

# Fining Wines for Structure, Balance and Finish

## Iowa Wine Fining Workshop

April 18-19, 2005

Summerset Winery, Indianola, IA

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Sponsored by: Southwest Missouri State University, Scott Laboratories, and ISU Extension.

# Why Fine?

- ❖ Fining agents work by physically absorbing or chemically binding with specific compounds
- ❖ Protein fining agents bind principally with wine and juice phenols
- ❖ Fining agents will affect or modify color, clarity bitterness, astringency, mouthfeel structure and stability of wines.
- ❖ Fining agents can reduce microorganism populations
- ❖ Fining is not just to remove a flaw but an integral part of finishing a wine in preparation for bottling

# Palate Balance Equation

**Sweet** ↔ **Acid + Phenolics**

↗  
**Carbohydrates**  
**Polysaccharides**  
**Ethanol**

↖  
**Organic Acids**

↖  
**Skin, seed,  
and stem phenols**  
**Barrel phenols**  
**Enological tannins**  
**Volatile phenols**

# Sweet

**Sweet** ↔ **Acid + Phenols (tannin intensity, astringency, bitterness, dry tannins)**

↑  
**Volume / Body**

+ **ethanol**

+ **polysaccharides and other sugars**

**glycerol, unknown**

- **sulfur-containing compounds (VSCs)**

# Acidity

**Sweet** ↔ **Acidity** + **Phenols (tannin intensity, astringency, bitterness, dry tannins)**

- sugar

+ tannins

+ with certain VSCs, including herbaceous compounds

- ripe fruit

- polysaccharides (grapes, yeast, bacteria, oak, commercial products)

+/- correlation with body / volume

+ correlation with tannin intensity

+ correlation with dryness

+ correlation with bitterness

# Phenols

**Sweet** ↔ **Acid** + **Phenols** (tannin intensity, astringency, **bitterness**, dry tannins)

- + correlation with alcohol
- + correlation with grape and oak tannins, including immature seed tannins
- + correlation with acid, specifically malic acid
- + correlation with VSCs
- + correlation with yeast in suspension
- correlation with polysaccharides (sweetness, gums, and yeast fining)

# Phenols

**Sweet**  $\longleftrightarrow$  **Acid** + **Phenols** (tannin intensity, astringency, bitterness, **dry tannins**)

- correlation with alcohol up to 13%, + correlation above 13%
- 0 correlation with sugar
- + correlation with grape and oak tannins, including seed tannins
- + correlation with acid, mainly malic and acetic
- + correlation with VSCs and herbaceous compounds; add Xpress, microox
- + correlation with yeast in suspension
- + correlation with polysaccharides
- + correlation with non-soluble solids

# Fining Agents for Juice and Wine

## Protein Agents

**Gelatin:** hydrolysis of collagen from skin and bones (not bovine). The degree of hydrolysis determines molecular size and gelling capacity. Modern gelatins are more selective than egg whites. Liquid, granular or solid. Purity is important.

**Egg whites:** fresh or frozen, 5-8 eggs/barrel. There are 3-4 gms of albumin per egg white.

**Casein:** positive charged macromolecule in milk. Binds with oxidative phenols in white wines to prevent or remove brown color formation.

**Isinglass:** positively charged protein fining agent from fish bladders. Used in white wines to unmask fruit flavors. May need to counterfine with bentonite to completely settle. If not pure may have “fishy” odor.

# Non- Protein Agents and Blends

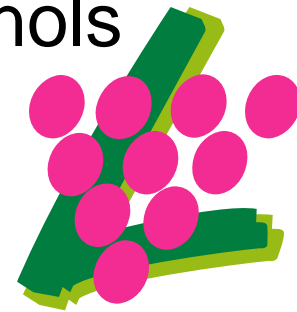
**Bentonite:** clay working by absorption

**PVPP:** synthetic high molecular weight polymer composed of cross-linked monomers of polyvinylpyrrolidone. Works like protein binding with smaller phenols.

