Hop Quality

COMPONENTS AND CONSIDERATIONS

Charlie Rohwer, U of MN SROC, Waseca, MN
Chemical components of hop quality

- **Bittering**
  - Alpha and Beta acids

- **Oil**
  - Flavor and aroma components

- **Residue**
  - Pesticides
Physical components of hop quality

Undesired material
- Leaf & Stem
- Seeds
- Metal

Color
- Indicator of chemical quality
Hop Quality
Mites, mildew, mold
Mites, mildew, mold

% Alpha Acids

Low  |  Medium  |  High  
15.8 |  14.6    |  14    

Mite infestation level

Doug Walsh, WSU
Mites, mildew, mold

D. Gent, USDA-ARS
Mites, mildew, mold
Mites, mildew, mold
Harvest timing

- Location
- Cultivar
- Customer?
2013 Harvest Date
By Variety

State
ID
OR
WA

To learn more visit www.alphaanalyticstesting.com
Wait for the oil!

Murphey and Probasco, J. Haas
Wait for the oil, but…

Preliminary brewing: Cascade

- Typical harvest hops = apple, apricot/peach, and sweaty/onion/garlic notes.
- Late harvest hops = higher melon and floral notes.
Post-harvest quality changes...

- Moisture
- Heat
- Oxygen
- Light
Everything changes quality

Val Peacock, Hop Quality Group (+Loftus, Steiner, & Haas)
Don’t make things worse

8.7 pounds / ft³

11.6 pounds / ft³

Forster, 2001 IHGC
Don’t make things worse

Bale: <9.5 pounds / ft³

Forster, 2001 IHGC
Don’t make things worse
Don’t make things worse

http://www.yeastboundanddown.com/
Don’t make things worse

![Graph showing the effect of storage conditions on % Alpha Acids over months']
You think that’s it?
Don’t make things worse

Drying time (h)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Time (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low airspeed, 150°</td>
<td>7.2</td>
</tr>
<tr>
<td>High airspeed, 150°</td>
<td>5.9</td>
</tr>
<tr>
<td>High airspeed, 130°</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Val Peacock, Hop Quality Group (+Loftus, Steiner, & Haas)
Other information

USDA inspection procedures
Traceability
Packaging & labeling
% OF INITIAL QUALITY REMAINING

Perfect world

100 100 100

HARVEST        PROCESSING        STORAGE
HARVEST PROCESSING STORAGE

% OF INITIAL QUALITY REMAINING

- Perfect world
- Reality
- There's always next year!

HARVEST PROCESSING STORAGE

Perfect world
Reality
There's always next year!
Don’t make things worse
Wait for the oil, but...

Indicators of Degradation
2010 Harvest

Cascade isovaleric acid

Willamette isovaleric acid

Concentration (mg/100 g hops)

Early  Typical  Late
Harvest Time Point

Early  Typical  Late
Harvest Time Point
What’s an MRL?

<table>
<thead>
<tr>
<th>Chemical</th>
<th>US MRL (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MYCLOBUTANIL</td>
<td>10</td>
</tr>
<tr>
<td>QUINOXYFEN</td>
<td>3</td>
</tr>
<tr>
<td>IMIDACLOPRID</td>
<td>6</td>
</tr>
<tr>
<td>CYMOXANIL</td>
<td>7</td>
</tr>
<tr>
<td>CARFENTRAZONE-ETHYL</td>
<td>0.1</td>
</tr>
<tr>
<td>BIFENZATE</td>
<td>15</td>
</tr>
</tbody>
</table>