



evropský
sociální
fond v ČR



EVROPSKÁ UNIE



MINISTERSTVO ŠKOLSTVÍ,
MLÁDEŽE A TĚLOVÝCHOVY



OP Vzdělávání
pro konkurenceschopnost

Mendelova
univerzita
v Brně




INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ



**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**



Establishment of fruit plantings (species and varietal territorial planning, delimitation)
Investments (intensive planting)
Design and works performed in compliance with valid legislation

Spacing

- Development trends for pomaceous and stone fruits favour more dense plantings
- Low-growing trees with less vigorous rootstock (row spacing for peach trees: manual picking – 5 m, mechanized picking – 6 m; spacing of trees - 3-4 m)



Orchard establishment

Procedure

- Preparation works prior to orchard establishment
- Orchard establishment
- Care and treatment of the orchard after planting (until the onset of productiveness)



Preparation work prior to orchard
establishment

Preparation and project documentation
(investment project, project objective,
one-level project)

Documents for orchard establishment

- Terrain survey – location (fragmentation, slope, exposition)
- Original stands survey (field species, corn – apricots, peaches; potatoes – apples, plums)
- Soil analysis (using soil probes, topsoil depth, water table)
- Climate analysis (temperature, precipitation, sunlight)
- Surroundings analysis (neighbouring woods, lakes, hills, mountains, industry centres)
- Economical survey (driving distance to clients, water resources, machinery, labour)

Planting plan

- Varietal composition is determined by varietal assortment and varietal territorial planning
- Selection of species, varieties (more species save labour: 3-6 species, no more than 6 varieties, main varieties: 3-4, additional: 2-3)
- Spacing and distances (distances must allow for proper care of the trees, enough space for air and light; spacing: square, rectangular, triangular, and diamond-like)
- Selection of growing shape (depends on spacing, mechanization)

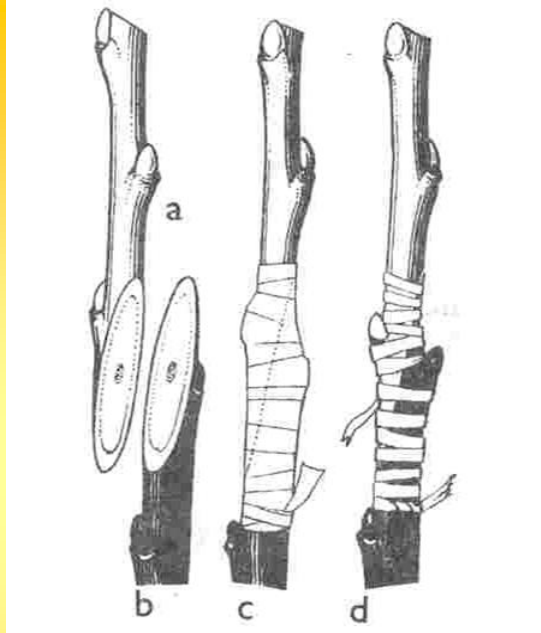
Planting material - grafting



Budded rootstock before tying

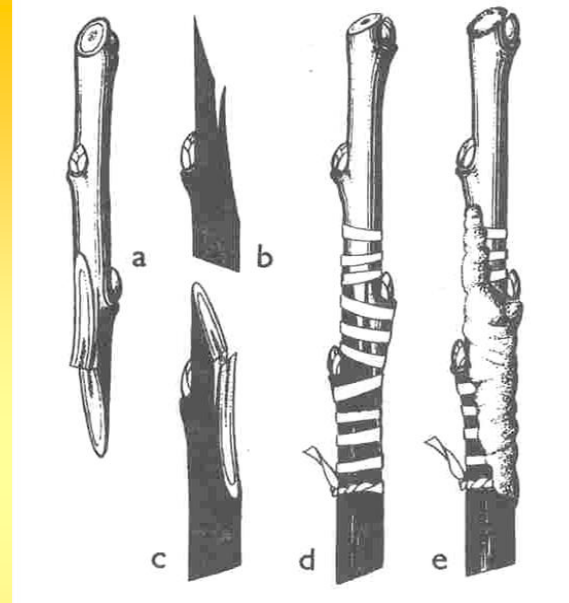
Bud tied with a rubber strip





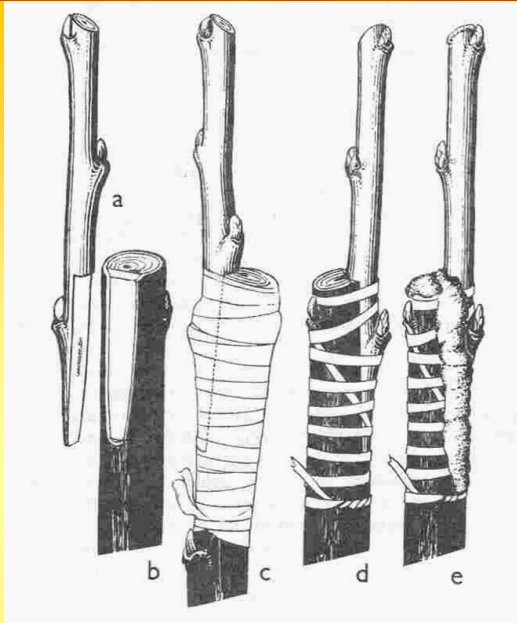
Whip grafting:

- a – Scion cut
- b – Rootstock cut
- c – Tying with a PVC tape
- d – Tying with a fibre



