

THE BARTH-REPORT



HOPS 2017/2018

BARTH-HAAS GROUP

CONTENTS

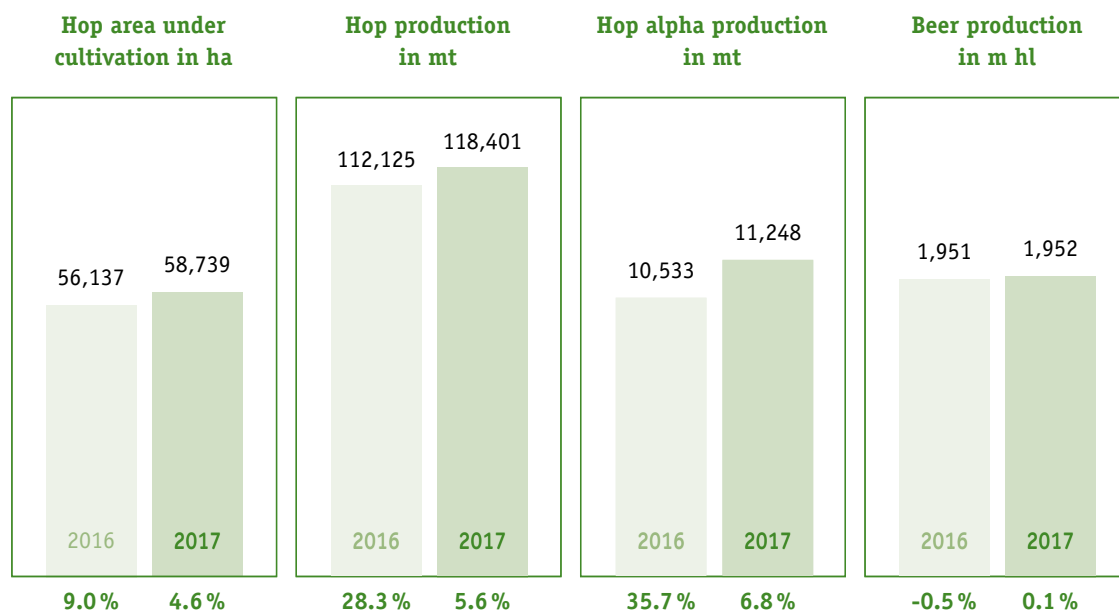
Publishing details	2	Poland	20
World market basic data	2	England	21
Foreword	3	France	21
Political situation	4		
European Union	5	Country reports 2017 crop/America	
Economic situation	6	USA	22
Top 40 breweries	7		
Beer output development	8	Country reports 2017 crop/Asia	
World beer production 2016/2017	9	China	27
Hop varieties – International standard	10		
Hop alpha acid production	10	Country reports 2018 crop/Australia/Oceania	
Alpha acid balance	11	Australia	28
Market analysis	12		
Hop forward contract rates	13	Hop plant development 2018	28
Development 2006 – 2017	13	Outlook 2018	29
World hop acreage and crop 2016/2017	14		
		Key data (USA, China, Japan, Germany)	30
Country reports 2017 crop/Europe		Currency exchange rates	30
Germany	15	Conversion table weights and measures	30
Czech Republic	18	Members of the Barth-Haas Group	31
Slovenia	19	Hop Flavourist Course	32

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WORLD MARKET BASIC DATA





Hop Esperanto – a common aroma language for hops

Hops delight brewers and beer drinkers in equal measure! And this passion among those obsessed with hops to discover and brew all the aromas and flavours of every single hop variety shows no sign of abating. This enthusiasm has stimulated hop breeding activity around the world and, as a result, new hop varieties with new, fascinating aromas are continually being released. At tastings of typical pilsner and lager beers, the descriptors “floral”, “citrus”, “spicy” and occasionally “green-grassy” used to suffice. But with the new beer creations – particularly in the craft segment – these brief descriptions no longer do justice to the abundance of hop flavours.

The hop is the soul of the beer and sensory analysis is becoming increasingly important in brewing science, in breweries, among specialists and also among consumers. Over the past ten years, the use of hops in brewing has changed fundamentally. Whereas a delicate to moderate hop aroma used to be the standard to be achieved by adding hops during the boil, hops today are being added in very high quantities not only during the boil, but often in even greater quantities for dry hopping. Therefore, it makes sense to use a common language throughout the industry to describe the hop aroma and flavour notes – a sensory language based on hops. Aroma compounds create the sensory impressions that we call smells. The sense of smell is the only one of our senses that is directly connected with our feelings and can immediately trigger emotions.

Both the stimuli and the impressions triggered can be classified, even if the approaches so far have tended to be less than satisfactory.

With the help of perfumers and sommeliers, Joh. Barth & Sohn has developed a tasting scheme specially designed to be used for hops and hop-intensive beers and has published it in a three-volume hop aroma compendium. Over the years, we have further developed our tasting scheme and introduced various cultural aspects. In this tasting scheme we work with intensity values for twelve categories and allocate specific descriptors to them. The results are visualised as spider charts. This scheme allows different hop varieties or hop samples and likewise different hop-intensive beers to be compared with each other optimally. Until recently, scientists believed that the human sense of smell was less strongly developed in comparison with that of animals. In 2014, however, it was proved that humans can perceive up to one trillion different aroma impressions, although we find it difficult to describe them in words. This can be remedied: the BARTH-HAAS GROUP Hops Academy now offers corresponding course modules as part of its “Hopsessed” programme. Participants will learn how unique each hop variety is and how many suitable descriptors can be discovered in the depths of the hop aroma. The joy of discovery, practice and, above all, passion are the prerequisites for learning to speak fluent Hop Esperanto in next to no time at all.

Around the world, the liberal democratic order is under threat to an extent unknown for many years. According to the Transformation Index (BTI) published in March 2018 more than 3.3 billion people are living under autocratic rule. Government leaders in many countries are consolidating their power, weakening the rule of law and exerting influence on the media.

In **Turkey**, the state of emergency in effect since the attempted coup in July 2016 was extended for the seventh time by another three months in April 2018. The parliamentary and presidential elections which have been brought forward to 24 June 2018 will, therefore, be held in a state of emergency.

In **Europe**, a number of elections produced precedent-setting results: In the parliamentary elections in **France** on 11 and 18 June 2017, President Emmanuel Macron's social-liberal party **La République en Marche** won an absolute majority.

