

## What is Malt?

 Malt is a source of carbohydrates, proteins and other nutrients which are fermented by yeast to produce wort.

Malted for beer is mainly produced from

barley.



# Why Barley?

- Source of starch (carbohydrate)
- Source of enzymes (which break down starch, proteins etc)
- Natural source of color
- Unique source of malty flavors and aromas traditionally associated with craft beer.
- Husk material provides a filter for wort clarification

# Malt can also be made with:

Rye

Wheat

**Triticale** 

Corn

Spelt

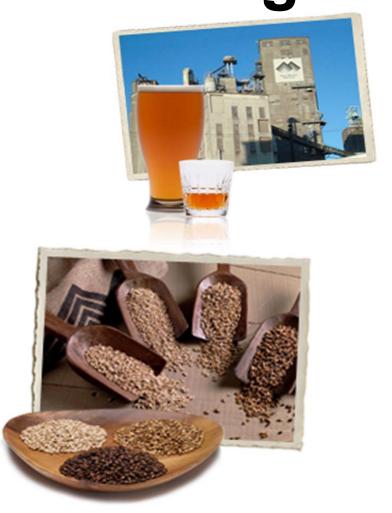
Sorghum





# Common types of Barley Malt used in Brewing

- State Select Malts
- Pilsner Malts
- Premium 2-Row or Pale Ale Malts
- Vienna & Munich Malts
- Crystal/Caramel Malts
- Brown/Chocolate/ Black Malts



# Minimum Requirements for Malting

Viable Barley Kernel

Water

Oxygen





# Three Stages of Malting

Steeping (36-54 hrs)

Germination (80-120 hrs)



Kilning (18-48 hrs)

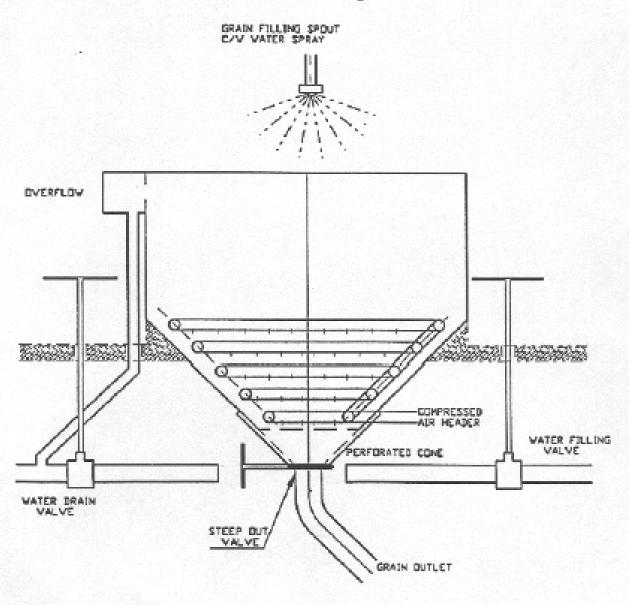


# Physiological Consequences of Steeping

- Embryo "activated"
  - Water and Oxygen Uptake
  - Disappearance of simple sugars
  - Generation of heat, carbon dioxide
  - Production of Hydrolytic Enzymes
- Each kernel is alive

 Each kernel must breathe, cast off waste material, and begins to grow a new barley plant.

## **Conical Steep Tank**











24/06/2014

# Three Stages of Malting

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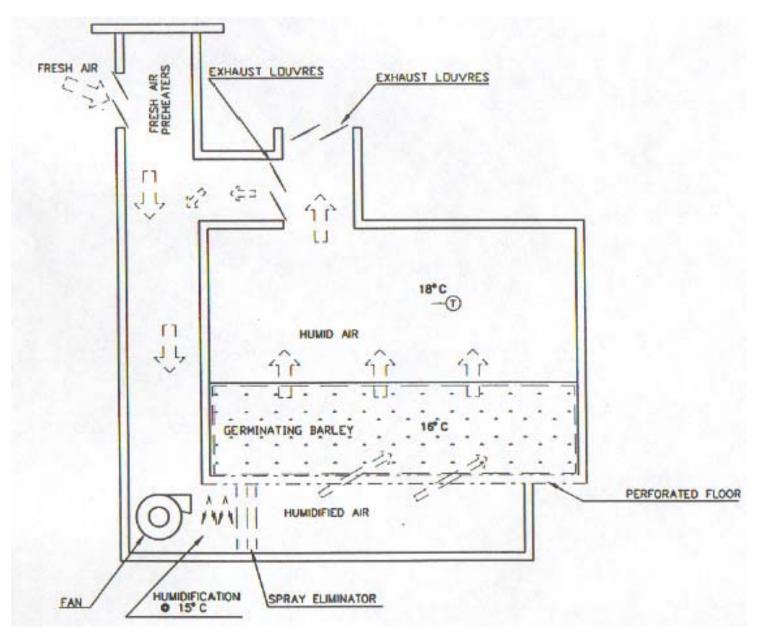
Kilning (18-48 hrs)

