Sensory Evaluation

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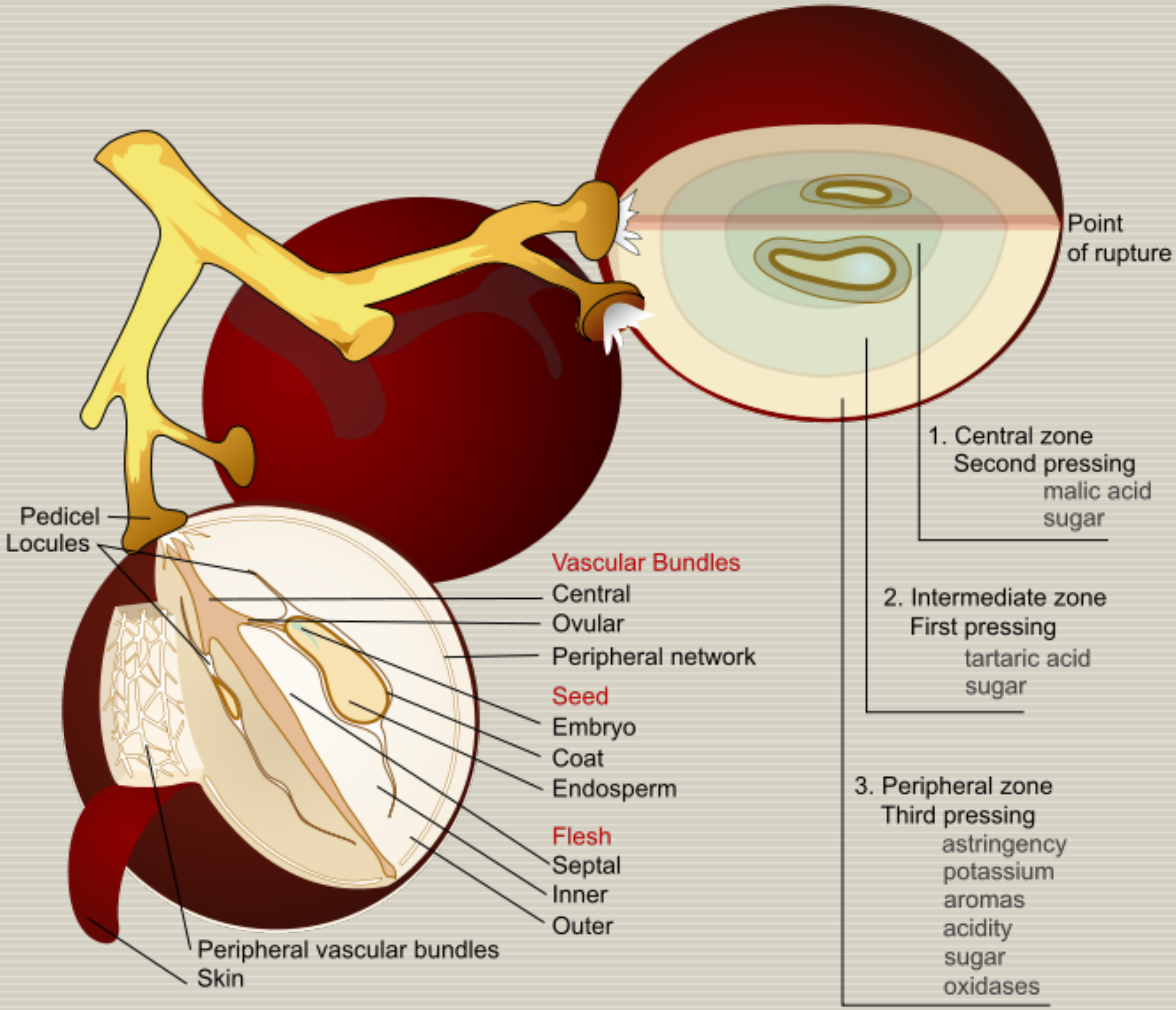
Components of Wine

- Water: 70 to 80%
- 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 in Wine

- 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
  - 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 allowing acids to decrease
- Values between 3.2 and 3.8 are preferable in wine

pH

- pH measures the quantity of acids present, and the strength of the acids
- Wine pH depends on three main factors:
  - the total amount of acid present
  - the ratio of malic to tartaric acid
  - the amount of potassium present
- Wines that contain lower acid and an excess of potassium show high pH values.
- Wine with more tartaric acid, less malic acid, less potassium have lower pH values.
- Higher pH musts and wines face increased risk of bacterial spoilage and growth of *Brettanomyces* sp. yeast. There are also negative effects on color stability.