On 24 September 2017, **Germany** went to the polls to elect a new parliament. None of the parties elected achieved a working majority. **Alternative for Germany (AfD)**, a Eurosceptic, right-wing populist party, entered the German parliament for the first time. It was not until 12 March 2018 that a coalition agreement was finally signed by the **Christian Democratic Union (CDU)**, the **Christian Social Union (CSU)** and the **Social Democratic Party of Germany (SPD)**, thus bringing to an end the hitherto longest government-formation period in German history. The new parliament convened on 14 March 2018 with the election of **Angela Merkel** as Federal Chancellor.

In **Spain**, on 1 October 2018 the regional government of **Catalonia** held a referendum on Catalan independence against the wishes of the central government. A majority of Catalans voted in favour. Thereupon, the central government disempowered the Catalan administration and called new elections for the regional parliament in December 2017. To the annoyance of the central government, the separatists won a majority once again. The formation of a new government was delayed because, following the forbidden referendum in October and the resulting independence resolution, many of the senior politicians elected had either been put in prison or fled abroad. After the previously elected separatist leader **Carles Puigdemont** renounced his candidacy for the presidency, the regional parliament elected his confidant **Quim Torra** as regional president on 14 May 2018.

The parliamentary elections held in **Italy** on 4 March 2018 strengthened the position of the right-wing parties, but failed to produce any majorities capable of forming a government. The extreme right-wing **Lega Nord** and the populist **Five Star Movement** reached an agreement in principle to form a joint government. At the end of May, Italy's president **Sergio Mattarella** instructed the independent lawyer **Giuseppe Conte** to form a government.

The presidential election in **Russia**, which was held on 18 March 2018, was won by the incumbent president **Vladimir Putin** who then entered his fourth period in office as President of the Russian Federation.

The parliamentary election in **Hungary** on 8 April 2018 produced a clear victory for the ruling national-conservative right-wing populist party **Fidesz** led by **Prime Minister Viktor Orbán** whose alliance with the **Christian Democratic People's Party (KDNP)** narrowly won a two-thirds majority in the Hungarian parliament.

In the **People's Republic of China**, **Xi Jinping** was confirmed in office as president and head of the armed forces by all the delegates at the people's congress on 17 March 2018. One week previously, the people's assembly had assented to an unlimited number of periods in office for the head of state and party leader.

The North Korean head of state **Kim Jong Un** and the South Korean president **Moon Jae In** assembled for historic summit meetings in April and May 2018 and discussed the issues of denuclearisation and lasting peace on the Korean peninsula.

With the turmoil of war in **Syria** now in its seventh year, it is virtually impossible to tell who is fighting whom. The Syrian and Russian armies and Turkey are still the key players. Most recently the war raged fiercely in Eastern Ghouta and Afrin, bringing many casualties and suffering to the civilian population. The Syrian government has repeatedly been accused of using chemical weapons.

The world continues to be faced with **terrorism**. The number of victims was particularly high in **Afghanistan**. Responsibility for the many serious attacks was claimed either by the Deobandi Islamic "Taliban" militia or the "Islamic State (IS)" jihadi militia. In **Iraq** the IS was considered to have been more or less defeated. However, since March 2018 this terrorist group has carried out an increasing number of attacks. Other countries, too, including **Syria, Pakistan, Egypt, Somalia, Nigeria** and **France**, were the targets of numerous inhuman attacks, mostly with an Islamist background.

In July 2015, after 13 years of negotiations, representatives of the international community (**USA, China, Russia, UK, France** and **Germany**) reached agreement with **Iran** in the dispute over its nuclear capabilities. Iran agreed to discontinue its uranium enrichment programme, in return for which the existing sanctions were lifted in January 2016. The International Atomic Energy Agency (IAEA) certified that Iran had complied with the conditions. Nevertheless, on 8 May 2018 US President **Donald Trump** announced that his country was unilaterally withdrawing from the nuclear agreement and imposing sanctions at the same time.



Brexit

The European Union and the United Kingdom have agreed that after the UK's departure from the EU on 29 March 2019 there will be a transition phase lasting until 31 December 2020. During that time the UK will continue to be bound by all EU rules and shall have to transfer financial contributions to Brussels as in the past. However, it shall no longer have any say in EU decision making. In return, the country shall continue to have access to the Single Market and shall remain part of the Customs Union. This transition phase is designed to give citizens and companies more time to adapt to the new situation and to allow a trade agreement to be negotiated.

Sanction proceedings

In December 2017, for the first time in the community's history, the EU Commission initiated sanction proceedings against a member state on the grounds of a threat to the basic values of the European Union. The Polish government is accused of undermining judicial independence and thus violating the principle of the rule of law.

According to a report from the European Parliament of April 2018, democracy and the rule of law are also under serious threat in Hungary. The report recommends that sanction proceedings be initiated as they already have been against Poland. The report also points to restrictions of freedom of speech and assembly and of scientific freedom, as well as to efforts to weaken the constitutional and judicial systems and the position of non-governmental organisations. In addition, it refers to violations of the rights of minorities and refugees, as well as to corruption and conflicts of interest

Refugee crisis

In December 2017, the European Commission brought a case against Poland, Hungary and the Czech Republic before the European Court of Justice because these states refuse to accept refugees within the framework of the EU's refugee redistribution plan.

The Common Agricultural Policy (CAP)

The results of the three-month public consultation initiated by the European Commission on 2 February 2017 were presented at a conference in Brussels on 7 July 2017. According to these results, there is a consensus on the following points:

- retention of a strong common agricultural policy at EU level
- the added value of a common agricultural policy
- future challenges (adequate standard of living for farmers; the environment and climate change)
- the need for a simpler and more effective policy

On the basis of these results, on 29 November 2017 the European Commission published a notice in which it set out its ideas on the future of food and agriculture. The notice contains proposals for a series of changes to the CAP which are primarily intended to simplify it and optimise cost efficiency.

According to the notice, combating climate change and preserving the environment are the greatest challenges facing the EU. In order for agriculture to fully play its part in helping the EU to meet its international obligations regarding climate change and sustainability, strict new targets will be defined at European level. Each EU member state will have to draw up its own strategy – which will require the Commission's approval – setting out how it intends to meet the targets. The focus will be less on compliance with regulations and more on monitoring progress, and funding will be orientated towards specific results.

