



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ



**Inovace studijních programů AF a ZF MENDELU
směřující k vytvoření mezioborové integrace
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**Tato prezentace je spolufinancovaná z Evropského sociálního fondu a
státního rozpočtu České republiky**

Nursery Management of Fruit Trees
Fruit-growing - Seminar
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Nursery Production

Objective

Produce excellent planting material

Fruit tree nursery = land area for propagation and growing of planting material

- 1) Rootstock nursery – production of rootstock
- 2) Production nursery – production of planting material (trees, shrubs)

Establishment of fruit tree nursery

Location: flat land, no frost valleys and windy locations

Higher locations (more than 450 m above sea) – shorter vegetation period, worse maturation of wood

Avoid areas where existence of pests and diseases is subject to compulsory quarantine – isolation distance (European plum tree)

Soil: loamy-sandy, 3-5 % of humus

Well disintegrated soil – deep tillage

Nuts, stone fruits: Soil rich in Ca

Underground water: Max. 1 m

Surface area: 3-5 times larger than rootstock nursery

Crop rotation – Rotation of crops

Prevention of soil fatigue

Suitable preceding crop: root and tuber crops (potatoes)

Legume-wheat mixtures – green manure

No lucern and clover – viruses, rich in N

Fencing: 1.5-2 m high

Equipment at the nursery

- Stratification pits
- Seed-bed
- Stool bed and rootstock plant area
- Hot-bed, plastic greenhouse tunnels, greenhouse, shaded premises

Special Propagation - Semi-hardwood cuttings

- Cultivation land area - nursery products
- Container plant (less common)
- Cool chambers (storage of scions, seedlings)
- Products storage site (establishment of planting material – sales in spring)
- Working and handling area (package area, fuel, pesticide and fertilizers storage)
- Irrigation system
- Machinery

Methods of cultivation of planting material

Spring (mid-April):

Lining out of stock or grafted tree (manual grafting)

Manual (lining hoe, spade) or mechanical lining out

Stock length: 40-60 cm

Machine-dependent spacing (1.0 x 0.25 m)

- Banking up for vegetative propagation of rootstock



During vegetative period

a) Management of grafted trees

- Clearing of rootstock
- Tying to support - bamboo poles
- Soil treatment – mechanical treatment (herbicides)
- Removal of tapes



b) Rootstock budding

- Budding in the beginning of the dormant stage (most common method)
- Timing: July-Aug, plant sap circulation – T-budding Later (Sep) – no sap: Chip budding
- Within 2-3 weeks: Removal of tapes



Second year

Budded plants

Spring

Head the budded plant just above the bud:
pomaceous fruits

Bench cut: Stone fruits

During vegetative period

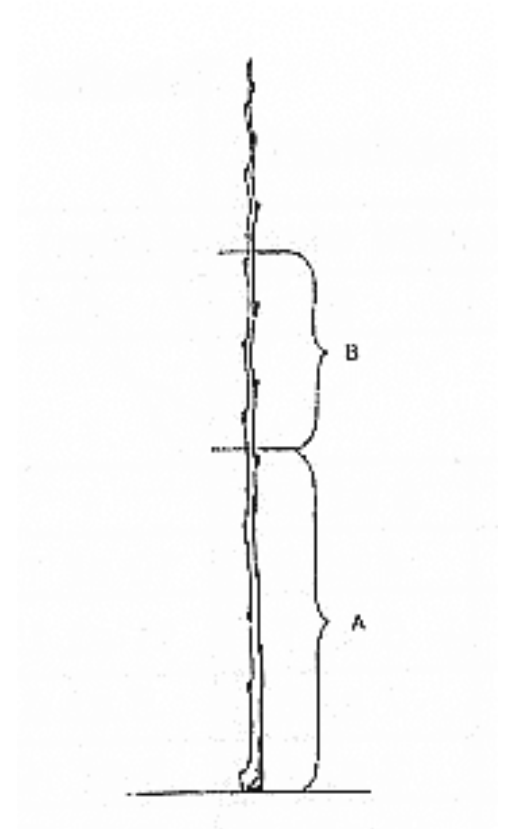
- Similar treatment as in grafted plants
- No need to remove tapes
- Tying to a support or stub
- Removal of the stub in August



Second year
Grafted plants

Spring
Low growths (dwarf tree, spindle tree)

- Head the whips: Tree stemlet length 30-60 cm + 5 buds
- Cutting at the knee-height: “knip baum”, annual shoots will form premature annual shoots



Trunk types (QS, HS, FS)

