

# FINAL HOP REPORT - CROP 2016

Saaz, September 9, 2016



## THE SITUATION DURING THE CROP YEAR AND THE QUALITY

### A/ Development of the weather and the situation in production 2016

The monthly Hop Reports 2016, regularly published on the web sites of Bohemia Hop, a.s. Žatec - [www.bohemiahop.cz](http://www.bohemiahop.cz) are enclosed to this Report. Tables No. 1 and No. 2 indicate summarized data concerning the whole vegetation period (April – August) in 2016, compared to the same period of 2015 and to the long-term average.

**Table No. 1** – Temperature (°C):

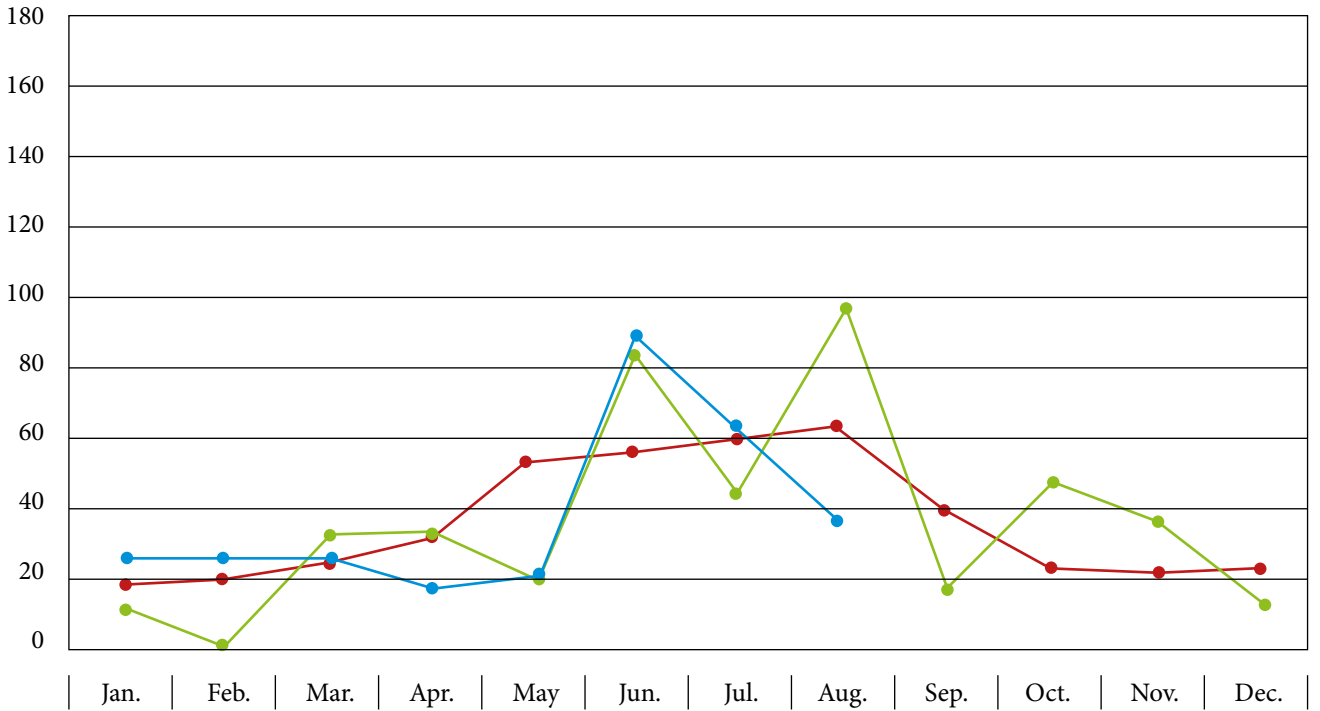
Month	Average temperature		Difference + -	30-years average	Difference + -
	2016	2015			
April	8,40	8,70	- 0,30	8,50	- 0,10
May	14,30	13,30	+ 1,00	13,40	+ 0,90
June	18,10	16,40	+ 1,70	16,70	+ 1,40
July	19,70	20,50	- 0,80	18,00	+ 1,70
August	18,00	21,40	- 3,40	17,40	+ 0,60
<b>Total</b>	<b>78,50</b>	<b>80,30</b>	<b>- 1,80</b>	<b>74,00</b>	<b>+ 4,50</b>