Support for farmers will continue to be provided within the framework of the direct payment system, but – as the notice points out – the current method of distributing these payments will have to be reassessed.

Further proposals:

- The use of modern technologies should be promoted in order to support farmers on site and to ensure greater market transparency and security.
- Young people should be encouraged to a greater extent to take up farming as a profession. This also requires coherent concepts in the individual member states.
- Citizens' concerns with regard to sustainable agricultural production – health, nutrition, food waste and animal welfare – should be taken into account.
- The correlation between the content of the CAP and that of other areas of EU policy, such as trade, migration and sustainable development, should be ensured.
- An EU platform for risk management should be set up in order to clarify how farmers may best be supported in dealing with uncertainties concerning the climate, market fluctuations and other risks.

In the first half of 2018, the Commission intends to put forward detailed legislative proposals specifically designed to achieve the goals set out in the notice as soon as the proposal for the EU's next Multiannual Financial Framework (MFF), i.e. the seven-year budget after 2020, has been published.

EUROPEAN UNION (EU)

Effects on hops as a speciality crop

In connection with its review of the simplification and debureaucratisation of the Common Market Order for agricultural produce (Regulation (EU) No. 1308/2013), the EU Commission published a first draft of a working document on rules for the marketing of agricultural produce in January 2016. This includes what were previously separate sets of rules for hops covering

the “Certification of hops and hop products” and the “Importation of hops from non-member countries”. This working document has been on hold since April 2016. Due to the ongoing Brexit negotiations, the Commission has not put forward any new proposals on marketing rules to date.

ECONOMIC SITUATION

GDP data: IMF World Economic Outlook, April 2018

The world economic environment in 2017 was favourable, with nearly all countries benefiting. **Gross domestic product (GDP)** worldwide was 3.8% (2016: 3.2%), representing the strongest growth in six years. **Asia** was once again the continent with the highest growth. Here, the most significant GDP growth was in **China** with 6.9% (2016: 6.7%). Political tensions notwithstanding, **Turkey** posted even higher growth of 7.0% (2016: 3.2%). The **USA** also saw its economy grow at a robust rate of 2.3% (2016: 1.5%). GDP in the **eurozone** was 2.3% (2016: 1.8%). The key contributors here were **Germany** with 2.5% (2016: 1.9%) – its highest growth rate in six years; **Spain** with 3.1% (2016: 3.3%) – in spite of the Catalonia crisis; and **France** whose growth rate of 1.8% (2016: 1.2%) demonstrated its new-found economic strength.

Development of the key economic indicators for the world's four largest economies on page 30

The looming trade dispute between the **USA** and **China** represents a significant risk to the sustainability of this robust economic growth. US President Donald Trump's imposition of import tariffs on washing machines and solar collectors in January 2018 was followed by a further executive order in March imposing punitive tariffs on imports of steel and aluminium. Some countries, such as the neighbouring states of Mexico and Canada as well as Europe, were until May 31st provisionally exempted from these tariffs. In response, China imposed its own punitive tariffs on US products. In addition, China called on the World Trade Organisation (WTO) to open dispute settlement proceedings.

With inflationary trends around the world remaining subdued, the major central banks were in no hurry to adjust their monetary policy. The **European Central Bank (ECB)** left its benchmark interest rate unchanged since March 2016 at 0.00%. Likewise, the **People's Bank of China (PBC)** maintained the interest rate of 4.35% it had had since October 2015. The **US Federal Reserve (Fed)** raised its base rate as expected. Since the first adjustment in March 2017, the US base rate has risen in three steps of 0.25% each, bringing it to 1.75% (at the end of May 2018).

In late January/early February 2018, stock markets around the world weakened at the prospect of a reversal in interest rates. For share prices on the **Dow Jones (DJIA)**, which at the end of May 2017 stood at 21,144 points, there was only one direction: upwards. On 26 January 2018 the index closed at an all-time high of 26,616 points. This was followed shortly afterwards, on 5 February, by a fall to below 24,000 points. This collapse affected stock markets worldwide. The **German share index (DAX)**, which had reached the record level of 13,600 points on 23 January 2018, fell sharply. Stock exchanges in Asia and Australia also experienced painful losses. Among the major Asian stock markets, Japan's suffered the heaviest losses. Following further turbulence, on 31 May the benchmark indices in the US and Germany closed at 24,400 and 12,600 points respectively.

At the end of May 2017, the **euro / US dollar** exchange rate stood at 1.12 USD. The euro recovered towards the end of June 2017 and reached its highest level during the period under review of 1.25 USD on 1 February 2018. On 31 May 2018 the exchange rate stood at 1.17 USD.

With the world economy gathering pace, there was an increase in demand for **crude oil**. On top of that, the OPEC states cut back their oil production. The withdrawal of the USA from the nuclear treaty with Iran further drove up the oil price due to fears of a decline in Iranian oil exports. While a barrel of Brent crude oil cost around 50 USD at the end of May 2017, after a number of minor corrections the price had risen to 77.50 USD by the end of May 2018.

Following the withdrawal of the **USA** from the **Trans-Pacific Partnership (TPP)**, the remaining parties to the agreement continued their negotiations in spite of the loss of the most important participant. In March 2018, government representatives from **Australia, Brunei, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore** and **Vietnam** signed the successor treaty, the **Comprehensive and Progressive Trans-Pacific Partnership (CPTPP)**.

