



Don't seem to grow everything he needs for brewing. We think he just filled a well.

BEER BASICS

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BARLEY

BARLEY-SWEET SWEET BARLEY

Our first look at the four primary ingredients in beer delved into hops. Now it's barley's turn to bat. Hops create beer's decorative, attention-grabbing fresh aroma and biting bitterness. Malted barley, on the other hand, is the soul of beer, providing the foundation from which it all begins.



THE BEGINNING OF MALT

Every year fine-hearted farmers plant barley, an annual plant that yields animal feed and, among other things, kernels that are turned into malt. Barley is a cereal grain and a member of the grass family Poaceae. It is also one of the most commonly cultivated cereal crops in the world.

Even though malted barley is the most common ingredient in beer, the grains of the barley plant are more reluctant to give up their sugars than, say, grapes. In malting,

barley is soaked in water for a couple days and allowed to germinate for about a week. The kernel develops and gets ready to sprout, as if it was going to live off its own sugars in the ground. At this point a drying process stops the germination, preserves the sugars in the barley kernels, and completes the malting procedure.

As you can imagine, the variety in methods and sizes of malting facilities is surpassed only by the variety of malts they produce. Some traditional methods involve getting the sacks of barley wet in a crystal spring, or hand spreading the germinating malt across an old stone floor, while more modern methods involve mechanized large-scale maltsters where machines do massive amounts of work.

One method of drying worth mentioning is one that would have been very common in pre-modern societies. Barley was often dried over wood fires, and the smoke infused itself into the grains. The beers possessed a smoky character that the drinkers would have considered necessary in their brew. This was, of course, until other methods that were capable of producing lighter, cleaner malted barley became available. Non-wood-fired malting was a step towards the crisp clear pilsner style which subsequently took over the world. There are, though, breweries today (most notably in the quaint historic German town of Bamberg) that still smoke their malt over beechwood and produce delicious, compelling Rauchbiers (smoked beers).

BRIEF TIMELINE

To learn when barley cultivation was first recorded we look back thousands of years, perhaps as far as 9,000 B.C. Barley has been used by humans much longer than hops, which weren't commonly used until around 1,100 A.D.

It is possible that barley was used in the first primitive form of fermented cereal grain liquid. It is also possible that another grain such as millet, sorghum, oats, wheat, or corn was used. In Egypt, there are recorded references to alcohol as early as 5,000

B.C. We can only speculate as to the actual discovery of fermented grain water, but that shouldn't stop us from imagining scenarios.

What was this ancient beer like? Most likely, it would taste terrible to our palettes. The theory goes that a bowl of grain or piece of bread was accidentally left out in the rain. Once wet, the grain could have started to sprout and produce sugars. If the grains were sitting in water the sugars could have seeped into the water and been fermented spontaneously with wild yeast. Some daring soul, rather than toss the stinking mess, decided to taste it. One can only imagine that very first alcohol buzz. Apparently, our imagined hero liked it, and soon began "accidentally" leaving more bowls of grain out in the rain. The rest, as it goes, is history.



GROWTH HARVEST



Barley is more tolerant of varying climate conditions than our beloved hops, which only thrive between certain parallels of latitude. In fact, barley will grow in places where most other cereal grains will not. It is grown on a wide scale in Russia, Australia, Germany, Turkey, and North America. Due to its ability to grow in many different climates it is also found in places such as Alaska, Iceland, Norway, Algeria, India, Switzerland, and Chile. In the US, Canada, and most of Europe, barley is sown in the spring, whereas in countries surrounding the Mediterranean Sea it is sown in the fall. In some countries, a short winter crop may also be grown.

The top three barley-producing countries are Russia, Canada, and Germany. Rounding out the top 10, not necessarily in order, are France, Ukraine, Turkey, the United Kingdom, USA, Australia, and Spain.

If their barley is to be used for malting, the farmers wait until the stocks are very ripe and uniformly mature. The grain is harvested with... (wait for it...) harvesting machines. If sheaves are dry enough they are moved indoors out of the rain as dampness will lessen the quality of the crop.



We request you drink a beer while you read.

FROM PALE TO BLACK PATENT

Barley can be categorized into two, four, or six row barley depending on how the kernels are arranged in the head. Four-row barley is unsuitable for brewing, leaving two or six-row to be malted and made into beer. Two-row has become the most commonly used form due to a higher extract yield and comparatively easier use in brewing. Six-row barley, though, can be used and is often called upon when making beers that utilize adjuncts such as corn or rice.

The greatest variety in barley comes not just from type, though, but from the differences in malting techniques. After the barley is allowed to sprout and germinate, it is kilned. The kilning can be done at different temperatures or for different lengths of time. Some malts are very light in color while others are as black as espresso beans. The lightest kilned barley can produce golden beers such as pilsners with a soft, clean, lightly-sweet malt quality. British pale malt is kilned just slightly more to impart more color and perhaps more bread, biscuit notes. Pilsner malts kilned even a bit more might turn into reddish Vienna or Munich malts. There are many more steps along the way, but on the “almost carbonized” end of the spectrum are heavily roasted malts like chocolate, black patent, and roasted barleys.

Brewers use these malts in moderation to give beers like porters and stouts their chocolate, dry, coffee overtones and motor oil-like deep black colors.

Furthermore, malted barley can for the most part be divided into either base or specialty malts. Base malt is where the majority of the fermentable sugar comes from and makes up 80 to 100% of the malt bill for most styles. There are many types of base malt, but the number of different specialty malts available to brewers is even more mind boggling.

Specialty malts can influence a beer’s flavor, color, body, aroma, and

mouthfeel, but do not always contribute much in the way of fermentable sugars. A beer with a higher percentage of certain specialty malts, perhaps like some stouts, might end up with more unfermentable sugars that give the beer a fuller, sweeter mouthfeel and flavor. Often this is intentional, but it depends on what the brewer intends to make. Knowing what the different malts do, even in small amounts, is critical in recipe design.



