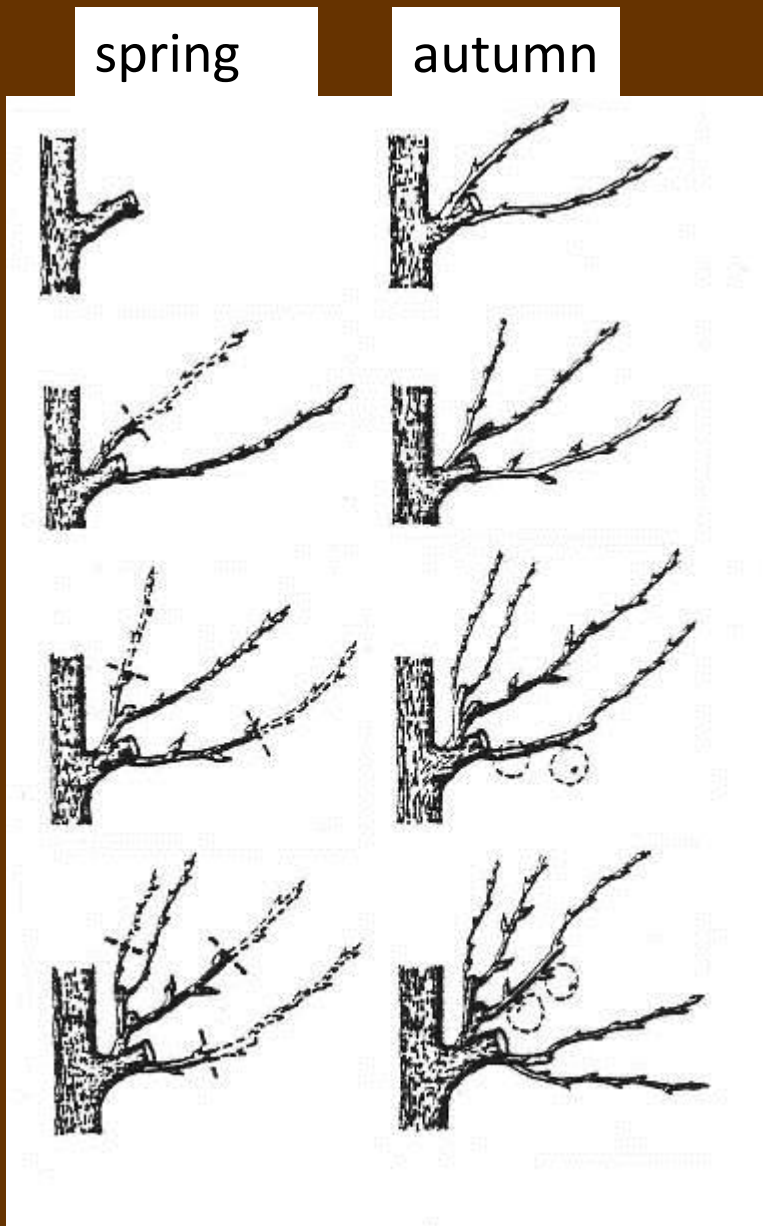
Short – Lorett style pruning Long – Gauncher style pruning

Pomaceous fruits: 4-5-shoot crown - renewal 100-120° angel (apple tree), 75-80° (pear tree) - basic dormant pruning (winter, early spring) – additional summer pruning (for better light penetration)

Pillar system

- Pruning of fruiting wood (pomaceous fruits)
- Slender spindle, palmette-shaped trees, and conventional shapes

1. First year: Reduction to 2 buds – shoots with leaf buds
2. Second year: Development of flower buds
3. Third year: Productiveness
4. Fourth year: Removal of fruiting wood



Stone fruits:

- Always during vegetation period (reduces infestation with pathogens)

– Wounds diameter max. 6 cm

Cherry tree pruning
Pruning in the first year must be more hard (development of a new crown for trees with two –co-dominant central leaders, 6 buds)

Pruning of sour cherry tree
Crown consists of premature shoots
Pruning must respect nature of the growth
1. Erect growth: Sweet sour cherry tree
2. Weeping growth – Common sour cherry tree
Timely mild renewal pruning, after harvest