TOP 40 BREWERIES



The world's top 40 brewing groups as of 31 December 2017

Ranking	Brewery	Country	Beer output 2017 in m hl	Share of world beer production
1	AB InBev	Belgium	612.5	31.4%
2	Heineken	Netherlands	218.0	11.2%
3	China Res. Snow Breweries	China	126.0	6.5%
4	Carlsberg	Denmark	113.4	5.8%
5	Molson-Coors	USA/Canada	99.6	5.1%
6	Tsingtao Brewery Group	China	78.0	4.0%
7	Asahi	Japan	58.2	3.0%
8	Yanjing	China	43.0	2.2%
9	BGI / Groupe Castel	France	38.8	2.0%
10	Kirin	Japan	29.9	1.5%
11	Petropolis	Brasil	25.0	1.3%
12	Efes Group	Turkey	21.1	1.1%
13	Constellation Brands	USA	21.0	1.1%
14	San Miguel Corporation	Philippines	18.3	0.9%
15	Saigon Beverage Corp. (SABECO)	Vietnam	17.2	0.9%
16	Diageo (Guinness)	Ireland	15.5	0.8%
17	Singha Corporation	Thailand	14.5	0.7%
18	Grupo Mahou - San Miguel	Spain	12.6	0.6%
19	Pearl River	China	12.1	0.6%
20	Radeberger Gruppe	Germany	11.5	0.6%
20	CCU	Chile	11.5	0.6%
20	United Brewery	India	11.5	0.6%
23	Damm	Spain	10.6	0.5%
24	Oettinger	Germany	8.6	0.4%
24	Sapporo	Japan	8.6	0.4%
26	TCB Beverages	Germany	8.5	0.4%
26	Beer Thai (Chang)	Thailand	8.5	0.4%
28	Suntory	Japan	8.2	0.4%
29	Bavaria N.V.	Netherlands	7.3	0.4%
30	Bitburger Brewery Group	Germany	6.8	0.3%
31	Polar	Venezuela	6.2	0.3%
32	Krombacher	Germany	6.1	0.3%
33	Paulaner Brewery Group	Germany	5.7	0.3%
34	HiteJinro	South Korea	5.6	0.3%
35	Hanoi Beverage Corp. (HABECO)	Vietnam	4.8	0.2%
36	Obolon	Ukraine	4.5	0.2%
37	Gold Star	China	4.0	0.2%
38	Warsteiner	Germany	3.8	0.2%
39	Veltins	Germany	2.9	0.1%
40	Estrella de Galicia	Spain	2.8	0.1%
TOTAL			1,722.7	88.3%
World beer production 2017			1,951.7	100.0%

The data were taken from the brewers' own annual reports.

In other cases, after different sources had reported differing figures, or where no figures were available, the production volume had to be estimated.

Mergers & acquisitions

Following the mega takeover of SABMiller by ABI in 2016, merger activity has become somewhat more subdued again. The list would be unchanged were it not for the entrance of two new breweries at the bottom

of the table: Veltins, Germany, and Estrella de Galicia, Spain, which have replaced a Chinese brewer (Yunnan Lancang River) and another German brewer (Carlsberg, Homburg).

TOP 40 BREWERIES

The joint venture of ABI and EFES in Russia and Ukraine, which was announced in 2017, received approval in March 2018, which means that the new unit is now a strong challenger as number two behind Baltica (Carlsberg Group) in the Russian market. Kirin has sold the Brazil-based brewery group formerly known as Schincariol to Heineken, as a result of which Heineken has greatly strengthened its competitive position vis-à-vis AmBev (ABI Group), the dominant player in the Brazilian market.

The main focus of acquisition and consolidation activities was the craft segment: here, for example, Sapporo bought the brewer of the legendary Anchor Steam Beer in San Francisco. ABI acquired the Australian brewer 4 Pines and Heineken took a stake in the Brixton Brewery in London. The established brewing groups continue to show great interest in the fast-growing and well-known craft beer specialists as theirs is the only growth segment in the industry.

BEER OUTPUT DEVELOPMENT

	2016 1,000 hl	2017 1,000 hl	2016 +/- % rel.	2017 +/- % rel.
European Union	399,739	398,522	0.6%	-0.3%
Rest of Europe	129,221	125,615	-1.1%	-2.8%
Europe total	528,960	524,137	0.2%	-0.9%
North America	350,791	349,830	3.1%	-0.3%
Central America/Caribbean	20,109	20,364	4.7%	1.3%
South America	217,256	224,977	-4.7%	3.6%
America total	588,156	595,171	0.1%	1.2%
Asia	668,285	663,865	-2.1%	-0.7%
Africa	144,841	148,263	1.4%	2.4%
Australia/Oceania	20,296	20,312	-0.3%	0.1%
WORLD TOTAL	1,950,538	1,951,748	-0.5%	0.1%

As a result of the adjustments to the output figures for some countries, world beer output in 2016 was in fact 7 million hl lower than stated in last year's report. The most significant corrections were made for Asia (-12.3m hl) and North America (+5.4m hl).

There was an insignificant **increase in world beer production in 2017 of 1.2m hl, or 0.1%**, compared with output volume in 2016. The variation in beer output was therefore less than one per cent for the fifth year in succession.

The most important beer-producing nations remain **China, the USA, Brazil, Mexico and Germany**. These five countries account for more than half of world beer output volume.

The decline of 4.8m hl in **Europe** is the result of a fall of -1.2m hl in the European Union (Germany: -1.9m hl) and -3.6m hl in the countries in the rest of Europe (Russia -3.8m hl).

America saw output grow by 7m hl. This growth came above all from countries in South America (Brazil +6.7m hl, Columbia, Argentina, Peru and Chile combined +3m hl, Venezuela -2.3m hl). In North America, the result was essentially influenced by a decline of -5.7m hl in the USA and an increase of + 5.0m hl in Mexico.

In **Asia** the increase in output in some countries (Vietnam +5.9m hl, Philippines +2.3m hl and Myanmar +1.2m hl) was insufficient to compensate for the decline in others (China -10.5m hl, Japan -3.5m hl, Thailand -1.7m hl) which led to a decline of 4.4m hl in total.

The main contributor to growth of 3.4m hl in **Africa** was Ethiopia (+1.6m hl).

WORLD BEER PRODUCTION 2016/2017

Europe			
R**	Country	2016	2017
5	Germany	94,957	93,013
6	Russia	78,200	74,400
9	United Kingdom	43,734	43,300 *
10	Poland	41,369	40,500
11	Spain	36,469	37,200
14	Netherlands	24,559	24,800 *
19	France	20,650	21,300
20	Belgium	20,616	21,200 *
21	Czech Republic	20,476	20,322
25	Ukraine	17,980	17,800
26	Romania	15,780	16,110
28	Italy	16,218	15,552
32	Austria	9,497	9,658
33	Turkey	8,939	9,067
35	Ireland	7,680	7,750 *
37	Portugal	6,475	6,990
40	Hungary	6,239	6,400 *
41	Denmark	6,200	6,250 *
46	Serbia	5,563	5,410
47	Bulgaria	5,180	5,130
48	Sweden	4,782	4,850 *
52	Belarus/ White Russia	4,300	4,442
53	Finland	4,100	4,020
55	Greece	3,850 *	3,900 *
59	Croatia	3,348	3,500 *
60	Switzerland	3,422	3,464
68	Slovakia	2,900 *	2,900 *
71	Lithuania	2,999	2,789
73	Norway	2,664	2,632
84	Slovenia	2,000 *	1,550 *
91	Estonia	1,416	1,369
101	Georgia	941 *	969 *
104	Bosnia- Herzegovina	915	950
105	Moldavia	950 *	947 *
108	Latvia	762	814 *
111	Macedonia	630	645
113	Albania	610 *	620 *
120	Cyprus	375	394
127	Montenegro	340	320
130	Luxembourg	290	291
136	Iceland	234	248
138	Armenia	185	201
144	Malta	166	170
	TOTAL	528,960	524,137