**Table No. 2** – Precipitations (mm):

Month	Total precip. per month		Difference + -	30-years average	Difference + -
	2016	2015			
April	14,80	34,00	- 19,20	32,00	- 17,20
May	20,60	18,80	+ 1,80	54,00	- 33,40
June	91,00	85,40	+ 5,60	56,00	+ 35,00
July	66,40	47,20	+ 19,20	59,00	+ 7,40
August	36,60	96,00	- 59,40	62,00	- 25,40
<b>Total</b>	<b>229,40</b>	<b>281,40</b>	<b>- 52,00</b>	<b>263,00</b>	<b>- 33,60</b>

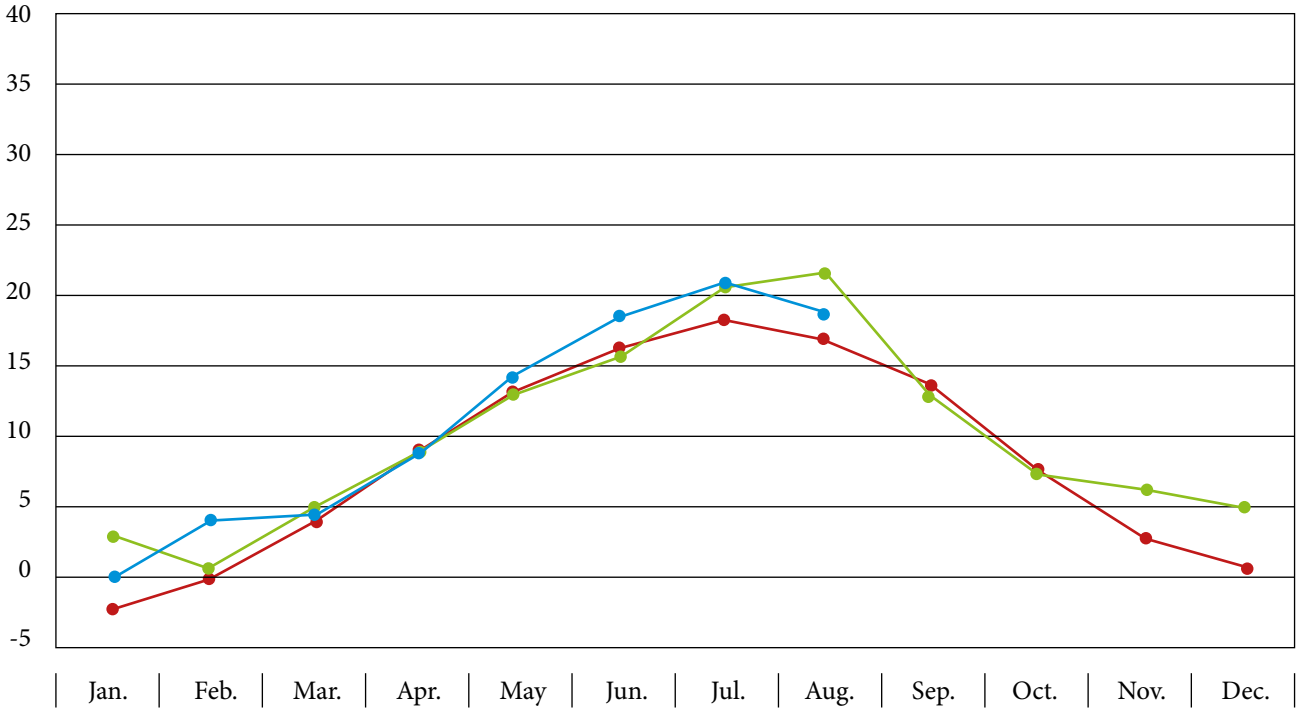
The data indicated above are accompanied by graphs illustrating the average temperatures and the total of the precipitations per month, covering period of January, 2016 to August, 2016 (Graphs No. 1 and 2).