Pruning of plum tree
Remove upright and narrow crotch angle branching
Annual maintenance pruning is recommended as it ensures adequate growths and productiveness
Rapid reduction of growths – mild renewal
The terminal must be reduced!
Greengage trees naturally develop open-centre crown shape

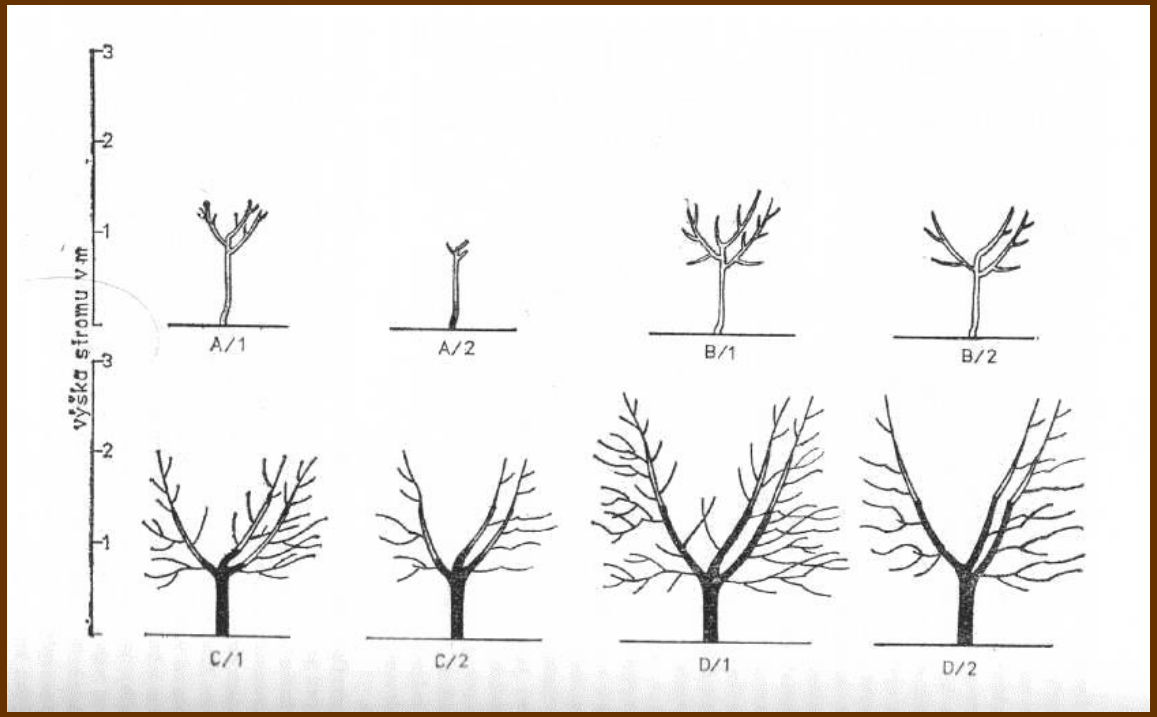
Zahn style pruning – stone fruits

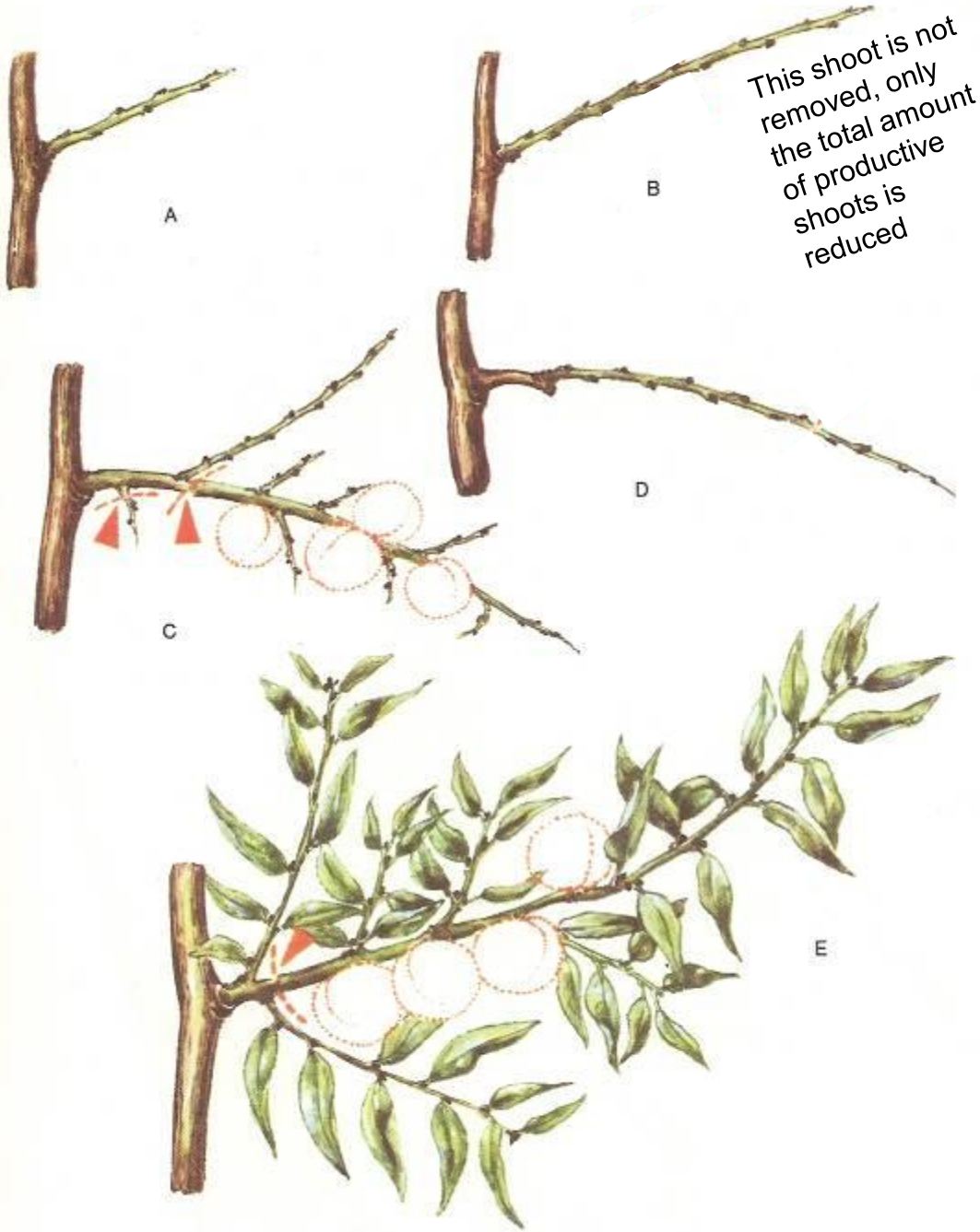
- Removed branch must be max. half the size of the branch be
branching point
- Remaining branch must be more than half the size of the bra
branching point
- Bench cut (long, weakly active branch)
- Stub: 30-40 cm (up to 1 m)

- Stub is removed once the side branch is strong enough

Pruning of heat-demanding stone fruit trees
- Pruning even after blossom loss (frost damage) Standardization of productiveness
 –Pruning after / before harvest – until August

Pruning of peach trees
-Highly specific
-Rapid development – necessary renewal pruning
-After spring planting: hard bench cut
-Cultivation of open-centre crown (3-4 limbs)
-Annual thorough productiveness pruning
-Contour pruning in August – maturing of annual shoots





