ANN ARBOR BREWERS GUILD Est 1986

The Herald Trubune

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April Meeting

This month's meeting of the AABG is Friday April 10th and will be hosted by **Matt and Rene Greff.** See the map and directions on the next page. The featured style is **Extract.**

AABG 2009

January	Rolf Wucherer	Strong Ale
February	Mike O'Brien	English Pale Ale
March	Chris Frey	1.080+*
April	Matt and Rene Greff	Extract
May	Stephen Krebs	Scottish and Irish Ale
June	Mark Zadvinskis	Spice/Herb/Vegetable
July		Fruit Beer
August	Tom Roach	Amber Hybred*
September	Jeff Renner	European Amber Lager*
October		Pilsner
November	Chris Frey	Belgian Strong Ale*
December	Rolf Wucherer	Sour Ale

* Denotes AHA Club Only Competition Style
All meeting are the second friday of each month beginning at 7:30 p.m., except for the July meeting (BeerBQ) which is the second saturday.

AABG Pico System

The guardian of the club's pico system is Mike O'Brien. Anyone wishing to use it should contact him at: 734.637.2532 or e-mail: mobrien315221MI@comcast.net

Shopping for Extracts

The freshness of the extract is important, particularly for the syrup. Beer brewed with extract syrup more than a year old will often have a blunt, stale, even soapy flavor to it. This is caused by the oxidation of the fatty acid compounds in the malt. Dry malt extract has a better shelf life than the liquid because the extra de-hydration slows the pertinent chemical reactions.

Another quality of an extract that can have a particularly strong affect on the quality of the final beer is Free Amino Nitrogen (FAN). FAN is a measure of the amount of amino acid nitrogen that is available to the yeast for nutrition during fermentation. Without sufficient FAN, the yeast are less efficient and produce more fermentation byproducts which result in off-flavors in the final beer. This is why it is important to not follow most canned kit instructions to add sugar to the wort. Corn, rice, and cane sugar contain little, if any, FAN. Adding large percentages of these sugars to the wort dilutes what little FAN there is and deprives the yeast of the nutrients they need to grow and function. FAN can be added to the wort in the form of yeast nutrient.

Malt Extract is available as either Hopped or Unhopped. Hopped extracts are boiled with hops prior to dehydration and usually contain a mild to moderate level of bitterness. Alexander's, Coopers, Edme, Ireks, John Bull, Mountmellick, and Munton & Fison are all high quality brands. Read the ingredient list to avoid refined sugar.

Malt extract is commonly available in Pale, Amber, and Dark varieties, and can be mixed depending on the style of beer desired. Wheat malt extract is also available and new extracts tailored to specific beer styles are arriving all the time. The quality of extracts and beer kits has improved greatly in the last 5 years. An all-extract brewer will be quite satisfied brewing entirely from beer kits as long as they ignore the instructions on the can and follow the guidelines in this book. With the variety of extract now available, there are few beer styles that cannot be brewed using extract alone.

— John Palmer

Brewing with Malt Extract

Brewing with malt extract (liquid or dry) is the starting point for every new brewer. Today many homebrewers use malt extract as the dominant base for their beer.

I bought my first malt extract, a Muntuns and Fison's Irish Stout kit in 1987 when I started brewing, and continued brewing exclusively with extracts for the next 10 years. Brewing with extract offers many advantages over all-grain brewing. Less time and equipment is required.

While some purists point out that all-grain brewing gives you more control over certain ingredients in beer, the parade of award winning extract recipes in both local and national competition indicates that extract brewers are more than capable of going toe-to-toe with all grain brewers with regards to beer quality.To design a great beer recipe with malt extract it is important to understand its characteristics and limitations.

Malt extract is made by mashing grains using the traditional process to produce wort, a hot sweet sugary liquid. The wort is then concentrated from its original gravity of perhaps 1.080 to a thick syrup with gravity of between 1.400 and 1.450. The wort is concentrated by evaporation under heat.

To reduce the heat required, the entire process is typically done under vacuum. Heating the wort to concentrate it also produces meanoidins, a color pigment that darkens the extract. This darkening process continues when boiling your extract. That is why wort made with even the palest malt extracts is significantly darker that corresponding all grain wort.

Liquid malt extract also contains water, an element that allows the coloring reaction to continue at a slow rate as the malt extract ages. Thus liquid malt extracts will continue to get darker as they age. Dry malt extract is not susceptible to this effect.

