From Field To Glass

Brewing Beer With Local Grains

Presented by Andrea & Christian Stanley
The Grain of Beer

- All beer contains malted Barley or malted wheat
- Some beers use raw, unmalted barley or grain as an adjunct in addition to the malted grain.
- Malt gives beer color, taste, body, aroma, head, and with yeast alcohol.
The Malting Process

- Steeping
- Germination
- Kilning
- Additional Kilning or Roasting of Specialty Grains
**Maltsters**

- Traditionally a local, value added producer. Regions would have farmers growing barley, maltster and brewers.

- Since prohibition ended, malt houses have grown to malt factories – minimum batch size on the order of 150,000 pounds at a small facility.

- Our intention with Valley Malt is to bring malting back to the local level.
  - We are not the only ones, but probably the only ones in the Northeast.
  - On the West Coast, breweries such as Sierra Nevada, and Rogue are looking into growing and malting barley.
  - Small malt houses are also popping up: Rebel Malting in Nevada, and Colorado.
Our Vision

- Start with a 10 lb, Home Brew system today.
- Design and build a larger system over the course of the next 6 months to malt grains for the end of the year.
- Work with farmers and universities to develop compatible varieties for New England, and sustainable farming practices.
- Release our own beer line at the end of the year utilizing the malted barley that was grown and malted locally.
Barley

Range of acrospire length for full modification.

- Acrospire (grows)
- Rootlets
- Aleurone Layer
- Hull
- Endosperm

2r 6r
# Specifications of Malting Barley

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Viable For Malting</th>
<th>Not Suitable For Malting</th>
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<tbody>
<tr>
<td>Kernel Size</td>
<td>Plump (6/64” Dia.) – Uniform</td>
<td>&lt; 5/64” Diameter</td>
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<tr>
<td>Color</td>
<td>Light and Tan</td>
<td>Dark Brown to Black</td>
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<tr>
<td>Odors</td>
<td>Fresh – Grainy</td>
<td>Moldy</td>
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<td>Husks</td>
<td>In–Tact</td>
<td>Cracked or Peeled</td>
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<tr>
<td>Endosperm</td>
<td>Mealy and White</td>
<td>Glassy and Grey</td>
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<tr>
<td>Moisture Content</td>
<td>11 – 13.5%</td>
<td>&gt; 13.5%</td>
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<tr>
<td>Protein Content</td>
<td>Low to Moderate (11 – 12.5%)</td>
<td>High (&gt;12.5%)</td>
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<tr>
<td>Nitrogen Content</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>Germination Rate</td>
<td>95% Viable Kernels</td>
<td>&lt; 95%</td>
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<tr>
<td>Free of...</td>
<td>Disease, FHB, Insects, Chemicals, Frost/Heat Damage</td>
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Benefits of Growing Barley

- Offers erosion control
- Recycles nutrients
- Suppresses weed
- Tilth improving organic matter – Winter variety roots can be over 6’
- Can be used as a nurse crop
- Can be successfully no tilled
- Prefers a cool, dry growing season
- Can help to reclaim over worked, weedy or over eroded fields.
- Can be inexpensive to grow
- Yield from 2,000 to 3,000 pounds per acre
# Malting Barley Varieties

<table>
<thead>
<tr>
<th>Month</th>
<th>Cultivations</th>
<th>Drilling</th>
<th>Growing</th>
<th>Disease and Pest Control</th>
<th>Harvest</th>
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<td>September</td>
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<td>August</td>
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- **Winter Varieties**
  - Planted in fall, harvested in summer (9 to 10 month growing season)
  - Could prevent FHB

- **Spring Varieties**
  - Planted in spring, harvested in fall (4 to 5 month growing season)

- **Facultative**
  - Planted in spring or fall

- **What we see is needed**
  - Variety Trials
  - Farmers, Farmers, Farmers
  - Land with Farmers
  - Farmers with combines
Growing Malting Barley

- Soil
  - Medium texture
  - Loam, clay loam or silty-clay loam ideal
  - Can tolerate slightly acidic soils (> 6.0 pH)

- Seed
  - Certification and varietal purity

- Planting
  - Shallow (1 in.) seeding into a firm moist seed bed – early
  - 1.5 to 2 Bushels seed per acre/25 plants per square foot
  - Thin seeding results in heavy tillering and large heads in seeds

- Fertilization

- Harvesting
  - Must be fully mature
  - At least 18% moisture (13.5% moisture ideal)
  - Low cylinder speed – check regularly for skinned or broken kernels

- Storage
  - Cool, dry, clean – Insect and rodent free
  - Less than 70°F
  - Aerated
Malting to Brewing

MALTING

Cleaning/Sizing
Grain is cleaned to remove foreign material. Barley may be sized into different kernel fractions, since size impacts malting time.

Steeping
Grain is soaked in water for 1 to 2 days to promote rapid and uniform germination.

Germination
The steeped grain is germinated for 4-5 days. During this time enzymes are produced and structure of grain endosperm changes into a form more suitable for brewing.

Kilning
Grain is dried to low moisture. During final high temperature stages, malt colors and flavors develop.

BREWING

Mashing
Malt is extracted by combining with water and heat, and malt enzymes convert starch to sugars. Under ideal conditions 29-81% of malt is extracted. Sometimes a portion of malt is replaced with unmalted rice or corn.

Lautering/Filtration
Extract is separated from insoluble grain during filtration.

Boiling
Extract is boiled for about 1 hour. Hops are added to impart some bitterness and flavor.

Fermentation
Yeast is added to extract. Fermentation takes place for about a week.

Aging and Packaging
Beer is further aged, aged for several weeks, filtered, carbonated and packaged.
Detailed Barley Physiology