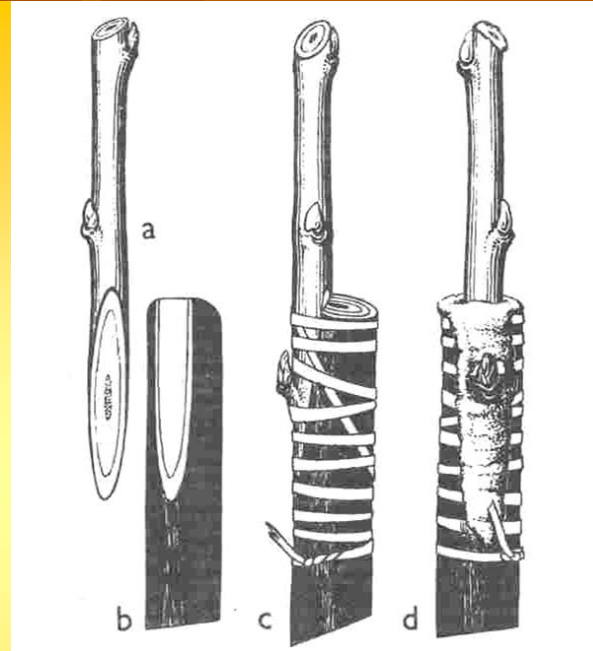
Tongue whip grafting:

- a – Scion cut
- b, c – Rootstock cut
- d – Tying with a fibre
- e – Covering with a grafting wax



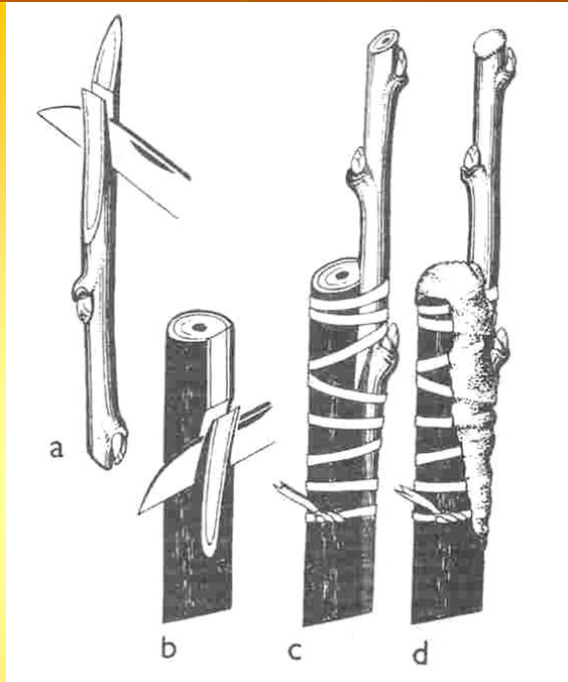
Top bark grafting:

- a – Scion cut
- b – Rootstock cut
- c – Tying with a PVC tape
- d – Tying with a fibre
- e – Covering with a grafting wax

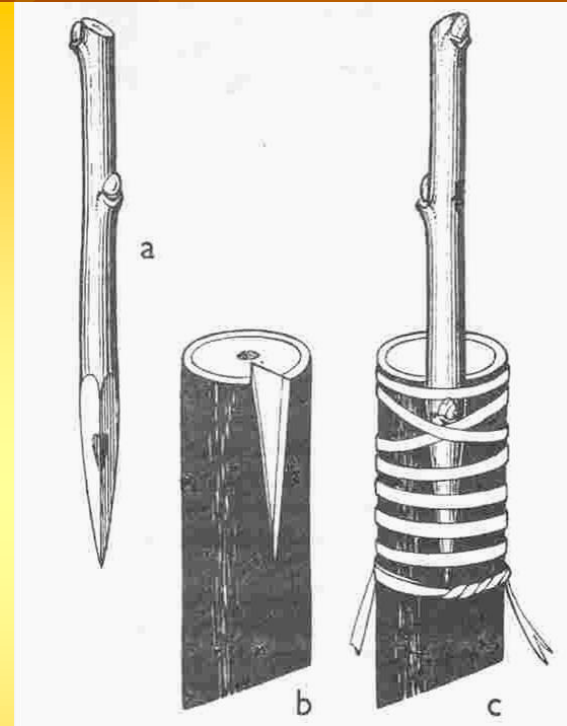


Side cleft grafting:

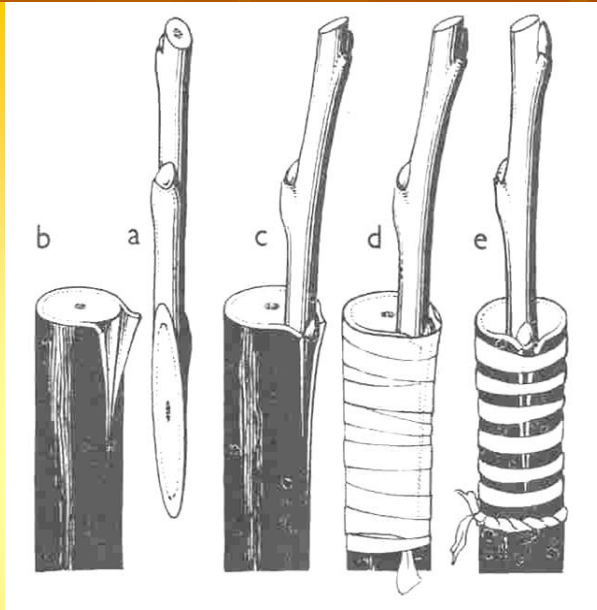
- a – Scion cut
- b – Rootstock cut
- c – Tying with a fibre
- e - Covering



Improved side cleft grafting
 a – Scion cut
 b – Rootstock cut
 c – Tying with a fibre
 d - Covering