Beers made with malt extract will tend to ferment slower and finish at a higher gravity than corresponding all-grain beers. This is due to a variety of factors including the presence of

Brewing Extract *continued on next page...*

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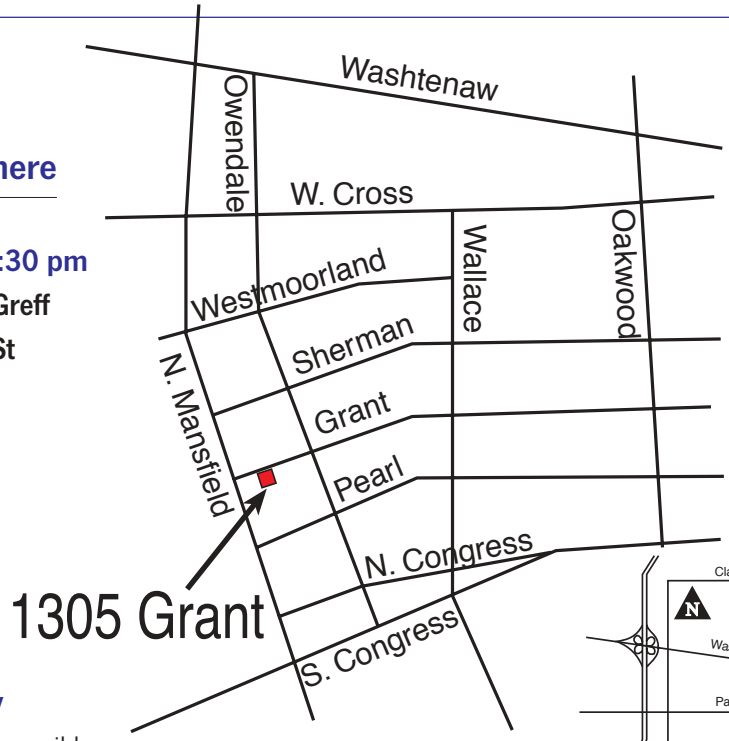
When and Where

Friday April 10, 7:30 pm

Matt and René Greff
1305 Grant St
Ypsilanti MI
678-7620

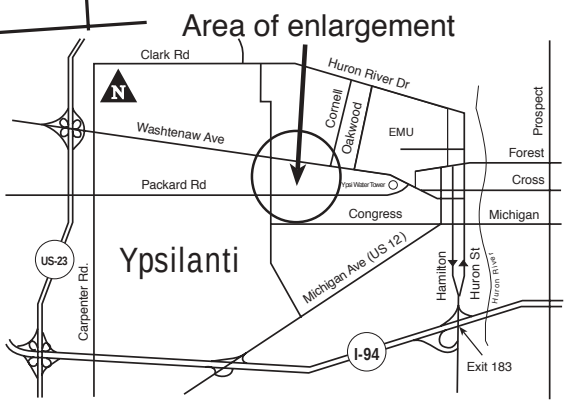


AABG Policy

AABG encourages responsible, legal consumption of homebrewed and craft beers. **You must be at least 21 years old to attend AABG meetings.**

Guide for New Members

Bring 1–2 bottles per batch of your beer that you'd like to share, or an interesting commercial beer. Bring tasty munchies to cleanse the palate and sop up the alcohol. Feel free to share and sample with other members and make and accept constructive comments. Please use good judgment while imbibing and don't drive while intoxicated.



*...**Brewing Extract** continued*

unfermentable dextrins from the concentrating process, the lack of free nitrogen in extract malt needed for yeasts, and the potential for oxidization of the malt for malts stored for an extended period.

The last point is worth mentioning, as both dry malt and liquid malt are prone to oxidizing when exposed to air or moisture for an extended period of time. All of these factors point to the critical importance of getting fresh malt extract whenever possible, and storing malt extracts in an airtight container in the refrigerator to minimize moisture and slow the effects of aging.