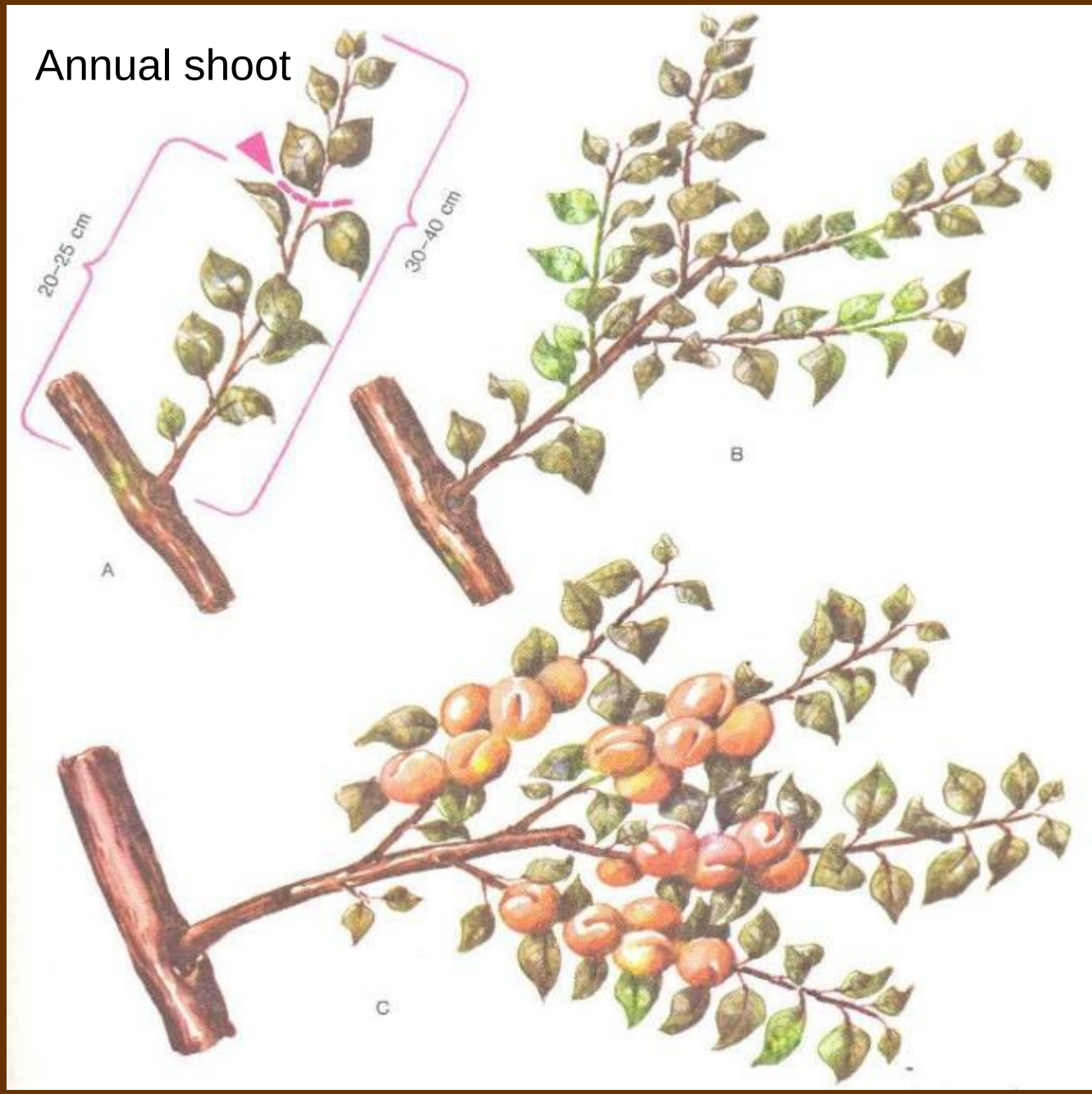
Long (American style) pruning of peach trees

60-120 fruiting shoots per ma

Short pruning of peach trees

Šitt style pruning of apricot tree

May/June



Pruning of walnut tree
- Control of adequate light penetration
- Intolerant to winter and early spring pruning - sap-exudation, infection
- August pruning recommended in past – no callus
- Optimum timing: May/June, annual shoots: 5-10 cm
- Pruning of branches up to 5 cm in diameter and 3-5 cm length of annual shoots
- Pruning of branches of max. 10 cm in diameter and 10-15 cm annual shoots (2-phase pruning)