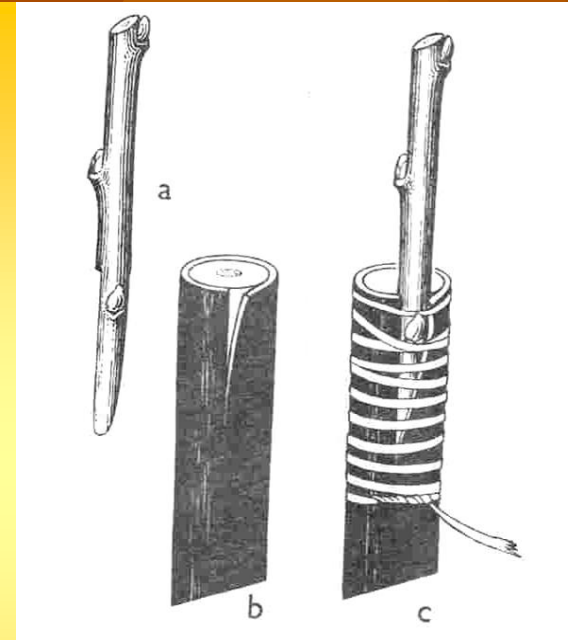


Wedge grafting:
 a – Scion cut
 b – Rootstock cut
 c – Tying with a fibre



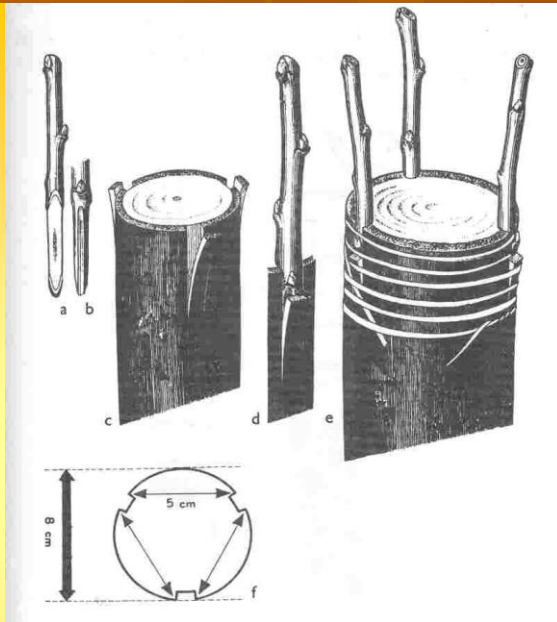
Slipping bark grafting:

- a – Scion cut
- b – Rootstock cut
- c – Slipping of the scion
- d – Tying with a PVC tape
- e – Tying with a fibre

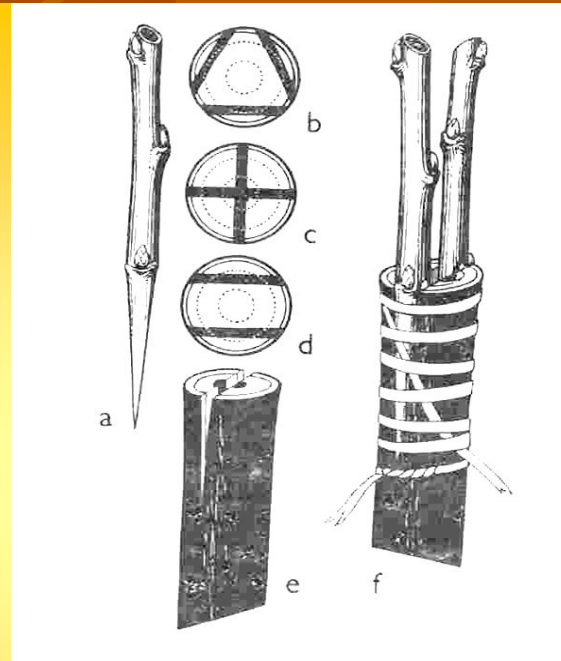


Improved slipping bark grafting:

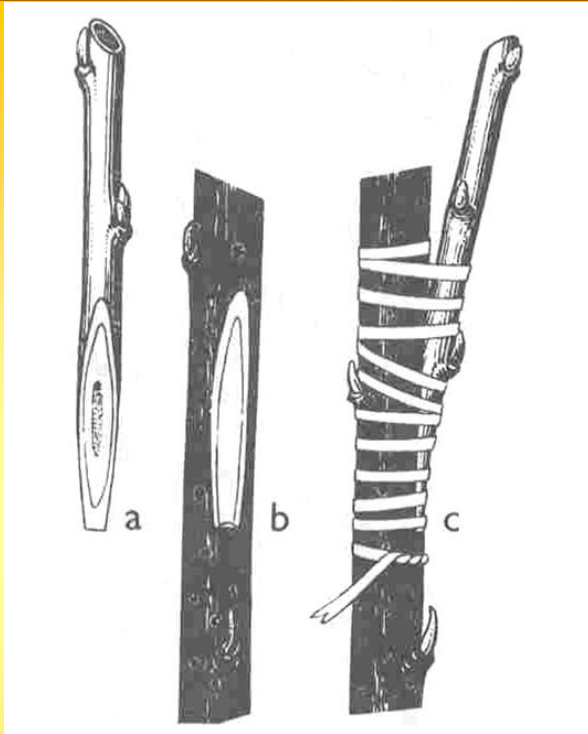
- a – Scion cut
- b – Rootstock cut
- c – Slipping and tying of the scion with a fibre



