

# Hop report - crop 2020



## 1. The situation during the crop year and the quality

### A/ Development of the weather and the situation in production 2020

The monthly Hop Reports 2020, 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 1 and 2 indicate summarized data concerning the whole vegetation period (April–August) in 2020, compared to the same period of 2019 and to the 30 years' long-term average (1981–2010).

**Table 1 – Temperature (°C)**

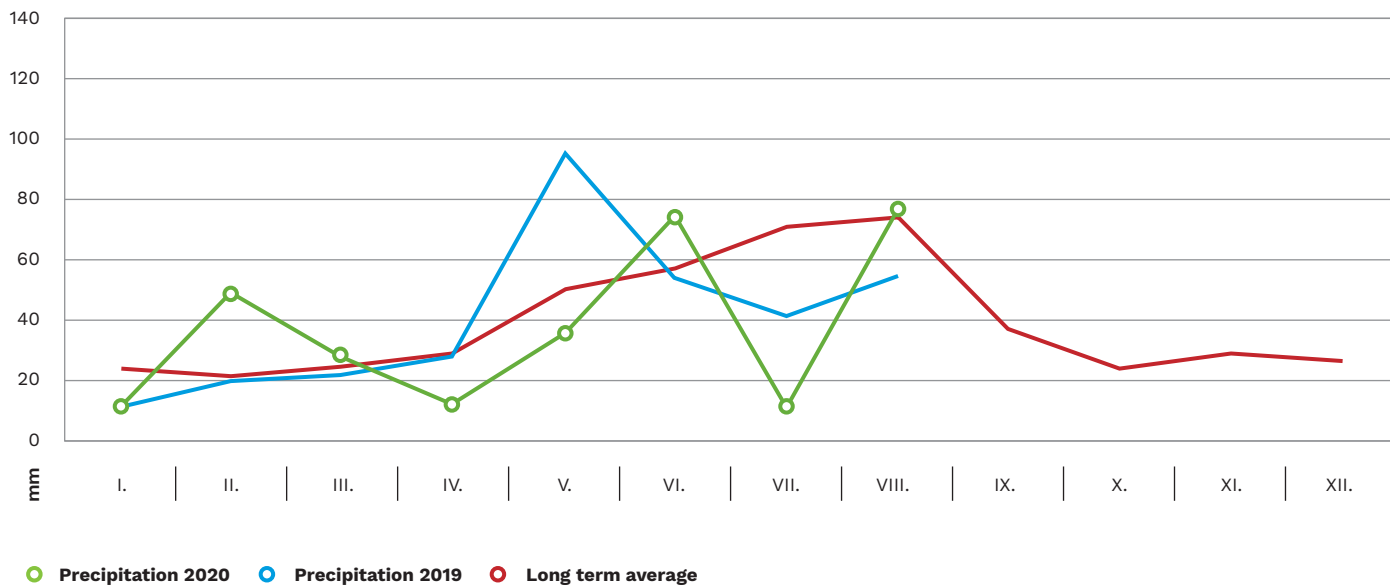
Month	Average temperature		Difference +-	30-years average	Difference +-
	2020	2019			
April	10,20	9,60	+ 0,60	9,10	+ 1,10
May	12,94	11,60	+ 1,34	14,20	- 1,26
June	18,45	21,40	- 2,95	17,00	+ 1,45
July	20,10	20,10	0	19,00	+ 1,10
August	21,18	19,70	+ 1,48	18,30	+ 2,88
<b>Total</b>	<b>82,87</b>	<b>82,40</b>	<b>+ 0,47</b>	<b>77,60</b>	<b>+ 5, 27</b>