mm



- LONG AVERAGE
- PRECIPITATION 2016
- PRECIPITATION 2015

°C



- LONG AVERAGE
- TEMPERATURE 2016
- TEMPERATURE 2015

The weather during the first trimester of 2016 was characterized by higher temperature variation in comparison to the first trimester of previous year; January was cold, February abnormally warm and March was on the normal level. The precipitations on the other side were balanced during the whole first trimester and slightly above long-term average. The wintertime in lowlands was again without snow cover. The temperatures in April varied around the long-term average. The weather during the second half of that month was rather windy. The rainfalls were very low in April, they just reached 43, 5% of the level of April 2015. More abundant rains came only in Tirschitz region. Temperatures in May exceeded the levels of long-term average, especially during the last decade of the month. Parts of Saaz and Auscha regions were affected by hail-storm on 23rd May, 2016. It concerned the estates in the localities of Zlonice, Pálež, Radovesice, Lounky, Polepy and Lukov. Overall 130 hectares of hop gardens were damaged within the rate of 65 to 100 % of loss. Otherwise, the precipitations in May were very poor. The temperatures in June oscillated above the normal, although without expressive extremes. The same month was the richest in precipitations. The rains were distributed equally among the decades of June. Also the climatic conditions in July were favourable, with above-average temperatures and again without considerable extremes. The precipitations then were on the level of long-term average. The average temperature in August also reached the normal level, the second half of the month being warmer. The rains came during the first decade of the month, when the soil was soaked and as consequence 23 hectares of hop gardens have fallen down; 13 ha of gardens fell down in Saaz region and 10 ha in Terschitz region.

### **B/ Quality: Alpha Contents in Original, Aroma, the Appearance of the Cones, the Pests**

The spring works in the hop gardens started in time. The development of the vegetation was influenced by the climate. View to considerable fall in temperature during the second half of April the growth of hops slowed down. The hops training was then expected around 10th of May. In May the development of hops was quite normal. Cool weather and weak growth of hops equalized the time differences in hops pruning. The hops training took place in determined time and there were no problems with excessive growth of hop vines. The hop training completely finished until the end of May. On majority of hop gardens then passed the additional fertilizing and also the hilling. The state of hops was assessed as good by the end of May and also in June it stayed very good. Thanks to rich precipitation the hop growths exceeded the height of trellis, especially the young hop vines, and habit of the plants reached abnormal state. The blossoming was not monitored yet in June. The state of hops remained very good also in July. The elongation

growth continued on majority of hop gardens until the mid-July, when the vines started to blossom. As consequence of sufficient precipitation the hops started to create the cones by the end of month. It was well-marked especially in older hop growths, whereas in younger hop gardens the plants continued to blossom. These hops then created cones in the first decade of August. Thanks to sufficient reserves of water and favourable temperatures the hops created relatively good cones and the production of alpha-bitter substances was of satisfactory level. In conclusion it can be stated that hops was in very good condition and we could expect above average harvest as far as the quantity as well as the alpha-bitter substances are concerned.

According to the monitoring of spring hop pests only sporadic occurrence of alfalfa snout weevil (*Otiorrhynchus sulcatus* F.) and flea beetle (*Psylliodes attenuata* K.) was recorded. Since the beginning of the hops growth the attention was given to the protection against downy mildew of hops (*Pseudoperonospora humuli* Miy and Takah.) and May was not the exception. The farmers applied the preparation Aliette 80 WG and in gardens with the occurrence of spike-shaped sprouts also the preparation Curzate K was used. The intensity of fly-over of hop aphid (*Phorodon humuli* Schrank) was very weak and it was not necessary to use chemical preparations of plant protection. View to dry and warm weather the farmers paid attention to the occurrence of red spider mite (*Tetranychus urticae* Koch). Climatic conditions of June were propitious to the propagation of downy mildew of hops. For the chemical protection the preparations Ortiva, Bellis, Revus or Curzate K were recommended. In some gardens, where the number of nymphs exceeded the critical point (50 wingless nymphs to the leaf), the preparations Teppeki or Confidor 200 OD were applied. In this year also relatively strong occurrence of red spider mite was monitored and therefore the preparations Nissorun 10 WP, Ortus 5 SC and/or Vertimec 1, 8 EC were used against this pest. All the time a close eye was kept on downy mildew of hops and July was not the exception. During the first decade of the month majority of the farmers applied the preparation Movento 150 OD and by this way the hop aphid (*Phorodon humuli* Schrank) as well as red spider mite were eliminated. Despite the fact that during the whole year a high attention was given to downy mildew of hops, some of the hop growers did not manage the protection against this pest and part of hop gardens, especially the young ones, was damaged. The reason was a big habit of plants and insufficient coverage of whole plant, mainly the upper parts, by the effective substances of chemical spraying.