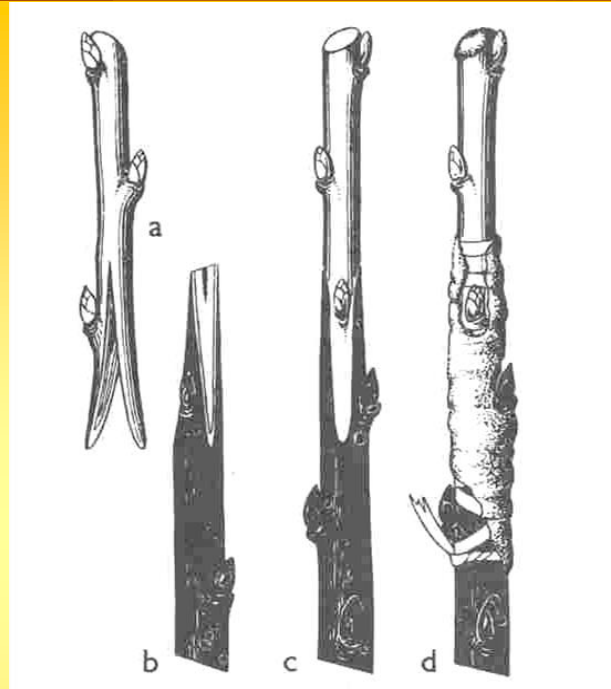
Tittel's grafting:
 a, b – Scion cut
 c – Rootstock cut
 d – Slipping of the scion into the rootstock
 e – Grafted limb



Top cleft grafting:
 a – cut scion
 b, c, d – various types of rootstock cleft
 e – Cleft rootstock
 f – Grafted limb



Side bark grafting:
 a – Scion cut
 b – Rootstock cut
 c – Grafting of a scion to a rootstock, and tying



Top grafting:
 a – Scion cut
 b – Rootstock cut
 c – Grafting of a scion with a rootstock
 d - Covering

Tree propagation in a nursery





Cultivation of trees in
containers



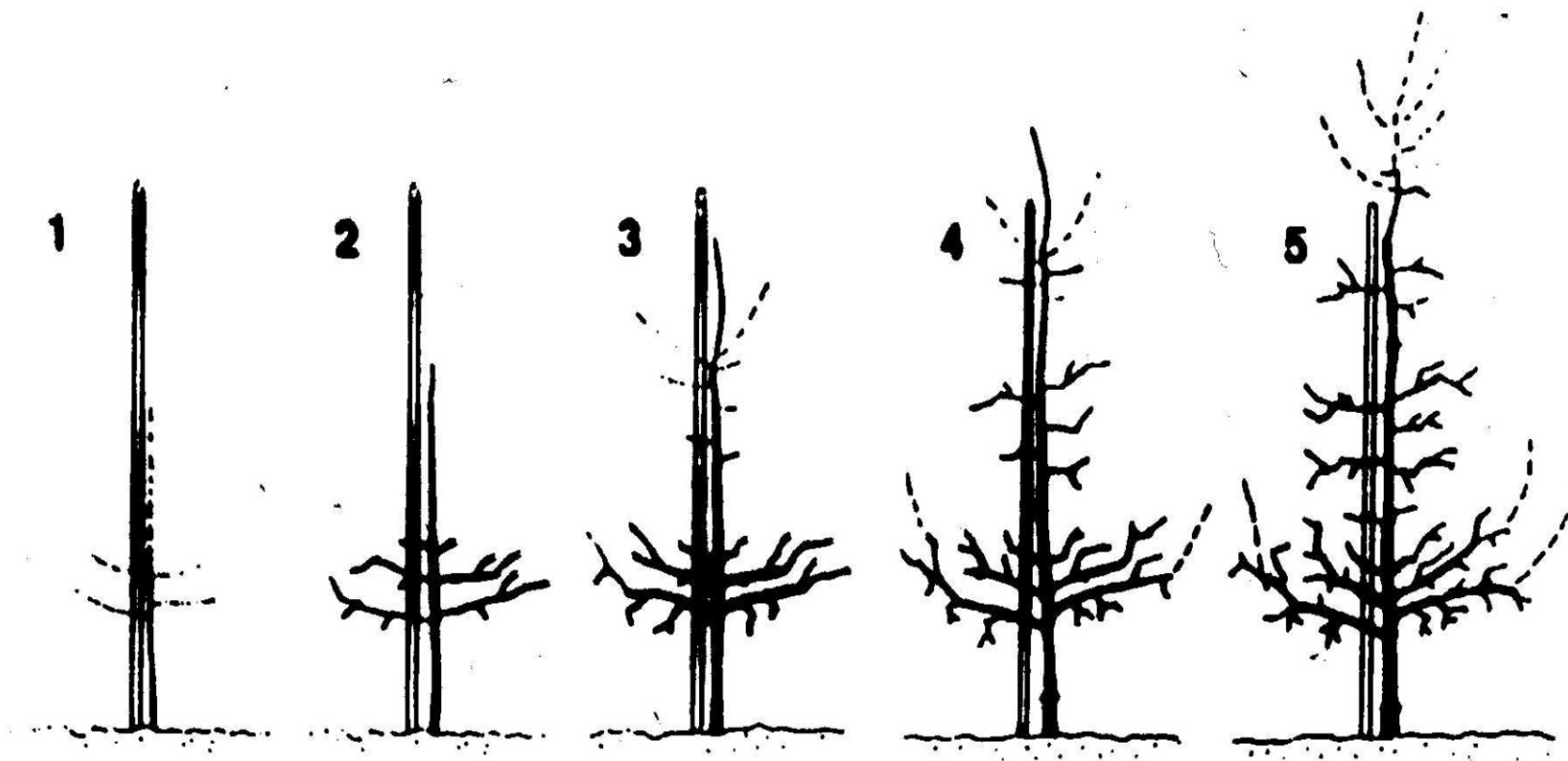
Apricot trees in
containers



Fruit tree	Type of planting	Row spacing (m)	Spacing (m)
<i>Apple tree</i>	Espalier, dwarfing rootstock	3.5-4.5	1-2
	Spindle	3-4	0.8-1.5
	Strip, dwarfing	4-5	2-4
<i>Pear tree</i>	Espalier	3.5-4.5	1.5-4
	Spindle	3-4	0.8-1.5
	Strip, dwarfing	4-6	2-4
<i>Cherry tree</i>	Espalier	4-6	2-5
	Strip, dwarfing	4-5	1-3
	Strip, dwarfing	6-7	2-5