**Table 2 – Precipitations (mm)**

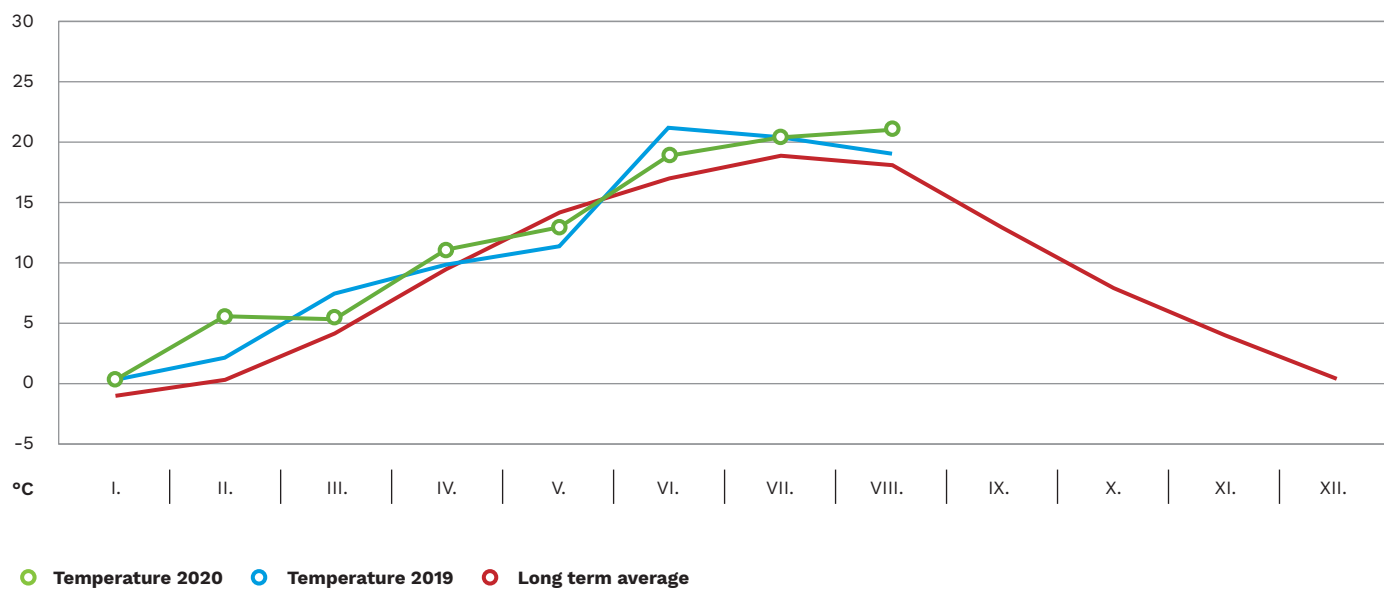
Month	Total precipitations per month		Difference +-	30-years average	Difference +-
	2020	2019			
April	12,80	30,60	- 17,80	30,70	- 17,90
May	37,40	96,20	- 58,80	52,00	- 14,60
June	73,60	56,20	+ 17,40	59,10	+ 14,50
July	12,60	41,60	- 29,00	69,40	- 56,80
August	78,40	54,20	+ 24,20	70,80	+ 7,60
<b>Total</b>	<b>214,80</b>	<b>278,80</b>	<b>- 64,00</b>	<b>282,00</b>	<b>- 67, 20</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 to August, 2020. (Graphs 1 and 2)

**Graph 1 – Precipitation in 2020 and 2019 compared to a long average**



**Graph 2 – Temperature in 2020 and 2019 compared to a long average**



The nature of the weather during the first two months of 2020 was characterized by an increase in average temperatures in comparison to 2019 as well as to the long-term average. March was colder than the same month in 2019, but the average temperature in that month was still higher than the long-term average. Paradoxically, March in this year was colder than February.

In terms of precipitation, the first quarter of 2020 was above the level of both the long-term average and 2019. The monthly total precipitation was significantly exceeded in February, when 227 % of precipitation fell compared to the long-term normal. This year's winter, as it has become the rule in recent years, was again without a snow cover.

This year's April was above average in temperature. Twentyone days reached an average daily temperature higher than 10 °C, although there were relatively large differences between the minimum and maximum temperatures. The feeling of the temperature was lowered by a fresh wind, which, however, significantly drained the soil. In terms of precipitation, this April was catastrophic. According to the Ministry of the Environment, this was the worst situation in the last 500 years, given that the soil entered this year in worse condition, caused by recent years, which were marked as very dry.