Cereal makes us think of Captain Crunch or Frosted Flakes.

What makes specialty malts special? It’s all in the malting, baby. Let’s take a closer look at two specialty malts.

CRYSTAL – Crystal malts are prepared separately from Pale malts (a simple base malt) and are wetted and roasted in a rotating drum before kilning at medium-high temperatures up to 320-degrees. The sugars in the malt are rendered unfermentable and beers made with Crystal malt may have more residual sweetness, intentionally so. These malts come in a range of colors and can darken a beer to suit the brewer’s preference.



CHOCOLATE – Chocolate malts are dried at a low temperature, like base malts, but kilned at high temperatures over 400-degrees. Chocolate malt does not actually produce a chocolate flavor, but creates an acrid, bitter taste that, when used in the right proportion, can add complexity and dark color to beers like porters, stouts, dunkels, etc.



Brewing with OTHER GRAINS

Malted barley is the most commonly used grain to produce what we know of as beer. Often, though, other grains are added to make up a portion of the mash. A brewer might use just a touch of rye, for example, to give an IPA a little extra zip. A brewer might use almost 50% or more of a different grain, such as wheat, to create a specific style of beer like a German Hefeweizen.

Here are some of the grains that you might also find in beer:

WHEAT – Hefeweizens, Wit beers, and Lambics are just a few styles that use wheat.

RYE – Roggenbier is a German style that uses a fair amount of rye, but other craft brewers have taken to making hoppy beers with rye. It can add an earthy tang.

OATS – Oatmeal stout is one example of a style that uses oatmeal.

CORN – Certain lighter lager styles often use corn as part of the grist. It can add alcohol without increasing the body like more malted barley would.

RICE – See ‘Corn’ above.

SORGHUM – Genus of grasses that are employed in making the gluten-free beers that have become more common.

SOBA - Japanese Buckwheat usually in form of brown noodle. Rogue uses it in their Morimoto Soba Ale.



OTHER FERMENTABLES BESIDES GRAIN

Grains are the most common product used in beer, but brewers also use other ingredients to provide sugar for the yeast.

FRUIT – Belgian lambic brewers have used cherries or raspberries to create Kriek and Framboise. San Francisco brewers 21st Amendment are known for their Watermelon Wheat. Surly Brewing's second-Anniversary Beer Two is a stout made with cranberries. Countless other breweries, brewpubs, and homebrewers use any imaginable fruit in their beers to create unique and experimental flavors. You name it and it has been used (peach, kiwi, blueberry, cranberry, etc).



WHITE OR BROWN SUGAR – Belgian brewers also use candi sugar in strong abbey ales. Certain English styles use invert sugars to boost specific gravity without altering the flavor. While beer made with too much simple sugar begins to taste less than great, small amounts are fairly common.

HONEY – This might be one of the oldest simple sugars used in beer you very likely have had a Honey Wheat or Honey Porter or some other beer made with honey. (Mead is a wonderful alcoholic beverage made exclusively by fermenting honey water.)

MOLASSES – This is sometimes used in stouts, porters or brown ales to add a rich, bold character. Moderation is key when using molasses, as too much can make a beer somewhat unpleasant.

MAPLE SYRUP – Nut Brown Ale is at least one style in which maple syrup is occasionally used to provide a unique flavor component, and I'm sure homebrewers have used it in many other styles.

STARCHY FOODS LIKE POTATOES, YAMS, PUMPKINS, ETC. – People have not always had the luxury of making all-malt beer, and have filled the grain bill with other sources of sugar. Pumpkin ales are a favorite seasonal beer and some are actually made with real pumpkins as opposed to just pumpkin spices.



BARLEY INTO BEER

Once the barley is grown, harvested, malted, and left to sit in a brewery silo or pile of 50-pound sacks, it is time to make beer. The first step is to mill the barley to crack the husk. This allows water to penetrate to the inside of the kernel.

The crushed grain is mixed with hot water and held at different temperatures depending on what the brewer is making. The hot water allows the enzymes in the malt to break down the starches in the grain into fermentable sugars. This mash typically lasts at least an hour and, might I add, creates a wonderful sweet grainy aroma in the basement of a homebrewer's residence on a fine Saturday morning.

After the mash the sweet sugar water ("wort") is drained from the grains ("lautering") and sent on its way to the boil kettle. The grains are rinsed with hot water ("sparging") to collect as much of the sugar as safely possible. Once the wort is collected in the brew kettle and brought near a boil, hops are added and the wort is boiled for an hour or more. The wort is cooled and strained into fermenters, yeast is pitched, and beer is born.

Let's take a minute to discuss malted barley and homebrewing. Most commercial brewers will use the grains of barley in a mash. Homebrewers, however, commonly begin the hobby using barley malt extract before possibly graduating to "all-grain" brewing (considered more involved and difficult but possibly yielding better results). To make malt extract, a normal mash takes place and the wort is collected. Then some of the water is evaporated to produce a thick, molasses-like syrup. Dry malt extract has had all of the water evaporated and is a sweet, sticky powder. A few commercial brewers use malt extract too, but it is generally more expensive to use in bulk than barley grains.

Whether they use extract or all-grain, brewers creatively and ingeniously use all of the different malts to formulate beers that either hold up style guidelines or smash through them, resulting in the wonderful variety of beers available in nearly every market today. The next time you hear "America the Beautiful" you might smile quietly to yourself when singing about her "amber waves of grain."¹⁵



Special thanks to Northern Brewer homebrew supply store St. Paul, MN for permission to take photographs in their grain room.