Fruit tree	Type of planting	Row spacing (m)	Spacing (m)
<i>Sour cherry tree</i>	Espalier	4-5	2-3
	Strip	5-6	3-4
<i>Plum tree</i>	Strip	4-6	2-5
<i>Peach tree</i>	Strip	5-6	3-4
<i>Apricot tree</i>	Strip	6-7	4-5
<i>Currant</i>	Strip	3-3.5	1.5-2.5
	Dense, strip	3-3.5	0.5-0.8
<i>Gooseberry</i>	Strip	3	1

Tvarování štíhlého vřetene



1. – 5. rok







Double row tree plantings

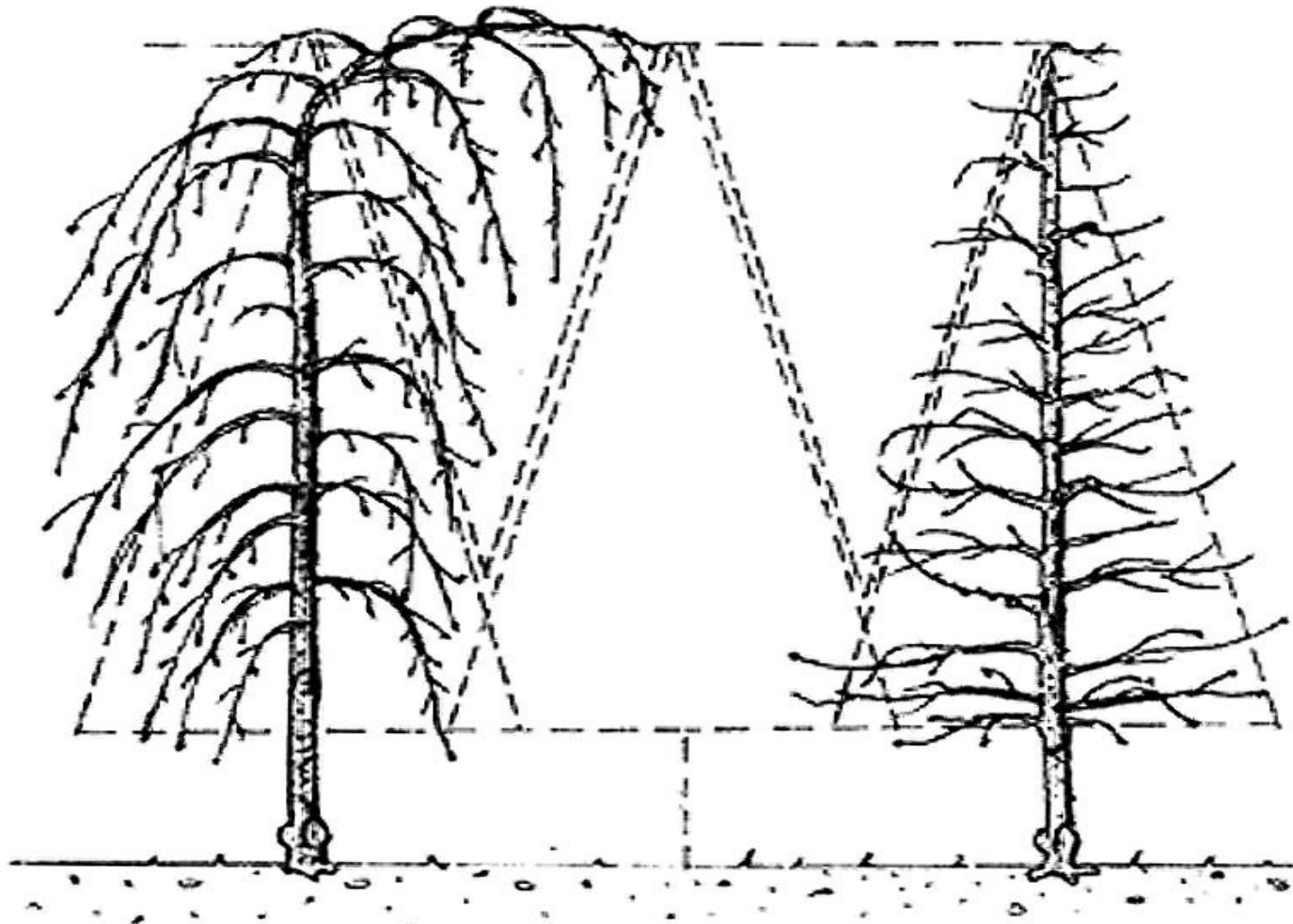




Growing shapes of apple trees



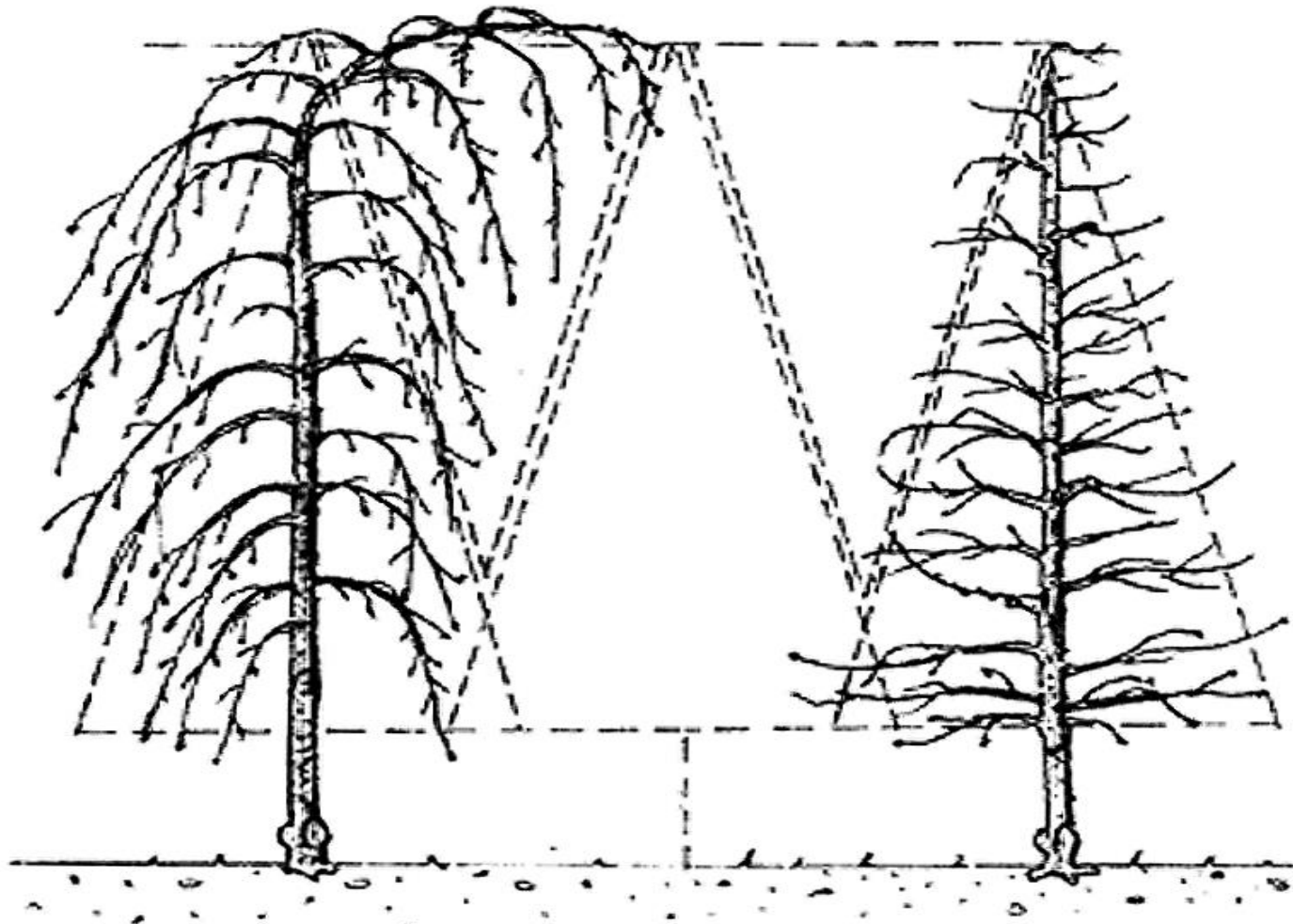
Comparison of growing shapes of SOLAX and narrow spindle