The average temperature in May of this year was slightly above the level of May 2019. The second decade of May was the coldest, as the minimum temperatures fell three times below freezing point. There was no significant and longer warm period during May in this year. That is why that this year's average temperature in May was below the long-term average. In terms of precipitation, this May was very poor compared to last year (only 38.9 %). And compared to the long-term average, it reached a level of only 70 %. Although the surface layer of the soil appeared wet due to precipitation in the last decade of the month, the groundwater deficit unfortunately did not improve in May either.

In June, the situation in terms of climatic conditions and average temperatures developed quite favourable. The monthly average temperature of 18.45 °C was only slightly above the long-term average. The feared increase of temperatures to the level of tropical heats did not arrive in the last decade of June. The humid and rainy weather from the last decade of May lasted practically throughout the whole period of June. There were only eleven dry days during this month – it testifies that the distribution of the precipitation was regular during the whole month. The rains in the middle of June were of a stormy nature and the hops were damaged by hail in an area of approximately 150 ha. The damage was at the level of 10 % to 80 %. Due to the stormy nature of precipitation, the differences in individual places, registered according to data from small weather stations within the region, were very different and reached somewhere up to 130 mm. We have evaluated the course of climatic conditions in June as exceptionally very good for the growth and development of hops, in comparison to several previous years.

If we judged the month of June as very good in terms of conditions for the development of hops, then July was very bad, especially in terms of the level of precipitation. Although the average monthly temperature of 20.11 °C corresponded approximately to the value of the long-term average, the volume of precipitation was critical, at least in the Žatec (Saaz) region. The volume of precipitation for the month of July 2020 was only 12.60 mm, which is the lowest value in the last twenty years. The very small amount of rainfall negatively affected the development of hops during this period, especially where growers did not have the possibility of irrigation.

In terms of the average monthly temperature, August of this year was relatively above normal. The average monthly temperature exceeded the long-term normal by 2.88 °C. The warm weather lasted practically for the first two decades of August, i.e. until the beginning of the hop harvest. Precipitation was above average in terms of the monthly evaluation, but in this year the rainfall fell in August only at the end of the first decade and then at very end of the month. However, precipitation, especially at the end of the month, no longer had a positive effect on the condition of the hops, but on the other hand caused worries for growers during harvest. The precipitation was mostly of a stormy nature with large differences in individual localities. Due to strong winds in these storms, about 53 ha of hop gardens fell, of which 29 ha in the Tršice (Trschitz) area, 5.5 ha in the Auscha region and 18.5 ha in the Žatec (Saaz) region. At the end of August, a storm with a wind force of over 75 km/h hit practically the entire territory of our country. It caused the fall of a high number of hop plants, the break of the lateral shoots and the beating off hop cones themselves. This, of course, resulted in a decrease in hop production.

## **B/ Quality: alpha contents in original, aroma, the appearance of the cones, the pests**

The nature of the weather allowed hop growers to carry out spring work in hop gardens at the usual times. All work, especially the pruning of hops, could be regulated according to their needs. Great concerns about securing a sufficient number of temporary workers to ensure spring work arose after the declaration of a state of emergency and the closure of borders in connection with COVID - 19. After the suspension of production in some industrial enterprises, it was possible to transfer these vacant work capacities for spring work to hops. At the same time, we also noticed a greater interest in working in hop gardens from the part of local inhabitants. By this way it was possible to manage the first stage of the spring works by the end of April. At the end of April, the training of hybrid varieties, especially the Sládek variety, also began. Locally, also smaller areas of the Saaz semi-early red bine hops variety were trained.

The cold weather, which lasted practically throughout May, kept the growth of hops at such a level that it did not overgrow. The training of hops therefore took place continuously in accordance to the condition of the plants growth on individual hop gardens. The composition of temporary workers this year was completely different from what growers are usually used to, yet the hops were successfully trained in time. The situation was difficult for growers from the organizational point of view, but also brought increased costs for seasonal workers, which amounted to about 30% compared to the normal situation. This year was also demanding in terms of compliance with all regulations regarding the health situation associated with the occurrence of coronavirus.

