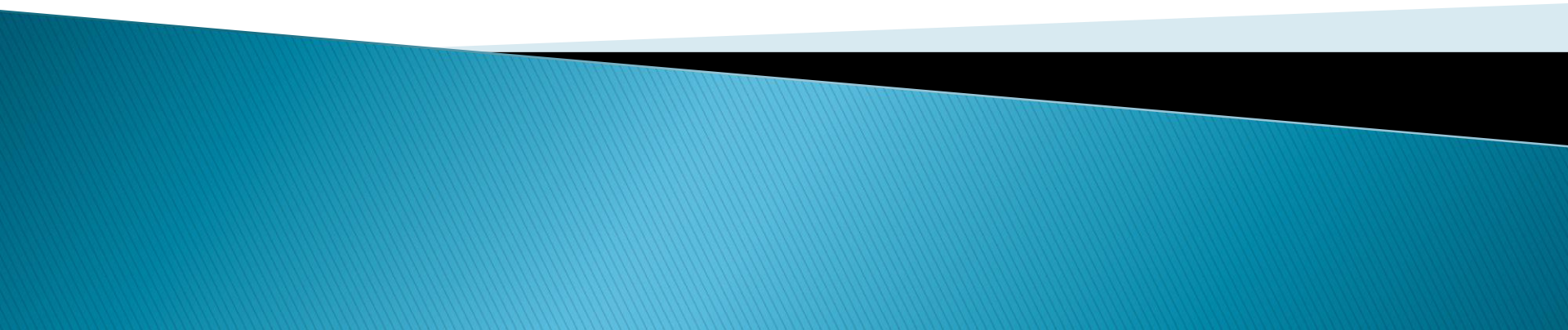
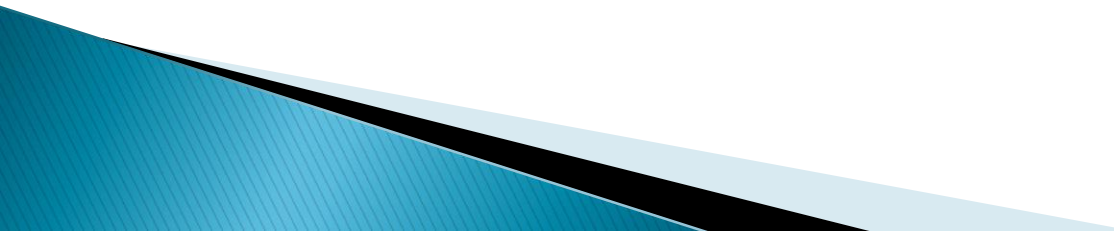


Nutrient Additions, pH Levels & YAN: A Primer On Yeast For Mead Day

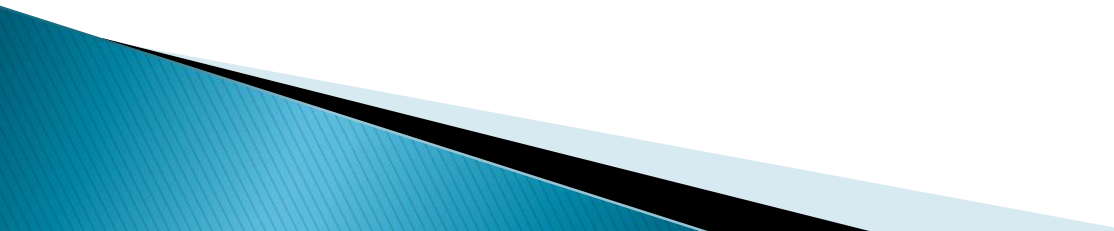
with Susan Ruud

August 3rd, 2016



- Ingredients
 - Equipment
 - Sanitation
 - Yeast
 - pH levels
 - Nutrients required
 - What is YAN
 - Levels of YAN needed
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Ingredients:

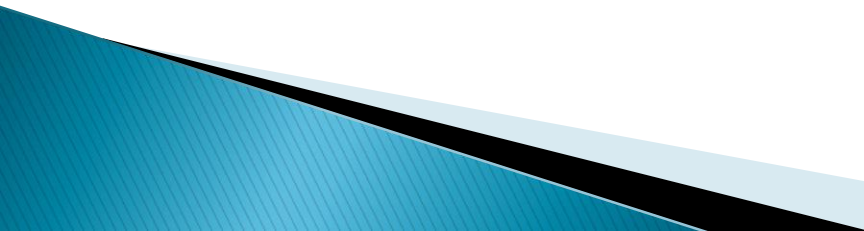
- Honey – If it tastes good it will make good mead
 - Water – If your water tastes good then it will make good Mead – carbon filtering will remove chlorine and other off flavors– if not – deionized or spring water will work well
 - Yeast – wine yeast is most typical, ale yeast will work also.
 - Fruit, spice, other sugars
 - Nutrients – Rehydration for Dry yeast, Yeast Nutrient, Yeast Energizer
 - Potassium Bicarbonate to control pH if needed
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Common Honey Varieties

