Wine Faults

Amateur Winemakers Workshop

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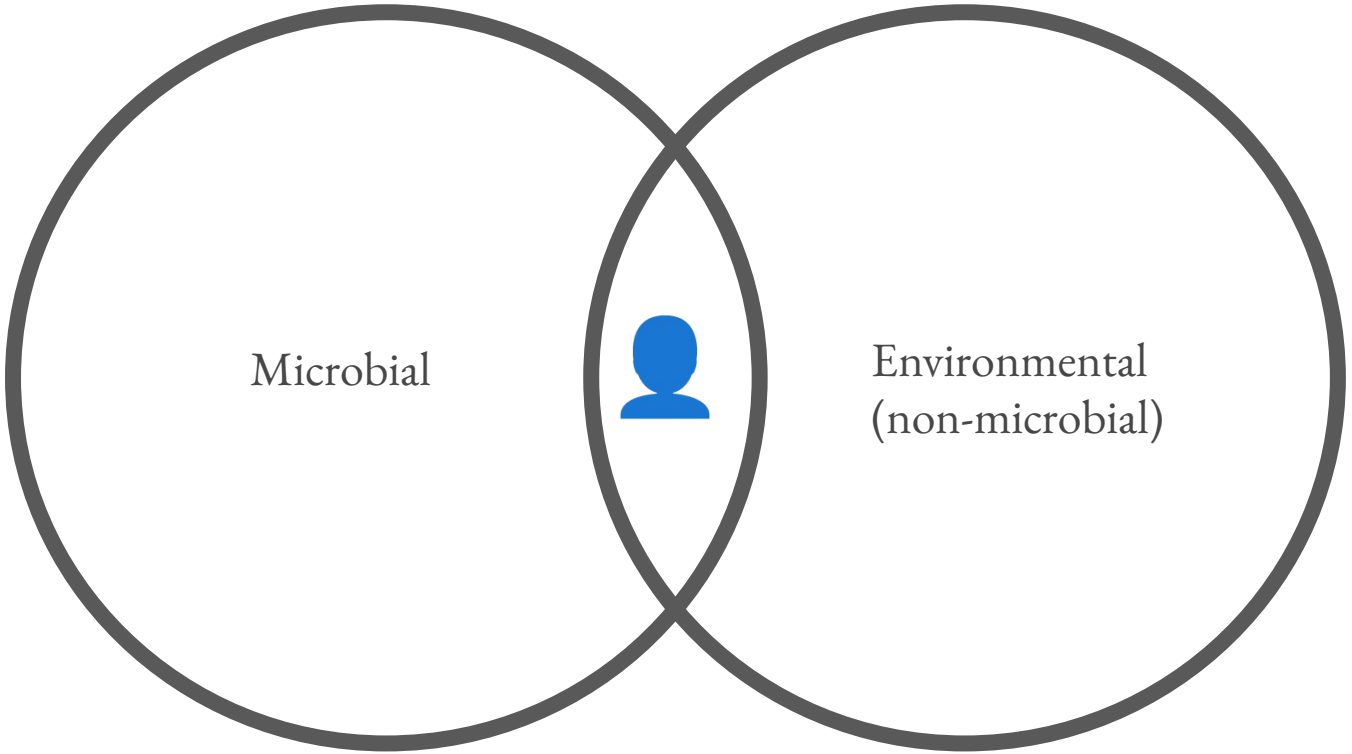
What will we be talking about?

- What wine faults are
- Deep dive into some of the most common faults
- How to prevent these faults and how to remedy them
- Winery sanitation
- Sensory development

What are wine faults?