The growth and development of hops throughout June was very good and corresponded to the optimal development of hops. Only a small part of hop gardens, especially those that were cut at a later date (after 20. 4. 2020) and where also a deeper cut was done, did not reach the height of trellis. As of June 30, it was estimated that 90 % of hop gardens have grown to the height of trellis. The condition of the hops at the end of June was therefore assessed as very good.

Although the climatic conditions were not ideal in July, hops developed normally in the first half of the month. The habitus of the plants was good. An anomaly of this year was the late beginning of the blooming of hops. This year the hops did not start to bloom until the end of the second decade of the month, which means at least ten days later than the optimal date. The deployment of flowers was good, but the creation of cones practically was not recorded in July.

Climatic conditions in August did not improve the situation in hop gardens. Although the flowering was relatively good, the creation of the cones did not meet the expectation, the cones remained small and some flowers stayed completely undeveloped. The small increase of cones could have been caused by high temperatures in the first half of August, which led to rapid ripening, but without an increase in the size of the cones. The first laboratory analyses show a higher content of alpha acids in the Saaz variety. The hybrid varieties will probably be on average level. The harvest by individual growers started in the time horizon from 16. 8. 2020 to 27. 8. 2020.

## **B/ Chemical protection of the Hops**

The chemical protection of hops in April was concentrated to the protection against downy mildew of hops (*Pseudoperonospora humuli* Miy et Takah.), alfalfa snout weevil (*Otiorrhynchus ligustrici* L.) and flea beetle (*Psylliodes attenuata* Koch).

Downy mildew of hops - the dry and warm weather was not favourable for the development of, this disease, and the primary infection was eliminated by using Aliette 80 WG and Profiler. Alfalfa snout weevil - self-monitoring was recommended and treatment was performed where at least five beetles per hundred plants were found. A spraying by Actara 25WG was applied. Flea beetle - application was performed where the limit of harmfulness, i.e. 5-10 % of the leaf blade damages - was exceeded. The preparation Actara 25WG was used. Spring treatment against this pest also prevented the laying of the eggs by the females and the occurrence of the summer population.

Even the beginning of May was not optimal for the development of downy mildew of hops. The increase in the pathogen's pressure did not occur until the arrival of precipitation in the third decade of May. The preparations Aliette 80 WG, Profiler, Curzate K or Revus were available. The first occurrence of hop aphid (*Phorodon humuli* Schrank) was detected in the hop gardens around a middle of May. The treatment was performed by Teppeki or Silvano Prime preparations. The occurrence of red spider mite (*Tetranychus urticae* Koch) was not recorded, the cold weather was not favourable for its development. The occurrence of flea beetle was recorded in some areas. The treatment was performed with Actara 25 WG.

The development of the weather in the first week of June created good conditions for the spreading of downy mildew of hops. Therefore, it was recommended to perform the first treatment against the secondary infection of this pest by 15 June. The preparations Folpan Gold, Bellis or Ortiva were used. By the end of the month, a second spraying was carried out with Ortiva, Bellis or Orvego. The application of Curzate K was recommended on hop gardens with a higher incidence of spiked shoots. The intensity of the hop aphid's flight was higher than in previous years. The treatment had to be performed on most hop gardens. The preparations Teppeki and Silvano Prime were used. Red spider mite in this period occurred only on some hop gardens on their edges, in anchor rows and around columns. It was recommended to use the preparations Nissorun 10 WP, Ortus 5SC or Vertimec 1.8 EC.

In the beginning of July, the fourth spray against downy mildew of hops was carried out, namely by Ortiva, Bellis, Orvego, or Revus. The use of Movento 100 SC eliminated the possible occurrence of hop aphids and red spider mites. It was recommended to monitor the symptoms of hop powdery mildew (*Sphaeroteca humuli* (DC) Burr.). The preparation Bellis, in particular, was available against this disease. In August, the protection of hops was focused primarily on maintaining good health in terms of elimination of downy mildew of hops. Practically copper-based preparations were available.