Majority of growers started the harvest between 15<sup>th</sup> and 20<sup>th</sup> August 2016. Already on the beginning of the hop picking the assumptions of good harvest and good content of alpha-bitter substances were confirmed.

Following table demonstrates the results of the alpha acid contents according to individual regions and varieties, as analysed in the laboratory of Chmelařství, cooperative Žatec.

**Table No. 3** – Contents of alpha in original material according to varieties and regions (in %)

<b>Region</b>	<b>Saaz-ST</b>	<b>Saaz virus free</b>	<b>Saaz</b>	<b>Sládek</b>	<b>Premiant</b>
Saaz	3,45	3,66	3,56	6,84	8,74
Auscha	3,42	3,11	3,38	7,73	8,31
Terschitz	3,49	3,21	3,26	6,08	8,22
<b>Czech Rep.</b>			<b>3,50</b>	<b>6,50</b>	<b>8,50</b>

## C/ Estimation of acreage and yields according to regions

The harvested acreage in 2016 is shown in following table. The data indicated were kindly conceded by ÚKZÚZ Žatec. (up to 20<sup>th</sup> August, 2016).

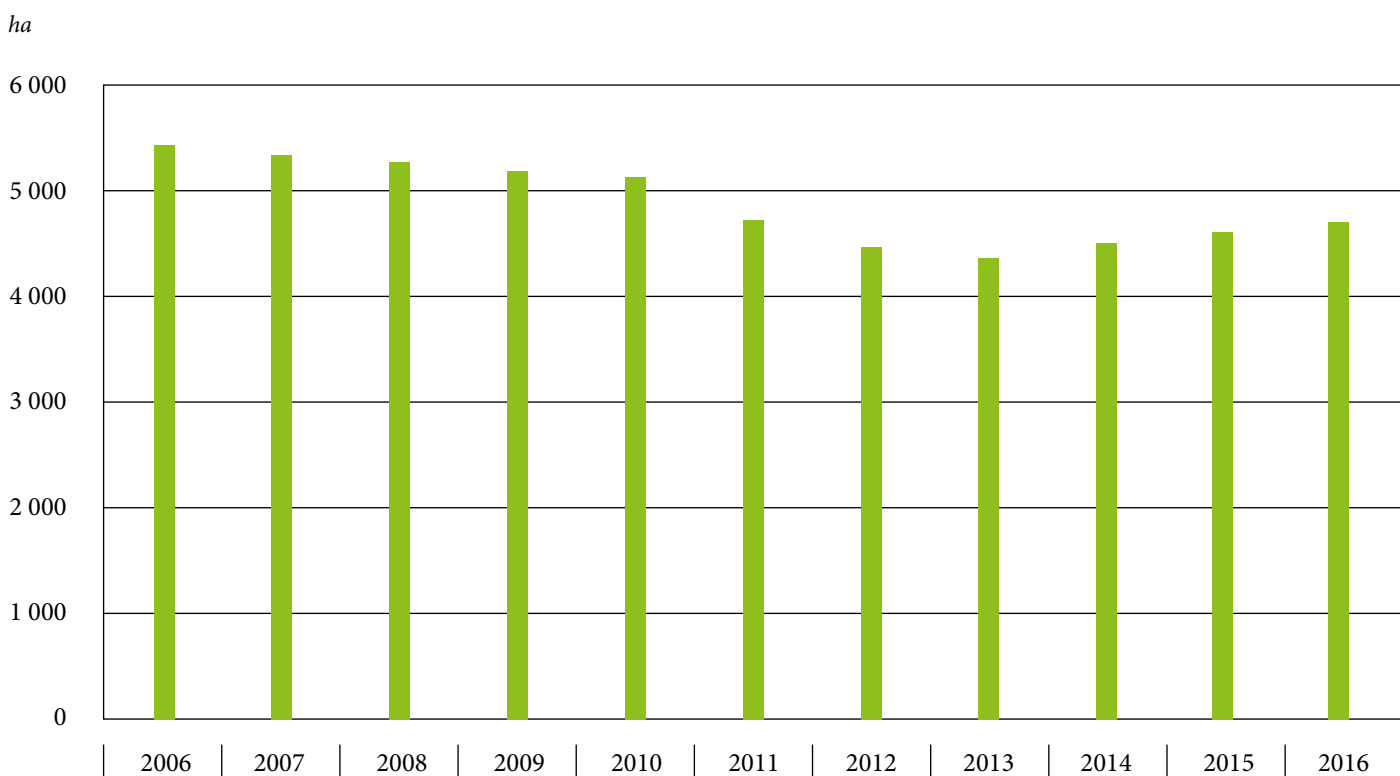
**Table No. 4** – The acreage of hop gardens in the Czech Republic (ha):