SOLAX

NARROW SPINDLE

Comparison of growing shapes of SOLAX and narrow spindle



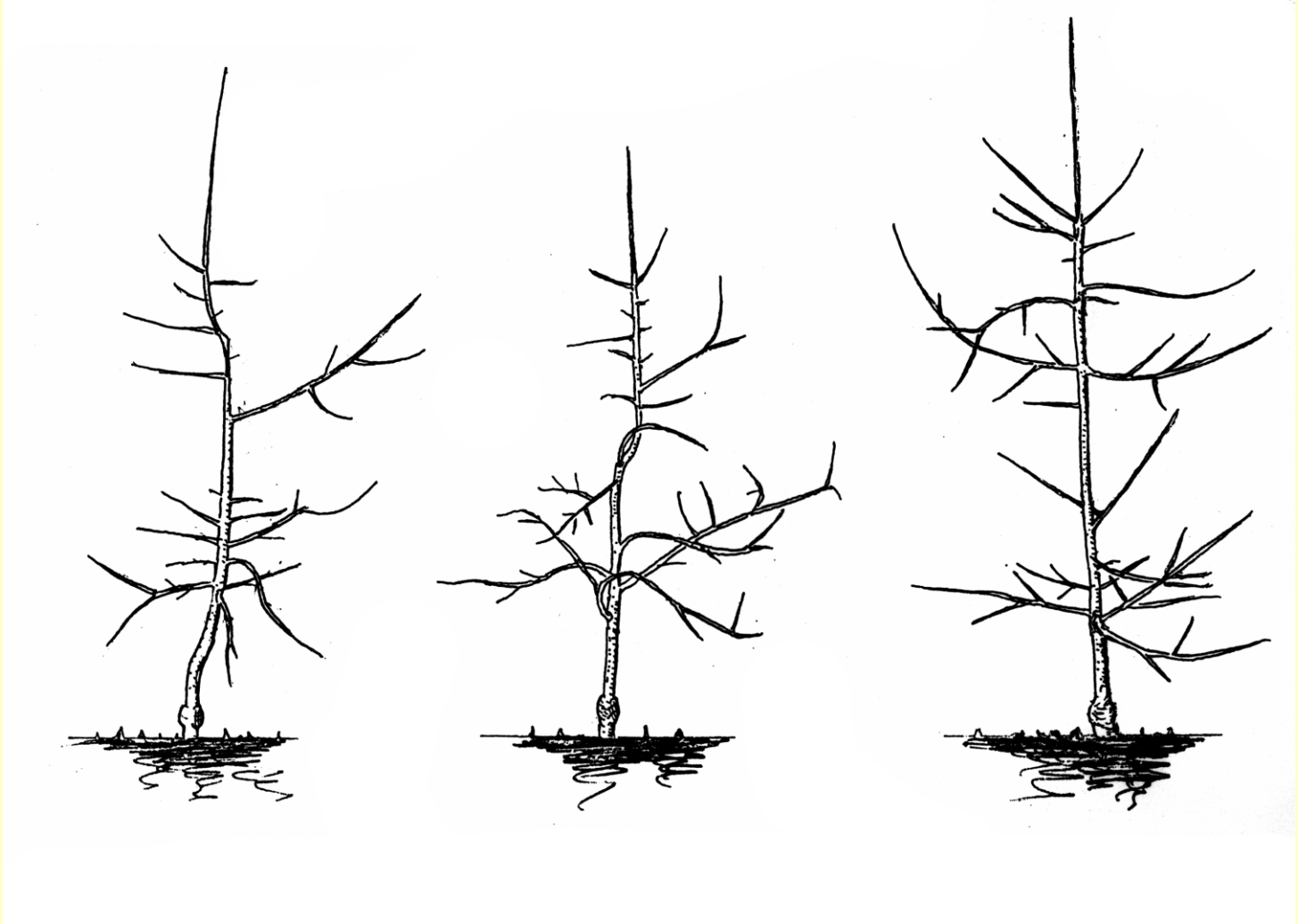
SOLAX

NARROW SPINDLE

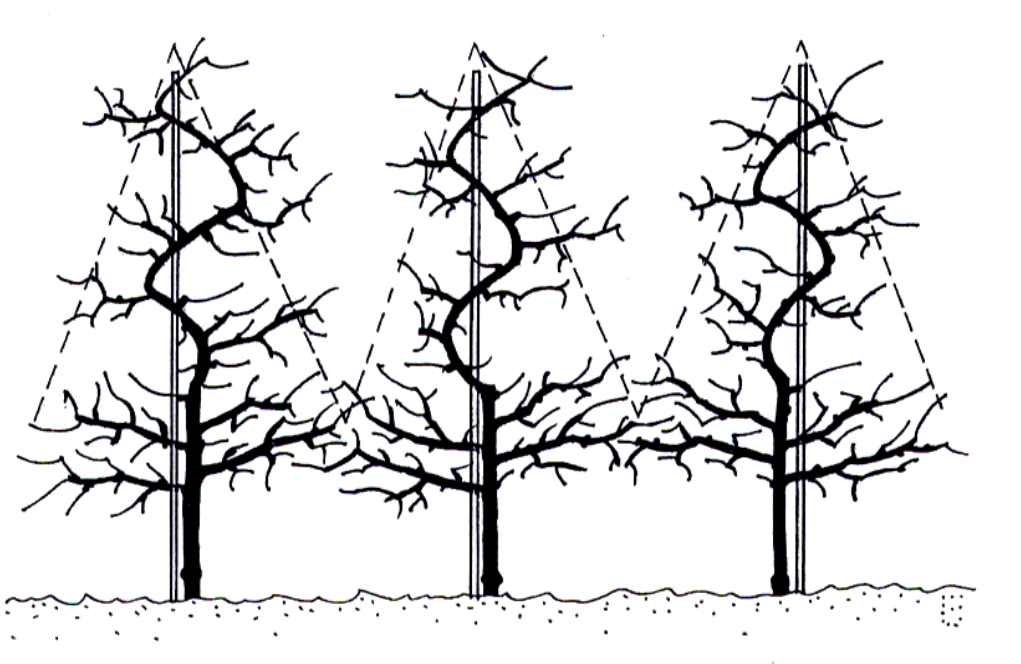
Benefits of Solax:

- Less tedious pruning
- Fewer requirements on workers' qualification
- Preservation of more natural tree growth
- Fruits weight helps shape the tree (branch bending)
- Reduction of terminal annual shoots growth
- Better flower bud setting