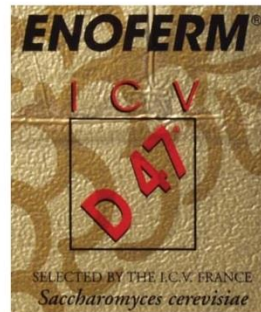
- Alfalfa
- Basswood
- Blueberry
- Blackberry
- Buckwheat
- Clover
- Fireweed
- Meadow Foam
- Mesquite
- Orange Blossom
- Sage
- Tupelo
- Wildflower

Honey Sources:

- Grocery store – fairly processed – can make OK mead but probably not great mead. Rather expensive.
 - Walmart, Sam's Club, Costco – Can purchase honey relatively inexpensively in large quantities but need to be careful as many honeys coming from unknown sources may be cut with corn sugar
 - Larger honey supply stores – The Bee Folks, Glory Bee, Dutch Gold – good sources – shipping can be expensive
 - Farmers Market – great source for locally grown honey – tends to be expensive although occasionally can find someone selling cheaper if bulk.
 - Local apiary – best choice if you have one available.
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Wine Yeast

- 24 °Brix or below, 1 gram of wine yeast/gallon of must is recommended.
- 25 °Brix or above, 1.25 grams of wine yeast/gallon of must is recommended



Equipment:



Sanitation:

- Probably the one main process that is required for making good mead.
 - The easiest way to ruin your Mead is to have bacterial or wild yeast Contamination. Easy to avoid.

Several methods of sanitation:

- Boiling water – easiest, cheapest – a bit time consuming and can be hazardous.
- Bleach – cheap but can give off flavors – not recommended – need to rinse with boiled water afterwards anyway to remove all traces of bleach.
- Star San – relatively cheap – easy to use – foamy but this will not affect your mead in any way – acid based.
- Many other commercial sanitizers available – all work if you follow the the directions.

****** Remember that once something is sanitized you cannot touch it again with your hands even if you sanitize your hands – they are full of germs and cannot be sanitized. Wearing rubber gloves and sanitizing the gloves is a good way to be able to safely handle your equipment.**

Common Yeasts used in Mead Making

Yeast Strain	Alcohol Tolerance	Fermentation Temperature Range	Nitrogen requirements	Fermentation speed
71B-1122	14%	59-85	Low	Moderate
ICV-D47	14%	59-68	low	Moderate
K1 (V1116)	18%	50-95	low	Fast
EC-1118	18%	50-86	low	Fast
RC-212	16%	68-90	Medium	Moderate

*www.scottlab.com/pdf/ScottLabsHandbook2016.

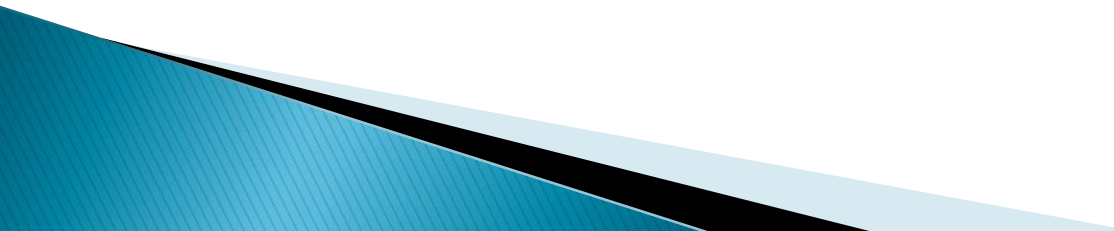
Fermentation Temperature

Most mead fermentations should be done about **65–68 degrees** – this means the internal temperature of your must – not room temperature. Fermentation releases heat and will warm up your must – above about 68 degrees almost all wine yeasts will put off unpleasant alcohols which take months to age out and smooth.

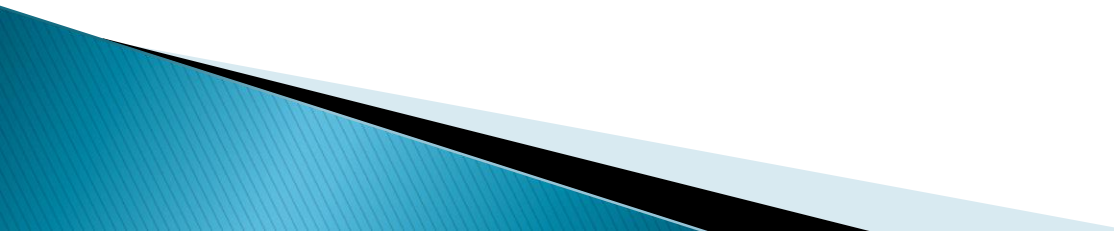
If you do not have a cool place in your home to ferment place your fermentation vessel in a container of cold water and let it ferment there. As the water warms either add new cold water or ice.

