

Managing Nutrition of Juice and Wine – General Winemaking

Chik Brenneman
Baker Family Wines

BAKER
FAMILY
WINES
california



Objectives

- What are yeasts?
- Assessment of the conditions to promote growth
- What goes into the assessment?
- Amelioration/Supplements
- Methods of addition
- Monitoring
- Close out

What Are Yeasts?

- Single Celled Fungi
- Reproduce by budding
- Under anaerobic conditions will produce EtOH and CO₂
- Used in food and beverage manufacturing
- Need favorable conditions for growth
- Link to Louis Pasteur

Legacy of Louis Pasteur



Assessment of Conditions

- Chemoorganotrophs
- Carbon source is generally hexose sugars (Glu/Fru)
 - Pentoses, alcohols, and organic acids in some cases
- Facultative Aerobes
- Optimal temperature ranges
- ID though selected media
- Opportunistic when the growth medium favors them

Assessment of Growth Conditions

- Nitrogen
- Vitamins
- Minerals
- Survival factors

- What is Yeast Assimilable Nitrogen
 - Free Amino Nitrogen (FAN)
 - Ammonia (NH_3)
 - Ammonium (NH_4^+)

YAN is Variable

- Variety, Rootstock, soils and viticultural practices
 - Yan vs nitrogen in juice/wine
 - Most in the juice and skins
 - A higher percentage of the total is left in the pomace
 - Proline
-
- Measurement requires a sample to the local wine lab!

Nutrient Additions: How much and when?

- 0.4-1.6 mg N / gram sugar
 - Brix g sugar/100 g solution
 - $1.6 \text{ mg N} * 250 \text{ g/L} = 400 \text{ mg N/L}$
 - 100-400 mg/L is accepted range
- Desire a healthy Nitrogen status at beginning of fermentation
- Additions generally dependent on yeast strain requirements
 - Yeast characteristic charts will list as low, medium, or high
- Additions at the time of inoculation and then when 1/3 sugar depletion

Nutrients

- Nitrogen
 - Amino Acids
 - Inorganic Nitrogen
- Proprietary Formulations
 - Scottlabs (Lallemand)
 - Gusmer (CHR Hansen)
 - Laffort

Nutrient Additions

- Di-Ammonium Phosphate (21 % N)
- Go-Ferm (3 % N)
- Fermaid K (Lallemand) (13 % N)
- Superfood (Gusmer) (8 % N)
- Example: Fermaid K at 13 % N
 - 1 g/L of FK = 1000 mg/L (1000 ppm)
 - Therefore 13% of 1000 mg FK = 130 mg/L N

=Continuing

- Target 250 mg N (Using Fermaid K (FK))

- $$\frac{250 \text{ mg N}}{L \text{ liquid}} \times \frac{1 \text{ g FK}}{130 \text{ mg N}} = \frac{2 \text{ g FK}}{L \text{ liquid}}$$

- In 5 gallons

- $$\frac{2 \text{ g FK}}{L \text{ liquid}} \times \frac{3.785 \text{ L liquid}}{1 \text{ Gal liquid}} \times 5 \text{ gal liquid} = 38 \text{ g FK}$$

Other Nutrients

- Di-Ammonium Phosphate (DAP)
 - 21 % Nitrogen
- Sometimes more effective in feeding after fermentation has started
- Fermaid K has DAP in it.
- 1 g/gal = 50 mg Nitrogen

Yeast Hydration

- Follow manufacturer's guidelines (Go-ferm or equivalent)
- Heat water to 100-104°F (38-40°C)
- Typical inoculum 2#/1000 gallons (25 g/hL)
 - Initial target of 3-4 million cells/mL
- Hydrate the yeast
- Wait 15-30 minutes
- Inoculation temperature should not be greater than 18°F (10°C) between the wort and the inoculum
- High Brix requires a culture build-up/

Yeast Hydration

- Proprietary hydration techniques are helpful
- High brix musts require modifications
 - Ice Wine Protocols are helpful
 - Higher osmotic stress

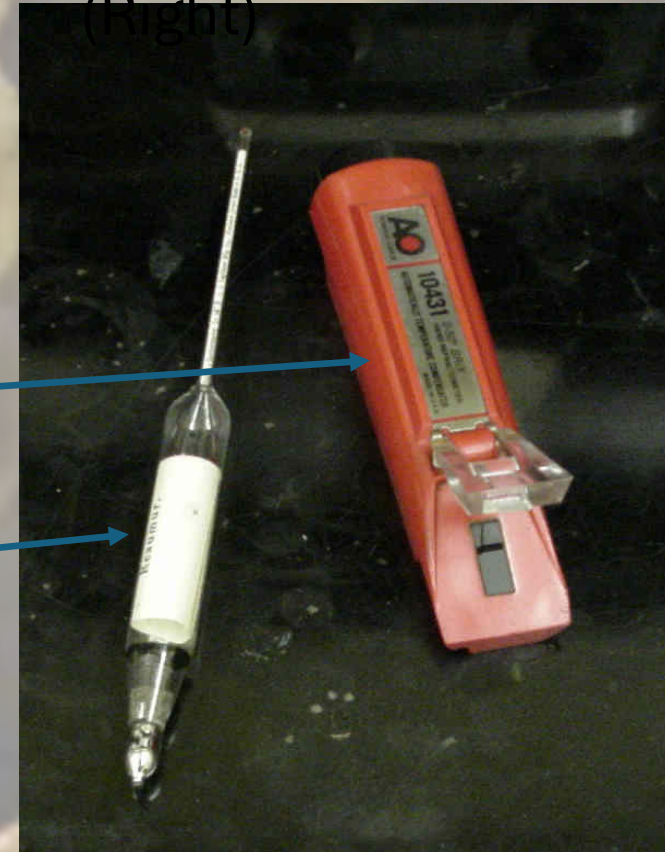
Successful Fermentation – Other Factors

- Temperature Control
- Controlled Oxygen Exposure
- Clean Fruit
- Winemaker's Attention

Monitoring

Brix	% sugar
Alcohol	Ethyl alcohol, EtOH, ethanol
Refractometer	Measures Refractive Index of <u>JUICE</u>
Hydrometer	Measures Density of fermenting <u>JUICE</u>

Hydrometer (Left)
Refractometer
(Right)



Concluding

- It's always best to die with a dollar in your pocket!!!
- Careful attention to your additions are important!
- Yeast are made happy not just with nutrients
- Sound cellar practices
- Reduce the possibilities of anything left for the heirs
- Listen to your yeast and talk back to them!