New Mexico Vine and Wine Conference

Yeast Selection (from us, to you!)

February 22 & 23, 2013
Sigrid Gertsen-Schibbye
Lallemand-Scott Labs
We could just tell you what to use...

But there is so much more to know and understand about these great little animals.
Yeast
Varietals to consider in New Mexico

- Chambourcin
- Baco Noir
- Seyval Blanc and Vidal Blanc
- Cabernet, Tempranillo, Malbec
- Pinot Meunier and Malvasia Blanc, Muscat, Gewürztraminer and Riesling
Without yeast

... it’s just juice!
Wine Related Yeast:

- **Non-Saccharomyces**
  - Schizosaccharomyces
  - Zygosaccharomyces
  - Hansenula
  - Hanseniaspora
  - Kloeckera
  - Dekkera
  - Brettanomyces
  - Debaromyces
  - Rhodotorula
  - Pichia
  - Torulaspora
  - Candida
  - Cryptococcus
  - Kluyveromyces
  - Metschhnikowia

- **Saccharomyces**
  - *Cerevisiae var.*
    - bayanus
    - cerevisiae
    - chevalieri
    - oviformis
    - ellipsoides
    - capensis
    - uvarum
What winemakers want? **SECURE FERMENTS**

- Regular fermentation = easy finish
- Absence of metabolic off-flavors
  - In some cases ... fast fermentation

Key parameter: slope at the end

- Good fermentation: slow or fast, but good finish
- Acceptable fermentation: slow but right to the end
- Worst case: fast at the beginning and sluggish / stuck at the end

Diagram:
- Y-axis: sugars
- X-axis: time
- Key parameter: slope at the end
What winemakers look for in a yeast strain…

• Reliability
  – Alcohol tolerance
  – Temperature tolerance
    • High
    • Low
  – Speed of fermentation

– Competitive “killer” factor
  • Positive
  • Neutral
  • Sensitive
What winemakers look for in a yeast strain...

• Type of *Saccharomyces*
  – *Cerevisiae, bayanus* or *uvarum*
• Production of by-products
  – $\text{H}_2\text{S}$, $\text{SO}_2$, V.A. & foam
• Malo-Lactic fermentation compatibility
• Sugar to alcohol conversion
• Agglomerating or flocculating
• Restart Stuck Fermentation
• Nitrogen & Oxygen Requirements
What winemakers look for in a yeast strain…

• Stylistic Impact on the wine
  – Aroma (Flavors) – Esters producer, Enhance Grape Character (EVC) or Neutral
  – Mouthfeel or Texture
  – Grape variety specific
  – Acidity management

• Vogue
  – where’s it’s selected from and/or who did the selection?
OUR CHALLENGE TODAY...

The grapes

AF practices

Winemakers needs

Consumers wishes
The importance of microbiology in the vineyard and winery

Lallemand uses ‘naturally selected’ since everything is offered to us by nature in the first place, BUT… terroir offers the opportunity and/or risk of a ‘natural’ flora BUT… this can be a menace, or simply unsuitable to wine quality.

(Werner Schönleber Riesling example)

Biological control during winemaking is not only a question of optimisation of fermentation, but also a matter of wine style.
The microbial world is unpredictable...

The apiculate yeast, acetic acid bacteria, filamentous fungi, flor yeast and contaminating yeast of the type *Brettanomyces* and *Zygosaccharomyces* are organisms that can create negative aromas and undesirable flavours.
Quality wine evolution: The technology

1. RUDIMENTARY TECHNOLOGY
   - FREE ACTION OF NATURE
     - Wines with many problems
   - CHEMICAL ACTIONS
     - Drinkable wines

2. MODERN BIOTECHNOLOGY
   - CONTROLLED BIOLOGICAL ACTIONS
     - High quality wines with typicity
     - Quality wines and stable