**Hot or Cold Mix Sparkolloid:** polysaccharides in diatomaceous earth

**Argilact:** casein and bentonite-treat moldy must and gentle removal of oxidized phenols

**Polylact:** PVPP and casein-prevent browning or pinking in white or rose



# Fining Agents

## Gelatin:

**Gecoll Supra** - liquid gel for red or white wine to target harsh tannins in juice or wine

**Gelarom**-liquid gel to enhance aroma of white, rose or red wines

**Gelatine Extra No. 1** - heat soluble powder gel for softening tannin harshness in heavily structured red wines prior to bottling

## Egg white:

Fresh or frozen, traditional non-specific tannin removal

## Isinglass:

**Ichtyocolle**-instant product from fish bladders for white and rose clarification

## Gum Arabic: gem-like material sourced from the sap of Acacia tree

**Stabivin** - purified liquid, forms protective colloid inhibiting perception of anthocyanins and sediment in bottle

**Stabivin SP** - liquid colloid protector to prevent sediment with added “soft palate” perception of sweetness

## Casein:

**Casei Plus** – Whole milk product to prevent or remove oxidation in white or rose wine and improve clarification



Bordeaux Red Wine contaminated by Brettanomyces.

Brettanomyces population =  $1.2 \times 10^4$  CFU/ mL



Wine after fining with 3 cL/hL GECOLL SUPRA.

Brettanomyces population = 270 CFU/ mL



Wine after fining with 6 cL/hL GECOLL SUPRA.

Brettanomyces population = 130 CFU/ mL



SARCO

# Fining with fresh egg white / Lactic Bacteria

(Millet, 2001)

Bactericidal action of lysozyme in egg white: specific action on Gram+ bacteria

- No effect of lysozyme on acetic bacteria (Gram-) and *Brettanomyces* yeast.
- Gelatins do not contain lysozyme.

Hypothesis :

- **Mutual Flocculation with proteins.**
- **Flocculation of agglomerates colonized by microorganisms.**
- **Simple adsorption phenomenon.**
- **Physical enrobing.**



**SARCO**

## Conclusions

Sarco demonstrated, for the first time, that fining contributes to a decrease in the populations of two undesirable microorganisms frequently present in red wines: acetic acid bacteria and *Brettanomyces* yeasts.



