

Base Malts 101

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“Malt does more than Milton can to justify God’s ways to man.” -- A. E. Housman

Defining Base Malts

Barley is the major grain used in beer making. Malting is the process of preparing the barley for brewing. Barley that has been malted is referred to as “malt.”

The basis for nearly every beer recipe, base malts compose the majority of the total grain bill. They are usually the source of most of the starch-bursting power in any recipe, due to their higher diastatic power. This provides them with the high levels of enzymes needed to convert complex starches into fermentable sugars. As the bulk of the malt in any recipe, this also means that base malts are the primary contributor to the malt flavor of the finished beer.

- 1) **Must be mashed** – All base malts must be mashed in order to convert their starch into fermentable sugars and dextrins, to continue the enzymatic breakdown that was begun during the malting process. In order for the long-chain sugars to be broken down to the size which the yeast can consume, these malts must be mashed.
- 2) **Diastatic power** – Base malts are higher in enzymes than specialty malts – they generally provide majority of diastatic power for all-grain recipes.
- 3) **Fully modified** – Virtually all modern base malt varieties available to US homebrewers are fully modified, indicating that they have sufficient enzymatic viability to mash both themselves and a fair percentage (20-40%, depending on variety) of adjuncts or non-enzymatic grains.

What does base malt bring to your beer?

- 1) **Carbohydrates** - Sugars for the yeast to convert to alcohol and dextrins for residual sweetness and body. Sugars are small, simple carbohydrates, while dextrins are larger, unfermentable carbohydrates.
- 2) **Proteins** – Amino acids (very small proteins), which assist in yeast vitality, as well as medium sized proteins for head retention and body/mouthfeel.
- 3) **Flavor Compounds** – These compounds are produced by kilning the starches and sugars in the malt.
 - a) Raw barley is virtually flavorless (think Beef Barley Soup – what does the barley taste like?)
 - b) Malting of barley develops some flavor properties, but air-dried barley is still very bland.
 - c) All the flavors we associate with malt – sweet, bready, malty, nutty, roasty, toasty, etc. – are the result of chemical reactions that take place while kilning.
- 4) **Color** – The yellow, reddish or brown tints to a beer comes from the melanoidins that are formed during the malting process. These are extracted from the grains during the mash, and often increase their intensity when exposed to the heat of the boil.

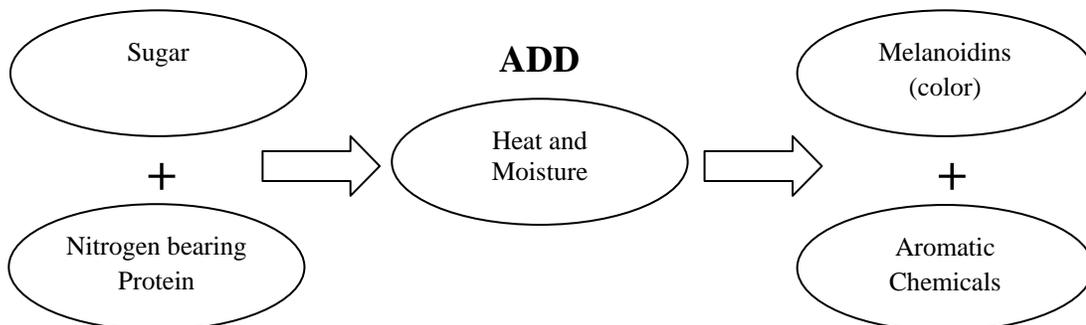
The Malting Process

The malting process is often referred to as “controlled germination,” due to the fact the process harnesses the basic germination cycle of the barley acrospire. Raw barley contains carbohydrates and proteins, but not in usable form. They are much too big and complex for beer making. **Malting** begins the process of reducing the size and complexity of these molecules. **Mashing** finishes the process.

