“Applications of Czech hops in the brewing industry“

Hop seminar – 22nd April 2015, Zatec (Saaz)
INTRODUCTION

Bohemia Hop in cooperation with the Hop Research Institute in Zatec organized a traditional seminar on „Application of Czech Hops in the Brewing Industry” that took place on 22nd April 2015. Almost 100 participants from Czech breweries and other experts related with brewing industry gathered at the Hop Research Institute to learn about the current trends in the hop and brewing industry and to taste and evaluate beers brewed from Czech hop varieties in a trial brewery of the Hop research institute. The seminar topics and beer samples were focused on dry hopping.

Mr. Josef Patzak, new director of the Institute, and Mr. Zdenek Rosa, chairman of Bohemia Hop and Chmelarstvi cooperative, welcomed all participants and opened the seminar. The program included 5 oral presentations and 5 rounds of the evaluation of different beer types.

Main topics of the seminar were focused on:

- Breeding Program of Czech Hop Varieties (Vladimir Nesvadba, Hop Research Institute)
- Beer Styles around the World (Aleš Dvořák, Budějovický Budvar, n.p.)
- Hop Grower Year (Josef Ježek, Hop Research Institute)
- Fresh Hops and Its Utilization in the Brewing Process (Karel Krofta, Hop Research Institute)
- News from the Craft Brewer’s Conference in Portland 2015 (Zdeněk Rosa, Bohemia Hop a.s.)

Main topics of evaluation of beers:

- Wheat beer – dry hopping with Kazbek
- Pale lager 12% EPM – single-hop beer (Saaz Late)
- Special lager 15% EPM – Dry hopping with different hop varieties and different hop products
- ALE 14% EPM – Dry hopping comparison between Kazbek and foreign hops
- ALE 14% EPM – Dry hopping comparison between Kazbek and new genotypes
**TESTING AND EVALUATION**

The first round

Wheat beer; upper fermentation; 13,7 % EPM; hops for kettle addition – 1<sup>st</sup> hop addition Sladek, 2<sup>nd</sup> hop addition Kazbek (10 min before the end of boiling process).

<table>
<thead>
<tr>
<th>Sample</th>
<th>aroma</th>
<th>bitterness</th>
<th>Final impression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>points</td>
<td>ranking</td>
<td>points</td>
</tr>
<tr>
<td>Kazbek - fresh hops</td>
<td>143</td>
<td>1</td>
<td>175</td>
</tr>
<tr>
<td>Kazbek - without dry hopping</td>
<td>168</td>
<td>2</td>
<td>166</td>
</tr>
<tr>
<td>Kazbek - pellets P90</td>
<td>179</td>
<td>3</td>
<td>152</td>
</tr>
</tbody>
</table>

The results of the first round were very close. The fresh hops had a very good impact on the aroma of the beer.

The second round

Pale lager, bottom fermentation; 12 % EPM; single-hop beer (Saaz Late)

<table>
<thead>
<tr>
<th>Sample</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>points</td>
<td>ranking</td>
<td>points</td>
</tr>
<tr>
<td>Saaz Late - fresh hops</td>
<td>189</td>
<td>3</td>
<td>185</td>
</tr>
<tr>
<td>Saaz Late - dry whole leaf hops</td>
<td>168</td>
<td>1</td>
<td>157</td>
</tr>
<tr>
<td>Saaz Late - pellets P90</td>
<td>182</td>
<td>2</td>
<td>181</td>
</tr>
</tbody>
</table>

In the second round the clear winner both in aroma and also in overall was the beer were dry hop cones were used. The pellets 90 ranked second mostly because the higher bitterness of the beer compared to the other samples.
The third round

Special pale lager, bottom fermentation; 15 % EPM; hops for kettle addition – 1st hop addition Agnus, 2nd hop addition Sladek, 3rd hop addition Saaz (10 min before the end of boiling process).

<table>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>points</td>
<td>ranking</td>
<td>points</td>
</tr>
<tr>
<td>without dry hopp</td>
<td>197</td>
<td>3</td>
<td>166</td>
</tr>
<tr>
<td>Kazbek - pellets P90</td>
<td>158</td>
<td>1</td>
<td>152</td>
</tr>
<tr>
<td>Saaz - fresh hops</td>
<td>163</td>
<td>2</td>
<td>198</td>
</tr>
</tbody>
</table>

The third round also had a clear winner in the beer where Kazbek pellets were used for the dry hopping. Saaz fresh (frozen cones) did very well in the aroma but not as well in the overall impression when higher bitterness was perceived in this beer.
The fourth round

ALE; upper fermentation; 14 % EPM; hops for kettle addition – 1st hop addition Agnus, 2nd hop addition Sladek, 3rd hop addition Kazbek. Whole leaf hops were used for dry hopping.