Region	up to 20.8.2016	up to 20.8.2015
Saaz	3 692	3 576
of it Saaz var	3 301	3 190
Auscha	513	497
of it Saaz var	445	433
Terschitz	570	549
of it Saaz var	444	416
<b>Czech Republic</b>	<b>4 775</b>	<b>4 622</b>
<b>of it Saaz var</b>	<b>4 190</b>	<b>4 039</b>

The trend of increasing of acreage, initiated in 2014 and 2015, continued also in this year's crop. In total there were added 153 hectares of hop gardens. Majority of new hop gardens was planted with Saaz semi-early red bine hops.

In order to illustrate the development of the acreage of hop gardens in the Czech Republic we enclose the graph covering the period of 2006–2016.

**Graph No. 3:** The development of the acreage of hop gardens in the Czech Republic



The exact estimations of the hop production in the Czech Republic in 2016 would be rather premature view to prolonging harvest. The exact results will be known after the summarization of individual **“Producers declaration about the number and the weight of marked packing with hops according to the cadastral territories and varieties of hops”**, which will be made out by UKZUZ Žatec.

**Table No. 5** – Estimation of the crop according to regions (total):

<b>Region</b>	<b>Harvested area (ha)</b>	<b>Production (t)</b>	<b>Yield in t per ha</b>
Saaz	3 682	5 382	1,46
of it Saaz var.	3 301	4 620	1,40
Auscha	513	850	1,65
of it Saaz var.	445	700	1,59
Terschitz	570	1 045	1,83
of it Saaz var.	444	755	1,70
<b>Czech Rep.</b>	<b>4 775</b>	<b>7 277</b>	<b>1,52</b>
<b>of it Saaz var.</b>	<b>4 190</b>	<b>6 075</b>	<b>1,45</b>

**A/ Expected replacement of the varieties and hypothetic production of individual varieties:**

**Table No. 6** – Comparison as per the variety composition in 2014–2015:

Variety	2016 (ha)	2015 (ha)	Diff. (ha) 16/15	2014 (ha)	Diff. (ha) 16/14	Diff. (ha) 15/14
Saaz var.	4 190	4 039	+ 151	3 894	+ 269	+ 45
Agnus	39	38	+ 1	40	- 2	- 2
Bor	-	1	- 1	3	- 3	- 2
Kazbek	21	19	+ 2	18	+ 3	+ 1
Premiant	175	180	- 5	187	- 12	- 7
Sládek	267	267	0	270	- 3	- 3
Saaz late	41	34	+ 7	15	+ 26	+ 19
Saaz special	20	20	0	11	+ 9	+ 9
Others	22	24	- 2	22	0	+ 2
<b>Czech Rep.</b>	<b>4 775</b>	<b>4 622</b>	<b>+ 153</b>	<b>4 460</b>	<b>+ 314</b>	<b>+ 162</b>

