

BARREL PROGRAMS: A WINE PERSPECTIVE FOR CIDER

HOW TO MANAGE AN EFFECTIVE BARREL PROGRAM IN
YOUR CELLAR

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we will discuss

- historical context
- barrel making process
- flavor influences of barrels
- choosing your barrels
- using your barrels
- maintaining your barrels



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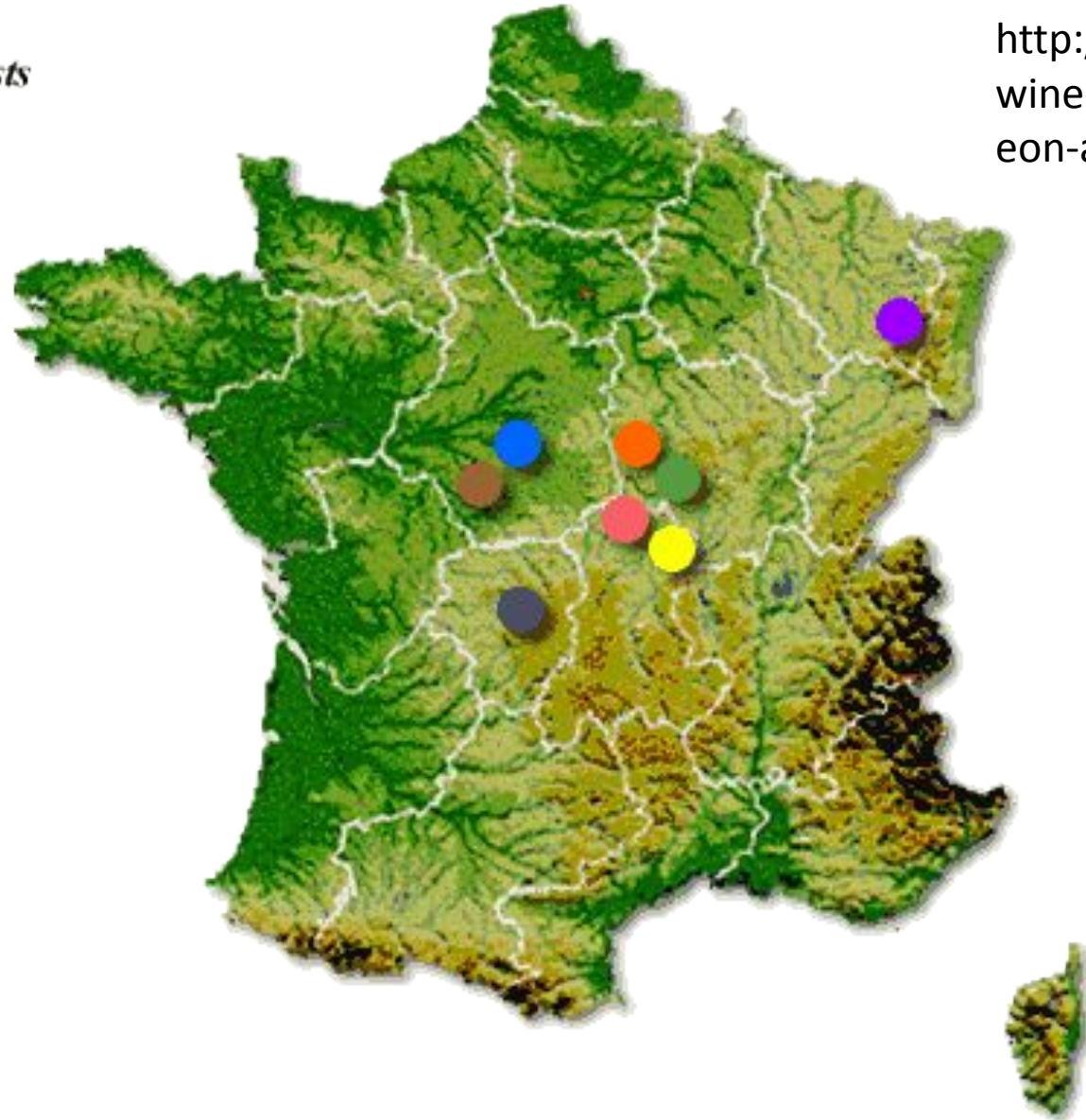
Before there were glass bottles, most wines and ciders were stored and sold in wooden barrels.