# Increasing Phenolic Structure

## Fermentation Enological Tannins

**Biotan**-grape only

**VR Supra** -combination of two types of tannins

## Post Fermentation Tannins

**Tan' Cor** -blend of grape and oak, extracted with water

**Tan'Cor Grand Cru** -blend extracted with alcohol

**Biotan** -grape tannin only

## “Final Seasoning”

**Quertanin** - french oak, also available in effervescent form

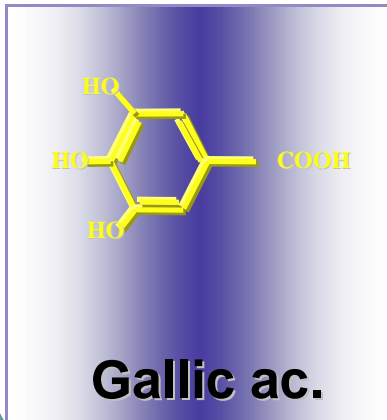
**Tanin Plus** - toasted american oak

# Two Families of Tannins

## Hydrolysable tannins



### Gallotannins



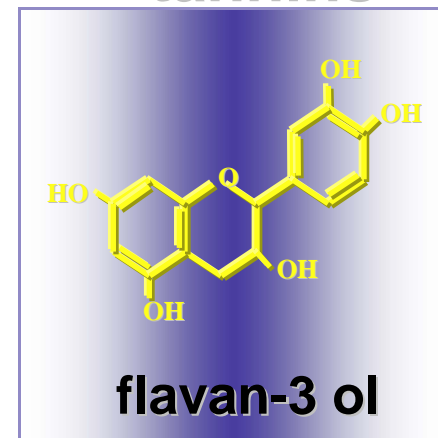
### Ellagitannins



## Condensed tannins



### Proanthocyanidic tannins



# Origin of Tannins

**Ellagitannins**



**Oak or chestnut**

**Gallotannins**



**Gall nuts (from oak)**

**Condensed tannins**



**Grapes and/or  
Exotic wood**

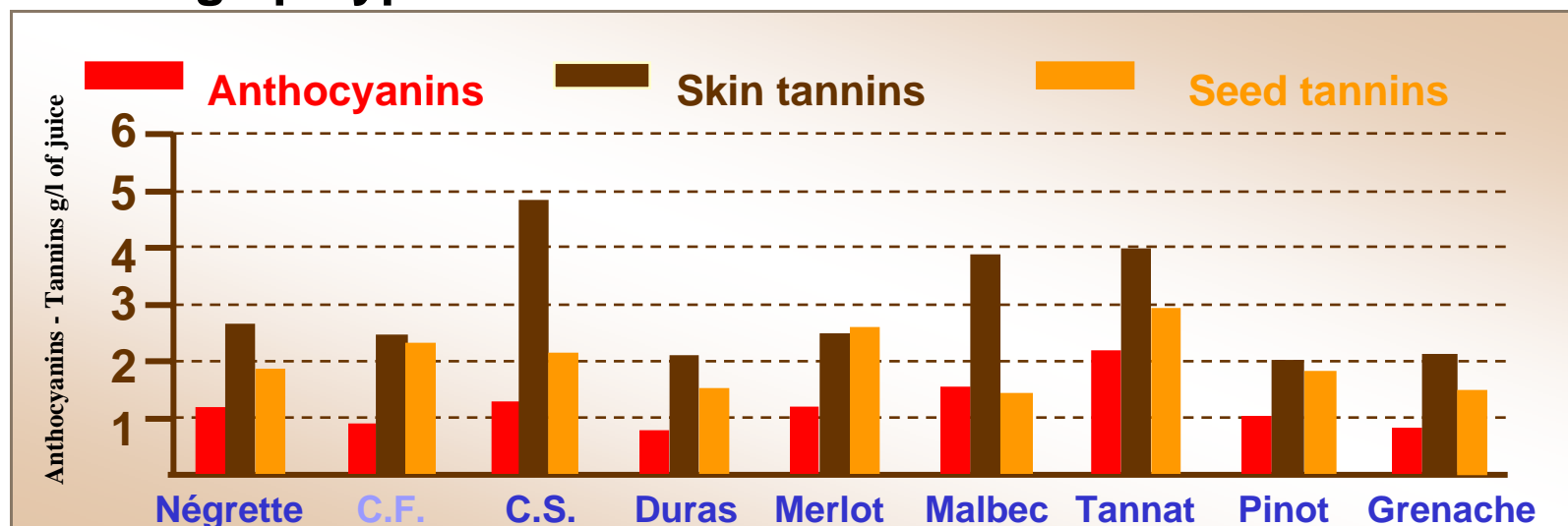
# Biotan



## Condensed Tannin Pure grape tannins

### Compensate for the lack of indigenous tannins

- ❖ Selected for specific quality to reduce astringency
- ❖ High polyphenolic richness-increase tannin level



# Tan'Cor or Tan'Cor Grand Cru



**Condensed and Ellagic tannins**  
extracted with water (TC) or alcohol (TCGC)

**Improve the structure of wine**

increase middle palate structure

**Stabilize the color**

combinations tannins-anthocyanins  
stable in time

**Anti-oxidative role**

Slow the oxidation and aging in barrels or  
wood tanks

# Quertanin or Quertanin Effervescent

## Ellagitannins Pure French Oak Tannins



**Contributes to the structure of the wine**

adds oak finish to wine

**Anti-oxidative role**

**Elimination of reductive flavors**

**Eliminates excess oxidation in the barrels**

maintaining high Redox potential in wines

**New**

**Quertanin Effervescent Tablets** – 5gm tablets release  
22 PPM/barrel

# Tanin Plus



## **Ellagitannins**

**Pure Toasted American Oak Tannins**

**Adds finish and flavor to the wine**

**Alternative to oak chips**

# Methods to Improve Balance

## Traditional

1. Yeast strain selection
2. Malolactic strain selection
3. Sur lie aging and stirring
4. Fining-reduces tannin
5. Gum Arabic fining-  
Stabivin SP
6. Residual sugar

## New Methods

1. beta- Glucanase enzymes- **NOW LEGAL** improves filtration
2. Inactive yeast product - **Polysaccharides** –yeast derived nutrients
3. Inactive yeast product - **Polypeptides**-yeast derived nutrients
4. Addition of fresh fine lees (yeast fining)

# Inactive Yeast Products – No Fear

## Some Basic Wine Chemistry

### Major Components in Grapes and Wine

**Organic Acids** -tartaric and malic in grapes lactic and acetic in wine

**Sugars (carbohydrates)** -glucose, fructose and other sugars form polysaccharides

**Pectins and Gums** -in cell walls and flesh of grapes, form polysaccharides with sugars

**Yeast** - also produce polysaccharides, specifically mannoproteins-mannose sugar with proteins

**Phenolic acids** -tannins (structure), anthocyanins (color) and flavor/aroma compounds-extracted from grape bunches, mostly skins and seeds

