Chapter 5
The Growing Environment

Vinspiration

What a Vine Needs

Heat

Sunlight + **CO2** + **Water** = **Glucose** + **Oxygen (photosynthesis)**

+

Nutrients = **Growth**

Heat

What a vine needs

Below 10℃ = too cold for the vine to grow

Heat defines which varieties can grow where

Factors affecting heat:

- **Latitude**
  - Must be between 30-50° latitude (N/S of Equator)
  - Factors other than latitude outside this area can make certain places unsuitable.
- **Altitude**
  - As altitude increases, temp drops (Cafayate, N Argentina -26°)
- **Ocean currents**
  - Major currents transport hot/cold water to cool or warm regions (Humboldt Current off Chile/Benguela Current of South Africa/Gulf Stream for NW Europe)
- **Fog**
  - Fog cools areas that may struggle to produce high quality grapes otherwise (California/Casablanca Valley)
- **Soil**
  - Dark soil/high stone and rock content absorb + reradiate sun's heat
  - Soil high in water - need more energy to warm up + conduct heat from the vine - can delay budburst.
- **Aspect**
  - Facing equator (more heat). N face S. S face N.
  - Steeper slopes = more benefit (ie, Mosel, Germany)

Continentality and Diurnal Range

- Continentality = Temperature difference between the coldest and the hottest months.
  - High continentality = large different in temp
  - Areas close to water have low continentality / inland, higher continentality.
  - Impact length of the growing season with total heat available.
- Diurnal range = Difference between daytime and night time temperatures.
  - Large diurnal range = cooler nights keep grape aromas/acidity = produce fresher wines.
  - Vineyards close to water shorten the diurnal range, making it smaller.
  - Cloud cover = reduces/shortens diurnal range by retaining heat at night + rising slowly in the day.

Temperature hazards

- **Winter**
  - Vines damaged in -20℃ - could die
  - 'Graft' most at risk; earthing up to bury graft prevents death
  - If mild winter; vine has no dormant period, may produce +1 crop = life shortened/poor grape quality/more insects survive to attack vine in summer.
- **Spring frosts**
  - Occurs when cold air (-0℃) collects at ground level and freezes water vapour on ground or vine.
    - Kills newly burst buds/shoots = hugely impact yields.
  - To prevent:
    - **Heaters** = placed throughout vineyards, creates movement to stop frost settling.
    - **Wind machines** = Large fan draws warm air from above to stop ground freezing (some use heaters too).
    - **Sprinklers** = Spray water onto vines; as freezes - heats plant tissue to protect buds/shoots.
    - **Thoughtful vineyard design** = Cold air sinks to the lowest point = slopes/no depressions in the soil prevents. Vineyards planted on the middle of the slope less at risk. Vines trained high to avoid cold air.
- **The growing season**
  - Cold temperatures in spring delay budburst; shortening ripening season (grapes don't ripen before becomes too cold).
  - Flowering/fruit set also disrupted by cold temp
  - Too hot and vines will slow growth, stop and die (even with sufficient water)

Sunlight

What a vine needs

- More sunlight → more ripening → more glucose produced for growth/ripening
- Flowering/fruit set also benefit.

Factors affecting sunlight

- **Latitude** = day length longer further from the equator (extra sunlight helps to ripen).

- **Seas and lakes** = large bodies of water = more cloud cover. Sunlight reflects seas/lakes, helps warmth + ripening.
- **Aspect** = steeper slopes = more sunlight. Vineyards far from the equator have weaker sunlight, need favourable aspect to ripen.

Sunlight hazards

- Flowering/fruit set = sunlight needed or crop yields too small
- Cloud cover slows photosynthesis prevents grapes from fully ripening.
- Too sunny = sunburnt grapes (bitter taste)
- Vine canopy can add or prevent too much sunlight.

Water

What a vine needs

- Water needed for photosynthesis + grape swelling
- Transpiration = how vine draws water up from roots
- If warmer, water evaporates from leaves + vines needs more water
- After leaf canopy grown - water limited to concentrate on grape ripening rather than shoot growth. Also reduces impact of canopy shading.

Rainfall and irrigation

Three main techniques:

1. **Drip irrigation** = (most advanced/expensive) each vine has own controlled dripper.
2. **Sprinklers** = (cheaper/widely used) waster water/cause damp, disease prone conditions (can also be used for frost protection).
3. **Flood irrigation** = (cheap) must be on flat/gently sloped vineyards - where there is access to lots of water.