Why?

Selected Oak Forests

FRANCE

-  *Nevers*
-  *Allier*
-  *Tronçais*
-  *Centre*
-  *Vosges*
-  *Bertrange*
-  *Jupilles*
-  *Limousin*



<http://clustercrush.com/make-wine-not-war-the-story-of-napoleon-and-frances-oak-forests/>

<https://www.startribune.com/rolling-out-the-barrel-parts-in-caledonia/40712997/>





Start with a straight tree



trim off the upper canopy



cut down trunk



divide the trunk into one-meter sections

French Oak



American Oak

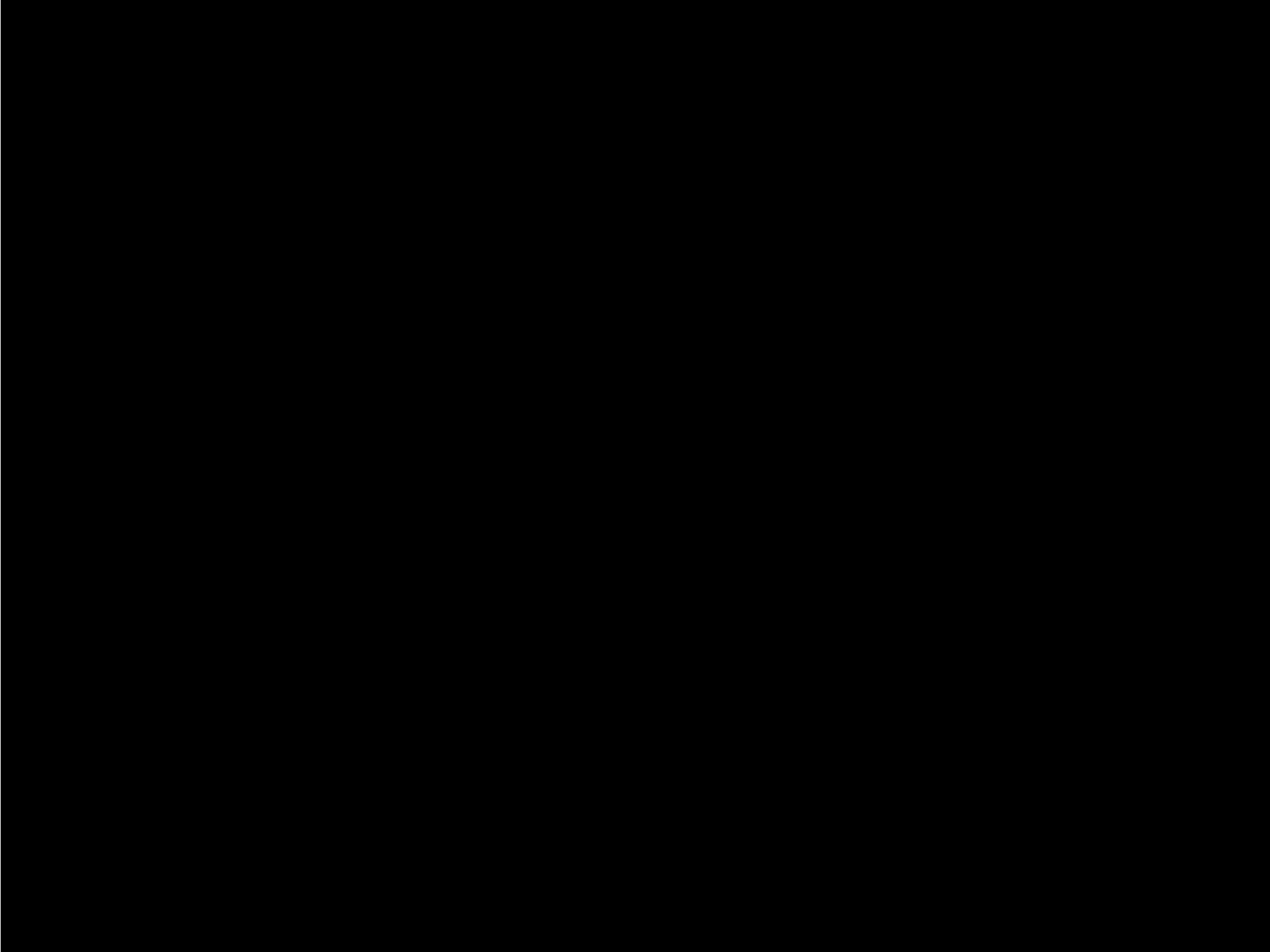


rough cut Staves
Season outside
2-3+ years



trimmed Staves





Coopers often categorize the toasting and bending of staves in three stages:

warm up,
shaping, &
toasting

flavor is impacted by:
source of wood
toasting level



LIGHT TOAST	vanilla, honeycomb, graham cracker and caramel flavors	color should deepen along the golden spectrum, Higher elagitannin concentrations with lots of mouthfeel influence	Good for wines that need tannin structure, limited aromatics
MEDIUM TOAST	complex, toasted spices, vanilla, honey and chocolate, well rounded	penetrates to two millimeters inside the wood's surface, moderate tannin extraction	Will compliment most wines, the most natural of all toast levels
MEDIUM PLUS	Highly complex, the most oak impact, roasted almonds, coffee, toffee, mocha	supple tannins and adds to mid palate weight	Good for wines with highly concentrated flavors
HEAVY TOAST	gives more bold and savory notes, like powdered cocoa, baking spice (cinnamon, allspice, clove) and smoky aromas	color should darken along the brown spectrum, silky tannins	Best for wines that need a bold oak influence & spirits

FLAVOR COMPOUNDS FROM OAK

FURFURAL

GUAIACOL

OAK LACTONE

EUGENOL

VANILLAN

SYRINGALDEHYDE

DRIED FRUIT, BURNED ALMOND,

BURNT SUGAR

BURN OVERTONES

WOODY, DILL AND

COCONUT NOTES

SPICES, CLOVES AND SMOKE

CHARACTER

VANILLA

VANILLA-LIKE

SENSORY THRESHOLD

500 mg of typical dry oak wood will produce a detectable difference when extracted into 1L of wine.

WINE TYPE

Light white table wine

Heavy port

DETECTABLE DIFFERENCE

200 mg/L

800 mg/L



ORIGIN OF OAK	AROMAS	NOTES
America	coconut, vanilla, dill, honey, sweet spices	Imparting a lot of perceived sweetness- vanilla and coconut assertive on aroma. The flavor impacts while not as intense in astringency as European, Am. oak has chunkier and chewier tannins on the mouthfeel.
France	mocha/milk chocolate flavor, cedar, brown sugar notes	In literature, flavor and mouthfeel is often described as more elegant than American. The mouthfeel is considerably more intense, the higher phenol content contributing more to astringency and bitterness than flavor impacts. These tannins present as higher intensity astringency, with a finer, grainier texture to the tannins present.
Hungary	toffee, butterscotch, bittersweet chocolate, vanilla	Palate has a very high perception of vanilla, but also some savory notes of toffee, leather, and sometimes a spice like black pepper.

BARREL CHOICE

choosing a barrel includes considering:
source of the wood
new or used?
barrel size
toast level/char



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BARREL AGING

During the aging process there are four main variables to account for:

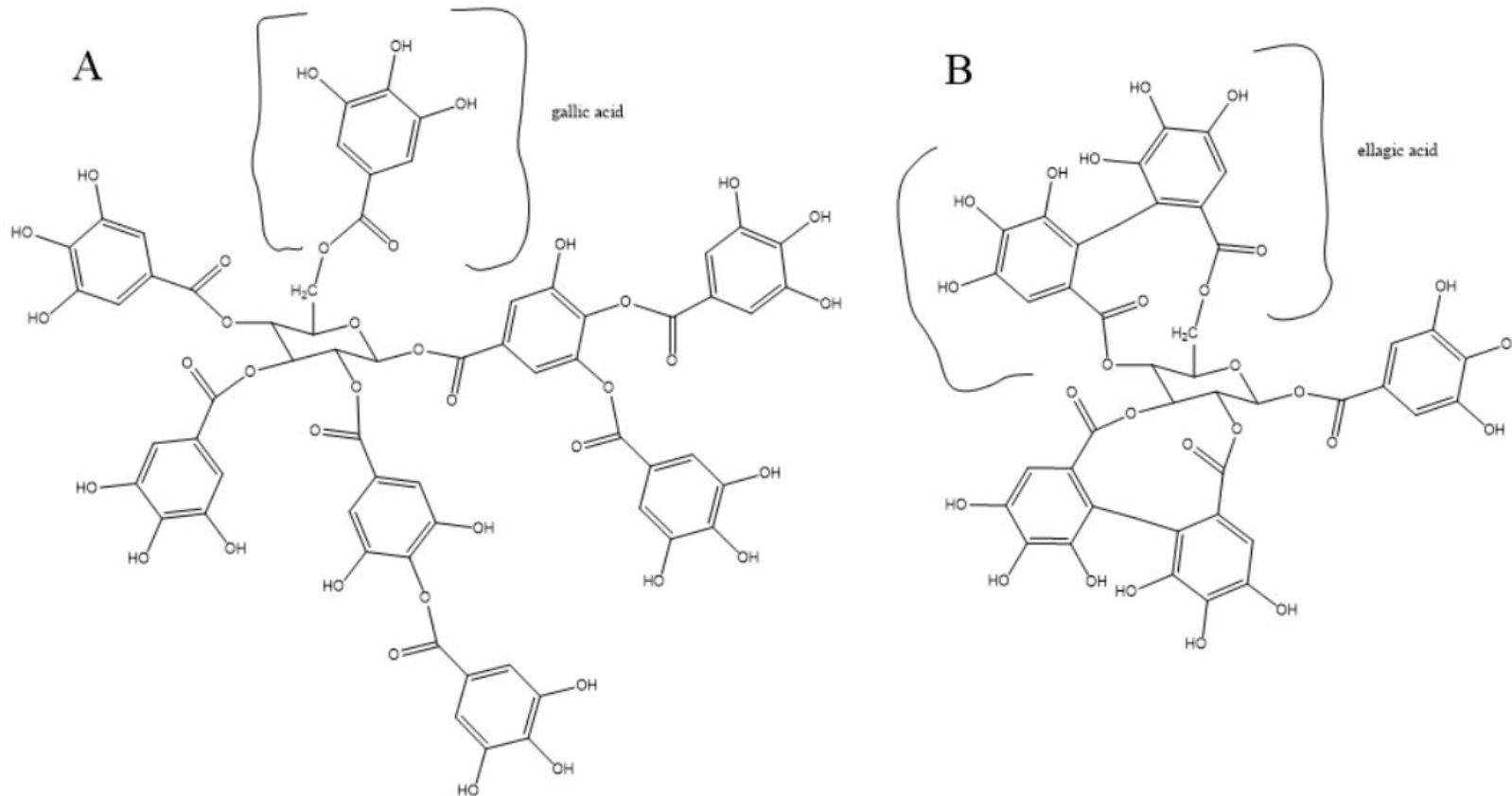
- extraction
- oxidation
- evaporation
- chemistry

BARREL AGING

Extraction of the oak flavor
has a lot to do with
temperature and pressure

BARREL AGING

About 90% of all oak phenols are non-flavonoid and ellagic tannins are by far the major contributors



BARREL AGING

Oxidation occurs quite passively in oak barrels

- increases the complexity
- enhances and transforms flavors
- responsible for the breakdown of primary flavors into deeper secondary and tertiary notes
 - oxygen produces toffee, hazelnut, almond, walnut, peanut aromas in a cider