**B/ Expectation of the planting of new varieties and the yields:**

In this year the growers ordered with the producers of certified planting stock the quantity of rhizomes corresponding to about 300 hectares of hop gardens for planting in autumn 2016. As the demand for the Czech hops have increased, the renovation and eventually enlargement of hop gardens can be expected also in 2017-2018, so that the current area will be stabilized at around 5 thousand hectares. With the expansion of small breweries also the interest in other varieties of the Czech origin, as e.g. Kazbek, Saaz Late, Harmonie and alternatively also Agnus and Vital. Saaz semi-early red-bine hops will nevertheless remain the flagship of the Czech hop industry. The varieties Sládek and

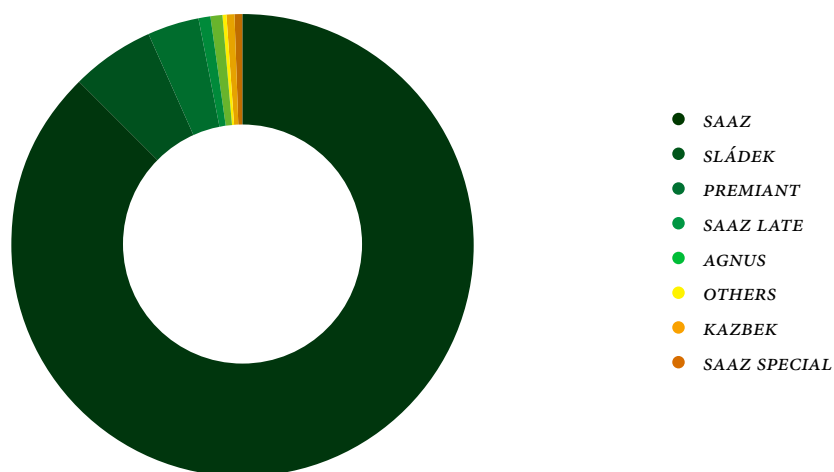
Premiant will also maintain their market positions. Taking into consideration the renovation and also the increase of the acreage of hop gardens, we can state, that the yields per hectare and the total production of hops should go up compare to a long term average yield. Of course, we are aware of the fact that we work with biological material, which is subject to influence of climatic conditions and certainly it will be influenced by them every year. We hope, that the climate development in future will be as favourable for our growers as it was in this year.

**C/ Expected production areas :**

**Table No. 7** – Composition of individual varieties on harvested area in 2016 and in 2015 (ha):

Variety	area 2016	%	area 2015	%
Saaz var.	4 190	87,77	4 039	87,39
Agnus	39	0,81	38	0,82
Bor	0	0,00	1	0,02
Kazbek	21	0,43	19	0,41
Premiant	175	3,66	180	3,90
Sládek	267	5,60	267	5,77
Saaz late	41	0,85	34	0,74
Saaz special	20	0,42	20	0,43
Others	22	0,46	24	0,52
<b>Czech Rep.</b>	<b>4 622</b>	<b>100,00</b>	<b>4 622</b>	<b>100,00</b>

**Graph No. 4:** Composition of individual varieties on harvested area in 2016



## TRENDS ON THE HOP MARKET

### A/ The purchase movement from big buying countries

Crop 2015 was very poor due to high temperatures and lack of precipitations during vegetation period. Yield and so total production were approx. 35% below long term average. Unfortunately also alpha acid content was deeply under average. BHC was forced to cut all existing contracts and important volumes were postponed to future crops, in certain cases up to 2022 crop.

Similar situation was in all European hop producing countries and spot market of aroma varieties did not exist.

Demand for all Czech aroma varieties considerably exceeded production and many breweries asked for future contracts. For farmer's motivation all prices went up, breweries accepted increased prices and nowadays whole Czech potential production of hop is covered by contracts until 2020 crop.

Major engine of high demand for top quality raw materials are craft breweries worldwide but also big brewing groups as their strategic inventories were on low level.