- 1) **Harvested Barley** – Incoming grain is received by the maltster.
 - a) **Dresser** – This device is designed to remove stones, straw and any other debris.
 - b) **Drier** – Grain is then dried to achieve the desired 12% moisture level to begin the process.
 - c) **Storage** – Grain is then stored until ready for steeping process to begin.
- 2) **Steeping** – Barley is soaked in a vat or tank for 2-3 days, during which time the water is changed out several times. The moisture content of the grain rises from 12% to over 40%.
- 3) **Germination** – Barley is then cast into a heap on the floor of the malting house, where the grains begin to germinate. Germination requires a continuous supply of oxygen, so the grain is “turned” periodically over the course of 4-6 days.
 - a) **Enzymes** in the grain begin to break down the protein matrix and the starch molecules, turning them into smaller chain molecules. Proteins and starch molecules in the grain become smaller and softer.
 - b) **Modification** is the enzymatic breakdown of proteins and starches. As modification proceeds, more enzymes are formed, thus more modified equates to more enzymes.
- 4) **Kilning** – When modified to the appropriate degree, the malt is dried with warm air in a kiln, stopping the modification process. This brings the overall moisture percentage back down, usually under 5%. Total kilning process take 18-24 hours.
 - a) At first, the temperature of the kiln is kept low to prevent the destruction of the enzymes in malt. Later, when the grain is almost dry, and the enzymes can handle more heat, the temperature is increased for **curing**.
 - b) Some grains are modified more than others, but almost all modern malts are “**fully**” **modified**.

The Science of Malt: the Maillard Reaction

Also known as non-enzymatic browning, the Maillard reaction is at the core of the formation of the flavors we often associate with beer. This chemical reaction between an amino acid and a reducing sugar in the presence of heat is vitally important in the preparation and presentation of many types of food. In fact, this is the same reaction that is responsible for caramel, the crust on bread, meat browning, the darkening of toast, and the browning of roux.



Measurable characteristics of Malt

There are a number of characteristics of malt that are most important to homebrewers, and these have been included for the majority of the base malts listed below. They are listed here:

- 1) **PG** = Potential Gravity. The amount of sugar produced by mashing 1 pound of grain in 1 gallon of water under perfect conditions (100% efficiency).
- 2) **Color** = Measured in degrees Lovibond (Lov.) or European Brewery Convention (EBC)
- 3) **Diastatic Power** (measured in degrees Lintner) – A malt with enough enzymes to self-convert has 35 degrees Linter. The most enzymatic malt, US 6-row barley, can get up to 160 degrees Linter.
- 4) **Protein level** – Any base malt with protein levels above 11% may cause some degree of chill haze in the finished beer, unless a protein rest is utilized during the mashing process.

North American Base Malts

As a result of the shorter kilning, American malts are very light in color so they would be more suited to the production of straw-colored beers. They also have more enzymes so that a brewer can use more adjuncts such as corn, rice, and non-malted wheat and barley.

<p>US 2-Row Pale Malt (Domestic)</p> <p>PG 1.037-1.038 1.8 Lov. Diastatic: 140 Lintner Protein: 12-13%</p> <p>Common name: Klages.</p>	<p>A variety of malt that forms two seed rows along the stem on the grain head. Well modified with a high diastatic power allows mashing with up to 35% grain adjuncts. Because it is high in diastatic power, well modified and fairly neutral, 2-Row makes an excellent base malt and is known as the "workhorse" of many recipes. The basic malt for brewing all grain beers from scratch.</p> <ul style="list-style-type: none"> • Protein rest recommended to avoid chill-haze. • Greater starch per weight ratio than 6-Row. • Produces virtually no sulphur flavors associated with Pilsner malts. • Best for both American Lager and Ale styles, Klages lends itself well to all beer styles.
<p>6-Row Pale Malt (Domestic)</p> <p>PG 1.035 1.8 Lov. Diastatic: 160 Lintner Protein: 13%</p>	<p>This malt variety forms six distinct seed rows on the grain head. Very high diastatic power allows mashing with up to 60% grain adjuncts, great if added diastatic strength is needed in a recipe. 6-Row also has greater husks per weight ratio than 2-Row, so could be better for mashing with huskless grain (like wheat).</p> <ul style="list-style-type: none"> • Protein rest recommended to avoid chill-haze. • Higher in enzymes than 2-row, making it useful with low-enzyme adjuncts; intended for high-adjunct American beers. • High in protein, which can lead to increased trub as well as haze problems in finished beer. • Grainy flavor, rather than malty. Many brewers feel 2-row is mellower.
<p>Canadian Pale Malt (Canadian 2-Row)</p> <p>PG 1.037 1.9-2.0 Lov. Protein: 12%</p>	<p>European style base malt for any beer.</p> <ul style="list-style-type: none"> • Very low protein giving better extract, and finished beer is less likely to have a haze. • Good "all-purpose" malt for brewing in a variety of styles.

English Base Malts

Due to longer kilning to ensure complete modification, English Pale Malts tend to be darker than Pilsner malts and the American malts. This longer kilning also denatures (kills) some of the enzymes, resulting in a malt that is somewhat less capable of handling adjuncts – as a general rule, keep those under 15% of the grist when using English base malts.