- More light for the tree and fruits
- More balanced fruits size
- Higher yields
- Better and more successful application of chemical fruits thinning (Rhodofix)

Examples of various shapes of slender spindle



Hytec system (Hybrid Tree Cone System)



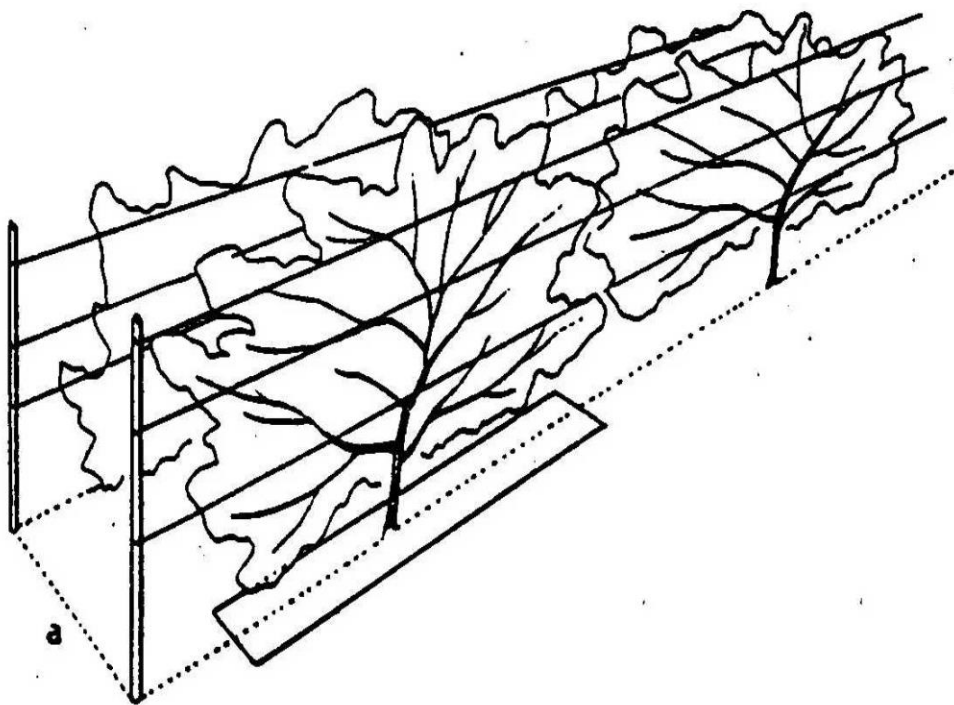
Hytec system: Conical, 3 m tall trees with a terminal. Trees with a dwarfing rootstock and a support are grown in medium to high-density plantings in a one-row system