- A wine fault is an unpleasant organoleptic characteristic including look, smell, or taste. Wine faults can come from a chemical or a microbial origin and some off-odors can be the result of multiple faults
- In more basic terms, anything negative that is detectable in the wine

What Causes Wine Faults



Types of Faults

Microbial

- Volatile acidity
- Ethyl acetate
- Brettanomyces
- Cork taint
- Lactic acid bacteria spoilage
- Volatile sulfur compounds
- Refermentation

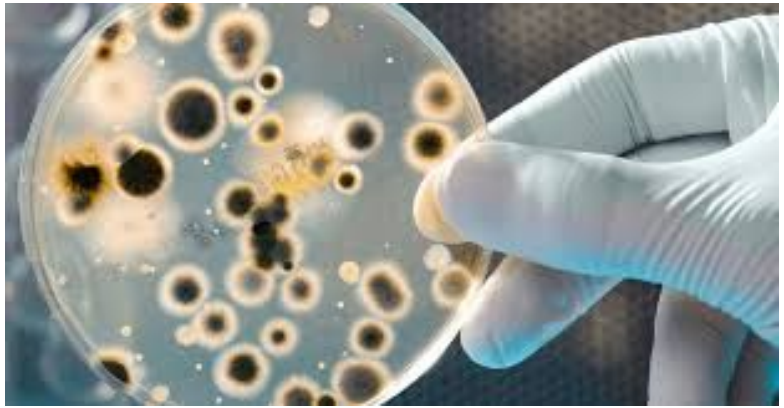
Non-Microbial

- Oxidation
- Excessive sulfur dioxide (SO2)
- Tartrates
- Protein haze

Microbial Faults

This category of faults comes from some sort of living organism that manipulates the wine through their own bio-chemistry. Every living thing needs food to eat and produces byproducts.

These faults can only exist if the specific organism is present and its has suitable living conditions!!!



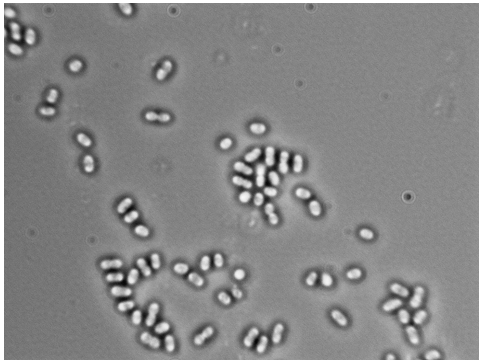
Volatile Acidity (VA)

Causes: Damaged Fruit, Vessel Headspace, improper use of SO2

Microbes: Acetic Acid Bacteria (Acetobacter, Gluconobacter, Gluconacetobacter)

Sensory: Vinegar

Prevention: Limit oxygen, low pH, use SO2, low temperature, top barrels, CLEANING!



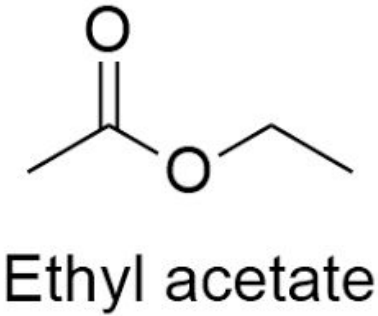
Ethyl Acetate

Causes: Damaged fruit, fermentation strain, oxidation

Microbes: Non-Saccharomyces yeasts Hanseniaspora and Pichia

Sensory: Nail polish remover, nail salon, glue

Prevention: Quality fruit, adequate SO2 at crush, limit headspace, CLEANING!



