Composition of Wine

Sensory Evaluation

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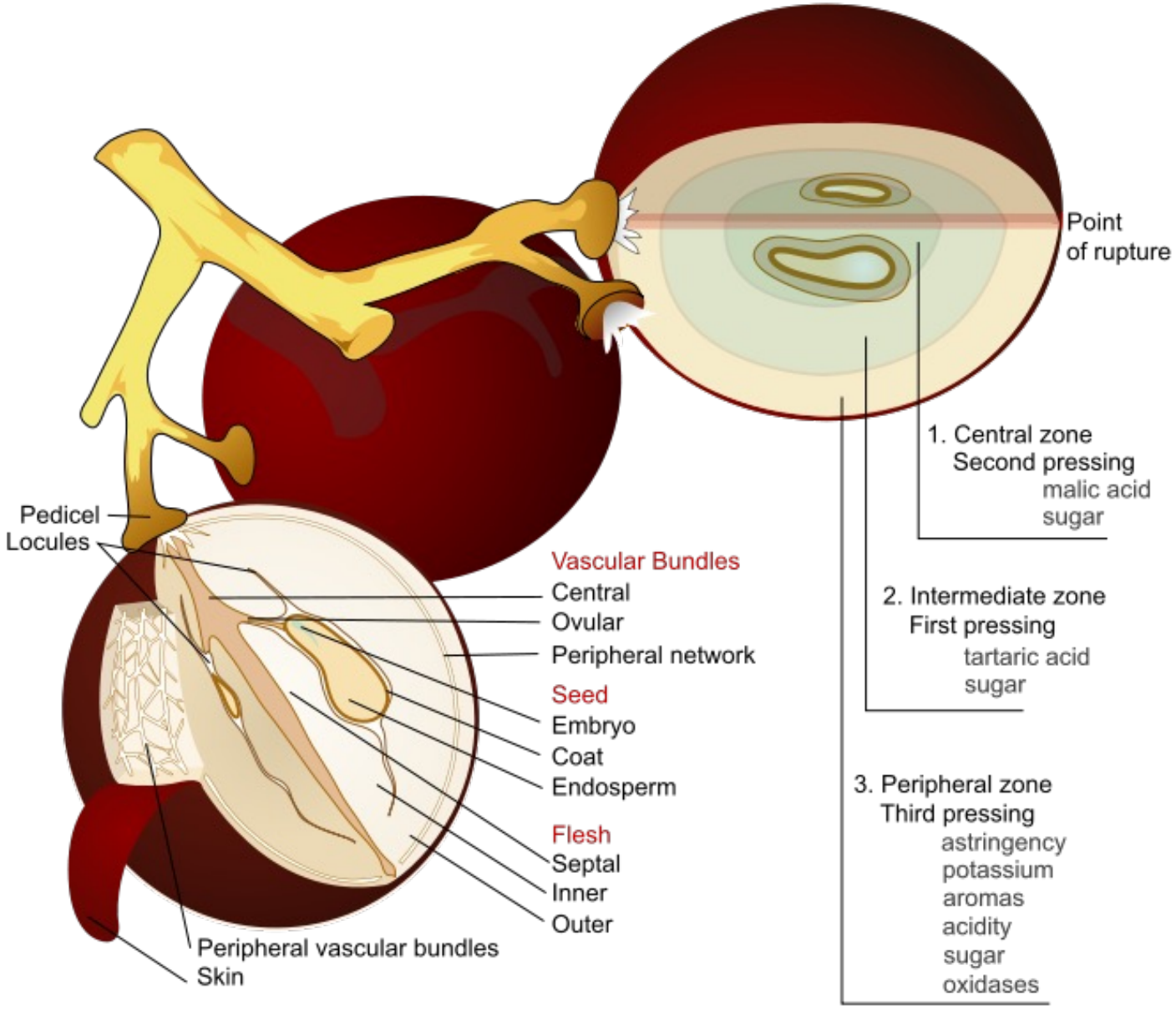
Components of Wine

- Water: 80 to 95%
- Alcohol
- Acids
- Polyphenols
- Sugars
- Carbon Dioxide/CO_2


Point
of rupture
1. Central zone
Second pressing
malic acid
sugar
2. Intermediate zone
First pressing
tartaric acid
sugar
3. Peripheral zone
Third pressing
astringency
potassium
aromas
acidity
sugar
oxidases
Pedicel
Locules
Vascular Bundles
Central
Ovular
Peripheral network
Seed
Embryo
Coat
Endosperm
Flesh
Septal
Inner
Outer
Peripheral vascular bundles
Skin

Acids

ORGANIC ACIDS in grapes and wine include tartaric, malic, acetic, succinic and lactic acids.

~ Maintaining balanced acid in grapes and wine will aid in anti-microbial stability

Tartaric Acid:

- The strongest acid
- Specific to grapes, rarely found in nature

Malic Acid:

- Most prevalent in unripe grapes
- Degrades as the grape ripens but remains at high levels in certain varieties and climates/soils
- Can be degraded by lactic acid bacteria and turned to lactic acid through malo-lactic fermentation

Together account for 90% of grapes acidity

Benefits of Acid

- Helps in stabilizing color
- React with alcohol to form esters (aromas)
- Uplift aromas and flavors in the wine
- Enhance wine's ageing potential
- Help to prevent microbial spoilage
- Balances residual sugar
- Brightens wine's reflectivity

Measuring acid through pH

- Strength of acid is measured in pH units in grapes
  - p – power
  - H – Hydrogen ion concentration
  - The property that gives a solution it's acidity
- **Generally: the lower the pH the stronger the acid**
- pH usually ranges between 2.5 and 4.0 in wine
- For every decrease of 1 unit in the pH scale – strength of acidity increases 10 times.
- **Potassium** ions replace Hydrogen ions as the berry ripens and acids decrease
- **Values between 3.2 and 3.8 are preferable in wine**

