

RESEARCH & EDUCATION FUND

**MEAD EXPERIMENT:
SAME MUST,
12 DIFFERENT YEASTS**



American Homebrewers Association®

Mead Experiment: Same Must, 12 Different Yeasts

By Chris P. Frey

Mead is an increasingly popular home and craft brewed beverage, but the current level of available information is considerably less than that for making beer. One challenge for mead makers is to really understand the contribution of flavors and aromas that various yeast strains provide.

While mead yeasts have information available from their producers, virtually all of it relates to their use in wine. Grapes have different nutrients, sugars, and flavor compounds than honey. By using a dozen of the most popular strains under identical conditions, this project provides another set of data points for mead makers to reference.

Background

At two previous National Homebrewers Conferences (Chicago 2003 and Baltimore 2005) members of the Ann Arbor Brewers Guild (AABG) and the Fermental Order of Renaissance Draughtsmen (FORD) homebrewing clubs put together presentations on “Same Wort, Different Yeast.” In Chicago we served 16 kegs of a Belgian dubbel fermented with 16 unique Belgian strains, and in 2005 it was 18 tripels, each fermented with a unique strain. Experiments such as these allow us to better understand the nuances and differences that these microscopic but critical creatures create in the finished beer. When everything else is held constant (grain bill, hops, boil and chilling, temperatures, days of fermentation, sanitation regimen, etc.) and only the yeast is changed, its contribution to flavor, attenuation, and aroma becomes apparent.

During the 2014 National Homebrewers Conference in Grand Rapids, Mich., we gathered a panel of judges to evaluate our mead samples to see what influence the yeast had on our must. Our plan was to create a poster presentation to support the mead track of the conference seminars and to serve the mead at the conference.

The Project

The AABG has the good fortune of having professional mead maker and *The Compleat Meadmaker* author Ken Schramm as a longtime member. Additionally, we have an impressive array of talented mead makers within our club of more than 170 members.

Our collective knowledge and experience base was deep and allowed for critical thinking and discussions as we prepared to take on this project.

Schramm facilitated the purchase of a 55-gallon drum (660 pounds) of cold pressed Michigan wildflower honey for the AABG. The experiment required only 20 gallons, so members of the club eagerly purchased the surplus. The honey was obtained locally from “the troll under the bridge,” Tom Reed, a beekeeper in Aloha, Mich. whose hives are located under the Mackinac Bridge. The honey was sourced primarily from Trefoil, Star Thistle, and Northern Michigan Basswood.

Wisps of cotton candy and other delicate aromas wafted from the drum of honey upon opening. The process of cold pressing preserves more of the volatile floral aromatics.

To get the honey pumped from the 55-gallon drum, Schramm wrapped a heat band around it, heating the honey to about 95° F, below the threshold to cause any deleterious effects on delicate aromas. The process de-crystallized the honey as well as made it fluid enough to pump from the drum to the awaiting buckets.



The honey has a ratio of 1.7:1 fructose to dextrose, so it tends to crystalize quickly.

The Process

We agreed to use the no-heat method to maximize the honey’s delicate aromas. Additionally, no sulfates or other wild yeast inhibitors were used. All equipment was carefully sanitized prior to coming into contact with the must.

A digital scale was utilized to ensure each new 7.9-gallon plastic bucket fermenter received exactly 20 pounds of honey. Each bucket was topped off with water to exactly the 6-gallon mark. The first gallon was warm to help dissolve the honey.

Each fermenter was provided a double dose of yeast—two smack packs of Wyeast, two vials of White Labs, or two packs of dry yeast. For the dry yeasts, two packs were fed three grams of Go Ferm in 106 to 110° F water and sat for 10 minutes prior to pitching.

Each bucket received about one minute of stirring, utilizing a drill with a paint stirrer tool to blend the honey, nutrients, and water, as well as to oxygenate each fermenter.

The temperature of all the buckets was 68° F after the yeasts were pitched and initially fed. It would have been preferable to start at a slightly lower temperature, but storing a dozen 7+ gallon fermenters under temperature-controlled circumstances was beyond the team's capabilities.

By fermenting the meads side by side, we ensured that temperature was not a factor. The experiment started in the fall, and the primary fermenters were stored on the basement floor, keeping the ambient temperatures between 63 and 65° F throughout the primary fermentation process.

A starting gravity of 1.125 was uniform across the fermenters. These were going to be big or "sack" meads.