<p>English Pale Malt (European 2-Row)</p> <p>PG 1.038 2.5 Lov. Protein: 9-11%</p>	<p>Fully modified British malt, easily converted by a single temperature mash. Preferred by many brewers for full flavored English ales. This pale ale malt has undergone higher kilning than Klages (Domestic 2-row) and is lower in diastatic power so keep adjuncts to a lower fraction of grain bill (preferably 15 % or less).</p> <ul style="list-style-type: none"> • Higher color and malt character than North American pale malt and European and pilsner malts. • Produces virtually no sulphur flavors associated with Pilsner malts. • Well suited to single-temperature infusion mash • Used to produce traditional English and Scottish style ales.
<p>Maris Otter Pale Malt (European 2-row)</p> <p>PG 1.038 3.5-4.5 Lov. Protein: 10.5%</p>	<p>A premium base malt for any beer, this variety of barley has long been the favorite of the English brewers for its rich flavor and very forgiving brewing performance. In the field, it is lower yielding than the more modern varieties, so it is grown under contract to many malt houses in the UK. In the brewhouse, excellent yields and efficient run-off make it the malt of choice for producing English style beers. This malt is produced in traditional floor malting or Saladin boxes.</p> <ul style="list-style-type: none"> • Use up to 100% of total grist.
<p>Golden Promise (European 2-row)</p> <p>PG 1.038 2-4 Lov. Protein: 9.5%</p>	<p>Scottish pale malt, essentially the Scottish equivalent of Marris Otter. A superior base malt for all Scottish beers, as well as most English style ales. Also used extensively by premium whisky distilleries such as The Macallan.</p> <ul style="list-style-type: none"> • Use as up to 100% of grist. • Superior, rounded malty flavor makes this malt an excellent choice for Bitters and other English-style ales. • Producer: Thomas Fawcett.
<p>Mild Ale Malt (European 2-row)</p> <p>PG 1.037 2.3-3.2 Lov. Protein: 10.5%</p>	<p>Once a very commonly used grain for the production of British Mild, this grain is less frequently used in modern brewing. Dry, nutty malty flavor. Promotes body.</p> <ul style="list-style-type: none"> • Enough enzymes to convert itself and a small portion (10%) of adjuncts. • Used in English mild ales, barleywines, old ales.

Continental Europe Base Malts

In beers with little specialty malt, European grains provide more complex palate and rounder flavor—very useful when trying to duplicate European style ales and lagers.

<p>German Pilsner Malt (2-Row, Pilsner Malt)</p> <p>PG 1.037 1.6-1.8 Lov. Protein: 9.5-11%</p>	<p>A quality German 2-row pale malt. Produces a smooth, grainy flavor. Best for German Lagers and Alt Beers.</p> <ul style="list-style-type: none"> • Sufficient enzymes to convert its own starch and 15–20% adjuncts. • Infusion mash OK; decoction gives slightly higher color, malt flavor and yield. • Produces sulphur flavors (from dimethyl sulfide) typical of lagers; more intense in the German malt. This is partly a function of the barley strain, but it is also accentuated by the lower kilning. Those sulfur compounds are very volatile and would be driven off by higher temperatures.
<p>Belgian Pilsner Malt (European 2-Row)</p> <p>PG 1.037 1.8 Lov. Protein: 10.5%</p>	<p>An excellent base malt for many styles, including full flavored Lagers, Belgian Ales and Belgian Wheat beers.</p> <ul style="list-style-type: none"> • Light color, malty flavor. • Excellent for pilsners, dubbels, tripels, whites and specialty ales.
<p>Belgian Pale (European 2-Row)</p> <p>PG 1.038 3.25 Lov. Protein: 10-11.5%</p>	<p>Although this malt is Belgian, it has classic English character (very similar to Maris Otter). Well suited to both Belgian and English ale brewing.</p> <ul style="list-style-type: none"> • Higher color and malt character than North American and pilsner malts. • Produces virtually no sulphur flavors, such as those associated with Pilsner malts. • Sufficient enzymes to convert its own starch and 10–15% adjuncts • Commonly used as a base malt for any Belgian style beer with full body.

High-Kilned Malts

High-kilned malts are quite similar in production methodology to pale malts, but are generally kilned at higher temperatures and for longer periods of time, resulting in a deeper, darker color and more intense flavors and aromas. These malts typically dry have a very low moisture content, producing sweeter flavors and fewer fermentables, but still retaining some of its enzymatic capabilities.