3. PHYSICOCHEMICAL ACTIONS
The importance of (complex) microbiology in the vineyard and winery

Without fermentation, there is no wine; without yeast, it’s just juice and without bacteria, there is no malolactic conversion.
Is west... west, and yeast.... yeast?
Strain selection - case study in Beaujolais (3)

50 strains

Wine making : micro tests → 13 strains retained

Wine making : mini tests

Wine tasting : 1 strain selected
Commercial since 2000 harvest
Anthocyanin content in wines fermented by different yeast strains (Cuinier, 1997)
From the Priorat, the strain ‘Clos’

- Ground is made of **LICORELLA**: Very friable, loose and soft slate.
LALVIN RBS 133

“The Raboso Selection”
A new strain from a particular terroir in North Eastern Italy
What is Raboso?

Raboso is a **native red grape** of **Doc Piave area** known for its **heavy tannins, high acidity** and **deep colour** that grows primarily in Veneto region.

Raboso Piave is a **red strong and rustic vine variety** which **ripen late** and doesn’t fear the drought and cold temperatures: its unique character is **excellent for producing wines for ageing**.

From the **gravely soils** along the Piave river it gains elegance and fine flavours and from the **clayey vineyards** body and structure.
Example of selection project progress

1. Sampling
2. Yeast colonies
3. Genetic analyses
4. “Nanovinification”
   - Technologic characterization
   - Sensory evaluation
5. Micro & Pilot scale vinification
   - Technological validation
   - Sensory evaluation
1st SCREENING
SYNTHETIC MUST
pH 2.9, Malic acid 3.5 g/L, AF 24 °C

239 isolates

Genetic analyses

Fermentation Performances, H₂S-foam production, etc.

2nd SCREENING
NATURAL Raboso MUST
pH 2.9, Malic acid 4.5 g/L, AF 24 °C

107 strains + VRB

Sensorial Evaluation

Analytical controls

107 strains

5 strains

From E. Bartowsky
Alcoholic fermentation

Malic acid degradation

Finish of AF
Yeast characterisation: technological traits

Fermentation dynamics

Fermentation rate
Raboso

Fermentation rate: dCO2/dT (ml/min)
AF (days)

5 strains + VRB

Microvinification
Sensorial Evaluation
Analytical controls
Fermentation dynamics

3rd SCREENING

2007

2 strains
Fig. 11. Analisi delle componenti principali (PCA) dei descrittori sensoriali e dei composti aromatici relativi ai vini degustati.
LALVIN RBS 133

- Rapid growth, also in high microflora contamination (no SO2) it completely dominated in all fermentation checked
- Regular speed and reliable fermentation even without temperature control
- Good fermentative performance tested up to 15,5 % alcohol (Raboso passito)
- Low volatile acidity
- Good synergy with malolactic bacteria
- Low Nitrogen needs
LALVIN RBS 133

- In red complex aromas: violet, cherry, spices…
- Reduce the sensation of acidity and astringency
- Red wines with high tannic structure
- Red wines with high acidity
- “Passito” red
- Intense fresh fruity bouquet/flavours
- Balanced acidity
- Rosè wines
Welcome to Lallemand’s Cellar!

We are here to help!

Once again it is that time of year. Our phones are ringing off the hook with stuck fermentation calls. Too many calls, so many problems, and not enough hours in the day! So we put together a new section of the website called ‘the laboratory’ where you can go for help with fermentation problems. We hope that the sage advice from Lallemand’s Yeast Guru, Clayton Cone, and his lackeys will help you solve (or hopefully avoid) fermentation problems.

Click here for stuck fermentation help!

Sign up here for email updates
GRAPE & YEAST PAIRINGS

You can't make good wine from bad grapes! The inherent quality of the fruit can account for a majority of wine quality. The remaining quality contribution is related directly to winemaking. The yeast and its ability to marry all aspects of the grape during fermentation can contribute to a significant portion of winemaking quality.