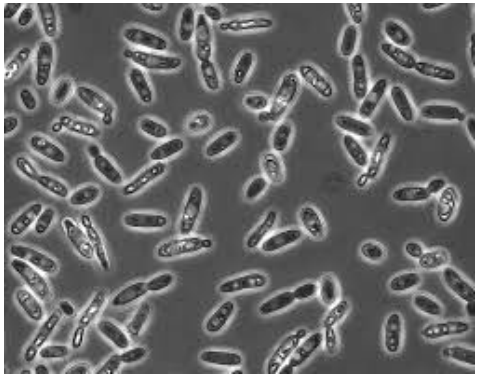
Brettanomyces

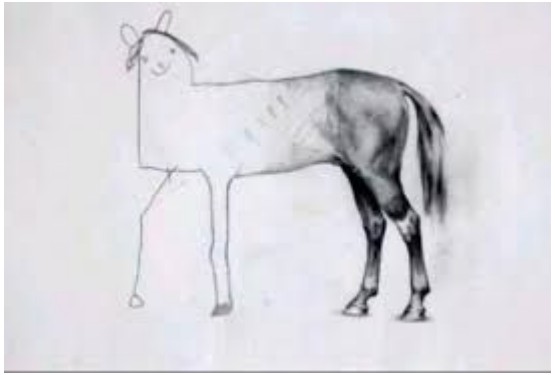
Causes: Spoilage yeast typically found porous surfaces from poor sanitation

Microbes: Brettanomyces

Sensory: medicinal, Band Aid, barnyard, horsey, wet dog, and smoky

Prevention: CLEANING!!! limit cross contamination





Cork Taint

Causes: 2,4,6-trichloroanisol (TCA)

Microbes: Penicillium and Aspergillus fungi (also need lignin and bleach)

Sensory: musty, moldy, earthy, mushroom

Prevention: do not use bleached corks, no bleach in the winery!, CLEANING! (without bleach)

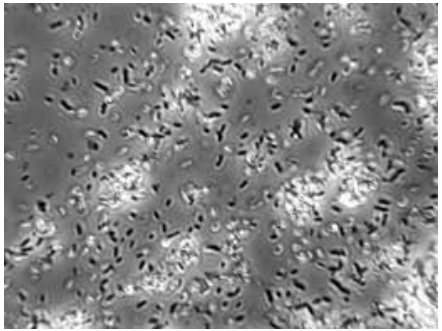
Lactic Acid Bacteria Spoilage

Causes: contaminated equipment, poor sanitation,

Microbes: Lactobacillus, pediococcus, oenococcus

Sensory: acetic,sour, buttery, cheesy, sauerkraut-like, bitter, pickle, mousy, and geranium taint (with presence of sorbic acid), ropiness

Prevention: Control wine pH, timing of MLF, use of SO2, filtration (MLF in bottle), CLEANING!



Hydrogen Sulfide and Volatile Sulfur Compounds

Causes: Stressed fermentations, Elemental Sulfur

Microbes: Saccharomyces and non-saccharomyces yeasts

Sensory: rotten eggs, sewer, burnt match, canned corn, onion, rotten cabbage

Prevention: adequate yeast nutrients, proper fermentation temperature, adequate oxygen during growth phase, use low H2S producing yeast strains, CLEANING!

Hydrogen Sulfide	Rotten Egg, Sewage	**Methyl Mercaptan**	Rotten Cabbage, decay
Ethyl Mercaptan	Onion, burnt match	**Dimethyl Disulfide**	Onion, cooked cabbage
Diethyl Disulfide	Garlic, Burnt rubber		

Refermentation

Causes: suitable fermentation environment in the wine post-bottling

Microbes: Saccharomyces and non-saccharomyces yeasts, Lactic acid bacteria

Sensory: haze or cloudiness in bottle, lees in bottle, bubbles forming, pushed corks

Prevention: appropriate use of SO2, sterile filtration, potassium sorbate, appropriate sanitization of bottling equipment, CLEANING!

Environmental (Non-Microbial) Faults

This category of faults can arise when something about the wine's environment changes which then causes a disruption in the wine's physical chemistry.

Arguably, these are some of the most easily avoidable faults

Oxidation

Causes: Presence of oxygen reacting with the wine to produce polyphenol oxidases and acetaldehyde

Sensory: Browning in color, bruised apple, nutty

Prevention: limit headspace, gas tanks, gas lines during transfer, limit mixing of wine, appropriate use of SO2, CLEANING (it's always important)

Excessive Sulfur Dioxide

Causes: The addition of too much sulfur dioxide to the wine

Sensory: burning sensation, choking

Prevention: ensure free SO2 goal is aligned with wine pH, double check math!