As long as proper care is taken in selecting and storing your extract, brewing with malt extract can be a real pleasure. To enhance your malt extract recipes I recommend the following tips:

- Use pale malt extract as your base for the beer.
- To add color to your beer, steep dark grains rather than adding dark extract, this will enhance the body and flavor profile of your beer.
- Avoid using sugar in proportions larger than 10%. Sugar adds a cider-like flavor to the beer without contributing body.
- For bitterness, boil with separate fresh hops (pellets, plugs or leaf). Many hop oils and bittering agents break down during storage in pre-hopped malt extracts. Its always better to go with fresh hops.
- Use steeped grains to enhance the color, body and flavor of your beer. From 2–5 pounds of steeped grains in a 5 gallon batch will produce better beer than extract alone. Remember that some malts (munich, wheats, flaked and terrified malts) require mashing, and can't be steeped.
- As you boil malt extract, it will get darker. Consider using a late malt extract addition if you are targeting a light to medium color beer.
- If you are brewing a wheat beer, use wheat based extract. Similarly if brewing an Octoberfest or Marzen beer, use Munich based extract.
- Use a spreadsheet or brewing program such as **BeerSmith** to estimate your color, bitterness and original gravity and match it against your target style. This will avoid many bad batches of beer.
- Be aware of the effect of the size of your boil pot on the bitterness of your beer. Small boil, high gravity malt extract batches will achieve significantly lower hops utilization than full size boils. Use a good spreadsheet or brewing program to estimate your bitterness before brewing.
- When converting an all-grain recipe to extract, take into account bitterness and color change as well as the base malt conversion. Extract recipes will generally need more hops and less colored additions than all-grain.
- Use high attenuation yeasts with extract brews. Remember that extract beers generally ferment slower and leave a higher final gravity than expected.
- Store your malt extract in airtight containers, away from light sources, and ideally in a refrigerator to minimize oxidization and aging effects.

Malt extract brewers produce fantastic beer. Every year, even at the national level, malt extract brewers consistently finish in the winner's circle. I hope this article helps you maximize the potential of malt extract brewing and helps you reach the winner's circle as well. As always, keep your suggestions, social bookmarks and comments coming.

Posted in August 16th, 2008
by Brad Smith in Homebrewing

Extract Conversion

As you look through homebrew recipes listed both here and in other sources, you will occasionally find recipes that use no extract — only grain. While you may not be ready to take up all-grain brewing quite yet, you can still copy these successful recipes. All you have to do is convert some or all of the base grain into extract.

Every all-grain recipe includes base grain plus some specialty grains. Base grain is the stuff that makes up the majority of the recipe - usually pale ale malt, pilsener malt or 2-row malt. Specialty grains are used in small quantities to add flavor, color or body to the beer. Examples of specialty grains include things like crystal or caramel malt, chocolate malt, roast barley and oats.

To convert an all-grain recipe for extract brewing, we will focus on the base malt. You can substitute your favorite brand of light or golden unhopped malt extract for some or all of this grain. The conversion factor is slightly different for liquid extract than for dry extract, but the procedure is the same.

To convert an all-grain recipe for extract brewing, we will focus on the base malt. You can substitute your favorite brand of light or golden unhopped malt extract for some or all of this grain. The conversion factor is slightly different for liquid extract than for dry extract, but the procedure is the same. For every pound of base malt taken out, you will need to add less than a pound of extract. With syrup extracts, you'll add 0.75 pound for every pound of grain removed. For dry extracts, you'll need 0.6 pound for every pound of grain.

Let's try an example to see how this works. Assume that we find the following grain bill for a pale ale:

8 lbs pale ale malt
lb crystal malt
0.5 lb toasted malt

If we replace all of the pale ale malt with liquid extract, we need to multiply 8 pounds by the conversion factor of 0.75. Thus, 6.0 pounds of liquid extract could be used instead of the pale ale malt.

If dry extract were used, we would multiply by 0.6 rather than 0.75. Thus, 4.8 pounds of dry extract could be substituted for the 8 pounds of pale ale malt.

Ideally, you want to use as much actual grain as possible in each recipe in order to produce the best possible flavor. If you have a grain bag that

holds three pounds of grain, you might routinely make beers that contain all of the recommended specialty malts plus as much base malt as will fit in your bag. For instance, for the pale ale recipe above, we have one pound of specialty malts, so we could include up to two pounds of pale ale malt in our grain bag. Under this plan, we would only need to substitute extract for 6 pounds of the base malt. Using our calculations, we can see that this would require 6 pounds x 0.75 = 4.5 pounds of liquid extract or 6 pounds x 0.6 = 3.6 pounds of dry extract.