Training
- Planting of seedlings in past, long development, no training
- Grafted trees – faster development, training necessary
- Terminal shoot is cut to leave a short stub
- Pinch out the primary buds (do not cut them)

– New terminal and crown develop from secondary shoots

Pruning of hazelnut tree

- Good regeneration capability
- Self-rejuvenation via shoot suckers
- Hard pruning after planting
- Training cut: 10-12 branches
- Formative pruning
- May be rejuvenated radically

PRUNING OF BERRY SHRUBS

Shrubs do not develop healing tissue after the pruning; pruning cuts only dry

Basic winter pruning – sprouts early

Un-fruiting branches may be pruned during harvest

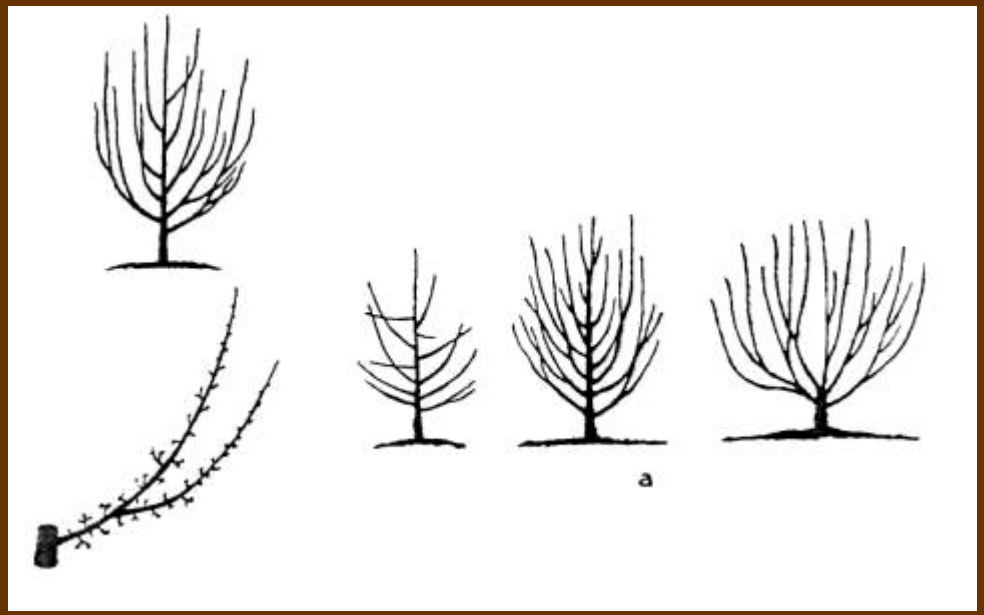
Gooseberry, currant
Hard pruning after planting
Following year: 4-5 shoots for establishment of a crown or a shrub
Maintenance pruning: Removal of old branches
Black currant: Max. 3-year old branches
Red and white currant: Max. 4-year old branches

Gooseberry shrub pruning

Gooseberry trees age more quickly compared to gooseberry shrubs! – Must be reduced!