Tartrates

Causes: Excess of tartaric acid and potassium that precipitates out of solution due to temperature changes

Sensory: Visual impact on wine, tartrate sediment

Prevention: Physical cold stabilization, chemical cold stabilization (KPA, CMC), electrodialysis, change your marketing???

NOTE: preventing tartrate development can impact wine pH

Protein Haze

Causes: proteins left in wines that unfold over time and become large enough to become visible

Sensory: Visual haze, sediments

Prevention: Protein stabilization (heat stabilization) most commonly through the addition of bentonite clay

I found a fault, now what?????

Volatile acidity	Limit O2, Fine Filtration, Blending, Reverse Osmosis
Ethyl acetate	Limit O2, Fine Filtration, Blending, Reverse Osmosis
Brettanomyces	Fine Filtration, Do NOT cross contaminate
Cork taint	Only found in bottle, too late
Lactic acid bacteria spoilage	Fine Filtration, Blending, Reverse Osmosis
Volatile sulfur compounds	Copper Treatment, More Air (during ferment)
Refermentation	Filtration, Re-bottle

I found a fault, now what????? cont.

Oxidation	PVPP, casein, tannins, blending
Excessive sulfur dioxide (SO2)	Nitrogen sparging,
Tartrates	More cold stabilization (before bottle)
Protein haze	More protein fining (before bottle)

💀💀💀💀💀💀 Brettanomyces Bewares 💀💀💀💀💀💀

One of the worst infections a winemaker can have in the cellar! Brettanomyces is a very robust spoilage yeast that can live in anything porous!

Treat Brettanomyces as if it were nuclear waste!

If dealing with an infection, sterile filter the wine to .45um level, preferably outside of the cellar. Anything the wine comes into contact with (hoses, pumps, gaskets, tanks, barrels) MUST be heat sterilized via steam or by boiling. If it is found in a barrel, highly consider destroying the contaminated vessel.

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Winery Sanitation

“Maintaining a CLEAN winery with SANITIZED equipment is the number one preventative measure you can take to keep faults out of your wine!!!!”

- EVERY WINEMAKER EVER

Cleaning Basics

1) De-bulking: use high-flow water to remove “bulk” of debris/lees.
2) Cleaning Agent: Surfaces need to be cleaned of all residues and bio-films. Some of the most common are: caustics (lye, caustic soda, potash), soda ash, percarbonates (soda ash and hydrogen peroxide, “Destainex”)
3) Hot Water Rinse: Helps to remove cleaning agents and cleaning residues.
4) Sanitize: All surfaces and equipment must be sanitized to prevent microbial growth. Hot water/steam (contact time based on temperature), SO2/Citric Acid, Peracetic Acid, ozone, and Quaternary Ammonium Compounds (QUATS) are the most common.
5) Air Dry: The less moisture that is present, the less likely that microbes will be able to grow

NOTE: When using cleaning/sanitizing agents, follow all manufacturer recommendations!

SENSORY:

All faults are labeled so that you can begin to train your senses on finding these faults

Write down how YOU interpret the sensory profile of each fault and what makes it recognizable to YOU. This way you recognize these faults in your own wines based off of how you remember them and not what general references tell you to look for.

Takeaways

PREVENTION IS KEY

It will always be easier to prevent a fault rather than trying to remediate.

Winery sanitation is the most important aspect in reducing wine faults!

If a fault arises, don't panic! Analyze the situation and move with purpose!

The worst thing you can do is nothing!

If you start with clean fruit, in a clean winery and use clean practices, the wine is 90% done!

QUESTIONS???

(Ask Jenny, she's the fault queen.....)

References:

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"Wine Microbiology", University of California Davis, https://wineserver.ucdavis.edu/industry-info/enology/wine-microbiology

"Wine Fault Series", Iowa State University Extension, https://www.extension.iastate.edu/wine/wp-content/uploads/2021/09/FS40.pdf