Tree stemlet is further grown for the required height, treatment of the tree

- Tipping to promote branching (pinching of annual shoots beyond 2nd-3rd leaf)
- Tipping of all annual shoots of the stemlet - Removal of all annual shoots (August)

tipping

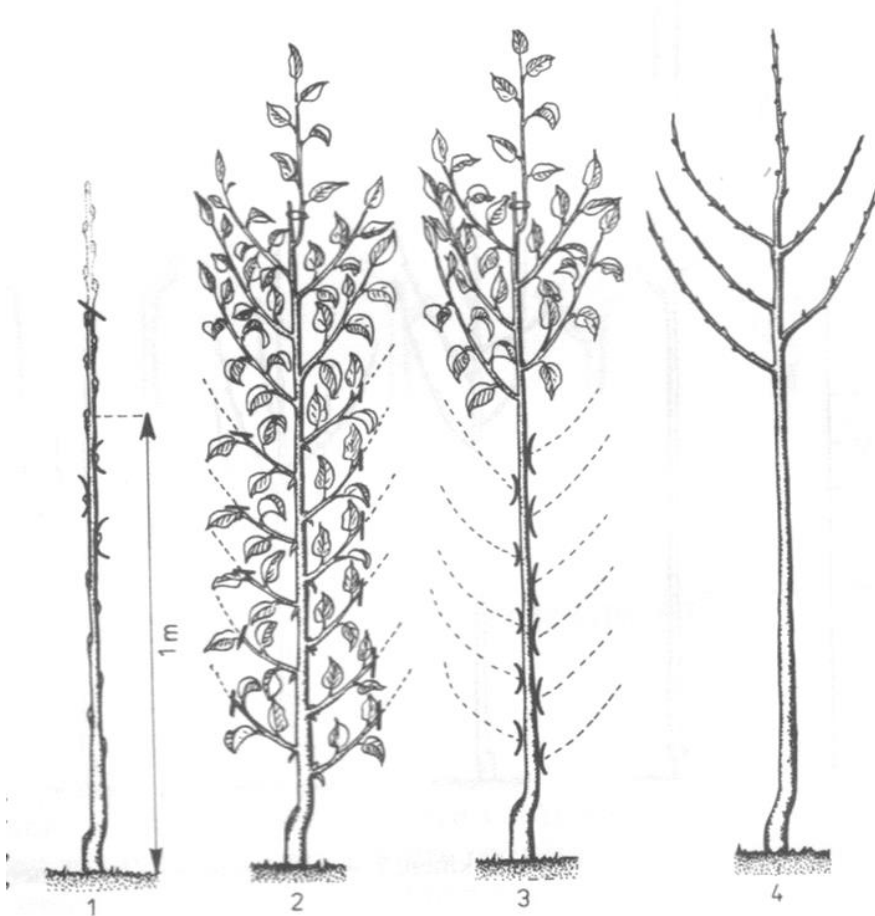


Removal of all annual shoots



Following year

- Continue to cultivate the stemlet
- or head the whip – alternating pruning method



1. Heading the whip
2. Tipping
3. Removal of all annual shoots
4. Fruit tree with a crown

Methods of cultivation of a trunk:

a) From a terminal bud: Vigorously and straight-growing varieties

b) Alternating pruning method:

- Poorly, less vigorous growths

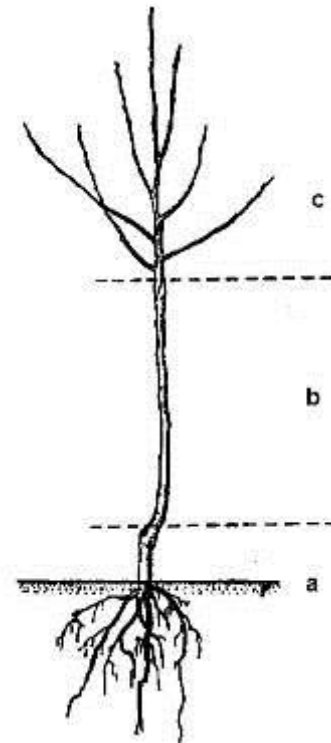
- Terminal is underdeveloped or damaged (frost, pests, etc.)

c) Interstem grafting: trunk-forming variety – insert

1) Suppression of affinity problems of quince-pear pair: Hardyho, Konference

2) Suppression of growth of Morellenfeuer, Köröšká, Morela late sour cherry trees

3) Health of the tree (apricot tree M-LE-1)



Autumn

-Removal of leaves: Mechanical, chemical (ethylene)

Dates:

Gooseberry, currant: 20 Sep

Peach tree, almond tree, walnut tree: 20 Oct

Others: 1 Oct

-Lifting: Mechanical, manual

Dates: Same as for removal of leaves

-Sorting

-Dispatch - sales

-Products placed into a storage site

Requirements on quality of nursery products

Height of graftage

- Generative rootstock: Min. 10 cm above the ground
- Vegetative rootstock: Min. 15 cm above the ground