- Retain sufficient enzymes to convert themselves but no additional adjuncts. Most varieties can even be used as malt in a recipe.
- When used in conjunction with pale malt, even small quantities (10%) will increase flavor and complexity.
- Must be mashed to produce fermentables, but extract brewers can steep for flavor and aroma.
- Malts provide a rich sweet flavor and aroma. They are most commonly found in dark German lagers, such as Vienna/Maerzen/Oktobefests, Munich Dunkels and Bocks.

<p>German Vienna Malt</p> <p>PG 1.035 2.8-3.9 Lov. Protein: 9.5-12%</p>	<p>German Vienna is high in diastatic power, meaning you can use it as 100% of the total grist for a fuller, deeper malt flavor and aroma. The flavor is rich, aromatic, malty, and grainy, and the grain provides deep golden color. Can replace pale malt as base malt.</p> <ul style="list-style-type: none"> • Favored styles: Dortmund, Maibocks, Vienna, and Marzen beers, as well as Golden Ales and Amber lagers. • Can be used at up to 100% of total grist. • For Pilsner beers, use 10 - 30% Vienna Malt for color and malty flavor. • For amber beers, use 60 - 90% Vienna Malt along with a percentage of Crystal Malt.
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<p>Vienna Malt (Domestic)</p> <p>PG 1.034 3.5-4 Lov. Diastatic: 130 Lintner Protein: 13%</p>	<p>A rich, aromatic malt that is kiln dried at a higher temperature than pale malt yet still retains sufficient enzyme power for use as 60 to 100% of total mash grist. Domestic Vienna has similar characteristics to German Vienna, but is slightly darker. Can be used in place of standard Brewers Malt as the base malt in a brew. This malt contributes a slightly more malty, grainy flavor and a slightly deeper golden color than standard Brewers Malt.</p> <ul style="list-style-type: none"> • Increases malty flavor, lends a deep color and provides balance. Use in Vienna, Marzen and Oktoberfest, as well as ales. • The increased malty flavor also balances nicely with higher-hopped, higher-colored and fuller-bodied beers. • May be used as a base for all beer styles. • Sufficient enzyme power for use as 60 to 100% of total mash. • Can even be used for hoppy ales: <i>Victory Hop Devil</i> is a prime example.
<p>Münich Light Malt (German Munchener)</p> <p>PG 1.034 5-7 Lov. Protein: 9.5-12.5%</p>	<p>A true Munich variety that has undergone higher kilning than the pale malt. German Munich still retains sufficient enzymes for 100% of the grist, or it can be used at the rate of 20 to 75 % of the total malt content in Lagers for its full, malty flavor and aroma. Higher diastatic power than US Munich, making it more suitable than US Munich for the production of beers that use large amounts of Munich malt (85% or more).</p> <ul style="list-style-type: none"> • Gives deep color and rich, full malt character. • Provides enhanced dark beer body and aroma, and a malty, nutty flavor. • Can be used at up to 100% of total grist. • Essential malt for Oktoberfest and Vienna style beers. Useful in making Dark Ales and Lagers, Bock beer, Oktoberfest, Stout, Schwarzbier, Brown Ales and Amber beers.
<p>Münich Dark Malt (German Munchener)</p> <p>PG 1.034 8-11 Lov. Protein: 9.5-12.5%</p>	<p>A true Munich variety that has undergone higher kilning than the pale malt. German Munich still retains sufficient enzymes for 100% of the grist, or it can be used at the rate of 20 to 75 % of the total malt content in Lagers for its full, malty flavor and aroma. Higher diastatic power than US Munich, making it more suitable than US Munich for the production of beers that use large amounts of Munich malt (85% or more).</p> <ul style="list-style-type: none"> • Gives deep color and rich, full malt character. • Provides enhanced dark beer body and aroma. • Can be used at up to 100% of total grist. • Essential malt for Oktoberfest and Vienna style beers. Useful in making Dark Ales and Lagers, Bock beer, Oktoberfest, Stout, Schwarzbier, Brown Ales and Amber beers.
<p>Münich Malt (Domestic)</p> <p>PG 1.034 8-12 Lov. Diastatic: 40 Lintner Protein: 11.5%</p>	<p>Darker than German Light Munich malt, Domestic Munich adds a deeper color and fuller malt profile. An excellent choice for Dark and amber lagers, blend Munich with German Pils or Klages at the rate of 10 to 60% of the total grist. It adds a pronounced malty, grainy flavor to beers without adding non-fermentables or affecting the foam stability and body. Small amounts added to the mash-in will improve the malty flavor and give a richer color to low gravity brews.</p> <ul style="list-style-type: none"> • Similar to continental Munich, but darker. Provides a modest color increase toward the golden to orange hues. • Used in small quantities will intensify beer's malt character. Sweet, toasted flavor and aroma. • Much lower diastatic power than European varieties. If Munich is going to make up large portion of grist, continental Munich (see above) is better choice. • Excellent malt for Oktoberfests and malty styles. Essential ingredient in German Bock beers. • Darker grades of Munich are available from continental maltsters.