**Nitrogen Compounds** -Amino Acids and formation of polypeptides then proteins (larger compounds)

# Polysaccharides in Wine

## Sources

1. Grapes
2. Yeast cell walls
3. *Botrytis cinerea*

Yeast cell walls release polysaccharides during fermentation (growth phase) and during autolysis-degree is strain dependant

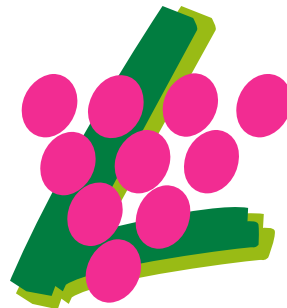
# Beta-Glucanase Enzymes

**NOW LEGAL**

## Filtrazyme® -Laffort

Oenologie enzyme preparation now available in US to improve filterability of wines.

Breakdown glucans and other proteins in wine



**LAFFORT**  
OENOLOGIE

## Extralysse®- Laffort

Oenologie enzyme preparation for use in juice/wine to aid in clarification and yeast autolysis - speeds up sur lie process

Both are pectinase and glucanase enzyme preparations

# Polysaccharides/Mannoproteins

Mannoproteins are one type of polysaccharide released from the cell-wall during fermentation and autolysis

- Positive mouthfeel contribution
- Protecting agent against tartaric crystallization
- Promoting agent for protein stabilization
- Antioxidant properties to decrease gold color

# Mouthfeel Contribution-Summary

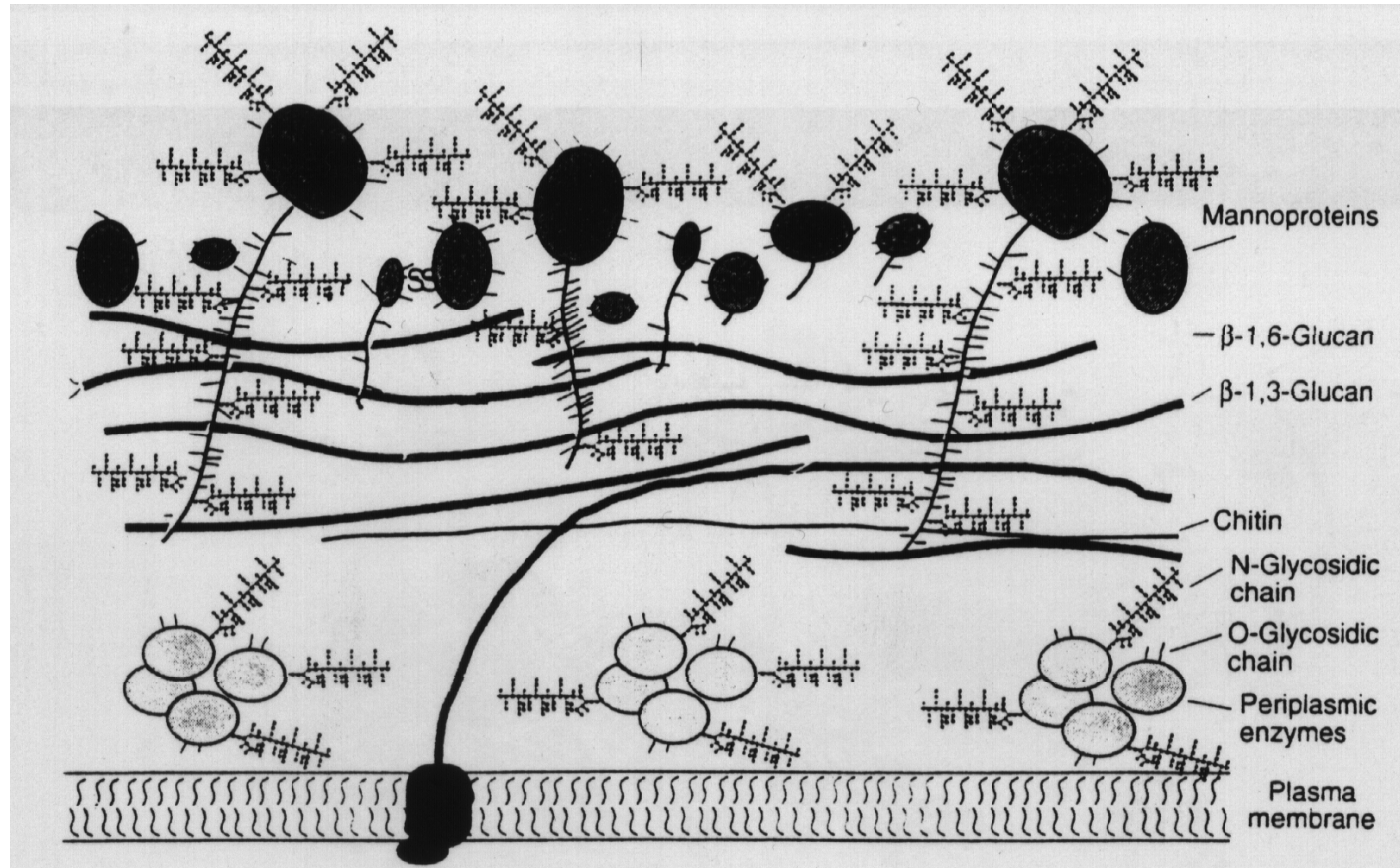
Specific mannoproteins released from yeast cells surround the phenolic colloids and enrobe tannins and/or anthocyanins