Roots: Healthy, fresh, no damage, mature

- Generative rootstock: Min. 4 branched main roots (4 roots for pear tree, 2 for almond tree); min. 20 cm long root hairs
- Vegetative rootstock: Roots min. 14 cm long (golden currant: 7 cm), fascicular roots, basal part: min. 12 cm long (golden currant: 8 cm)

Stemlet:

- Erect, smooth, no damage
- Wounds after removal of annual shoots on the stemlet and stubs
- Max. tilt of the stemlet – 20 °
- Peach tree: Annual shoots on the stemlet are removed as soft-wood

Crown:

- Max. 2 years old
- Professional training and pruning
- Healthy, mature and regularly positioned shoots
- Peach tree: Terminal, semi-hardwood shoot removed

Requirements on nursery fruit tree products with graft union close to the ground

Shape	Min. number of shoots (pc)	Mid. length of lateral shoot (cm)	Mid. length of terminal (cm)
Spindle (S)	5	20	30
Palmette-shaped (P)	3	30	40
D, QS, HS, FS	4	30	40
Open-centre nursery tree product	3	30	-

- Nursery tree products formed by graftage in the crown
 - Min. 1 shoot, 0.3 m long (0.25 m for sour cherry tree)

One-year old grafted plant – whip

Min. 1.0 m high

Min. 0.8 m high

Sour cherry tree, pear grafted on quince

apple tree on less vigorous and dwarfing stocks

One-year old grafted plant with premature annual shoots
on the stemlet

- Shoots removed up to 0.4 m seedling height

Knip baum: Two-year old nursery product with one-year old
crown

- Suitable for establishing intensive plantings



Requirements on nursery products: Berries

Shape	Trunk height (cm)	Min. number of shoots	Min. shoot length (cm)
Shrub (S)	-	1	40- 1 shoot 25- 2 and more shoots
Half standard (HS)	60-80	1	20- 1 shoot
Full standard (FS)	90-110		10- 2 and more shoots

Raspberry and blackberry

- Root collar diameter: 7-20 mm
- Underground bud developed
- Shoots reduced to 0.5 m at the dispatch

Requirements on planting material for large-fruit strawberry

Features	Characteristics
Appearance	Well developed terminal bud without any damage, healthy and fresh roots, no wilting, leaves/no leaves
Root collar diameter	Min. 7 mm
Length of one-year old roots	Min. 50 mm

Quality of nursery products

Quality criteria

1. External quality: dwarfing (D), palmette-shaped (P), quarter standard (QS), half standard (HS), full standard (FS), whip, knip baum, etc.

2. Biological and phytosanitary quality
 - Registered or conforming material
 - Quality grade
 - 1) Virus free (Vf)
 - 2) Virus tested (Vt) – no economically significant viruses
 - 3) Not tested

3. Origin, variety consistency and authenticity of material: Central Institute for Supervising and Testing in Agriculture (CISTA) auditing, ethical conduct of the nursery grower

Approval procedure

Procedure for approval of propagation stands

Procedure for approval of propagation material


Approved propagation material

- 1) Basic propagation material: Propagation of a given variety by a grower
- 2) Certified propagation material: Produced by nurseries (C1, C2)

Variety:

1. Registered variety: state variety book (SVB)
2. Registration terminated, propagation processes are finishing
3. Variety enlisted in a common variety catalogue or at least in one EU Member State
4. Non registered but propagated by the supplier for foreign clients, description available

Modrá návěska: nese tato označení biologické kvality:

Země původu CZ		Uznaná sadba ÚKZÚZ Jakost EHS	Číslo série	Druh (vědecký název).....	Odrůda
				Kat./st. mn./zdr.tř.....	Podnož.....
				Dodavatel - reg. č.	SRS - Identifikační údaj rostlinolékařského pasu

Kategorie: **C** = certifikovaný materiál pod kontrolou státních kontrolních orgánů

Stupeň množení: **C1** = vyšší stupeň množení pěstovaný za přísnějších podmínek než stupeň množení C2

C2 = konečný stupeň množení certifikovaného materiálu další přemnožování se označují žlutou návěškou jako CAC materiál

Zdravotní třída: **VF** = výpěstky prosté virů

VT = výpěstky prosté jen některých hospodářsky závažných virových onemocnění

bez označení – výpěstky které nebyly na vybrané virové choroby testovány

Propagation stand: production of propagation material

- Audits by CISTA

Guarantee of variety and health authenticity

Standard grade material (CAC)

- No need to be approved
- Even non-registered (older) varieties
- Since 2003 in CR
- Since 2006 – no tree labelling (previously yellow labels)