Typical Acidity in Wine

- **Dry White Wine – 5 g/l – 8 g/l**
- Sweet White Wine – 7 g/l – 10 g/l
- **Dry Red Wine – 5 g/l – 7 g/l**
- Sweet Red Wine – 6 g/l – 9 g/l
- Fortified Wines – 5 g/l – 6 g/l

Organoleptic Characteristics of Acids

Visual:

Gives brilliance, reflective quality

Olfactif:

Usually not perceivable but malic acid reminds of green apple, sometimes a citrus note is detected

Taste:

Has an acidic flavor, tart and mouth drying leading to salivation

Tactile sensation:

Felt on side of the tongue, plus salivation, mouth watering sensation

Your teeth may feel squeeky

Malolactic fermentation:

Adds creamy, buttery notes, plus added body/texture

Sugar

SUGAR:

- Mostly glucose and fructose
- Found in varying degrees in finished wine
  - (Brix x 0.55/.56 = potential alcohol)
- Converted to alcohol by fermentation
- Glucose ferments faster than fructose
- Fructose is almost twice as sweet as glucose
- If detectable, characterized as

  Residual Sugar listed as grams per liter (g/l)
- Specific to wine type:

  Dry wine: less than 4 g/l (EU standards)

  Sweet wine: can be up to and beyond 50 g/l

Sugar in Ripe Grapes

The sugar content of the juice of ripe grapes can vary greatly - 150 to 250 g/L

- In unripe berries, glucose is the predominant sugar.
- At the ripening stage, glucose and fructose are generally present in equal amounts.
  - (1:1 ratio)
- In overripe grapes, the concentration of fructose exceeds that of glucose.
- In ripe grape varieties, there are variations in the glucose to fructose ratio
  - Chardonnay is classified as high fructose variety
  - Chenin blanc is a high glucose variety

BRIX

- **Degrees Brix** (symbol °Bx)
  - Brix – measurement of sugar in the grape
  - Formula for potential alcohol
    - Brix x .55 or.56 = potential alcohol % by volume
    - The unit °Brix represents grams of sugar per 100 grams of juice (ml of juice)
- **Measurement of sugar in the grape will determine how much alcohol that wine will potentially make**
    - The winemaker will decide if they want to convert all of the sugar into alcohol.
    - Some wine with residual sugar will have lower alcohol in them as a result of stopped fermentation

Organoleptic Characteristics of Sugar

Visual: increased viscosity, increased potential alcohol in finished wine (tears)

Olfactif: Contributes to "ripe or honeyed" aromas but not necessarily detectable

Taste: Has a sweet flavor, rich mouth feel and

increased palate weight

Increased heaviness/fatness if unbalanced

Alcohol

ALCOHOL IS:

- Mostly ethanol with small amounts of methyl alcohol
- 7 to 15% by volume (fortified up to 20%)
- Issued from fermentation - converting sugars into alcohol through yeast

- In most cases alcohol will be lower if residual sugar is present but can still be very high with grapes from a hot climate or picked late.
- Alcohol sweetens and can balance acid
- Alcohol adds bitter flavors too

Organoleptic Characteristics of Alcohol

Visual: Contributes to tears and viscosity when combined with glycerol

Nose: Tactile sensation – burning of the nostrils

Taste: In high quantity, contributes to sweetness

Contributes to mouthfeel and viscosity and "heat" when the alcohol is in excess

Polyphenols /Phenolic Compounds

POLYPHENOLS:

- Extracted mainly from grape skins, seeds and stems
- Group of chemical compounds that affect wines color, texture, astringency and bitterness

The phenolic compounds responsible for red wine color are:

Anthocyanins – found in pulp cells under the skins of black grapes

In red wine (200 to 500 mg/l)

Tannins: Large Phenolic compounds determine body and astringency – act as antioxidants and preservatives – precursors to aromatic compounds when wines are aged

1 to 3g/l in reds

Can also be found in very small quantity in whites

(20-30mg/l) if matured in oak barrels due to wood tannins

Tannins are very complex compounds

- Tannins are large molecules and are yellow, brown, and red colored.
- **They FEEL astringent and TASTE bitter.**
- Tannins **polymerize** leading to increased molecular size.
- Generally smaller molecules are more bitter and possibly more astringent on the palate
- In time… continual increase in molecular size makes these compounds insoluble and, consequently, they precipitate out, and the wine's astringency decreases.

Organoleptic Characteristics of Polyphenols

Visual: responsible for the color of red and white wine

- Level of tannins vary and are specific to each varietal
- As wine ages, tannins polymerize and form sediments for red wines resulting in a lighter color and less astringency
- Color will deepen for whites due to oxidation

Nose:

- Grape tannins can have earthy-green aromas and flavors
- Oak tannins will have smoky, charred aromas of wood.

Taste: responsible for the astringency of wine

- Grape tannins will tighten your tongue and constrict
- Oak tannins tend to dust the palate and leave a dusty mouth feel.

Astringency vs. Bitterness

Tannins brings astringency and structure

Characterized by three sensations:

- Constriction of sides of cheeks and gums
- Dusty, roughing sensation on teeth and gums
- Drying sensation
- Can taste bitter

Bitterness is a flavor – not a feeling like Astringency

Balance-alliance of flavors

- Sugar diminishes acid perception
- Bitter (from tannin) will reinforce acid taste
- High acidity tones-down high alcohol
- High tannins can be balanced by moderate-high acidity
- High alcohol volatizes esters and can distort structure and overwhelm delicate aromas
- Alcohol sweetness can balance high acidity
- Alcohol can also add bitterness and heat to the palate
- Low alcohol wines with RS will need refreshing acidity