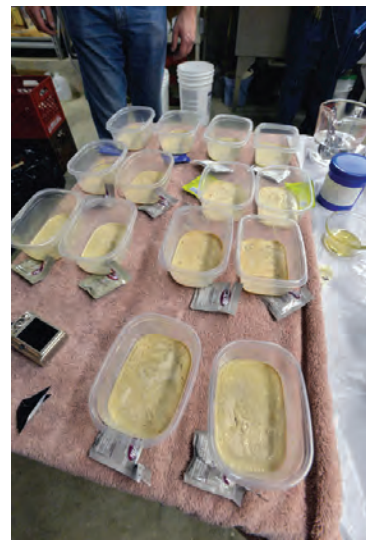
Each fermenter was labeled and the lids were put on. When dealing with 12 different strains and identical fermenters, positive identification was a priority. Additionally, tape was put on each fermenter so that daily feeds and CO₂ releases could be recorded.

Feeds of 2.8 grams of DAP and 4 grams of Fermaid K were provided on days 1, 2, 3, and 4. Care was taken during each feed, since, as expected, large releases of CO₂ were experienced with these additions and consequent stirs. Rocky heads of up to four inches over the bucket lip occurred in some fermenters with as little as two to three stirs. After about three to four days, the CO₂ releases were significantly reduced. During the first three days, meads were stirred to release CO₂ at least twice daily.

The Yeasts

The yeasts were chosen via an online dialogue with club members identifying their go-to yeasts, while others suggested lesser known strains. The cutoff at a dozen strains was somewhat arbitrary, but it provided ample samples to test.

Wyeast 1056 was chosen as a "calibrator" yeast strain. It probably isn't anyone's go-to yeast for mead, but it was



chosen because even the most novice brewer likely is familiar with it.

Fermentation

Gravity readings were taken a half dozen times during the 200-day fermentation period, and the meads were racked over on day 28 and day 40. On day 28 they were moved from plastic primary fermenters to glass carboys to reduce the potential oxygen uptake through the plastic walls.

On day 40, the meads were moved off the floor and onto a lab bench and then racked over to fresh carboys. This was to obtain gravity readings, provide clarification, and to keep the temp in the low 60s, as winter was bringing the basement floor temperatures down to the upper 50s.

While it is common practice to cover beer fermenters to keep light off of the brew, the group was mixed as to the need to do this for meads. To err on the side of safety, they were covered.

A finishing gravity hydrometer (purchased through Beer, Beer & More Beer) provided accurate readings.

Kegging

After 200 days of fermentation, it was time to keg the meads in preparation for delivering them to Grand Rapids. The meads likely finished weeks or even months prior, but the carboys were clear and arrangements to borrow a dozen kegs had to be made (a tip of the hat to Jason Henning!). Meads were carefully transferred and pressurized under 12 pounds of nitrogen, as it was recommended by the club that nitrogen was a more neutral gas to the aroma's and flavor versus CO₂.

A call went out to some of the best local mead minds to help sample the resultant meads and provide their senses of taste and aroma. Two meadery owners, two certified mead judges, and two prolific mead makers from the club responded and an afternoon of evaluation ensued.

The Results

Wyeast 1056 has a stated alcohol tolerance of 11 percent and it appeared that it wasn't going



to budge much beyond 1.048 after two months. However, the finishing gravity was right in the range of the other non-sweet blends. But the various descriptors for this neutral ale yeast were staggering (see Table 1). They included peppery, anise, nutty, dank mushroom, herbal, citrus, woody, sulfur, Chardonnay, orange, cinnamon, white grape, and even fruit loops!

Several of the more familiar yeasts common to homemade mead makers fall into the Champagne varietals, such as the Premier Cuvee, Lalvin 1116, and Lalvin 1118. These also tended to showcase higher levels of alcohol and heat and lower perceived body, according to the panel.

A few of the readings stood out (see Table 2). As expected, the two Sweet Mead yeast strains from White Labs and Wyeast finished significantly higher than the others. The other 10 strains all finished very dry. No attempts were made to stop fermentation. These 10 finished around 16 percent ABV (sack), and as noted by the judging panel, many were perceived as having higher perceived body than others.

Interestingly enough, while most shared similar alcohol levels, some were clearly “hotter” than others. Schramm wondered if certain yeast strains generate more fusel alcohols, leading to an increased perception of heat.