Australia/Oceania			
R**	Country	2016	2017
27	Australia	15,944	15,950 *
69	New Zealand	2,921	2,886
109	Papua New Guinea	750 *	780 *
137	Tahiti	207 *	210 *
141	Fiji Islands	193 *	200 *
147	New Caledonia	141 *	142 *
155	Solomon Islands	69 *	69 *
157	Samoa	60 *	64 *
168	Vanuatu	11 *	11 *
	TOTAL	20,296	20,312

America			
R**	Country	2016	2017
2	USA	223,491	217,753
3	Brazil	133,346	140,000 *
4	Mexico	105,000	110,000
17	Canada	22,300	22,077
18	Colombia	21,000	21,893
23	Argentina	18,000	18,856
29	Peru	13,500	14,365
34	Chile	8,000	8,418
36	Venezuela	9,500	7,195
42	Ecuador	5,720	5,950
54	Dom. Republic	3,990	4,000
56	Bolivia	3,800	3,820
62	Panama	3,200	3,350
67	Paraguay	2,900	2,990
75	Cuba	2,600 *	2,600 *
82	Costa Rica	1,700 *	1,720 *
83	Nicaragua	1,500 *	1,560 *
88	Guatemala	1,450 *	1,450 *
95	El Salvador	1,200 *	1,200 *
98	Honduras	1,050 *	1,050 *
99	Uruguay	1,000	1,010 *
103	Jamaica	950 *	950 *
107	Puerto Rico	812	820
116	Trinidad	430 *	430 *
122	Guyana	390	380
126	Belize	340 *	340 *
142	Haiti	190	198 *
146	Bahamas	150 *	150 *
148	Dutch Antilles	140 *	140 *
150	Suriname	100 *	100 *
153	Barbados	80	80 *
154	St. Lucia	75 *	75 *
158	Martinique	60 *	60 *
159	Aruba	55 *	55 *
161	St. Vincent	45 *	45 *
164	Grenada	30 *	30 *
165	St. Kitts	25 *	25 *
166	Antigua	20 *	20 *
167	Dominica	12 *	11 *
171	Cayman Islands	5	5 *
	TOTAL	588,156	595,171

Asia			
R**	Country	2016	2017
1	China	450,600	440,150
7	Japan	55,150	51,610
8	Vietnam	37,900	43,750
15	India	22,100 *	22,500 *
16	Thailand	24,036	22,338
22	South Korea	20,000 *	20,000
24	Philippines	16,400	18,700
39	Cambodia	6,300 *	6,500 *
43	Kazakhstan	4,958	5,629
44	Taiwan	5,453	5,620
51	Myanmar	3,280	4,500 *
57	Laos	3,675 *	3,800 *
63	Malaysia	3,100 *	3,100
74	Uzbekistan	2,750 *	2,613
78	Indonesia	2,210	2,135
79	Iran	2,000 *	2,000 *
89	Sri Lanka	1,270 *	1,420 *
93	Israel	1,300 *	1,300 *
94	Singapore	1,250 *	1,260 *
96	Nepal	1,000 *	1,200 *
114	Mongolia	533	592
115	Turkmenistan	550	560
118	Hong Kong	400	400
121	Azerbaijan	337	389
123	Bangladesh	380 *	380 *
124	Tajikistan	365 *	380 *
125	Bhutan	320 *	350
129	Kirgistan	285 *	299
134	Lebanon	250 *	255 *
151	Jordan	98 *	100 *
163	Pakistan	30 *	30 *
170	Palestine	5 *	5 *
	TOTAL	668,285	663,865

Africa			
R**	Country	2016	2017
12	South Africa	32,000 *	32,320 *
13	Nigeria	26,000 *	26,000 *
30	Angola	11,000 *	11,500 *
31	Ethiopia	9,947	11,500 *
38	Kamerun	6,635	6,635 *
45	Kenya	5,590 *	5,500 *
49	Dem. Rep. of the Congo (Zaire)	4,560 *	4,560 *
50	Tanzania	4,300 *	4,500 *
58	Zambia	3,650 *	3,650 *
61	Uganda	3,300 *	3,400 *
64	Mosambique	3,000 *	3,100 *
65	Congo (Brazzaville)	3,000 *	3,000 *
66	Ivory Coast	2,500 *	3,000
70	Ghana	2,800 *	2,850 *
72	Namibia	2,700 *	2,700 *
76	Burundi	2,350 *	2,400 *
77	Zimbabwe	2,300 *	2,300 *
80	Burkina Faso	1,750	2,000
81	Tunisia	1,800 *	1,750
85	Rwanda	1,500 *	1,500 *
86	Botswana	1,500 *	1,500 *
87	Madagascar	1,400	1,500
90	Gabon	1,400	1,400
92	Algeria	1,460	1,300
97	Benin	1,090 *	1,050 *
100	Malawi	840 *	1,000 *
102	Egypt	950 *	950 *
106	Morocco	810	850
110	Togo	650	670
112	Chad	700	620
117	Lesotho	440 *	400 *
119	Mauritius	386	394
128	Guinea Conakry	330 *	300
131	Equatorial Guinea	300	270
132	Kingdom of eSwatini	270 *	270 *
133	Central African Republic	260	260
135	Réunion	250 *	250 *
139	Sierra Leone	200 *	200 *
140	Senegal	200	200
143	Eritrea	180 *	180 *
145	Mali	150	160
149	Liberia	155	135
152	Seychelles	90 *	90 *
156	Niger	65 *	65 *
160	Guinea Bissau	45 *	45 *
162	Gambia	30	31
169	Cape Verde	8 *	8 *
	TOTAL	144,841	148,263

World		
	2016	2017
TOTAL	1,950,538	1,951,748

It is becoming increasingly difficult to obtain figures for beer output volume in individual countries. In addition, there are often significant differences in the production figures provided by different sources. The output volumes here, which in some cases are estimates, are based on close scrutiny of all available data and our own judgement.