When yeast strains give a temperature range – that is the temperature that the yeast will grow at – not necessarily the best temperature for fermentation.

pH and Potassium Levels

- Potassium levels above 300ppm are critical to maintaining proper pH.
 - Food-grade potassium carbonate and potassium hydroxide can provide this potassium.
 - Adding 5g K_2CO_3 to a 5 gallon batch of mead adds about 136ppm of potassium, and the carbonate raises the pH of the honey.
 - Below a pH of 3.2, most wine yeasts start to struggle.
 - A starting pH of 3.6–3.9 will allow the mead to ferment and reach a final pH of 3.0–3.2
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Required Nutrients of Mead Yeast

- Adequate supply of sugar (Honey)
 - Nitrogen – very important to the growth of the yeast – very low in honey so need to supplement to provide essential Amino acids that yeast cannot produce.
 - Vitamins – essential for many enzyme reactions. Biotin, nicotinic acid Vitamin B and pantothenic acid.
 - Phosphorus – essential component of DNA and phospholipid production.
 - Trace elements – calcium, potassium, magnesium among others – Needed for many enzyme reactions for uptake of materials and building cell structure.
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What is YAN?

- **Yeast Assimilable Nitrogen** = Free Amino Nitrogen + Ammonia Nitrogen
 - Primary or alpha amino acids, ammonium ions and small peptides (proteins).
- **FAN = Free Amino Nitrogen** – generally from organic sources – alpha amino acids – yeast use this much more efficiently than ammonia.
- **NH₃-N = Ammonia ions** – non-organic sources (DAP)

Why is Yan Important?

- Adequate Nitrogen is important for good fermentation!!!
- Honey is very low in Nitrogen – range of 10–2000 ppm –
When diluted to fermentation strength is very low
- YAN requirements depends on Yeast strain*
 - Extra Low N requiring strains: Sugar (g/L) x .5
 - Low N requiring strains: Sugar (g/L) x .75
 - Medium N requiring strains: Sugar (g/L) x .9
 - High N requiring strains: Sugar (g/L) x 1.25
- To calculate your Sugar (g/L) you will need a hydrometer and take specific gravity and brix readings
Sugar g/L = Brix x Specific Gravity x 10

*From Scott Labs – Fermentation Handbook and Advanced Nutrients in Meadmaking – Google Doc – by Travis Blount–Elliott

Where do you get your Nitrogen?

There are several different Nutrients and Energizers available

- **Yeast Nutrient** – generally refers to Di-ammonium Phosphate (DAP)
- **Yeast Energizer** – Contains Nitrogen plus vitamins

Companies:

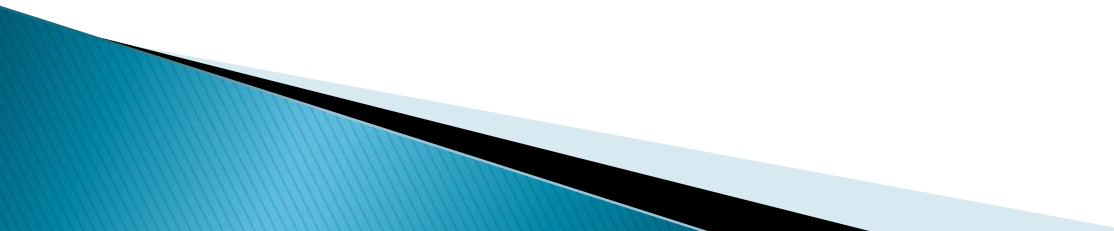
- Lallemand/Scott Labs
 - Go Ferm – rehydration nutrient – protects yeast from alcohol toxicity
 - Fermaid K – DAP + organic nitrogen + sterols + vitamins
 - Fermaid O – Organic Nitrogen
- L.D. Carlson
 - Yeast Nutrient – Food grade urea and diammonium phosphate
 - Yeast Energizer – A blend of diammonium phosphate, magnesium sulfate, yeast hulls and vitamin B complex
- Others
 - Fermax yeast nutrient (Amazon) – blend of yeast nutrient and energizer
 - Wyeast Nutrient Blend: A blend of vitamins, minerals, inorganic nitrogen, organic nitrogen, zinc, phosphates and other trace elements

The correct level of YAN is important as with too little YAN you can get slow or sluggish fermentations, higher alcohols and increased hydrogen sulfide.