Melodie variety bent under fruits weight





Stěnová výsadba



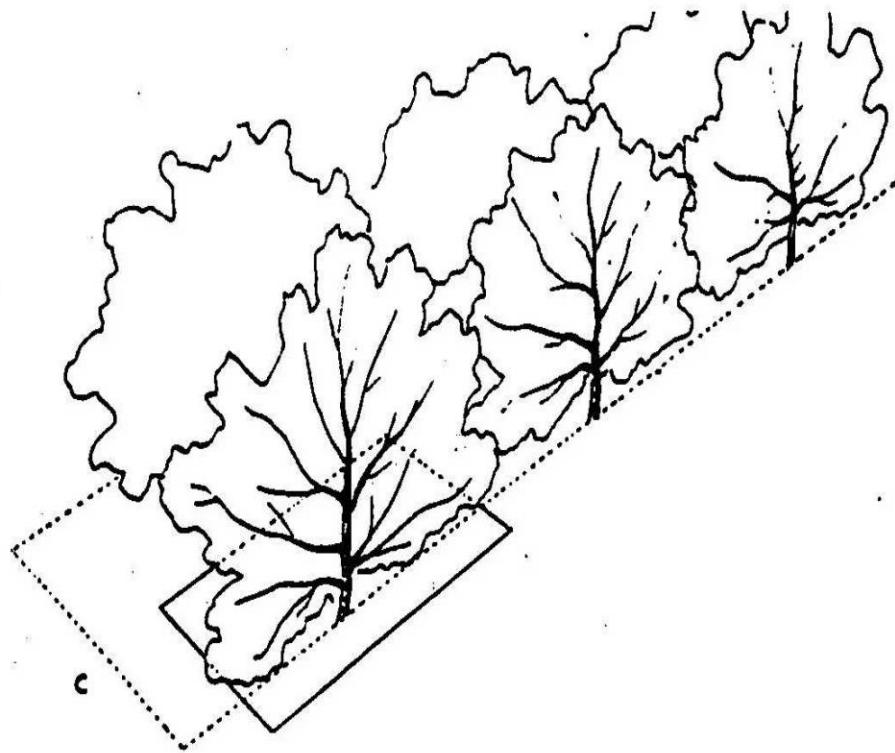
a

b

a) vzdálenost řad

b) šířka stěny

Pásová výsadba



c

d

c) vzdálenost řad

d) šířka pásu

Pollination factors

- Biological (germinating ability of the pollen, mutual failure to fertilize)
- Climatic (weather during blooming)
- Phenological (date and length of blooming)
- Cropping (nutrition and fertilization)

Pollen germinating ability:

Good pollinators: Above 30 %

Poor pollinators: Below 30 %

Block separation arrangements:

Main variety: 75 %

Pollinators: 25 %

Planting plan includes:

- Total land area of the orchard with designated blocks, handling areas, and routes
- Title of the future plantings, cadastre, designation of plots, contour lines, legend for the varietal and species composition, etc.
- Project elaboration (date, place, engineer)
- General plan, location maps (1:5,000), planting plans in scales 1:500 to 1:1,000
- Planting spots: Identified with a circle, dot, cross; block marks are used for the same variety sections
- Varieties are designated with various colours, symbols, and/or initial letters
- Planting plans may be combined with a technical plan of the irrigation

Preparation of the plot before planting

Objectives of the soil preparation:

- Supply organic matter and nutrients
- Aerate and improve structure in the whole soil profile in general
- Remove weeds

- Most suitable preceding crops: clover, legumes
- Basic soil preparation before orchard establishment (2-3 years before planting, terrain arrangements, construction of routes and handling areas; anti-erosion and hydro-technical measures, land improvements – reserve fertilization and trenching)
- Soil preparation before orchard establishment (ploughing of green manure, deep ploughing, 3-4 weeks before planting)
- Preparation of poles (delimitation, support during rooting and after planting – for 6 years)

- Measuring and marking out the plot of land (transfer of data from the planting plan onto the terrain)
- Preparation and arrangement of holes for planting (dig the holes, mechanized planting)
- Acquire planting material (acquisition, transport, establishment)
- Preparation and treatment of the trees prior to planting (cut the root system before the planting, soak the roots)
- Planting dates (most commonly in the autumn, mid-Oct till the end of Nov; in the spring: peach trees “from soil to soil”)
- Planting technique (manual, planting machine, root collar 50-80 mm above the soil, water the trees)
- Autumn planting: Cover the trees up to 0.3-0.5 m

Treatment after planting

- Treatment after planting (head the whips in spring, tie the trees to the support pole, protect trees from game)
- Remove weed from below the trees, soil mulching recommended
- Grow crops for green manure in the inter-rows, or maintain dead fallow; catch crop may be grown in the first years

Fence and support construction

- Orchards must be fenced
- Orchards larger than 20 ha have internal fences

Fencing

- Wire fences, minimum height 1.5 m
- (1,8 – 2,0 m)
- Treat the fence with anti-corrosive coating
- No weed around the fences
- Tree support: Wooden poles, metal sewage pipes, plastic poles, wire support
- Wire support with concrete poles (10-20 m apart), zinc-coated wires are stretched between the poles
- (3 – 4 mm)
- Simple wire support for easier training – single wire stretched on shorter wooden poles

The background of the slide features a pattern of stylized autumn leaves in various shades of orange and brown, set against a darker orange gradient background. The leaves are scattered across the frame, with some showing detailed vein structures.

Thank you for your attention