

## UNDERSTANDING MALTING BARLEY ANALYSIS

Producing high quality malting barley is crucial to the growth of the craft malting industry. Barley should be tested at a lab that understands the quality factors that are important to maltsters and that uses standardized methodologies approved by the industry.

Malting barley is tested at the Upper Peninsula Research and Extension Center quality analysis lab utilizing the methods outlined by the American Society of Brewing Chemists – <http://methods.asbcnet.org/>. The lab participates in the ASBC check sample program to ensure confidence in results.

### MALTING BARLEY QUALITY PARAMETERS

The American Malting Barley Association (AMBA) has outlined [ideal commercial malt criteria](#) for an all malt two-row barley – the predominant market in Michigan, throughout the Great Lakes states, and eastern US.

Parameter	Preferred criteria
Plump kernels (on 6/64)	> 90%
Thin kernels (through 5/64)	< 3%
Germination (4ml 72 hr. GE)	>98%
Protein	≤ 12%
Skinned and broken kernels	< 5%

AMBA also recommends “barley that is mature, can break dormancy quickly without pre-germination and germinate uniformly. The hull should be thin, bright and adhere tightly during harvesting, cleaning and malting. Malted barley should exhibit a well-balanced, modification in a conventional malting schedule with four day germination. Malted barley must provide desired beer flavor.”

### PARAMETERS EXPLAINED

**Kernel plumpness and thin kernels** – A uniform kernel size ensures grain modifies (absorbs water) evenly when steeped. Too much variation, and a lot of barley may germinate unevenly. Furthermore, a plump barley kernel will contain a greater starch to protein ratio (desirable) than thin kernels. A [Sortimat](#) is used to determine the size and uniformity of a barley sample.

**Germination** – A set of germination tests is conducted on barley to determine germination efficiency. Samples are forced to germinate under a set of conditions. Barley should germinate uniformly and rapidly.

**Germination Energy (GE)** – Ability to germinate fully with vigor

**Germination Capacity (GC)** – Viability of kernels, determining potential germinative energy at some future date

**Water Sensitivity (WS)** – Numerical difference between 4.0 ml and 8.0 ml GE test, which examines the grain’s ability to germinate in the presence of minimal and excessive water, > 20% indicates water sensitivity and the malting process must be adjusted

## UPREC QUALITY ANALYSIS LAB

The malting barley quality analysis lab was established in 2016 through funding support from Michigan State University, Michigan Department of Agriculture and Rural Development, and the Brewers Association.

The lab only analyzes quality of malting barley grain, not processed malt.

The lab is located at the Upper Peninsula Research and Extension Center in Chatham, MI.

Mail barley samples to:  
E3774 University Drive  
Chatham, MI 49816

### PRICING:

Complete analysis (test weight, moisture, kernel plump & thin, germination tests, protein, pre-harvest sprout, and DON)

\$50/sample

Protein + DON only

\$30/sample

DON only (using Neogen Reveal Q+)

\$20/sample

Germination only (germination energy, capacity and water sensitivity)

\$20/sample

**Protein** – Protein impacts barley’s ability to modify and produce malt extract. Too much protein can also create haze in the resulting beer. Typically maltsters want barley between 9 – 12% protein. Variety does affect protein, but the most influential element is nitrogen fertility management during growth. Nitrogen fertilizer is crucial for plant health and yield, but too much can negatively impact desired protein content. Barley producers should soil test soil, account for crop history, and only apply the fertilizer necessary to achieve quality and yield goals. Protein is analyzed using near infrared transmittance technology.

*Two additional quality parameters important to the malting industry are DON and sprout damage. Although DON and sprout damage can be devastating to crop quality, often their effects cannot be seen with the naked eye.*

**Deoxynivalenol (DON)** – DON is a mycotoxin that is found in grain infected with *Fusarium* head blight (FHB). FHB can be a very destructive fungal crop disease and should be managed through preventative fungicide applications. High levels of DON indicates the presence of *Fusarium*, which can be detrimental to the malting process, pose human health concerns, and cause gushing in beer. Infected grain will likely have blackened and/or thin kernels, which adversely impacts yield. Most maltsters will reject barley over 1 ppm. DON is tested at the lab using Neogen’s Reveal Q+ technology – a quantitative lateral flow analysis. (*Note – methodology approved through GIPSA, but not ASBC*)

**Pre-harvest sprout (PHS)** – PHS occurs when mature grain is exposed to moisture, typically through precipitation. If grain does not have a high level of dormancy, often bred out of modern malting barley varieties, it can sprout in the field making it unsuitable for malt. Grain with minor sprout damage can be malted, however storage time is greatly diminished. A Rapid Visco Analyzer (RVA – stirring method) is used to determine the Rapid Visco Units, which translate to the degree of sprout damage. To avoid PHS, consider harvesting early, even if that means harvesting at a higher than optimal moisture level. Grain can be dried down in a bin using very low (< 100° F) or no heat to avoid killing the germ in the seed.

Risk of rapid germination loss in storage	RVA final viscosity RVU (units)
Low	≥ 120
Intermediate	≥ 50 & < 120
High	< 50

#### OTHER CONSIDERATIONS

It is very important to check with the malthouse you plan to sell your grain to first, in case they have additional quality parameters to meet, or if target values differ from those listed above. Often times, these requirements are outlined in a grain contract, which is strongly encouraged for this industry.

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## UPREC QUALITY ANALYSIS LAB

### SECURING A SOUND SAMPLE:

- Collect a representative sample that will reflect the quality of each lot or batch of barley that you intend to buy, sell, or malt.
- If you intend to combine fields or bins of grain, make sure a composite sample is taken that reflects that blend.
- Accuracy in your quality analysis will only be as good as the sample you submitted.
- One pound of grain (quart sized moisture proof storage bag) is all that is needed to run the quality analysis.

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Upper Peninsula Research  
and Extension Center

Research and resources  
can be found at:  
[msue.anr.msu.edu/topic/  
info/malting\\_barley](https://msue.anr.msu.edu/topic/info/malting_barley)