Once more important new plantations are planned for 2016 autumn. Crop 2016 seems to be very promising even if is still (12<sup>th</sup> September) running. Both yield and alpha acid content would be slightly over average. BHC will be able to fulfil all obligations and maybe some limited volume would be available for spot market. Due to the fact that we have quite long „waiting list“ potential overproduction would be easily placed on the market.

#### Japan:

no new contracts concluded due to situation on Japanese market

#### China:

important new contracts concluded for future crops

#### USA:

craft brewery segment of the market ordered more and more for future crops.

#### Czechia:

large volumes contracted for future crops

#### SABMiller:

large volumes contracted until 2021 srop

#### InBev:

large volumes contracted for future crops

### B/ The purchase movement of domestic breweries

In 2015 Czech brewing industry achieved record with production over 20 mio. hl. High production was driven especially by export of lager and premium beers. Export exceeded 4 mio hl for the first time. Local consumption stayed flat with approx. 144 l/capita/year but with growing ratio of lager and decreasing ratio of mainstream and economic brands. Over 50 new craft breweries were opened during 2015 year. All above mentioned facts increased demand for Czech hop varieties.

### C/ The estimated forward contract ratio

Crops 2017–2019: 100%

Crops 2020–2021: 90 %

Crops 2022–2023: 70%

**A/ The change of technology and packing material for crop 2016**

Chmelarstvi is continuing in the on-going process to maintain its processing facility up to the world standard.

Chmelarstvi and Bohemia Hop use for both processed and raw hops a cold storage with an automatic system of stocking and manipulation that enables Chmelarstvi to store all hops contracted by Bohemia Hop as well as some other suppliers in cold storage.

The laboratory of Chmelarstvi is certified and carries out all usual analysis according to EBC or MEBAK. The company takes part in a number of circle tests for research of possible differences amongst laboratories of foremost customers to ensure the quality of work of our laboratory. There are international rounds (AHA Group) as well as domestic rounds with brewers and research institutions.

Chmelarstvi will start in February to build new cold storage capacities and extend its cold capacities for future demand (rebuilding of existing warehouse behind the office building).

PESTICIDE RESIDUA

**A/ Supplement to the instruction regarding affusion within previous year**

Basic trends of the hop protection, as well as protection of other agriculture commodities are fully subject to the rules valid in European Union.

**B/ Newly used pesticides**

By comparison of the Methodology of the Hop Protection in 2015 and 2016 we registered the inclusion of new preparations in 2016:

Name of preparation	Active substance	Effect
Revus	mandipromamid	downy mildew of hops

The preparations excluded from the Methodology 2015 in comparison to 2014:

Name of preparation	Active substance	Effect
Aliette Bordeaux	fosetyl .Al + oxychlorid Cu	downy mildew of hops
Ridomil Gold Plus 42,5WP	metalaxyl M + oxychlorid Cu	downy mildew of hops
Karate se Zeon tech. 5 CS	lanbda-cyhalothrin	only hop aphid and alfalfa snout weevil

**C/ System of control of pesticide residua**

Chmelařský institut, s.r.o. Žatec (Hop Research Institute, s.r.o. Žatec) did not receive any instructions in order to change the control system of pesticide residua, so that it goes on in compliance with the present trends. Connection to EUROFINS SOFIA GmbH Berlin, an international certified laboratory, continues and in compliance with the facilities of the laboratory we extend also the spectrum of analyses of active substances. At the same time there is the possibility in this line to extend the cooperation with Chmelařský institut s.r.o. Žatec, which is equipped – since this year - with new laboratory facilities for analyses of pesticide residua.

**D/ Protection of hops in the crop year 2016**

The protection of hops carried out by our suppliers was subject of the Methodology of the Protection of Hops for the year 2016 and of the List of the Preparations Approved for the Protection of Hops in 2016, issued for the companies Chmelařství, co-operative Žatec, and Bohemia Hop, a.s. Žatec. View to the fact, that we have agreed in the Contracts for dried hops, concluded with the suppliers, an obligatory deadline for sending of the “List” until the 31<sup>st</sup> March of the current year, we need to know possible requirements for the adaptation of allowed chemical preparations before that day, preferably up to 28<sup>th</sup> of February of current year.