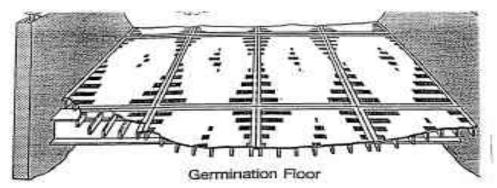


# Typical Germination Conditions

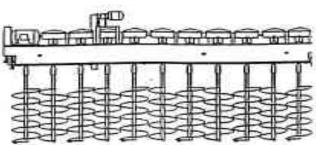
- Four day germination
- Temperature Air Applied 57-63°F (14 17°C)
- Temperature Exhaust Air 63-68°F (17 20°C)
- Typical Delta T 34 37°F (1-3°C)
- Humidity 100%
- Airflow 6 10 cfm/bu
- Exhaust Air recirculation
- Green Malt moisture 44-46% prior to kilning

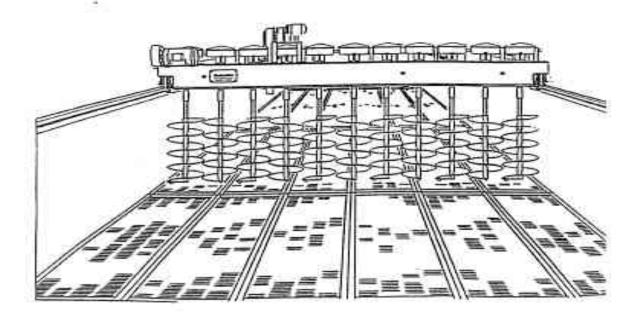
#### **Saladin Box Germination Bed**





Germination compartment Turning machines.







# Germ/Kiln Helices





#### PROGRESS OF MODIFICATION

#### <u>DAY 1</u>

Chit - some modification parallel to scutellum

#### **DAY 2 - 3**

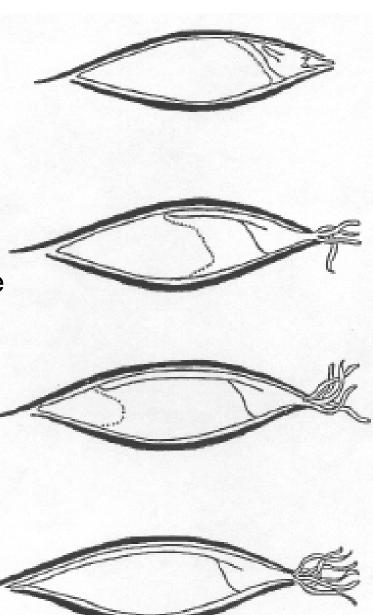
Rootlets, modification parallel to scutellum and inwards from aleurone

#### **DAY 3 - 5**

Rootlet, modification proceeding with acrospire

#### **DAY 4 -6**

Rootlets withering, most of endosperm modified



# Three Stages of Malting

Steeping (36-54 hrs)

Germination (80-120 hrs)



Kilning (18-48 hrs)