Grain to extract substitution chart

If you find the calculations difficult, just use this chart:

Pounds of	Pounds of Extract	
Grain	**Liquid**	**Dry**
1.0	0.75	0.6
1.5	1.13	0.9
2.0	1.50	1.2
2.5	1.88	1.5
3.0	2.25	1.8
3.5	2.63	2.1
4.0	3.00	2.4
4.5	3.38	2.7
5.0	3.75	3.0
5.5	4.13	3.3
6.0	4.50	3.6
6.5	4.88	3.9
7.0	5.25	4.2
7.5	5.63	4.5
8.0	6.00	4.8
8.5	6.38	5.1
9.0	6.75	5.4
9.5	7.13	5.7
10.0	7.50	6.0

Additional Notes on Using Extract

Those who are just beginning to brew will quickly learn that beers made with malt extracts have slightly different characteristics compared to beers made directly from malt. To make excellent beers using extracts, you'll need to keep in mind a few tips.

The total portion of the base malt that you can replace with extract depends upon the beer style. A light colored beer like a Munich helles that relies on malt for the primary flavor component will not tolerate much extract. To get both the color and the flavor required for good results, you will need the vast majority of the total extract to come from a grain mash.

As the target color of the beer gets darker, it can generally sustain larger proportions of extract without detrimental effects. The same is true of beers where hops or spices are the primary flavor component. Good hoppy American pale ales for instance, can be quite good when made from a recipe that contains a large amount of extract. Also, beer with strong yeast-derived flavors such as weizen can be made well with a larger portion of extract than grain.

A perfect place to use extract is in the production of high gravity beers. Almost any beer with an intended original gravity above 1.060 (15 deg P) can incorporate some extract without any detrimental effects. When you review winning recipes for styles like doppelbock and barley wine, it is unusual to find one that does not include extract. These recipes usually start with a regular mash of about ten pounds of grain to get the gravity up to 1.050 or so, then rely on the extract to provide the rest. Using this technique, even brewers with a relatively modest mashing capability can produce very good high-gravity beers.

— Home Brew Forum
All About Beer Magazine

Malt Extracts: Cause for Caution

— Martin Lodahl

Worts made from extracts often present fermentation problems. These problems are in large part caused by the low free amino nitrogen levels characteristic of these worts and may sometimes be due to an extract composition that is different from what the extract's labeling indicates.

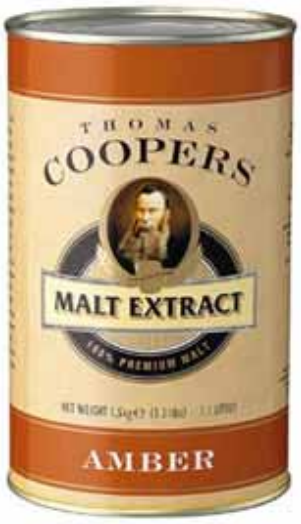
A stuck fermentation is always a tiresome experience, and in a brewpub or microbrewery it can be an expensive one. Similarly problematic is an apparently finished beer with an unexpectedly high terminal gravity, unusually long lag times before the beginning of fermentation, or unexpectedly high diacetyl levels. Each of these problems can result from any number of causes, but if the wort is all-extract, the problem may be the extract itself.

Extract Caution *continued on next page...*

……**Brewing Extract** *continued*

The definitive study of this effect was published in a professional journal three years ago (1) and was discussed in a home brewer's publication shortly after that (2,3). In the study, researchers at the University of Saskatchewan used a combination of high performance liquid chromatography (HPLC) and fermentation studies to explore the relationship between extract composition and the fermentation characteristics of worts prepared in a standard fashion from these extracts. One finding was that extract-based worts contained a generally lower level of free amino nitrogen (FAN) than the all-malt "reference" wort that the researchers had obtained for comparison from a commercial brewery. Another finding was the disturbing presence of substantial amounts of glucose syrup, invert syrup/liquid sucrose, and high-fructose corn syrup in many of the extracts tested, even in some of those labeled "all-malt extract."

To the acute frustration of many brewers, the researchers did not identify the extracts tested. The Association of Brewers contacted the authors of the study for more information and published a letter from Professor Ingledew in which he said that they indeed had no plans to release the names of the extracts tested (3). He said that they couldn't be sure whether the adulteration was done by the manufacturers or by the distributors. He also said that their sample might not be representative, because they tested only 44 "lager" extracts and no "ale" extracts (their terms, apparently derived from product labeling). His lab had neither the time nor money to handle additional testing or possible legal action. He also asserted that the burden of following up on the problem rested with the brewing industry, through the marketplace. Professor Ingledew then closed with the following paragraph:



In spite of my comments above, I have complete confidence in the results obtained in my lab by my colleagues. There is no doubt that some manufacturers are profiting from the addition of lower cost corn sugars to malt extract.