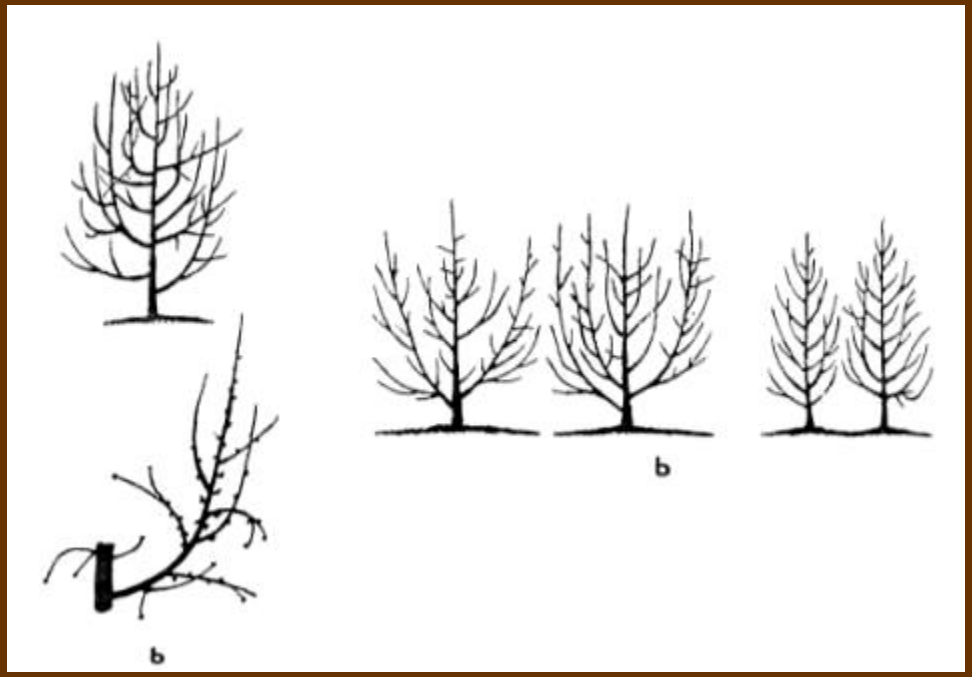
Pruning: Variety requirements
Significant varietal differences
Growth intensity
Productiveness
Branching density
Amount of branches without buds breaking and annual shoots
See pomology

Type of varieties (apple trees)
Type 1 – spur-type and compact varieties - Short internodes Little branching spur-type trees Branching in apical part of the shoot compact-type trees – short fruiting growth spurs “Starkrimson Delicious”, “Goldspur”