When evaluating the health status of hops in August, we stated that the condition as a whole was good.

Following Table demonstrates the results of alpha-bitter substances in hops according to individual regions and varieties, as analysed in the laboratory of Chmelařství, cooperative Žatec.

**Table 3 – Alpha-acid content in original material according to varieties and regions (in %)**

Region	Saaz	Sládek	Premiant	Kazbek	Saaz Late	Agnus
Saaz	3,70	-	-	-	-	-
Auscha	3,40	-	-	-	-	-
Trschitz	3,60	-	-	-	-	-
<b>Czech Rep.</b>	<b>3,64</b>	<b>6,40</b>	<b>7,80</b>	<b>5,50</b>	<b>3,30</b>	<b>12,00</b>

Obs.: The results of the analyses of other varieties are still not available.

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

The harvested acreage has been stable during last four years and they remain stable around the level of 5000 ha. For the Crop 2020 the harvested acreage is shown in following Table.

The data indicated were kindly conceded by ÚKZÚZ Žatec (data up to August 20, 2020 – comparison to August 20, 2019).

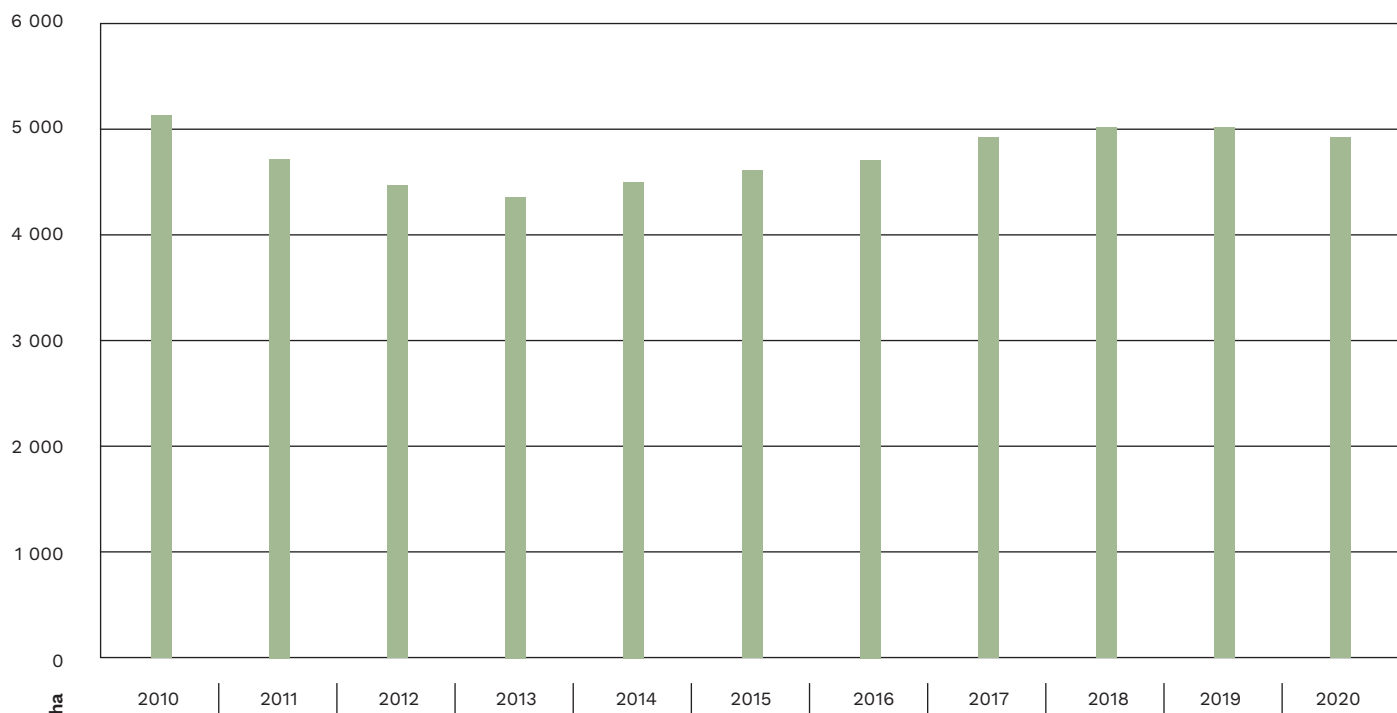
**Table 4 – The acreage of hop gardens in the Czech Republic (ha)**