We have created this grape and yeast pairing to help guide you in selecting the best yeast for your stylistic goals and given conditions. The yeasts are grouped together under descriptors or characteristics that they will typically contribute under normal winemaking conditions in different varieties. For example, if you would like to accentuate stone fruit character in Chardonnay, we recommend selecting Enoferm ICV-D47 or Lalvin ICV-D254. In our experience, these two yeasts express more stone fruit than yeasts such as Lalvin Bourgoblan CY3079 or T306.

As always, this is just a guide and only one part of the story. For more information on the strains, refer to the Naturally Selected Yeast descriptions and Yeast Chart. Of course, if you still have questions, send us an email and we will get right back to you!
**CHARDONNAY**

<table>
<thead>
<tr>
<th>White Fruit</th>
<th>Stone Fruit</th>
<th>Citrus</th>
<th>Nuts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enoferm QA23</strong></td>
<td><strong>Enoferm ICV-D47</strong></td>
<td><strong>DV30</strong></td>
<td><strong>Lalvin Bourgoblan</strong></td>
</tr>
<tr>
<td><strong>MO5</strong></td>
<td><strong>Lalvin ICV-D254</strong></td>
<td><strong>Enoferm ICV-D47</strong></td>
<td><strong>CY3079</strong></td>
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<tr>
<td><strong>Lalvin Bourgoblan</strong></td>
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<td><strong>Lalvin ICV-D254</strong></td>
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<tr>
<td><strong>CY3079</strong></td>
<td></td>
<td></td>
<td><strong>Enoferm ICV-D47</strong></td>
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<tr>
<td><strong>Simi White</strong></td>
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<td><strong>T306</strong></td>
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<tr>
<td><strong>M62</strong></td>
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<tr>
<td><strong>Lalvin ICV-D21</strong></td>
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</tbody>
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**Volume**

- BM4x4
- Cross Evolution
- Lalvin Bourgoblan
- CY3079
- Lalvin ICV-D254
- Enoferm ICV-D47
- T306

**BM4X4:** The attributes of Lalvin BM45 with optimized fermentation capacity

BM4X4 is a blend of Lalvin BM45 and another yeast known for its fermentation reliability. Lalvin BM45 is known and appreciated around the world for its round mouthfeel and stable color (see above description for Lalvin BM45). Lalvin BM45, however, is a slow fermenter and can require substantial nutrients to complete fermentation successfully and without the production of H₂S. While Lalvin BM45 has a very strong following from winemakers who enjoy its slow fermentation and its suitability for long maceration programs, there are others who desire the attributes of Lalvin BM45 but with a timelier and secure fermentation. BM4X4 achieves this goal.

During the yeast growth phase, BM4x4 has the unusual capacity of releasing a significant quantity of polyphenol reactive polysaccharides into the fermenting must. The quantity and quality of the polysaccharides released during fermentation facilitate the production of
CABERNET

Rosé Style
- ICV-GRE
- 71B
- MT

Plum
- BM45
- BRL97
- BDX
- ICV-D254
- ICV-D80

Color Stability
- BRL97
- RC212
- BM45
- ICV-D254
- BDX
- CSM
- MT

Berry
- ICV-GRE
- CSM
- T73
- RC212
- M2
- MT

Spice
- ICV-D80
- CSM
- M2
The Chronology of ICV’s Enological Yeast Selection

Different goals for the yeast through the decades
The range of ICV yeast

... and ...
Selection goals for ICV’s enological yeast

1980

First selection to answer industrial and field problems: competition with indigenous microflora. First killer enological yeast on the market. K2 phénotype yeast.