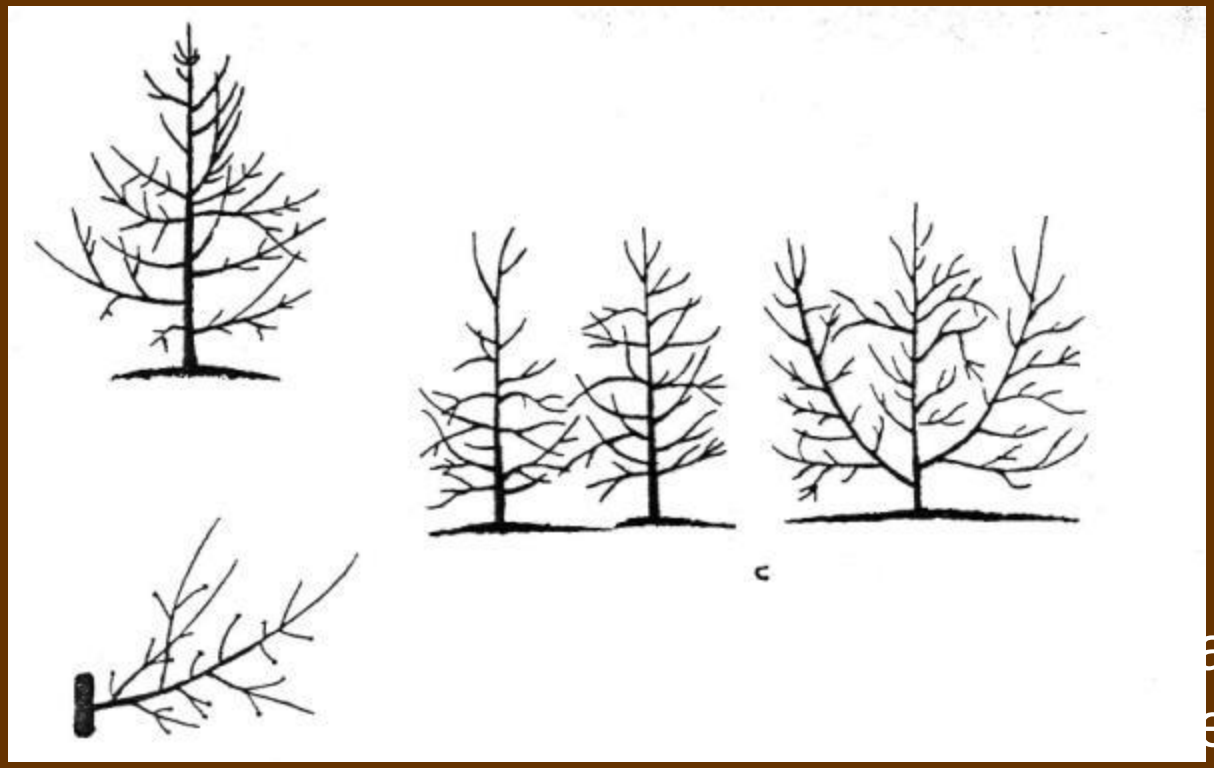
- Reduction of shoots
- Renewal pruning

Type 2: varieties with more prominent apical dominancy - short fruiting growth - spurs (2-year old wood) – mediocre branching – “Oldenburgovo”, “Spartan”, “Parména zlatá zimní”



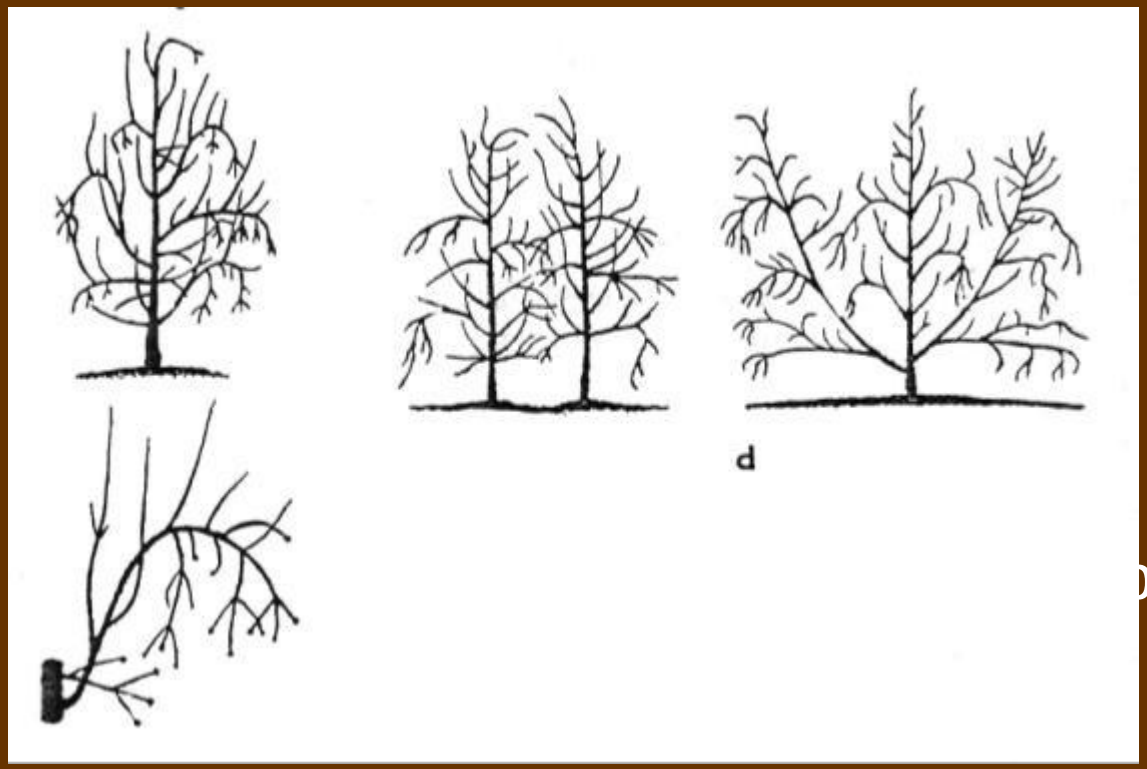
- Maintenance and renewa

Type 3:
Varieties with early productiveness
Mixed fruiting growth
Lots of branching, good for shaping
Golden Delicious



ance pruning
ewal pruning

Type 4:
Anti-spur-type varieties, fruits on long fruit-bearing shoots, branches may have no buds breaking, ´Jonathan´, ´Coxova reneta´, ´Krasokvět žlutý´, ´Rubín´



pruning
shoots
the annual shoots!