Region	up to 20.8.2020	up to 20.8.2019
Saaz	3 836,6	3 869
of it Saaz variety	3 320	3 361
Auscha	504,1	513
of it Saaz variety	410,6	426
Terschitz	625,6	621
of it Saaz variety	485,5	475
<b>Czech Republic</b>	<b>4 966,3</b>	<b>5 003</b>
<b>of it Saaz variety</b>	<b>4 216,1</b>	<b>4 262</b>

The acreage of hop gardens is stable. The total area decreased from 5003 ha to 4966,3 ha. The main reason is slower replacement of the hop gardens than it was scheduled.

In order to illustrate the development of the acreage of hop gardens in the Czech Republic we enclose the graph covering the period of 2010–2020.

**Graph 3 – The development of the acreage of hop gardens in the Czech Republic**



It is very complicated to make the estimations of the production of hops in the Czech Republic in this year, due to differentness of the beginning of the harvest by individual growers, due to the state of hops cones creation and therefore a big variation in yields among growers and the hop gardens. 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”**, i.e. during the second week of December.

**Table 5 – Estimate of the crop according to regions (total)**

Region	Harvested area (ha)	Production (t)	Yield in t per ha
Saaz	3 836,6	4 320	1,13
of it Saaz variety	3 320	3 320	1,00
Auscha	504,1	670	1,33
of it Saaz variety	410,6	490	1,20
Terschitz	625,5	825	1,32
of it Saaz variety	485,5	545	1,12
<b>Czech Republic</b>	<b>4 966,3</b>	<b>5 815</b>	<b>1,17</b>
<b>of it Saaz variety</b>	<b>4 216,1</b>	<b>4 355</b>	<b>1,03</b>

## 2. Forecast of the production in the future (2020–2021)

### A/ Expected replacement of the varieties and hypothetical production of individual varieties

**Table 6 – Comparison as per the variety composition in 2019–2020**

Variety	2020 ha	2019 ha	Diff. ha 20/19
Saaz	4 216	4 262	- 46
Agnus	53	58	- 5
Kazbek	26	33	- 7
Premiant	196	193	+ 3
Sládek	365	344	+ 21
Saaz late	44	47	- 3
Saaz special	41	41	0
Others	25	25	0
<b>Czech Republic</b>	<b>4 966</b>	<b>5 003</b>	<b>- 37</b>

### B/ Expectation of the planting of new varieties and the yields

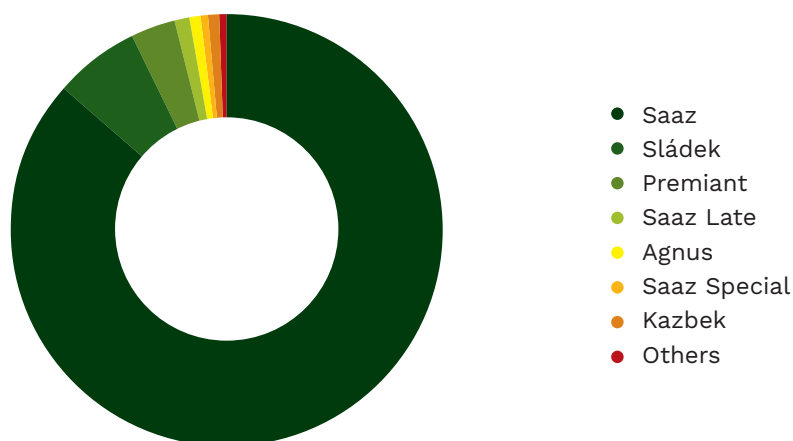
It can be stated that the trend in the renewal of hop gardens and planting has stabilized. According to the information from the seedling producers, there is still interest among growers in the Saaz variety and then we see an increasing interest in Premiant and Sládek. The amount of ordered seedlings represents an area of approximately 200 ha. However, it will mostly concern the renewal of hop gardens, especially in case of the Saaz hops. For other varieties, especially for the Premiant and Sládek varieties, we expect a slight increase in areas. The overall situation will also be affected by the need to rebuild fallen trellis.