Wheat Malts

Unlike barley malts, wheat malts are huskless, so they must be mashed with properly milled barley malt to avoid stuck run-off. In cases where a large fraction of wheat is used, a sparging aid such as oat hulls may be advisable. Alternately, the brewer can employ a beta-glucan or “acid” rest (105F) to help break down the sticky beta-glucans that often are produced by a largely wheat mash.

- Grainy flavor; lighter flavor than barley malt.
- More enzymes than barley malt, but slower to convert.
- Some beer styles (such as hefe-weizen, American wheat beers, and Belgian Witbiers) are made with large amounts of wheat malt (30–70%).
- Typically higher in protein than barley, so beers with high percentage of wheat are more likely to have a haze. A protein rest can alleviate this problem.
- When used in small amounts (3–5 %), assists with head formation & retention.
- Must be mashed to produce fermentables, but extract brewers can steep for flavor and aroma.

<p>Wheat Malt (Domestic)</p> <p>PG 1.038 2 Lov. Protein: 13%</p>	<p>Use to make wheat and weizen beers at 40-60% for wheat and 35-65% for Bavarian weizens. In small amounts (about 3-6 %), aids in head retention to any beer without altering final flavor. Often combined with high enzyme malts such as Klages.</p> <ul style="list-style-type: none"> • Use with a highly modified malt to insure sufficient diastatic enzymes. • Protein rest highly recommended due to very high protein content. • Imparts a malty, grainy flavor. Excellent for American wheat beers, weizenbocks and doppelbocks.
<p>Wheat Malt (German)</p> <p>PG 1.039 1.5-2.3 Lov Protein: 10.5-13.5%</p>	<p>German Wheat malt is the perfect ingredient for Weiss, Weizen and Berliner Weiss beers. Blended in proportions of 20 to 70% with pale malts, weizen malt is the perfect companion for German wheat strains for a full flavored, classic wheat beer. In Germany, a weizen must be of at least 50% wheat malt, as measured in the final beer. This means if a weizen is made of 55% wheat, and subsequently krausened with say Helles krausen, the amount of krausen must not reduce the final proportion of wheat to below 50%.</p> <ul style="list-style-type: none"> • Lighter colour & flavor than domestic wheat malt, making it a better choice than domestic for continental styles (hefe-weizen, dunkelweizen, Belgian Wit). • More highly modified than domestic wheat. • Imported varieties have lower protein levels. • Light flavor and creamy head.
<p>Dark Wheat (German)</p> <p>PG 1.039 6-8 Lov Protein: 10-14%</p>	<p>Similar to Light Wheat in flavor, but produces a darker, slightly more malt beer. The perfect ingredient for Dunkelweizen and Weizenbock beers.</p> <ul style="list-style-type: none"> • Darker colour & flavor than domestic wheat malt, making it a better choice than lighter strains for dunkelweizen. • More highly modified than domestic wheat. • Imported varieties have lower protein levels. • Light flavor and creamy head.