These conclusions concern extracts supplied through the same channels as those used by small-scale brewers. To quote from the study:

Forty-one malt extracts (all of light lager type) were purchased from a local brewing supply store. These malt extracts were called beer kits, home brew kits, concentrated brewing worts, or malt extracts for home brewing. . . . In addition, one bulk malt extract sample from a malting company and two bulk malt extract samples from a local brewpub were obtained.

The researchers used Red Star lager yeast for all of the fermentation studies. The extracts and tmihe reference wort were diluted with sterile, distilled water to 12 degrees P, were saturated with air, pitched with 6 X 10-6 viable yeasts/mL, and were fermented at 14 degrees C with constant stirring.

Varying FAN Content

The first sign of real trouble was the observation that the time that extract-based brews required to drop from 12 degrees P to 6 degrees P varied from a low of 45 h to a high of 173 h, compared with the baseline of 51 h for the commercial wort. In addition to this significant variation, they also found a strong correlation between FAN levels and fermentation rate — the slow-fermenting worts had low FAN content. That finding comes as no surprise, because brewing literature has long linked low FAN content with a variety of fermentation problems including slow or incomplete fermentation (4,5). Ingledew has published widely on the relationship of FAN to stuck and sluggish fermentation in high-gravity worts, and a fascinating new article by Fix (6) establishes a clear connection between low FAN levels and elevated diacetyl production. Some of the extract worts had dramatically lower FAN content (and correspondingly lower fermentation rates) than the reference all-malt wort; one wort's FAN content was as low as 80 mg/L compared with the reference wort's 220 mg/L. Because it appears that a wort FAN content must exceed 150 mg/L to avoid stuck or incomplete fermentation (7), many brewers preferring to keep their worts above 200 mg/L, it is reasonable to expect a troubled fermentation from a wort made solely from extracts such as those tested in this study. I find it interesting that at least one extract had a FAN content significantly higher than the reference all-malt wort and that the correlation between FAN and the attenuation rate remained significant.

Also interesting was the "utilized FAN" figure the researchers obtained by subtracting the FAN content remaining after fermentation from the original FAN content, the difference having presumably been metabolized by the yeast. This figure differed substantially between the reference wort and the extract worts. ***(see Table I)***.

As the table suggests, FAN utilization and fermentation rate are related. Fix (6) has shown that wort composition can dramatically affect a yeast strain's amino acid uptake and that a yeast's response to the wort environment is strain-dependent. Although the results may have been somewhat different had another yeast been used, the average utilized FAN for the extract worts in this study was 32% compared with 81% for the reference wort. The authors of the paper, noting that brewer's yeast metabolize di- and tripeptides slowly and can use no larger peptides, suggested that it was possible that the worts used in the production of the extracts were incompletely modified or that the concentration process resulted in the degrading or binding of a significant fraction of the original FAN. For now, though, all that is clear is that the FAN content of extracts differs qualitatively as well as quantitatively from that of the reference all-malt wort. This appears to be an area ripe for further research.

Table I: Relative FAN utilization rates.

Wort Type	Fermentation Time (h)	Itital FAN (mg/L)	Utilized FAN (mg/L)	FAN Utilized (%)
Standard all-malt wort	51	220	178	81
Fastest fermenting extract wort	45	317	154	49
Medium fermenting extract wort	75	210	46	22
Slowest fermenting extract wort	173	80	15	19

Extract Adulteration

The real bombshell of the Saskatchewan group's paper are the results of the HPLC analyses of carbohydrate profiles. The researchers divided the extracts into three groups according to the contents listed on the labels ***(see Table II)***. Group 2 and 3 extracts listed various supplements and adjuncts, and the analyses tracked pretty well with the labeling. This in itself does not guarantee the quality of these extracts, some of which had low FAN content and lots of nonmalt sugars.

Extract Caution *continued on next page...*

Group 1 extracts, however, "were labeled at the source as pure malt extracts." Of the 21 extracts in that group, a commendable 14 had

Table II: Carbohydrate profiles of malt extracts tested.