Judging and describing these meads led to a divergent set of feedback from the panel, but many common threads can also be seen in the comments. What was clear was that each yeast strain contributed its own unique characteristics. The meads were not judged in the classic “competition” sense. The goal was to obtain perceptions and descriptors of the flavors, aromas, and mouthfeel. Three stewards poured the meads from the kegs in an adjoining room, so no one knew which strain of yeast they were receiving.

Each would quietly take their samples and write down their thoughts, and then a group discussion followed. The judges included:

- Ken Schramm, Ann Arbor Brewers Guild member and founder of Schramm’s Meadery
- Paul Zimmerman, co-founder of B. Nektar meadery
- Dan Fick, CRAFT homebrew club member and certified Mead BJCP judge

- Gail Milburn, Motor City Mashers member and certified Mead BJCP judge
- Matt “In the Hat” Goebel, Ann Arbor Brewers Guild member and prolific mead maker
- Phil Wilcox, Ann Arbor Brewers Guild and Prison City Brewers member, as well as a prolific mead maker (note: Wilcox arrived late, so was not able to sample all of the meads)

Thanks to this experiment and the generous donation of time from our judges, mead makers now have some additional data points as they relate to these specific strains and can take their understanding of their properties to new levels as they produce and consume meads with friends and family.

Chart on Following Page

	Ken Schramm	Paul Zimmerman	Gail Milburn	Dan Fick	Matt Goebel	Phil Wilcox
Laivin 71B - 1122	Soft, not tremendously honeyed in expression, sternal, wine-like mid palate	Mild aroma. Not a lot of honey character. Spice, herbal, a touch hot.	Woody, spicy, somewhat muted by alcohol heat. Cinnamon. Nutty, low honey (mead) expression. Needs fruit!	No unexpected aroma or flavor. Hot alcohol present. Flavors and aromas were very muted.	Muted, alcohol, light flavored, some nutty/toasty.	Nice, very plain. Med/low expression, Aromatics OK - neutral.
Laivin D 284	Delicious - much higher perceived sweetness than numbers indicate. Nutty, peppery, bread, delicious. Loved it.	Pepper, citrus, big aroma and flavor. Nutty, fruity, good mouthfeel. Herbal, woody and acidic.	Orange, grapefruit, spicy phenols. Rubbery, meaty, soy sauce yeastiness. Urea late in the aroma. Lingering acid/tannins.	Light aroma. Multiple aromas. Nutty and medium body for how dry it is. Flavors are also fairly intense.	Lightish alcohol, good mouthfeel, white grapes, musty, nutty, woody. Hints of musk melon in the nose. Alcohol evident, not hot.	Good aromatics, spicy, peppery, dryness apparent. Very middle of the road.
Laivin D 47	Liked this better than others. Extremely yeasty nose, some nuttiness. Structurally sound, clean on palate, stayed nutty over time.	Very hard to find aroma. Spicy, nutty, herbal, fruit. Hot.	Very bread, yeasty. Herbal (rosemary). Some sulfur in taste (corn, asparagus). Berries, woody. Harsh acidic, lack of complexity.	Strange aromas of soap and buttery and cedar aromas and flavors. Very dry and high acidity.	Toasty/nutty/wood/cinnamon nose. Spicy notes, cinnamon, alcohol, musty/nutty flavors. Acid balanced.	Mild aromatics, mild everything. Clean, bit hot in flavor and finish. No legs.
Laivin EC 1118	Nose and palate didn't work together. Aroma was better than the taste, powerful alcohol up front. Med-full on mouthfeel. Lots of citrusy notes	High alcohol, spicy, star anise. Hazy, dry, med-finish, waxy flavors. Sharp, wood.	Dry, hot alcohol, acidic. Some sulphur, clay/earthy. Some kerosene, esp. in flavor. White, legs. Harsh. Perfume, vinous.	Aroma much better than flavor. Flavor very acidic and hot alcohol. Harsh. High level of star anise and orange. Quite woody.	Nose better than taste. Alcohol in the nose and taste. Not balanced, acidic and alcohol on the end. Thinnish body, nose woody, slightly floral.	N/A
Fermentis S33	Didn't much like the nose, and the palate didn't up the game at all. Herbal, pepper, ethanol out of balance. Wonk.	Herbal, cinnamon, alcohol and acidic, phenol, hot	Banana/olive. Dry, acidic. Unbalanced. Belgian like. Some tropical fruit late. Green leaves.	Aroma very low and muted. Alcohol and acidity are very intense. Spicy, almost Belgian beer-like. Waxy.	Cinnamon nose and flavor. Higher alcohol acid and tannins on the end	Muted aromatics, yeasty, fermented honey. Hot alcohol, slight burn to finish.
