



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ



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Establishing a Vineyard

- Vineyard is established for a period of minimum 20 years
- Analyse all input parameters

Removal of an old vineyard

- Most commonly, old vineyards are renewed (grapevine is grown as a one-species culture for 25 and more years)
- Significant soil fatigue, expansion of diseases and pests
- Major harmful agents in soil: wood-decay fungi, bacteria, viruses, nematodes, phylloxera
- Liquidation of an old vineyard – first, trellis is removed (optimally right after harvest)

- After columns and trellis are removed, above-ground parts of the vines are cut off close to the ground (the whole vines may be pulled out as well)
- Old wood and a root system must be completely removed (burnt)

Soil analysis

- Soil fatigue must be treated, soil must be supplied with nutrients
- Soil analysis concerns both soil horizons, horizon A (0 – 30 cm) and horizon B (30 – 60 cm)
- Sampling of the soil must reflect variability of the land slopes (variability of soil conditions)
- Analysis of basic parameters: soil pH, humus content, macrolements, potassium, phosphor, magnesium, and calcium. Nitrogen fluctuates a lot; humus content is a good indicator of nitrogen concentrations

- Soil analysis before vineyard establishment - total CaCO_3 and active lime in soil must be identified
- Content of admissible levels of nutrients is determined according to the Mehlich 3 test
- Optimum intake depends on soil pH
 - Sandy soil 6.0-6.5
 - Loamy soil 6.5-7.0
 - Clay soil 6.8-7.2
- Liming increases soil pH; magnesium is not supplied (due to washing-out)

- Organic fertilizers are part of soil preparations (fertilizers of animal origin, biocomposts); one-off application of 600-100 tons per ha before vine planting
- Fertilizers should be applied in soil right after liquidation of the old vineyard; soil trenching and deep aeration should follow
- Planting of manuring plants; various types of cover plants

Aspect of a slope and row spacing

- Suitable aspect of a slope (i.e. the compass direction the slope faces), suitable row spacing and proper vine training are prerequisites to establishing a high-quality canopy
- Aspect of a slope is an important factor in vineyard management, it affects fruit zone microclimate during the stage of ripening
- Aspect of a slope must provide optimum sunlight for the canopy and fruit zone; most common aspects: north–south (N-S) or east–west (E-W)

- Grapes on both sides of the canopy must be evenly ripe
- Risk factors - E-W aspect: lower sun exposure; N-S aspect: canopy facing the west might be damaged by sun scald (due to intensive afternoon sunlight)
- Good sun exposure depends on row spacing (distance between canopies) – the closer and higher the canopies, the less sunlight they receive

- Spacing between rows should be minimum 2.0 m
- Plant spacing within the rows is important and should range between 0.8-1.2 m (sufficient air flow and light penetration in the canopy)
- Narrow row spacing is bad for the machinery, canopy management and protection against diseases and pests
- Variety and growth vigour are decisive factors in row spacing; dense spacing – roots grow deep, better supply of water

- Vigorous growth enhances yields, decreases grape quality and increases susceptibility to fungi diseases
- Physiology of the vine as well as machinery (width of a tractor + 30 cm extra) are important factors in choosing the right row spacing
- Spacing of plants within a row reflects expected loading of the plant (desired type and quality degree of a wine)

Rootstock selection

- Root damage caused by phylloxera is manifested in a form of root nodules (small root growths) and tuberosities (lignified roots)
- Susceptible varieties have basically no practical meaning and are replaced with rootstock tolerant and resistant to phylloxera
- Phylloxera causes nodosities in tolerant rootstock; the infection does not affect growth and development of aboveground plant parts
- Resistant rootstock prevents growth and development of phylloxera on the roots

Selection of rootstock:

Resistance to higher lime concentrations in soil

Resistance to drought

Adaptation to relevant soil conditions

Impact on grape quality

Rootstock greatly affects growth vigour of the grafted variety

Site properties are decisive for selection of rootstock:

Depth of soil horizon, soil structure, water holding capacity, aspect and exposure of the site, climate

- High levels of carbonate ions in soil cause deficiency and absence of iron
- Stress induced by high concentrations of lime greatly affects grape production (decrease in yields and grape quality, chlorosis occur on young leaves first)

- *Vitis riparia*, *Vitis rupestris* and *Vitis cinerea* are susceptible to high lime concentrations
- *Vitis berlandieri* is more flexible; most resistant species
 - *Vitis vinifera* – no resistance to phylloxera
- Most common parameter for selection of rootstock on calcareous soil: Content of active lime in soil
- Stress induced by drought during growing season has serious effect on physiological functions of the grapevine (reduced number of leaves and shoots)

- Rootstock must be selected in relation to soil type, and portions of loamy, clay and sandy particles
- Rootstock variety affects ripening, quantitative and qualitative parameters of grapes

Preparation of soil before planting

- Create conditions for good vine growth and development
- Remove all plant residues of the old vines; loosen the soil
- Plant cover plants eliminating soil fatigue

- Trenching changes soil structure, soil horizons are mixed
 - Trenching is justifiable on extremely compact soil; it is good for processing of heavy soils with lots of clay particles
- Deep soil aeration (30-50 cm) is recommended for relevant soil structure
- Trenching and deep soil aeration: Autumn, right after liquidation of the previous vineyard
- Soil should relax over the winter and longer (time necessary between deep soil processing and planting of the vine)

- Green fallow in soil preparation helps eliminate soil fatigue, improves soil structure, and reduces populations of nematodes
- Trenching and deep aeration clash with deep ploughing of green manure into soil (first, lightly plough the green manure, and plough it deep into the soil again after 4-6 weeks)

Planting of grapevine

- The best time to plant is in spring or in autumn; spring (April) is the most common time for planting
- Seedling treatment – shoots are cut to 2 buds
- Most of the seedlings today are waxed (15 cm), which prevents drying and the plants do not have to be covered with soil

- Each type of planting requires a specific treatment of the vine root system; seedlings with longer roots are better since they root more easily and grow more vigorously after the planting
- Seedlings should be immersed in water for min. 12 hours before planting
- Manual planting is the most expensive part of the process; workers dig holes, place compost and gardening substrate in each hole and plant the seedlings (grafting union is 3-5 cm above ground)

- Planting with diggers, root system is adjusted to match the digger diameter; roots must be evenly laid out in the holes (additional irrigation)
- Planting using a tractor-mounted digger with water sprays – no need to additionally irrigate the seedlings; roots must be adjusted
- Machinery planting – most common these days. Planting machine is controlled by a laser beam (sets row and vine spacing), seedlings are irrigated in dry weather

Construction of a trellis system

- Trellis system is essential for the grapevine and must be established as early as possible (columns, poles, wire support, trellis, anchoring elements, etc.)
- Height of columns in the row: 2.2-2.7 m, columns on the row edges are taller: 2.7-3.0 m (0.5-0.7 m deep; column spacing: 6.0-7.0 m)
- Columns on the edges are tilted and anchored with a wire

- Concrete, wooden, metal columns
- Concrete columns – heavy, hard to manipulate
- Wooden columns may be erected in the whole vineyard or on the edges
- Metal columns: Various profiles, easy manipulation and simple instalment, use of mobile double wires; plastic line posts – similar to metal line posts
- Enough space should be left at the end of vineyard rows to provide room to turn equipment

- Mostly metal line posts help support individual plants (5-10 mm wide)
- Wires for trellises are made of various materials, use of wire joiners and tensioners (Gripple)