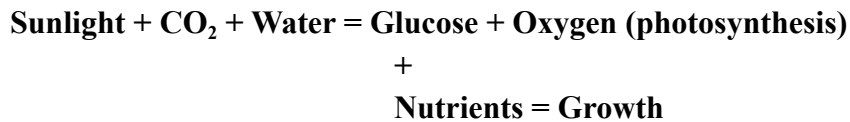


Chapter 5 The Growing Environment

WHAT A VINE NEEDS

Heat



HEAT	<p>What a vine needs Below 10°C = too cold for the vine to grow Heat defines which varieties can grow where</p> <p>Factors affecting heat:</p> <ul style="list-style-type: none"> ● Latitude <ul style="list-style-type: none"> ○ Must be between 30-50° latitude (N/S of Equator) ○ Factors other than latitude outside this area can make certain places unsuitable. ● Altitude <ul style="list-style-type: none"> ○ As altitude increases, temp drops (Cafayate, N Argentina -26°) ● Ocean currents <ul style="list-style-type: none"> ○ Major currents transport hot/cold water to cool or warm regions (Humbolt Current off Chile/Bungeula Current of South Africa/Gulf Stream for NW Europe) ● Fog <ul style="list-style-type: none"> ○ Fog cools areas that may struggle to produce high quality grapes otherwise (California/Casablanca Valley) ● Soil <ul style="list-style-type: none"> ○ 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 <ul style="list-style-type: none"> ○ Facing equator (more heat). N face S. S face N. ○ Steeper slopes = more benefit (ie, Mosel, Germany) <p>Continentality and Diurnal Range</p> <ul style="list-style-type: none"> ➤ Continentality = Temperature difference between the coldest and the hottest months. <ul style="list-style-type: none"> ○ High continentality = large different in temp
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	<ul style="list-style-type: none"> ○ 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 nighttime temperatures. <ul style="list-style-type: none"> ○ 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. <p>Temperature hazards</p> <ul style="list-style-type: none"> ● Winter <ul style="list-style-type: none"> ○ Vines damaged in -20°C - 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 <ul style="list-style-type: none"> ○ Occurs when cold air (-0°C) collects at ground level and freezes water vapour on ground or vine. <ul style="list-style-type: none"> ■ Kills newly burst buds/shoots = hugely impact yields. ○ To prevent: <ul style="list-style-type: none"> ■ 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 <ul style="list-style-type: none"> ○ 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	<p>What a vine needs</p> <ul style="list-style-type: none"> - More sunlight → more ripening → more glucose produced for growth/ripening

	<ul style="list-style-type: none"> - Flowering/fruit set also benefit. <p>Factors affecting sunlight</p> <ul style="list-style-type: none"> ● 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. <p>Sunlight hazards</p> <ul style="list-style-type: none"> ● 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	<p>What a vine needs</p> <ul style="list-style-type: none"> - 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. <p>Rainfall and irrigation</p> <p>Three main techniques:</p> <ol style="list-style-type: none"> 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. <p>Water hazards</p> <ul style="list-style-type: none"> ❖ Drought <ul style="list-style-type: none"> ➢ Vine can stop transpiration to preserve resources. Very severe = water stress (photosynthesis stops/leaves wilt/grapes don't ripen/vine dies). ❖ Too much water <ul style="list-style-type: none"> ➢ 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)

	<p>formed)</p> <ul style="list-style-type: none"> ➤ Damp = fungal disease ➤ Heavy rain before harvest means berries swell + dilute flavours/split (fungal disease likely) <p>❖ Hail</p> <ul style="list-style-type: none"> ➤ Damage grapes + vine ➤ Netting to protect (expensive) ➤ Localised - different vineyard sites reduce risk
<p>CLIMATE AND WEATHER</p>	<p>Climate = average temp/sunlight/rainfall over several years Weather = annual variation relative to climactic average (some regions greater variations, eg, Bordeaux)</p> <p>Climate classifications</p> <p style="text-align: center;"><i>Cool climate: 16.5°C or below</i> <i>Moderate climate: 16.5°C - 18.5°C</i> <i>Warm climate: 18.5°C - 21°C</i> <i>Hot climate: 21°C or above</i></p> <p>Must consider continentality/diurnal range Temp measured in growing season (Apr-Oct - Northern/Oct-Apr - Southern)</p> <p>Continental climate</p> <ul style="list-style-type: none"> ● 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 <p>Maritime climate</p> <ul style="list-style-type: none"> ● 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 <p>Mediterranean climate</p> <ul style="list-style-type: none"> ● 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	<p>Soil composition Sits above bedrock; few cm to metres deep. Made of particles, larger stones, humus (organic matter like decomposing leaves).</p> <ul style="list-style-type: none"> ● Stones, sand and clay <ul style="list-style-type: none"> ○ Come from underlying rock or later deposits laid on top of rock ○ Size matters: <ul style="list-style-type: none"> ■ Stones on surface heat vineyard. Stone not always present (largest soil particle) ■ Soil made up of tiny particles: sand (largest) + clay (smallest) ● Humus <ul style="list-style-type: none"> ○ Decomposing plant and animal matter - rich in plant nutrients - excellent water retaining properties. <p>Soil and water</p> <ul style="list-style-type: none"> ● Early in season, water needed for shoot/leaf growth. ● Mild water stress good after véraison. ● Water stored by binding with clay or humus. <ul style="list-style-type: none"> ○ 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 <p>Soil and nutrients</p> <ul style="list-style-type: none"> ● 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.
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