Too much YAN upfront from inorganic Nitrogen can give you the same results as the yeast will increase their biomass too quickly which can then lead to starvation and leading to a sluggish or stalled fermentation.

Staggered Nutrient additions tend to be important because of this – also the type of nitrogen that your yeast receives initially is important also. Do not use just DAP as inorganic nitrogen can lead to a huge growth in yeast very quickly which then use up all of the nutrients needed to keep fermentation going.

Using a blend of nutrients and then adding them over several days tends to keep the yeast happy.



PPM (Part/million) explanation and hand calculations?

1 ppm = 1 part in 1,000,000 parts – quite simple. 😊

So a few equivalents help.

1 ml of water = 1 gram.

1 liter = 1000 ml so 1 liter = 1000 grams

1 mg = .001 grams

So if you add 1mg of nutrient to 1 liter of water (or must in this case) then you have 1 part/million ($.001\text{g}/1000\text{gr}=.000001$) – so to get 250 ppm you would add 250 mg to 1 liter.

YAN tho is only concerned with how much Nitrogen is in your must. Before any nitrogen additions most Mead musts have fewer than 25 ppm YAN.

YAN Calculations:

1g/gal of Fermaid-O = 40ppm N/L - Use no more than 450 mg/liter to avoid yeasty flavors in your mead.

1g/gal of Fermaid-K = 100ppm N/L - In commercial use the TTB limits this to 500 mg/liter due to the thiamin present

1g/gal of DAP = 210ppm N/L - In commercial use the TTB limits ammonium phosphates to 960 mg/liter. After about 2/3 fermentation or around 9% ABV yeast cannot use DAP due to the alcohol present.

1g/gal of GoFerm = 30ppm N/L - only used as rehydration nutrient used up in 1st 24 hours.

<http://www.meadmakr.com/advanced-sna-calculator/>

Staggered Nutrient additions: – explanation

This means you calculate your entire batch of nutrient and then add this over several additions – generally 4 – at 24, 48, 72 hours then either at 1/3 sugar break or 7 days – whichever comes first.

A few notes:

- vigorously stir your yeast when adding yeast and GoFerm to aerate your wort. Then either stir or shake the carboy several times a day to release carbonation build up for the first week or two – you don't want to whip the wort here – just swirl it to release the CO₂.
- Check your Specific Gravity daily – you should see a fairly quick drop over the first few days as the yeast use up the sugars present.
- Check your pH at each nutrient addition – if your pH drops below 3.2 you will want to add Potassium Bicarbonate to buffer your must.

Basic Traditional Mead recipe – 5 gallons

OG 1.120 65–68 degrees – no warmer. This means the internal
FG 1.020 temperature of your must – not room temperature.

14.5 lbs Honey (any varietal) – liquefied ahead of time.
Water to total of 5 gallons including yeast rehydration
1 packet 71B–1122 yeast (8 gr)
1 packet Go Ferm (10 gr)
8.5 gr DAP
9.5 gr Fermaid K
8.5 gr Fermaid O

Sanitize everything! Rehydrate yeast 20 min before adding to batch

Mix honey and part of water till well blended. Add rehydrated yeast and
Remaining water to batch and stir well to aerate must. Leave for 12 hours
And again aerate wort.

After 24 hours start staggered nutrient additions.



Staggered Nutrient additions:

Divide Fermaid O in 2 batches – add at 24 hours and 48 hours.

Mix Fermaid K and DAP together and divide in 2 batches – add at 36 hours
And at 1/3 sugar depletion (Starting at 1.120 this is at 1.080) or 7 days –
Whichever is first.

Check pH and SG daily to make sure fermentation is going smoothly – Gravity
Will generally drop about 6–8 gravity points or more/day. If your pH drops
Near or below 3.0 add Potassium Bicarbonate to buffer and bring pH back up
Slightly. If your fermentation is dropping off this is probably what is
Happening. Start with about 2 grams and test pH. Every must will be slightly
Different so add until you pH is back in the 3.4 to 3.9 range. Adding too
Much will give your mead a lifeless quality and you will need to add acid
Back.

Fermentation should be complete in 2–3 weeks following this process.



When mead has stopped fermenting or is at FG that you wish you can
Stop fermentation by racking off yeast and adding potassium metabisulfite/
Potassium sorbate and letting clear naturally, filter, add clearing agents, etc
Then bottle and drink.

Questions?

Thanks to the AHA for letting me talk today on such a wonderful and dear to my heart topic. I hope everyone has a wonderful National Mead Day this weekend!!!