All figures in 1,000 hl

** Estimate*

*** Ranking*

Italics: corrections of figures for 2016 as stated in last year's report. These figures only became known after going to press or were subsequently corrected.

HOP VARIETIES – INTERNATIONAL STANDARD

The International Hop Growers' Convention (IHGC) has revised its list of hop varieties and created an internationally applicable standard.

The hop varieties have been divided into two groups: "aroma" and "bitter". In addition, each variety has been given a three-character abbreviation.

This list is internationally applicable for all parties involved in the hop industry, be they institutions, producers, marketers or processors.

The link to IHGC variety list can be viewed on our website under Varieties & Products (<http://www.barthhaasgroup.com/en/varieties-and-products#varieties>).

HOP ALPHA ACID PRODUCTION

The working group "Arbeitsgruppe Hopfenanalyse" (AHA) reports the average alpha acid values measured in **freshly harvested hops**. These values constitute the basis for any adjustments of supply contracts containing "alpha clauses" between the brewing industry and the hop industry. The average values serve as the basis for parties concluding new supply

contracts containing an "alpha clause".

The members of AHA are the in-house laboratories of the German hop-processing plants, HVG Mainburg, the Bavarian state institute of agriculture and hop research (Huell), BLQ Weihenstephan, VLB Berlin, Labor Veritas (Zurich), TU Berlin and IHPS Žalec.

Alpha acid values as is, as per EBC 7.4, in freshly harvested hops from crop years 2007 to 2016 and the 5-year and 10-year averages:

All other alpha acid values mentioned in the Barth Report were recorded on the basis of % as is, EBC 7.4 ToP (Time of Processing)

Area	Variety	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Ø 5 Years	Ø 10 Years
Hallertau	Hallertau Mfr.	4.4	4.2	3.8	5.0	4.6	3.3	4.0	2.7	4.3	3.5	3.6	4.0
	Hersbruck Spaet	2.9	3.4	3.5	4.5	3.0	1.9	2.1	2.3	2.8	2.3	2.3	2.9
	Saphir	5.1	4.5	4.5	5.3	4.4	2.6	3.9	2.5	4.0	3.0	3.2	4.0
	Opal	9.4	9.0	8.6	9.7	9.0	5.7	7.3	5.9	7.8	7.2	6.8	8.0
	Smaragd	6.7	6.4	7.4	8.0	6.0	4.3	4.7	5.5	6.2	4.5	5.0	6.0
	Perle	8.5	9.2	7.5	9.6	8.1	5.4	8.0	4.5	8.2	6.9	6.6	7.6
	Spalt Select	5.4	5.7	5.7	6.4	5.1	3.3	4.7	3.2	5.2	4.6	4.2	4.9
	Hallertau Tradition	7.5	6.8	6.5	7.1	6.7	5.0	5.8	4.7	6.4	5.7	5.5	6.2
	Mandarina Bavaria					8.8	7.4	7.3	7.0	8.7	7.3	7.5	
	Hallertau Blanc					9.6	7.8	9.0	7.8	9.7	9.0	8.7	
	Huell Melon					7.3	5.3	5.4	5.8	6.8	6.2	5.9	
	Northern Brewer	10.5	10.4	9.7	10.9	9.9	6.6	9.7	5.4	10.5	7.8	8.0	9.1
	Polaris					20.0	18.6	19.5	17.7	21.3	19.6	19.3	
	Hallertau	Hallertau Magnum	15.7	14.6	13.3	14.9	14.3	12.6	13.0	12.6	14.3	12.6	13.0
Nugget		12.0	12.8	11.5	13.0	12.2	9.3	9.9	9.2	12.9	10.8	10.4	11.4
Hallertau Taurus		17.9	17.1	16.3	17.4	17.0	15.9	17.4	12.9	17.6	15.9	15.9	16.5
Herkules		17.3	17.3	16.1	17.2	17.1	16.5	17.5	15.1	17.3	15.5	16.4	16.7
Elbe-Saale	Hallertau Magnum	12.2	13.7	13.1	13.7	14.1	12.6	11.6	10.4	13.7	12.6	12.2	12.8
Tett nang	Tett nang	4.2	4.2	4.0	5.1	4.3	2.6	4.1	2.1	3.8	3.6	3.2	3.8
	Hallertau Mfr.	4.7	4.5	4.2	5.1	4.7	3.3	4.6	2.9	4.4	4.3	3.9	4.3
Spalt	Spalt	4.1	4.4	3.7	4.8	4.1	2.8	3.4	2.2	4.3	3.2	3.2	3.7
Slovenia	Aurora	9.0	7.8	8.3	9.1	8.0	6.1	10.2	8.5	8.7	7.3	8.2	8.3
	Savinjski Golding	3.4	4.0	2.7	3.8	2.6	2.1	3.9	2.0	3.4	2.2	2.7	3.0
	Bobek	5.6	5.0	4.8	6.0	4.0	2.1	6.4	5.0	4.4	3.5	4.3	4.7
	Celeia	4.2	4.2	4.0	4.1	3.2	2.2	4.7	3.2	3.2	2.8	3.2	3.6
Czech Rep.	Saazer	3.7	3.9	3.2	4.0	3.8	2.9	2.9	2.1	3.4	3.0	2.9	3.3
	Sládek	6.2	7.5	7.2	7.9	7.0	7.0	6.6	5.0	6.5	6.2	6.3	6.7
	Premiant	9.3	10.0	9.3	9.8	8.5	8.0	7.6	7.0	8.5	7.6	7.7	8.6
Poland	Lubliner	4.3	4.6	2.6	3.8	4.7	4.3	2.3	3.4	3.2	3.2	3.3	3.6

HOP ALPHA ACID PRODUCTION

The alpha acid production of the world hop crop, divided into the variety groups below, was as follows:

Group	2016					2017				
	Crop share	Crop mt	Alpha Ø	Alpha mt	Alpha share	Crop share	Crop mt	Alpha Ø	Alpha mt	Alpha share
Aroma	60.7%	68,058	7.0%	4,746	45.1%	61.2%	72,494	7.3%	5,291	47.0%
Bitter	39.3%	44,067	13.1%	5,787	54.9%	38.8%	45,907	13.0%	5,957	53.0%
TOTAL	100.0%	112,125	9.4%	10,533	100.0%	100.0%	118,401	9.5%	11,248	100.0%