Important effects of low pH in wine

- Low pH has many important effects:
  - Making sulphur dioxide more effective as an antimicrobial agent
  - Inhibiting bacterial growth
  - Improving the taste of the finished wine
  - Increases the acid – balancing the wine

pH of approximately 3.4 - 3.7 usually provides the most balanced flavor for red wines

pH for white wines is effective when it is slightly lower (3.0-3.3)

Typical Acidity in Wine

- Dry White Wine – 5.5 g/l – 8 g/l
- Sweet White Wine – 7.0 g/l – 10.g/l
- Dry Red Wine – 6.0 g/l – 7.0 g/l
- Sweet Red Wine – 6.5 g/l – 9.0 g/l
- Fortified Wines – 5.0 g/l – 6.0 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

Components of Wine: 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

Making Dry *versus* Off-Dry Whites

Dry Wine

- Normal harvest/physiologically ripe grapes
- Whole cluster press OR Crush then press
- Fermented dry
  - no RS/maximum of 4 g/l RS
  - EU allows up to 9 g/l if the acid trails by 2 g/l
- Malolactic (optional)
- Fined/Filtered (optional)
- Bottled

Off-Dry Wine

- Normal OR Late Harvest
- Crush then press OR whole cluster press
- Fermentation is stopped (various means)
  - residual sugar remains
- Fined/Filtered
- Bottled
- Residual Sugar

EU regulations state:

- The residual sugar content must exceed the maximum for "Dry" but not exceed 12g/l
- OR 18g/l where the total acidity content is not more than 10g/l below the residual sugar content

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

It's the winemaking decision about converting 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

- Mostly ethanol with small amounts of methyl alcohol
- 7 to 15% by volume (fortified up to 20%)
- Issued from fermentation
- In most cases alcohol will be lower if residual sugar is present but can still be very high with grapes from a hot climate
- Alcohol sweetens and can balance acid