1987: Marquée = natural mutation allowing easy and cheap identification. First full scale implantation monitoring: more than 2000 controls in ‘88 and ‘89.
Selection goals for ICV’s enological yeast

First selection to answer a defined mouthfeel goal vs microbiological, chemical or fermentation speed criteria
Selection goals for ICV’s enological yeast

First selection to answer heart of the wine market problems. Final choice made with the opinion of wine marketers.
Selection goals for ICV’s enological yeast

First selection with a 3 year field trials before commercial launching
Extended Red Maceration
(over 15 days)

1/3rd of the blend fermented with ICV D21 for hints of direct fresh fruit and black pepper, intense foremouth supported by fine grain acidity all through the mouth.
Short Red Maceration
(under 6-7 days)

ICV D21 is not for Red grapes with unbalanced maturity
Spontaneous!

In a controlled kinda way
Fugelsang, 1997

• Renewed interest among U.S. winemakers in utilizing native flora
• Stylistic distinction is, apparently, the driving force that tempts winemakers to accept the potentially enormous risks involved in native yeast fermentations
• It is a lack of predictability that is most troublesome when considering native fermentation vs. those resulting from starters
Fine tuning in non-\textit{Saccharomyces} yeast production
1- **Biodiversity considerations** as introduction

1- Diversity of yeast species means different metabolisms.
   Enzymes, polysaccharides, different killer proteins

3- **Biodiversity** as alternative to genetic engineering

4- *Saccharomyces cerevisiae* is not dominant at the beginning of the AF

(5-10%) > Re-Actualize some old **ecological** data

A “Gap” that can be filled up with non-*Saccharomyces* yeast:
**GREAT OPPORTUNITY for FUTURE TOOLS**

- S *cerevisiae*
- ● Kloeckera/Hanseniaspora species
- ■ Candida species

G. Fleet, 1990
FACTORS INFLUENCING WINE STYLE

- Growing conditions
- Vineyard management
- Grape handling at harvest
- Juice or Must handling
- Fermentation management
- Post fermentation practices
- Aging
Factors affecting Fermentation Management - Key Interrelationships

- JUICE or MUST
- TEMPERATURE
- YEAST STRAIN
- CELL NUMBERS
- TOXIC FACTORS
- NUTRITIONAL FACTORS
- COMPETITIVE FACTORS

MAXIMUM FERMENTATION MANAGEMENT
Rehydration!!!!
PROPER YEAST REHYDRATION & HANDLING…

1st suspend GO-FERM

😊 Clean water (104°F)

😊 Suspend GO-FERM

😊 Add Active Dried Yeast

😊 15-30 minutes

😊 Avoid cold shock

>15-20°F

😊 Add yeast slurry to bottom of tank

2nd add Active Dried Yeast

104°F

JUICE
Yeast **PROTECTION** is essential & Yeast **NUTRITION** is vital.
Assimilable nitrogen for S. cerevisiae

NH$_4^+$
Glutamine, asparagine
Glutamic acid
Serine
Arginine
Alanine, aspartate
Valine, phenylalanine, threonine
Methionine, tyrosine
Histidine, glycine, cysteine
Proline

PEPTIDES
PROTEINS

Assimilable nitrogen for S. cerevisiae

by S.c. L. Bisón, Universidad de Davis California
High temperature is not a key point for pigment and good tannin extraction in warm or hot climate regions...

...Because of high cell wall ripening
Temperature Control in Red Must

Max. Temperature

- 20 Brix • 95°F
- 21 Brix • 90°F
- 22 Brix • 85°F
- 23 Brix • 80°F
- >24 Brix • 76°F
Low alcohol concentration

High alcohol concentration

Slow alcohol excretion

Picture credit: Lallemand
First goal for good fermentation practices: manage risks
Some factors to consider when catering to the little critters

- Cell population
- Rehydration
- Nutrients
- Oxygen
- pH
- Particulate matter/Gravity
- Pressure / CO2

- Sugar / osmotic pressure
- Alcohol toxicity
- Wild yeast, bacteria & toxic substances
- Temperature
- Fructose
THANK YOU

For your attention!

www.lallemandwine.com
www.scottlab.com

and there is a (free) APP for that!