Laivin KIV 1116	Ethanol nose. I got lots of fermentation notes, but others did not. Citrus, pear, spice. Cocoa, tropical fruit, surly.	Hot. Spice, wood, fruit, citrus and herbal.	Under the alcohol heat, a nice expression of spicy, orange blossom-like honey. Needs age, and back sweetening would really showcase this honey.	No real perceived yeast characteristics. Fairly clean but very hot and harsh.	Citrus, wood, cinnamon, wood alcohol evident, taste similar to smell. Decent honey expression.	Not a huge character builder. Alcohols apparent, some tannins, very mild in general. Need to ferment at lower temps.
Premier Cuvee	Herbal, cinnamon, peppery estery, more linear (nose matches the palate).	High alcohol, spicy, citrus, wax, anise, dry, sharp wood, late cinnamon.	Hot alcohols, a bit solvent. Waxy. Some spicy cinnamon. Medium body, waxy mouthfeel. Lingering papaya, spice, acid.	Aroma and flavor match up well. High acidity. Hot alcohol. Moderate star anise and orange esters. Moderate woody. High perfume. High level of waxiness.	Highish alcohol, waxy notes, slight paper note in flavor and nose. Light woody, oaky, spicy also in nose.	N/A
White Labs 715 Champagne Yeast	Grassy/herbal, summer field. Very stark on the palate. Has the markings of a mead that needs age.	Woody, herbal, hot, spicy, anise, citrus, dry. Melon on the nose with grass.	Hot alcohol but spicy. Greasy aromas, orange. Bread, waxy. Basil and oregano late.	Aroma matches flavor pretty well. The honey comes through in both. Honey gives moderate floral, spicy, woody, citrus aromas and flavors.	Light wood/citrus nose, frames alcohol. Thinnish body, some oak/citrus/ephemeral acid on the back end, alcohol.	N/A
White Labs 720 Sweet Mead	Rubbery/phenolic nose. Hazelnut, rounded soft honey character. Tough to get past nose.	Nutty, sweet, balanced, phenols, spicy, fruity. Creamy, not bright.	Spicy, smoky phenols. Orange blossom-like. Acid doesn't quite balance sweetness—a bit flabby, not bright. Some nuttiness.	Sweetness seems lower than FG would indicate. Likely due to high acidity. Balance seems good. Perhaps could use a touch more acidity.	Light orange, sharp, some alcohol. Nutty/yeasty, sweetness acid balanced. Nice body, aged/oxidized note.	Sweetness apparent, mild additions of yeast character almost negligible, really lets the honey shine through.
Wyeast 1056 American Ale	Peppery, some funk on the nose. Better palate than nose.	Nutty aroma, almost yeasty, herbal with citrus and anise.	Nutty, dank, mushroom like. Some sulfur. Woody. Some Chardonnay. Orange. Some fruit loops linger.	Moderate honey flavors and aromas. Some strange kind of rubbery aroma. Lots of anise. Alcohol is harsh.	Light citrus up front, cinnamon/wood follows in flavor. Alcohol evident, white grape/musty.	N/A
Wyeast 4184 Sweet Mead	Notes of cotton candy, bubblegum, white wine grape. Low to no phenolics. Fullness (Muscadine, Riesling), some disagreement over acidity. True to the honey.	Good honey, citrus, mild/pleasant, white grape, bubblegum. Nice finish.	Cotton candy sweetness. Very vinous and grape-like, a sweet white wine. Woody. Balanced. Residual honey sweetness.	Aroma and flavor match up. Most flavors are pretty low in intensity. High sweetness and alcohol remain. Hot alcohol but not as harsh as some of the others. Fairly complex but low intensity.	Muscate grape/musk melon nose, some sweetness. Nose carries into flavor, nicely balanced.	High white grape notes, very winey. Plenty of residual sweetness left, sweet finish. Acidity medium to high. Tannins noticeable in the finish.
Wyeast 4632 Dry Mead	Low character in both nose and palate. Cleanly alcoholic.	Pretty smooth, decent nose. Honey is there but not big. Spice, nutty, fruity, anise.	Dry. Woody, vanilla, spicy cinnamon. Alcohol heat apparent. Acid lingers mostly because it is so dry.	No perceived yeast off flavors evident apart from a rubbery note. Alcohol is pretty intense.	Nose great, floral, hot alcohol, decent body, light acidity.	OK aromatics, very neutral, alcoholic heat apparent.