Dry hopping: 4 days, 4 °C

Kazbek, dry hops 3 g/l; 61,8 IBU
Cascade, dry hops 3 g/l; 61,6 IBU
Amarillo, dry hops 3 g/l; 60,2 IBU
Polaris, dry hops 3 g/l; 62,0 IBU

<table>
<thead>
<tr>
<th>Sample</th>
<th>aroma points</th>
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<th>ranking</th>
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<th>ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazbek</td>
<td>201</td>
<td>3</td>
<td>224</td>
<td>3</td>
<td>229</td>
<td>3</td>
</tr>
<tr>
<td>Cascade</td>
<td>181</td>
<td>2</td>
<td>184</td>
<td>2</td>
<td>186</td>
<td>2</td>
</tr>
<tr>
<td>Amarillo</td>
<td>153</td>
<td>1</td>
<td>170</td>
<td>1</td>
<td>160</td>
<td>1</td>
</tr>
<tr>
<td>Polaris</td>
<td>294</td>
<td>4</td>
<td>276</td>
<td>4</td>
<td>285</td>
<td>4</td>
</tr>
</tbody>
</table>

This was a very interesting round which proved that Cascade and Kazbek are quite close in the use for dry hopping in the brewing industry. In the same time Amarillo did well both in all rankings and Polaris finished clearly in the end.

Note: The high content of yeast in original beer has a harmful influence on an unpleasant bitterness and final impression of the beers.
The fifth round

ALE; upper fermentation; 14 % EPM; hops for kettle addition – 1st hop addition Agnus, 2nd hop addition Sladek, 3rd hop addition Kazbek. Whole leaf hops were used for dry hopping.

Dry hopping: 4 days, 4 °C

Kazbek, dry hops 3 g/l; 61,8 IBU
NS 30/226, dry hops 3 g/l; 62,8 IBU
NS 29/133, dry hops 3 g/l; 61,8 IBU
NS 33/140, dry hops 3 g/l; 64,9 IBU

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<td>2</td>
<td>194</td>
<td>2</td>
<td>188</td>
<td>2</td>
</tr>
<tr>
<td>NS 29/133</td>
<td>147</td>
<td>1</td>
<td>169</td>
<td>1</td>
<td>160</td>
<td>1</td>
</tr>
<tr>
<td>NS 33/140</td>
<td>241</td>
<td>4</td>
<td>238</td>
<td>4</td>
<td>249</td>
<td>4</td>
</tr>
<tr>
<td>Kazbek</td>
<td>227</td>
<td>3</td>
<td>228</td>
<td>3</td>
<td>227</td>
<td>3</td>
</tr>
</tbody>
</table>

The last round was focused on the outcomes of the breeding programme of the Hop research institute. All participants could see that we have some very promising varieties for the future. The most interesting for all was the number 29/133 which had very fruity aroma mostly described as peach.
VISIT OF DITTRICH´S FARM IN LENESICE

After the seminar, participants moved on to Dittrich´s Farm in Lenesice nearby Zatec (Saaz). Mr. Karel Dittrich jr., owner of the farm, introduced a history of his farm and described current trends in hop cultivation. Moreover, participants could see technologies for cultivation, harvest and postharvest treatment of hops. Representatives of breweries were very interested in all things about growing hops and were putting lot of questions to Mr. Dittrich and Mr. Rosa. This successful and interesting day was concluded with a dinner in the Hop and Beer Temple in Zatec.
SENSORY PROFILE OF CZECH HOP VARIETIES

**SAAZ**
- Fruit: 2.75
- Floral: 6.94
- Citrus: 6.91
- Herbal: 0.30
- Spicy: 1.85

**SAAZ LATE**
- Fruit: 0.01
- Floral: 0.00
- Citrus: 1.30
- Herbal: 0.30
- Spicy: 1.85

**PREMIANT**
- Fruit: 1.45
- Floral: 1.46
- Citrus: 8.74
- Herbal: 8.46
- Spicy: 1.00

**SLADEK**
- Fruit: 1.17
- Floral: 6.94
- Citrus: 6.91
- Herbal: 0.46
- Spicy: 1.63

**HARMONIE**
- Fruit: 1.90
- Floral: 1.90
- Citrus: 1.71
- Herbal: 0.57
- Spicy: 1.07

**AGNUS**
- Fruit: 1.99
- Floral: 1.99
- Citrus: 1.97
- Herbal: 0.57
- Spicy: 1.00

**BOHEMIE**
- Fruit: 1.14
- Floral: 1.27
- Citrus: 1.27
- Herbal: 0.46
- Spicy: 0.83

**KAZBEK**
- Fruit: 1.00
- Floral: 0.88
- Citrus: 1.36
- Herbal: 0.50
- Spicy: 1.95

**BOR**
- Fruit: 0.98
- Floral: 3.50
- Citrus: 1.00
- Herbal: 0.45
- Spicy: 1.00

**RUBIN**
- Fruit: 0.95
- Floral: 1.05
- Citrus: 1.60
- Herbal: 0.35
- Spicy: 0.52

**VITAL**
- Fruit: 2.05
- Floral: 1.45
- Citrus: 1.28
- Herbal: 1.24
- Spicy: 0.75

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