Group	Class	Samples	Labeling	Carbohydrates
1	1	14	pure malt extract	similar to reference wort
1	2	6	pure malt extract	high d-glucose content
1	3	1	pure malt extract	nearly entirely d-glucose
2	1	4	barley syrup	matched literature values
2	2	11	barley syrup + malt	matched literature values
3	1	2	malt + corn syrup	matched literature values
3	2	1	malt + invert syrup	apparently extra sucrose
3	3	5	malt + sugar	as expected

carbohydrate profiles "similar to the standard all-malt wort," which placed them in class 1. From here I quote from the study:

Group 1 class 2 extracts had d-glucose concentration 2.7 times that of the standard, with concomitantly less maltose and maltotriose. The two possible explanations for this sugar profile are that wort production was carried out using a longer saccharification period during the mashing process (considered unlikely as the final ethanol concentration of the beer would then be >5%), or that a glucose syrup was added to the malt extract. A single Group 1 class 3 extract was found to have 88% of its total sugar content as d-glucose. Because this sample did not contain any d-fructose, sucrose, maltose, or maltotriose, this product was highly adulterated with a high-glucose syrup.

In short, this "all-malt" extract had no trace of malt extract! The authors continued, "Carbohydrate analyses of all Group 1 extracts indicated that 7 of the 21 samples labeled as pure malt extracts were adulterated with glucose syrup."

While the implications of all that sink in, let me make it completely clear that the list of extracts involved in this test has never been published, and I don't have access to it. Please don't bombard BrewingTechniques with requests for it. We will probably never know what extracts were tested in the Saskatchewan study. Professor Ingledew said in a letter to the Association of Brewers, "We have identified a problem. Your pressure on the manufacturers or packagers will ensure that the situation is rectified" (3). To a degree this is true. Few of us, however, have HPLC equipment in our breweries, leaving us only one sure defense against adulterated extracts: not using extracts at all until the industry can demonstrate that the problem is solved. For many, however, this course is impractical or undesirable.

Brewing with Extract

Taste panel testing and contest results suggest that it is possible to make very good beer using malt extracts, but many of us have at some time had problem extract batches. The degree of variation this study identifies suggests that we may not always have been at fault. Following are some guidelines for using malt extracts:

If possible, make at least a portion of your wort from malt, performing a "partial mash." In addition to enhancing flavor, it will add utilizable FAN.

If you can't at least partial-mash, try adding small quantities of a commercial yeast nutrient. Although it may not provide the full spectrum of amino acids necessary to avoid all fermentation problems, it may at least boost the attenuation rate.

Don't add sugar to an extract wort. It may already have all that it can stand.

Some yeasts, especially lager strains, are very sensitive to wort composition. Experiment with yeast-extract combinations.

Whenever possible, request analysis data from suppliers or manufacturers. They certainly generate such data as part of their quality assurance process, and knowing the extract's composition will help you to decide how to use it. An extract's FAN content may be perfectly adequate for a high-gravity beer but deficient for a lighter one.

Experience is the best teacher with each product you use. If it works, keep using it; if it doesn't, switch.

THE Quest for Quality

The last decade has seen a dramatic improvement in the materials available to small-scale brewers. Though we're no longer living on the margins of a production and distribution system geared solely to serve the largest commercial brewers, we still are at a comparative disadvantage in purchasing our materials. By becoming informed consumers, we can make better beer and send the message that high-quality materials offer a supplier the greatest competitive advantage. We have seen this happen in some brewing products already.

— Republished from BrewingTechniques' July/August 1993.

Reference

(1) J. Paik, N.H. Low, and W.M. Ingledew, "Malt Extract: Relationship of Chemical Composition to Fermentability," J. Am. Soc. Brew. Chem. 49 (1991).
(2) D. Fink, "Brew News," Zymurgy 13 (5), 15 (Winter 1990).
(3) D. Fink, "Brew News," Zymurgy 14 (2), 14 (Summer 1991).
(4) D.E. Briggs, J.S. Hough, R. Stevens, T.W. Young, Malting and Brewing Science (Chapman and Hall, London, 1981).
(5) G.J. Fix, Principles of Brewing Science (Brewers Publications, Boulder, Colorado, 1989).
(6) G.J. Fix, "Diacetyl: Formation, Reduction, and Control," BrewingTechniques 1 (2), 20-25 (1993).
(7) M. Meilgaard, "Wort Composition," in The Practical Brewer (Master Brewers Association of the Americas, Madison, Wisconsin, 1977).