Group Aroma hops
 USA 62.4%
 (previous year 55.5%),
 Germany 20.9%
 (previous year 28.4%)

Group Bitter hops
 Germany 49.4%
 (previous year 54.5%),
 USA 33.5%
 (previous year 24.6%)

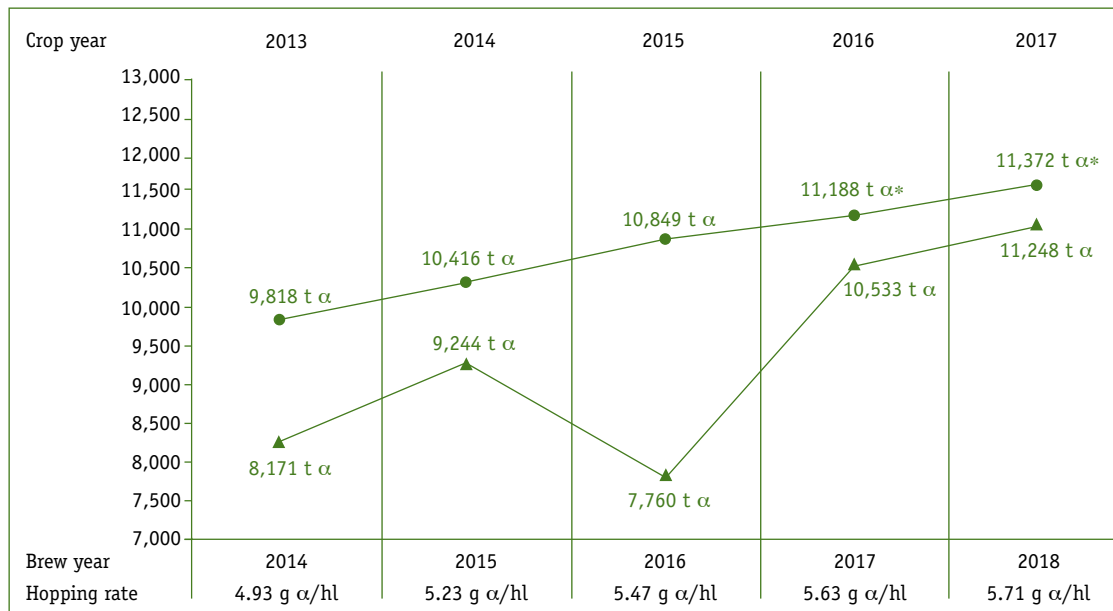
In terms of crop and alpha volume, yields in 2017 were higher year on year. While volumes in Europe were lower, those produced on the American continent were significantly higher. Never before had world alpha volume been as high as it was in crop year 2017.

market in 2016 with an alpha volume share of 42.7% (USA 38.5%), in 2017 it was the other way round. The USA accounted for 47% and Germany for 36% of world alpha volume.

The two leading hop producing countries USA and Germany increased their share to 83.1% (2016: 81.2%). Whereas Germany had dominated the world

The alpha acid values upon which the calculations are based are recorded using the method of EBC analysis 7.4 - % as is at the Time of Processing (ToP).

ALPHA ACID BALANCE



Alpha supply

Brew year	
2014	- 1,647 t α
2015	- 1,172 t α
2016	- 3,089 t α
2017	- 655 t α
2018	- 124 t α

● Alpha demand (brew year)
 ▲ Alpha production (crop year)
 * Estimated demand

The craft beer segment continues to grow and with it the hopping rate, albeit to a somewhat lesser degree. Although world beer output has remained virtually unchanged in the past six years, alpha demand has risen by 25%. The alpha acid balance is negative – also for the sixth year in succession.

The demand for hops beyond the brewing industry has been taken into consideration in the alpha supply calculation.



MARKET ANALYSIS

With hop acreage up 5% year on year, the world crop volume of 118,400 mt in 2017 not only represented an increase of 6% over the previous year, but was also the largest volume harvested since 1996. The harvested alpha volume of 11,250 mt set in fact, a new record. Nevertheless, the alpha acid balance for the 2018 brewing year is negative for the sixth year in succession.

On the whole, the hop industry is in good health. This is by no means self-evident, as world beer output has been stagnant at a level of roughly 1.96bn hl since 2012. In the same period, however, alpha demand has grown by 25% and since 2008 by as much as 47%. The reason for this astonishing development is the unbroken rise worldwide of the craft beer movement which, although thus far accounting for only 2.5% of total world beer production, now requires some 20 to 25% of the entire world hop crop. However, the growth in demand for alpha over the past 10 years has not come only from the craft sector. It is interesting to note that demand from the non-craft sector has also grown by 18%, although total beer production has increased by only 8% in the same period. This is a clear indication of the effect that the craft beer movement, with its motto of “beer flavour through hops”, has had on the brewing industry as a whole.

On the basis of growers’ revenues, the value of the 2017 world crop is estimated at roughly 900 million euros. It clearly is the USA with a world market share of 40% and a crop value of 530 million euros where the action is. Germany comes a distant second with a world market share of 35% and a crop value of 230 million euros. The primacy of the USA is also demonstrated in the number of different hop varieties grown there. According to the variety list of the International Hop Growers’ Convention, 87 of the 272 hop varieties now found worldwide are grown in the USA and 41 in Germany.

A more in-depth analysis of the 2017 world hop harvest and its consequences shows that the global hop market that was spoken of in the past no longer exists in that sense. Instead, nearly all the hop varieties have their own individual market segments.

For one to two years now, it has been apparent that the expansion of aroma acreage in the USA has been

outpacing the requirements of the craft industry. On the other hand, the reduction in bitter hop acreage in recent years has been too drastic. At the beginning of the 2017 season it was therefore foreseeable that there would be a surplus of flavour hops and a deficit of bitter hops on the world market.

However, this did not lead to a widespread fall in prices for flavour hops in the USA because, on the one hand, specific varieties such as Citra®, Mosaic® and Galaxy™ failed to meet demand and, on the other, up to 5,000 mt of US flavour varieties (particularly those with high alpha content) accumulated from previous crops were channelled into the extraction market for mainstream bitter hop products. In this way, it was possible once again to make up for and soften the impact of the structural deficit in the bitter hop segment that had been building up in recent years. Nevertheless, spot hop prices in the bitter segment rose to levels unseen since 2008.