Table I—Estimation of Evaporative Loss From Wine Barrels

BARREL AGING

evaporation

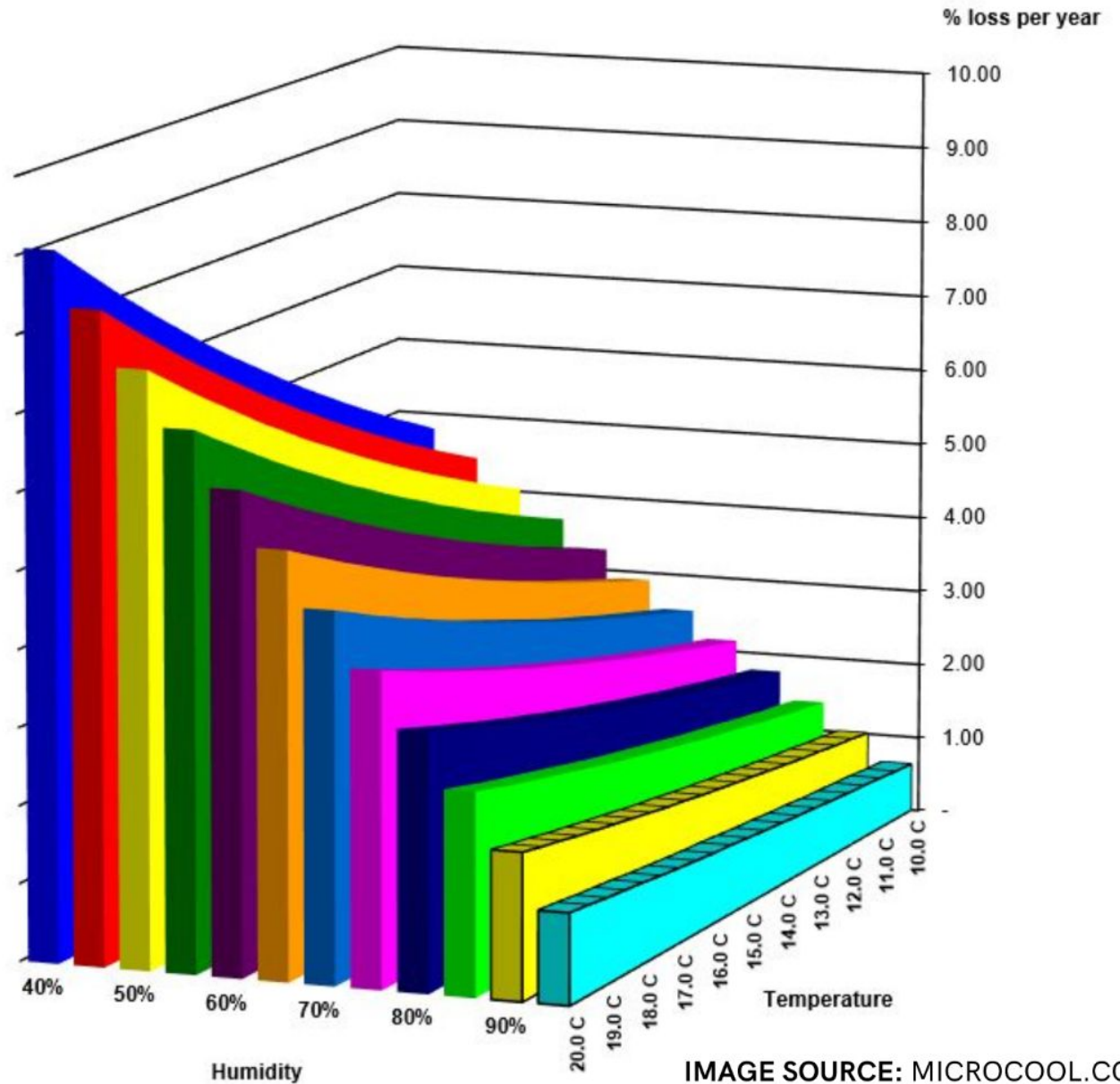


IMAGE SOURCE: MICROCOOL.COM/BLOG

BARREL AGING

The magic of maturation
-and oak maturation at that-
keeps us driven to taste and learn
and better understand the unique
characters of the products in the
barrel

“Cleanliness is a basic condition for quality. The whole enological science would be to no avail if the work itself were done in places that were dirty.”

-Emile Peynaud, *Knowing and Making Wine*



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CLEAN, SANITARY, STERILE

WHAT IS THE ROLE OF EACH IN PRODUCTION?



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CLEAN

TO REMOVE
PHYSICAL
DEBRIS, VISIBLE
DIRT,
PARTICULATE
MATTER

Cleaning is a process consisting of:

- **prerinse** – removal of gross soils
- warm water **rinse** (145°F cuts back on detergent usage)
- **clean** – the mechanical and chemical (detergent) lifting of dirt, debris, and particles
- **rinse** – removes residual cleaner and prepares for sanitation (usually room temp water)

MANAGING OAK BARRELS

Immediately after emptying a barrel
or when assessing dry barrels that have been in storage....