## **Purposes for Kilning**

Reduce moisture to ensure friability

Stabilize malt for long term storage

Color and flavor development

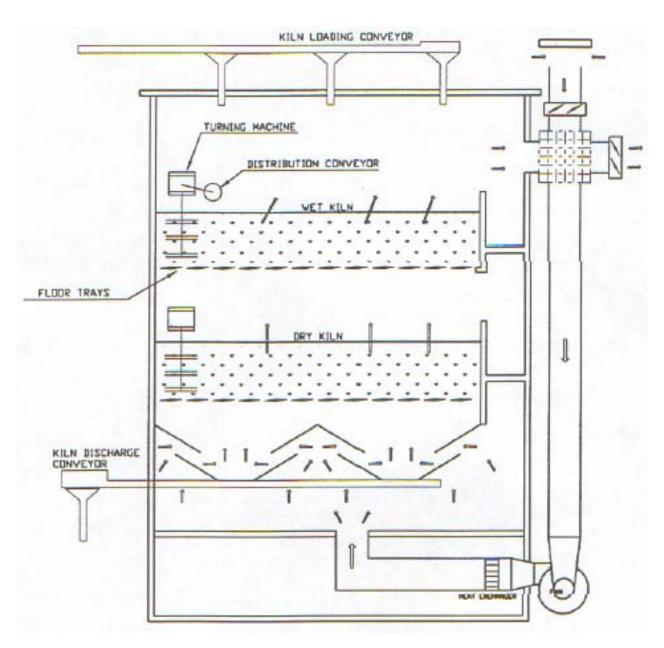


# **Typical Kilning Parameters**

- High Volumes of Air Flow
- Temperature Ranges 104-212+ °F (40-100+ °C)
- Reduction of moisture in green malt from 48% to 4-6% as finished malt.



### **Double Deck Kiln**



### **Diastatic Power**

• Is the measurement of the amount of enzymes available to break down starch.

 There is a trade-off with DP: The higher the protein, the higher the DP, and the lower the extract in the Malt. The more adjuncts used,



## **5 Families of Specialty Malts**

- #1: Base Malts (Pilsen to Vienna, incl. Select)
- #2: Stewed Malts (Munich to Melanoidin)
- #3: Wet Roasted Malts (10°L to 180°L Crystal)
- #4: Dry Roasted Malts (Biscuit to Black)
- #5: Miscellaneous Malts (Acidulated to Peated) (Including malted grains like DextraPils and Oat Malt, and unmalted grains like raw wheat, rolled oats, flaked rye, or Roasted Barley.)



### **#1: Base & State Select Malts**

- Base malts (40-100% of grist bill for beers)
  - Superior Pilsen (1.6-1.9 °L), <10% Protein
  - Premium 2-Row & State Select Malts (1.8-2.2 °L), <11.5% Protein
  - Northwestern Pale Ale Malt (2.6-3.0 °L), <12 % Protein
  - Vienna Malt (2.5-5.0 °L), <12 % Protein





### **#2: Stewed Malts**

- Munich and Melanoidin
  - Typical color
    - Munich 9 12 °L
    - Melanoidin 20 40 °L



- These products are used to add color, sweet flavor and body
- Stewed in the Kiln
- Adds to malt complexity in the beer without crystalization.
- Up through around 10 °L, there is still enough DP for a 100% barley wash or beer to convert itself.
- Melanoidin can go up to 80 °L, but is generally 20 30 °L.

## **#3: Wet Roasted Malts**

#### Crystal/Caramel

- Produced in Probat Drum Roaster
- Green malt at 44 46% moisture transferred to the Roaster
- Highly recirculated with higher applied temperatures 800 900 °F (420 480 °C)
- Three essential stages Stewing or Saccharification phase, Drying phase and Cure or Color Phase.
- Complete conversion occurs with high degree of crystallization.
- − 10 − 160 ASBC color: GWM C-15, C-30, C-40, C-60, C-75, C120, C150.
- Organic or non-Organic





## **#4: Dry Roasted Malts**

- Biscuit/ Brown/ Kiln Coffee/ Chocolate/ Black
  - Produced in Probat Drum Roaster.
  - Finished Base Malts transferred to the Roaster.
  - 850 °F applied temp.
  - Malt internal temp 300 403 °F (149 206 °C).
  - Used for non-crystal roasty flavor in beer & whiskey.
  - Organic or non-Organic on GWM products.





## **#5: Miscellaneous Malts & Grains**

- Dextrin malt (DextraPils®, to add body without color or flavor)
- Smoked malts (including peat, cherry wood & beech wood)
- Acidulated malt (to adjust pH of mash, add crispness to beer)
- Non-barley malts (we carry rye, wheat, spelt and oat malt)
- Roasted non-barley malts (crystal rye, roasted rye, crystal wheat)
- Non-malted grains (raw, rolled oats, flaked grains, roasted barley)
- Huskless roasted malts (Briess Black Prinz® & Midnight Wheat®)
- Combination roasted malts (Briess Extra Special Malt®)
- Other fermentables made from grain (Brown Rice syrup, White Sorghum syrup, Brewer's Crystals, Dextrose and Malto Dextrin are all made from corn.)

### **Colored Malts in Beer**

- If possible, taste a sample.
- Homebrew shops buy the same malts you do, and often allow you to taste if you ask.
- Make a tea for quick aroma evaluation.
- Brew a congress wort for best flavor evaluation.
- Ask your supplier if you have questions.