### C/ Expected production areas

**Table 7 – Composition of individual varieties on harvested area in 2020 and in 2019 (ha)**

Variety	area 2020	%	area 2019	%
Saaz	4216	84,90	4262	87,30
Agnus	53	1,06	58	0,85
Kazbek	26	0,52	33	0,69
Premiant	196	3,95	193	3,33
Sladek	365	7,35	344	5,96
Saaz Late	44	0,88	47	0,89
Saaz Special	41	0,82	41	0,52
Others	25	0,52	25	0,46
<b>Czech Republic</b>	<b>4966</b>	<b>100,00</b>	<b>5003</b>	<b>100,00</b>

**Graph 4 – Composition of individual varieties on harvested area in 2020**



### 3. Trends on the hop market

#### A/ Introduction

The Czech hop harvest started slightly later than in previous years and lasted until about September 19<sup>th</sup>. Despite the high expectation before the harvest the crop will be under average with regards to yields. The current estimate is around 20 % decrease compare to 2019 which means around 5 800 t in total (2019 – 7145 t). Many growers have however even larger decreases in their production. We are therefore not sure about how much hops will the hop growers be able to deliver and to what extent we shall be able to cover our contracted volume with breweries since we calculate with an average harvest with some reasonable reserve. We shall communicate with all our customers about the best solutions with regards to their current stock situation, their needs for the next brewing year and about possibilities to may be forward part of the contracted volumes to future years. We are optimistic to find a good solution for all parties involved.

**Japan:** from the information that we regularly receive it is clear that the beer production has not yet recovered from the market restrictions following Covid-19. It can be expected that there will be a large decrease in the production of the beer category in 2020 compare to 2019. This possibly also means a small requirement for hops.

**China:** it seems that the Chinese beer market has recovered faster after decreases in the March-May period. We still register a very strong demand for Czech hop varieties and we have long-term contracts in place.

**Vietnam, India :** we currently discuss the needs of these markets as both have been hit by restrictions of this year.

**North America:** despite this year situation and big pressure on the craft beer market we still see a strong and steady demand for Czech hops and trend of an increasing Pils type beer production of the craft brewers.

**South America:** the craft market was also hit very much but as in North America we also register an increasing demand for Czech hop varieties.

**Europe:** the situation in Europe varies region by region. The eastern part of Europe seems to be hit much less regarding beer production and there is a steady demand for Czech hops.

#### B/ The purchase movement of domestic breweries

At this moment it seems that the total beer production will not be drastically changed from the previous year and the decrease can only be about 10 %. The brewers were hit economically due to shift from keg beer to bottle products and the situation could again be changed due to new measures coping with increasing number of covid 19 cases being introduced in September. Still on the craft scene we can see more openings than closings and we are now well over 500 craft breweries in the Czech Republic.



## 4. Quality Control:

### **A/ The change of technology and packing material for the crop 2020**

#### **Hop processing and cold hop storage of Chmelarstvi**

After a long processing season of crop 2019 which finished on May 20<sup>th</sup> the processing plant performed a complete maintenance of the line for hop pellets with each part being taken apart and cleaned. The processing line is ready for the start of the crop 2020 season the first hops were already processed and full three shift processing shall start September 21<sup>st</sup>. The preparation for the new processing season included also maintenance and repairs of roof systems of cold hop storage and processing line. A new photovoltaic power plant was installed on the administration building to cover its electricity needs.