Other Base Malts

<p>Rauch Malt (Smoked Malt)</p> <p>PG 1.037 2.1-3.6 Lov. Protein: 10-13%</p>	<p>German “green” malt is smoked over a beechwood fire for a drier, sharper, obvious more wood-smoked flavor (some US brewers use malt smoked over Adler). Depending on the amount of smoking, the malt can be used in 100% of the mash, as some Bamberg brewers do, or used as a flavoring malt in the 10-30% range. Imparts a distinct smoked character.</p> <ul style="list-style-type: none"> • Imparts a distinct smoked flavor and aroma commonly found in German Rauch beers. • Different smoking woods will impart different flavor profiles. • Used for rauchbier, kellerbier, smoked porters, Scottish ales, Alaskan-style smoked porters and barleywines.
<p>Rye Malt (Domestic)</p> <p>PG 1.029 2.8-4.3 Diastatic: 105 Lintner Protein 10-13%</p>	<p>Dry, rye flavor and character. Sufficient enzymes to self-convert, so it can use as base malt. Rye contains a starch that can be gelatinized at mashing temperature and convertible to fermentable sugars, but the mashing process can also turn the high levels of protein into a sticky mess. Use with caution at high quantities!</p> <ul style="list-style-type: none"> • Unlike barley (and similar to wheat), rye has no husk, and also absorbs water comparatively quickly. Combined with the grain’s high beta-glucan content, this can often result in stuck mashes. A beta-glucan rest is strongly recommended. • For seasonal beers, roggenbier and ales. • Lends biscuit-like, smooth, almost oily rye component to finished beer.
<p>Acidulated (Sauer) Malt (European 2-row)</p> <p>PG 1.033 1.7-2.8 Lov.</p>	<p>Malt that contains high levels of lactic acid. This leads to a better mash working , intensified fermentation, lighter Pilsner color, improved flavor stability, and "well-rounded" beer flavor.</p> <ul style="list-style-type: none"> • Originally used to adjust pH in cities with extremely alkaline water, Acid Malt helps to reduces pH of the wort. • Best for use in making Pilsner, Light Beer, "Schankbier," and Wheat Beer. Sometimes used for lambics, sour mash beers, and Irish stout. • Use up to 10% of total grist.

Final thoughts

- 1) **Shelf life** of most base malts is 18 months, if properly stored under dry conditions. This is for uncracked grains only – pre-cracked grains have a much shorter shelf-life and should be used within a month if possible.
- 2) **Can good beer be made with 100% base malt?** Absolutely. A few examples are listed below:
 - a) Pilsner Urquell
 - b) Duvel
 - c) Thomas Hardy’s Ale
 - d) Lee’s Harvest Ale
 - e) Hundreds of others!

APPENDIX

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Common Maltsters (available to US homebrewers):

Baird's Malt Ltd. (Con Agra) – Located in the UK, the Hugh Baird Malting company was one of the world's best suppliers of specialty malts. They recently merged with Moray Firth Maltings to form Baird's Malt Ltd.

Bairds Malt Limited
Station Maltings, Station Road
Witham, Essex, UK
CM8 2DU
www.bairds-malt.co.uk

Briess – Wisconsin-based maltster is one of the primary suppliers of grain to the US microbrewing industry.

Briess Malt & Ingredients Co.
625 S. Irish Rd. / PO Box 229
Chilton, WI 53014
www.briess.com

Cargill – Brewing grain arm of agricultural conglomerate Con Agra, Cargill imports and produces a number of the grains that are used by US homebrewers today. Brand portfolio includes Canada Malting Co., Ireks, Schrier, Pauls Malt, Dingemans, and Warminster.

Cargill, Incorporated
PO Box 9300

Minneapolis, MN, 55440-9300
www.cargill.com

Canada Malting Co.
21 Four Seasons Pl, Suite 325
Toronto, Ontario
www.northamericanmalt.com

Crisp Malting – English Malthouse in County Norfolk, England, Crisp exports the distinctive Marris Otter brand of 2-row English malt to North America. Established in 1890.

Crisp Malting
Great Ryburgh, Fakenham, Norfolk, England.
NR21 7AS
www.crispmalt.info

Gambrinus Maltings – This small Canadian maltster produces some of the finest 2-row in the world, including the almost forgotten *bruhmalt*, a.k.a. Honey Malt, a pale malt that imbues the beer with a honeyed flavor and aroma.

Gambrinus Maltings
1101 Industrial Dr.
Armstrong, B.C., VOE 1B0
www.specialtymalts.com/gambrinus

Great Western Malting – GW's 2-row pale malt is widely regarded as the finest 2-row made in the USA. This grain is used as the base malt for many of the largest microbreweries on the West Coast.

Great Western Malting (includes Hugh Baird)
PO Box 1529, Vancouver, WA, 98668
www.northamericanmalt.com

Muntons Malt – A division within Muntons plc currently selling over 210,000 tonnes of malt annually to the world's brewing, distilling and food industries. Much of Munton's focus these days is providing added value malt products to the food and beverage industries of the world, rather than focusing on pure malt production.

Munton's Malt (imported by Crosby and Baker)
Cedars Maltings, Stowmarket, Suffolk, IP14 2AG UK
www.muntons.com

Weyermann – Major producer of traditional German malts.

Weyermann® Specialty Malting Company
Brennerstrasse 17-19
96052 Bamberg, Germany
www.weyermann.de/eng/index.asp?sprache=2