Yeast cell walls of specific strains are higher in polysaccharide production

Inactive yeast derived nutrient products are extracted during growth phase when mannoproteins are at maximum production

Differing yeast strains for red and white varieties

# Yeast Cell Wall Composition



**LALLEMAND**

# Scott Laboratories Yeast Derived Nutrient Products

**OptiWHITE®** -used pre or post alcoholic fermentation for enhancing white wine and antioxidant protection

**OptiRED®** -used pre or post alcoholic fermentation for enhancing red wine and stabilizing color

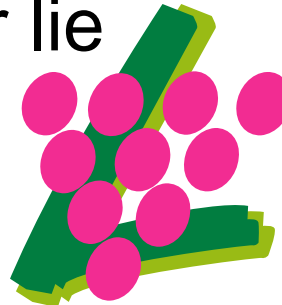
**NEW**

**Booster Rouge®** -ICV product from a specific strain of ICV yeast that protects the integrity of the tannins (more volume) while contributing benefits above.

**LALLEMAND**

# Polypeptides from Yeast

- Polypeptides can be extracted from inside yeast cells and cell walls
- Contribute “sweet” mouthfeel character in wines aging sur lie while aiding in clarification



**LAFFORT**  
OENOLOGIE

**New**

**Biolees®** - inactive yeast nutrient added pre or post mlf fermentation to fine and contribute or enhance benefits of sur lie aging

# Fresh Fine Lees Addition

1. Add 1gm/L ICV D-254, BM45 or F15 yeast to each barrel, 1-2 months prior to bottling. This is equal to adding  $\frac{1}{2}$  of a 500 gm package of yeast to each barrel.
3. Stir 2-3 times first week, then weekly for one month.
4. Rack and ready for bottling.

**! Caution: Feeding Brett+ and bacteria-Micro exam or plating required**



# Napa Valley Biolees Trial

1. Control 2004 Sauvignon Blanc
2. + 50g/L (500 PPM) Biolees
  
3. Control 2004 Pinot Noir
4. + 50g/hL Biolees



# Viognier Fining Trial

1. Control
2. + 20g/hL (200 PPM) Galalcool SP
3. + 500 PPM Gelarom
4. + 500 PPM Biolees for 18 hours  
(recommended 500 PPM for 2 weeks,  
then rack)



# 2002 Merlot Fining Trial

1. Control
2. + 100 PPM Tan'Cor
3. + 50 PPM Quertanin + 25 PPM  
Tan'Cor Grand Cru
4. + 2000 PPM Stabivin SP



# Cabernet Sauvignon Trial

1. Control
2. + 2000 PPM Stabivin SP
3. + 80 PPM Gelatine Extra No 1
4. + 100 PPM Tan'Cor and  
300 PPM Booster Rouge-18 hours



# Finishing Agents for Bench Trials

1. Gelarom
2. Gecoll Supra
3. Gelatine Extra No. 1
4. Isinglass
5. Galalcool
6. Galalcool SP
7. Booster Rouge
8. Biotan
9. Tan'Cor
10. Tan'Cor Grand Cru
11. Quertanin
12. Tanin Plus
13. Biolees
14. Stabivin
15. Stabivin SP

# Thank you!!

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