#### **Investments of Czech hop growers**

During the last year the Czech hop growers invested again into new hop harvesting technologies. Chmelarstvi, cooperative Zatec installed several new picking lines and there were also many modernization projects of both picking and drying technology at Czech hop farms. One of the main investment projects of the Chmelarstvi Machinery plant, which develops and manufactures hop technologies, was a construction of a large hop kiln of US type in Kounov where there is a new hop picking centre including 3 Czech hop picking machines, containers for green hops, hop kiln, chambers for dry hops and a hop press. The investments into new technologies continue to be supported by the Czech state and EU funding and the Czech hop growers were successful in their applications for further investments. The cooperative Chmelarstvi, which is a mother company of Bohemia Hop, assists regularly growers with their applications.

#### **Mini meteo-stations**

During the fall of this year we shall evaluate the running of the mini meteorostations which were tested during 2020 vegetation in the Saaz hop growing region. These meteo stations were in 2020 financed by several hop traders including Bohemia Hop and mainly by the Hop research institute and the data showed the rainfall is very various within the hop regions and most of the rainfall has a storm character and affects only small locations. The data is used e.g. to monitor the pressure of downy-mildew.

#### **Irrigation of hops in the Czech Republic 2020**

The hop area under irrigation has been growing in the past years. The total irrigated acreage is around 1400 ha according to the Ministry of Agriculture. There is a national support program for funding irrigation systems in hop fields. There also programs for funding reservoirs and pipe system connecting them to the drip irrigation system. In the last three year the growers added 60-80 ha of irrigation each year. The main system is drip irrigation from the top of the trellis but in the last 2 years a large part of the newly built drip irrigation in hop field is underground system. The main limit is the water source. Czech hop growers which are near large rivers (Ohre, Labe, Vltava) are using water from these rivers or from systems connected to these rivers. Some growers are connected to smaller streams but again it was forbidden to use the water from small streams due to general lack of water from the mid of July this year.

Several growers built again large artificial reservoirs with a combination of water sources (rain water from roofs, water from wells, water from other irrigation systems). The Czech government has the water supply as a priority and there are plans for new dams in some parts of the Saaz hop growing region (some smaller within 10-15 years, some larger within 20-25 years). Since the irrigation brought good results in the past several years the growers are intending to further increase the acreage. There are also further enhancements of the irrigation systems in the management of the irrigation (soil humidity sensors, better fertilizer application, etc.).

## 5. Pesticide Residua

### A/ Supplement to the instruction regarding spraying 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 2020 and 2019 we registered the inclusion of new preparations in 2020:

Name of Preparation	Active Substance	Effectiveness
Milbeknock	Funguran PRO	red spider mite
Nissorun 25 SC	hexythiazox	red spider mite
Flovine	folpet	downy mildew of hops
Funguran PRO	Cu hydroxide	downy mildew of hops

The preparations excluded from the Methodology 2020 in comparison to 2019:

Name of Preparation	Active Substance	Effectiveness
Plenum	pymetrozine	hop aphid
Ridomil Gold Combi Pepite	folpet + metalaxyl M	downy mildew of hops
IQ Crystal	quinoxifen	powdery mildew

### C/ Control system for pesticide residues

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. Simultaneously, in this year we extended even more the cooperation with Chmelařský institut s.r.o. Žatec, which is equipped – since 2016 - with new laboratory facilities for analyses of pesticide residua and since this year its accreditation ČIA according to the standard ČSN EN ISO/IEC 17025:2018 was approved.

### D/ Protection of hops in the crop year 2020

The protection of hops carried out by our suppliers was subject to the Methodology of the Protection of Hops for the year 2020 and of the List of the Preparations Approved for the Protection of Hops in 2020, issued for the companies Chmelařství, co-operative Žatec, and Bohemia Hop, a.s. Žatec. Due to the fact, that we have agreed in the Contracts for dried hops, concluded with our suppliers, an obligatory deadline for sending them 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 2021.

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Saaz, 12<sup>th</sup> September, 2020