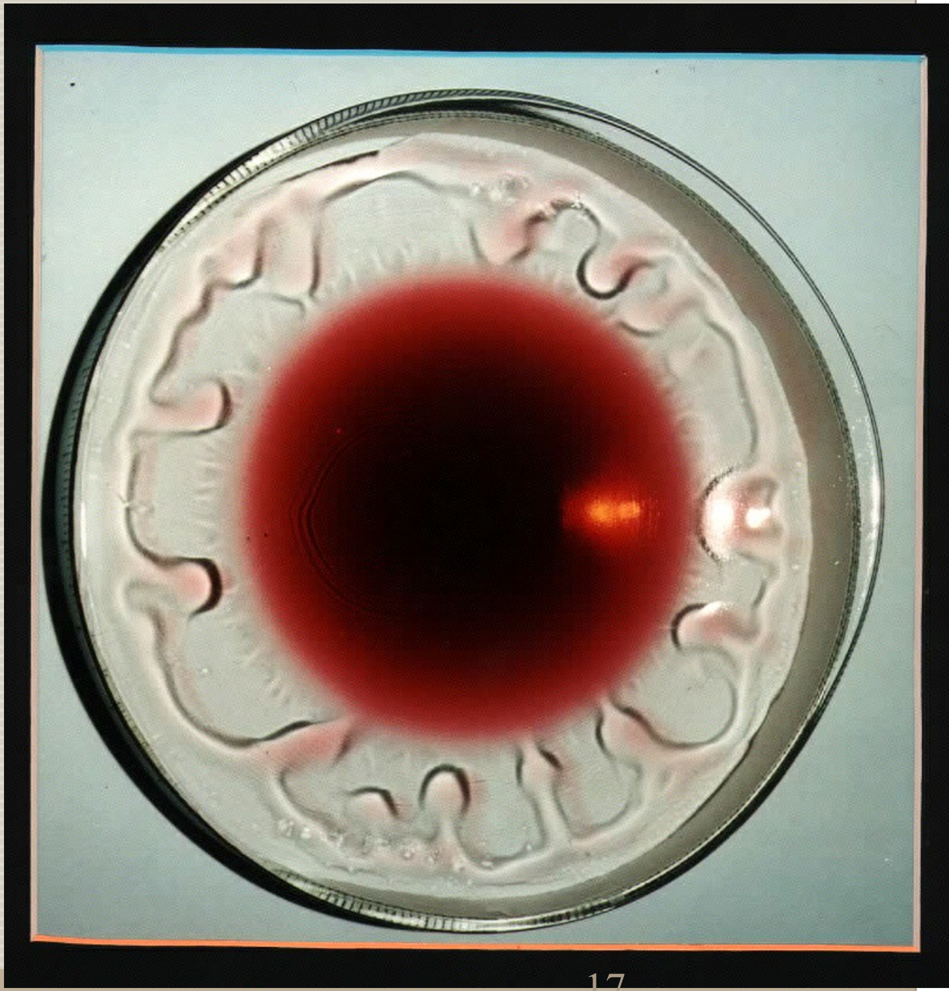
Organoleptic Characteristics of Alcohol

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 in excess



Polyphenols/Phenolic Compounds

- 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.
- During processing and aging, the tannins polymerize leading to increased molecular size.
- Generally smaller molecules are more bitter than astringent.
- Polymerization increases the molecular size which increases astringency perception and bitterness decreases.
- In time… continual increase in molecular size makes these compounds insoluble and, consequently, they precipitate, and the wine's astringency decreases.

Organoleptic Characteristics of Polyphenols

Visual: responsible for the color of red and white wine

- Varying levels and specific to each varietal
- As wine ages, tannins polymerize and form sediments for red wines resulting in a lighter color
- Color will deepen for whites due to oxidation

Nose: Grape tannins can have earthy-green aromas

Oak tannins will have smoky, charred aromas of wood.

Taste: responsible for the astringency of wine

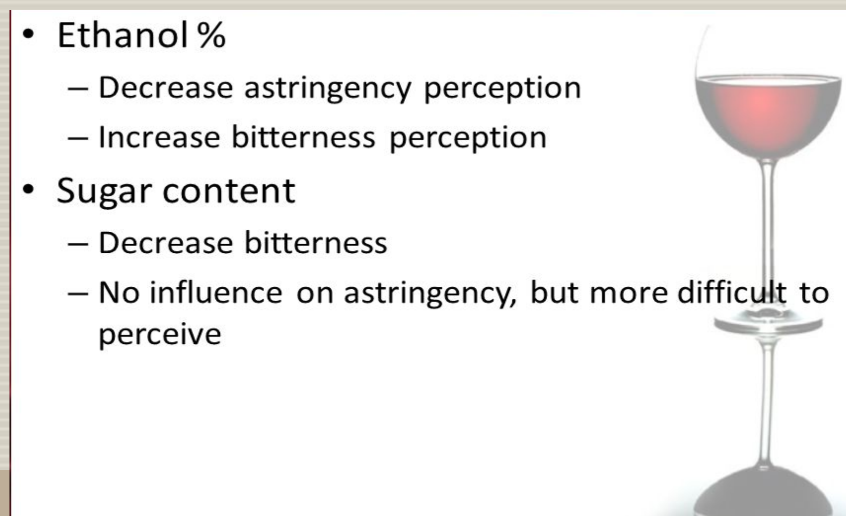
Astringency & Bitterness

Tannins brings astringency and structure

Characterized by these 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 sensation
- Acid will ”wash” high tannins
  - High tannins must be balanced by moderate-high acidity
- High acidity tones-down high alcohol
- High alcohol volatizes esters and can distort structure
- Alcohol adds sweetness
  - Alcohol sweetness can balance high acidity
- Alcohol can add bitterness and heat to the palate
- Low alcohol wines with RS need fresh acidity