1. SORT INTO CLEAN OR CONTAMINATED/QUESTIONABLE
2. RINSE WITH BARREL CLEANER, COLD OR HOT WATER
3. VISUAL INSPECTION/ SNIFF TEST

IF CLEAN

4. SO₂ gas or burn sulfur candle inside (if candle does not burn go to step 4 for contaminated/questionable)
5. Add barrel storage solution (100ppm Citric + 150ppm Sulfur in 1/2gal water)
6. Tight bung and store for up to 3 months

IF CONTAMINATED/QUESTIONABLE

4. Fill completely and soak with oak restore/ Peroxy sodium carbonate for 12hr to overnight
5. Empty or transfer out of cleaning solution
6. Rinse 5 minutes with cold or hot water
7. SO₂ gas or burn sulfur candle
8. Add barrel storage solution
9. Tight bung and store for up to 3 months



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SANITIZE

TO REDUCE
MICROBES TO A
SAFE LEVEL

Sanitizing:

- **cleaning** first – equipment and facilities cannot be sanitized unless they are clean
- uses chemicals, heat, or filtration
- reduces live microorganisms present on a surface but does not eliminate them entirely
- Reduction of non-pathogenic, vegetative cells on clean surfaces to 99.999%

Heat Sanitizing

● PROS

- Penetrates well
- Kills most microorganisms
- Penetrates irregular surfaces
- Suitable for CIP
- Relatively inexpensive
- Non-toxic

● CONS

- Can bake on residues, leading to biofilm formation
- Scalding hazard
- Contact time sensitive
- Energy intensive
- Requires specialized equipment

Sulfur Sanitizing

- PROS

- Compressed gas
- Sulfur candle
- Easy to use
- Affordable
- Doesn't require specialized equipment

- CONS

- Requires ventilation and proper PPE
- Limited effectiveness- *Brettanomyces*
- Improper use can cause volatile sulfur compounds to develop and or stave damage

Ozone Sanitizing

- PROS

- natural, organic cleaner
- O₃ gas more effective than O₃ water application
- has ability to kill Brettanomyces, lowering populations and lessening their sensory impact

- CONS

- Ozone in water form often degasses quickly
- Breathing hazard
- Requires specialized PPE
- Requires specialized equipment
- Expensive

MANAGING OAK BARRELS

OZONE USE IN SANITATION

HEALTHY BARREL

1. RINSE 5 MINUTES WITH COLD OR HOT WATER
2. RINSE WITH OZONATED WATER DIRECTLY FROM THE OZONE SYSTEM UNTIL THE CORRECT CT VALUE IS REACHED FOR SANITATION.
3. WAIT 30 MINUTES
4. SO₂ GAS OR BURN SULFUR CANDLE INSIDE (IF CANDLE DOES NOT BURN GO TO STEP 4 FOR CONTAMINATED/ QUESTIONABLE)
5. ADD BARREL STORAGE SOLUTION (100PPM CITRIC + 150PPM SULFUR IN 1/2GAL WATER)
6. TIGHT BUNG AND STORE FOR UP TO 3 MONTHS

CONTAMINATED/QUESTIONABLE

1. RINSE WITH OZONATED WATER DIRECTLY FOR 2 MINUTES
2. REMOVE BARREL WAND AND CLEAN BUNG AND BUNG HOLE WITH OZONATED WATER.
3. REINSERT BARREL WAND AND FINISH RINSE WITH OZONATED WATER UNTIL THE CORRECT CT VALUE IS REACHED FOR SANITATION.
4. LEAVE 12HR TO OVERNIGHT AND DO A SNIFF TEST
5. IF OFF ODOR REPEAT STEPS 1-4, IF NO ODOR ADD BARREL SOLUTION(100PPM CITRIC + 150PPM SULFUR IN 1/2GAL WATER)
6. TIGHT BUNG AND STORE FOR UP TO 3 MONTHS

BARREL STORAGE USING OZONE GAS

1. Give barrel an ozone gas rinse
2. Allow barrel to drain
3. Fill barrel with ozone gas
4. Gas barrels monthly

THANK YOU!

CIDERMAKERS

American Cider Association

If you would like a copy or have questions email
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