Water hazards

- **Drought**
  - Vine can stop transpiration to preserve resources. Very severe = water stress (photosynthesis stops/leaves wilt/grapes don't ripen/vine dies).
- **Too much water**
  - Water goes to shoots/leaves = less sugar for grapes.
  - More shading - restricts ripening
  - Waterlogged soil - roots saturate + die (stopped by steep site/drainage pipes)
  - Flowering/fruit set disrupted by rainfall (reduce no of grapes formed)
  - Damp = fungal disease
  - Heavy rain before harvest means berries swell + dilute flavours/split (fungal disease likely)
- **Hail**
  - Damage grapes + vine
  - Netting to protect (expensive)
  - Localised - different vineyard sites reduce risk

Climate and weather

Climate = average temp/sunlight/rainfall over several years

Weather = annual variation relative to climactic average (some regions greater variations, eg, Bordeaux)

Climate classifications

Cool climate: 16.5°C or below

Moderate climate: 16.5°C - 18.5°C

Warm climate: 18.5°C - 21°C

Hot climate: 21°C or above

Must consider continentality/diurnal range

Temp measured in growing season (Apr-Oct - Northern/Oct-Apr - Southern)

Continental climate

- Greatest continentality (difference in yearly temp)
- Short summers, large temp drop in autumn
- Risk of spring frost (Chablis/Champagne)
- Suit varieties that bud late/ripen early (as low temp effect flowering/fruit set/ripening)
- Can have hot summers - irrigation may be needed

Maritime climate

- Cool-mod temp + low continentality
- Even rainfall to moderate temp - grapes ripen into autumn (ie Bordeaux can ripen thick skin Cab Sauv)
- Spring rainfall can be harmful to flowering/fruit set/health of grapes at harvest

Mediterranean climate

- Low continentality
- Warm/dry summer (Mediterranean/California/Chile/SA/SE Aus)
- Wines fuller bodied/riper tannins/high alcohol/low acid
- Lower rainfall = healthier grapes
- Drought can be an issue

Soil

Soil composition

Sits above bedrock; few cm to metres deep. Made or particles, larger stones, humus (organic matter like decomposing leaves).

- **Stones, sand and clay**
  - Come from underlying rock or later deposits laid on top of rock
  - Size matters:
    - Stones on surface heat vineyard. Stone not always present (largest soil particle)
    - Soil made up of tiny particles: sand (largest) + clay (smallest)
- **Humus**
  - Decomposing plant and animal matter - rich in plant nutrients - excellent water retaining properties.

Soil and water

- Early in season, water needed for shoot/leaf growth.
- Mild water stress good after véraison.
- Water stored by binding with clay or humus.
  - Too much clay = becomes waterlogged (kill vine roots)
  - Too much sand/stone = can't retain water (drainage) so irrigation needed
  - Loam (best soil) sand + clay particles = good drainage and water retention

Soil and nutrients

- Nitrogen, phosphorus and potassium (most important)
- Do not need high amount to survive. If too much = canopy too leafy and shades fruit.
- Nutrients deplete over time, replaced with natural/chemical fertilisers
- Chlorosis = leaves yellow + vine limited in photosynthesis. Grapes struggle. Fertiliser to solve.

Multiple Choice Practice Questions

1) Which climate classification best describes a region with warm summers, dry summers where drought can become an issue?

a) Continental
b) Mediterranean
c) Maritime
d) Arctic

2) How does the presence of a large body of water, such as a lake or ocean, generally affect a vineyard's climate?

a) It increases the temperature
b) It moderates temperature extremes
c) It decreases humidity
d) It increases diurnal temperature variation

3) What is Humus?

a) Decomposing plant and animal matter
b) A Mediterranean dish
c) A type of harvesting method
d) A description of annual weather variety

4) At what latitude can viticultural grapes grow?

a) 30-60°
b) 20-50°
c) 30-50°
d) 15-50°

5) Which of the following is NOT a method of preventing the effects of Spring Frost?

a) Heaters
b) Fencing
c) Wind Machines
d) Sprinklers

Answers

1. b) Mediterranean

2. b) It moderates temperature extremes

3. a) Decomposing plant and animal matter

4. c) 30-50°

5. b) Fencing