In Germany and – for the first time since 2009 – in the USA, bitter hop acreage was increased by a combined total of 880 ha for crop year 2017. This was not sufficient to eliminate the structural deficit in the bitter segment, however. The US hop industry therefore will not be able to avoid costly restructuring of its hop acreage.

In the European aroma hop segment, the market was at its calmest thanks to another good harvest in Saaz and Poland. The opposite was the case for the German aroma varieties with supplies of Perle and Hallertau Tradition in particular giving cause for concern. As a result, prices rose. The situation eased after the hop marketers managed to make surplus hops from some of their contract partners available for sale on the spot market.

In view of the high proportion of contracted hops in the USA and Germany, amounting to 95% for crop year 2018, we expect the supply situation to be tight both in the bitter segment and for many aroma varieties. Hops belonging to the Saaz family are only likely to become scarce in the event of a poor harvest. Apart from a few exceptions, flavour varieties in the USA, as well as those in Germany and probably not only there, have been expanded beyond brewers’ requirements.

HOP FORWARD CONTRACT RATES

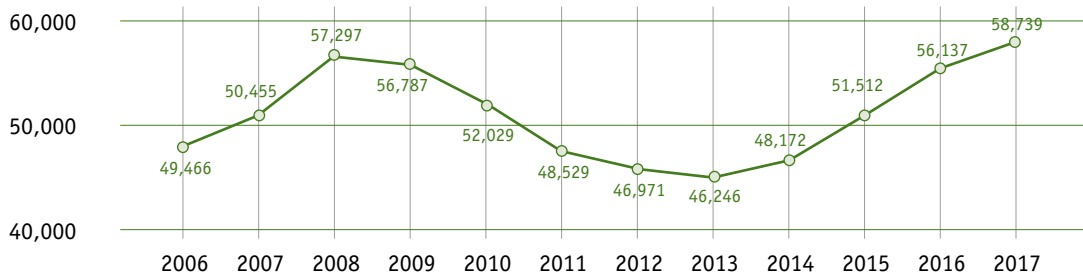
Forward contract rates (as per spring 2018)

COUNTRY	2018	2019	2020	2021
Germany	95%	90%	85%	65%
Czech Republic	95%	95%	90%	85%
Slovenia	85%	80%	75%	70%
Poland	75%	75%	70%	60%
England	85%	80%	70%	60%
France	90%	80%	80%	60%
USA	95%	85%	65%	35%
Australia	90%	85%	85%	75%

Due to insufficient availability of official data, the forward contracting rates are based on estimates and have been calculated on the long-term average yield

DEVELOPMENT 2006 - 2017

HOP AREA UNDER CULTIVATION IN HA



HOP PRODUCTION IN MT

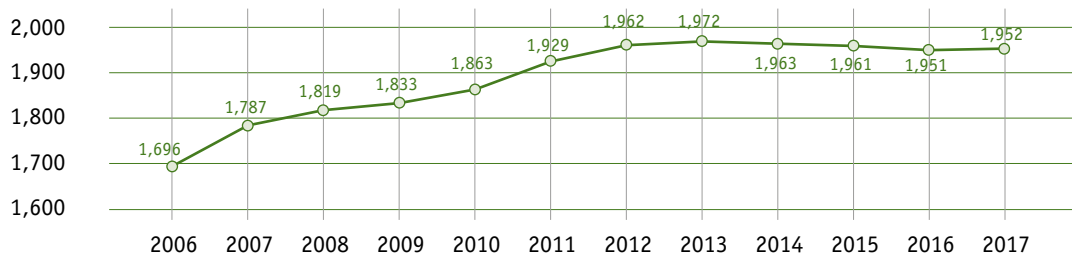


HOP ALPHA PRODUCTION IN MT



* not taking into consideration the quantities destroyed in warehouse fires

BEER PRODUCTION IN MILLION HL



WORLD HOP ACREAGE AND CROP

		2016				2017			
		Acreage ha	Production mt	Ø-Alpha %	Alpha mt	Acreage ha	Production mt	Ø-Alpha %	Alpha mt
Germany	Hallertau	15,510	36,953.5	10.8%	3,984	16,310	35,540.2	9.9%	3,518
	Elbe-Saale	1,409	2,845.4	11.0%	312	1,466	2,938.8	10.7%	315
	Tett nang	1,282	2,194.2	6.9%	151	1,353	2,270.4	7.1%	160
	Spalt	376	730.0	6.8%	50	391	762.2	6.6%	50
	Other	22	43.0	8.9%	4	22	44.7	8.8%	4
	Total	18,598	42,766.1	10.5%	4,501	19,543	41,556.3	9.7%	4,047
Czech Republic	Saaz	3,692	5,799.8	4.1%	239	3,815	5,116.4	3.8%	195
	Tirschtitz	570	1,092.5	3.8%	42	600	864.2	2.7%	23
	Auscha	513	819.3	4.5%	36	530	816.2	3.8%	31
	Total	4,775	7,711.6	4.1%	317	4,945	6,796.8	3.7%	249
Slovenia		1,484	2,475.5	5.3%	131	1,591	2,766.5	4.9%	134
Poland		1,475	3,043.6	8.3%	254	1,576	2,993.2	7.9%	236
England		920	1,423.9	7.4%	105	967	1,780.6	7.1%	126
Spain (incl. Galicia) ^o		540	947.5	11.6%	110	521	613.0	11.2%	69
France		459	771.8	3.8%	29	481	763.7	3.9%	30
Romania		260	180.0	10.0%	18	270	205.0	9.4%	19
Austria		249	479.4	8.5%	41	250	442.0	8.0%	35
Belgium		147	197.9	9.3%	18	155	237.1	9.0%	21
Slovakia		147	186.6	3.4%	6	138	118.0	3.3%	4
Bulgaria*		18	40.0	10.4%	4	22	64.0	9.1%	6
Portugal		12	13.7	10.7%	1	12	16.4	9.5%	2
Netherlands		2	2.1	12.5%	0	2	2.0	11.8%	0
	European Union	29,086	60,239.6	9.2%	5,535	30,473	58,354.6	8.5%	4,978
Ukraine*		380	380.0	6.0%	23	370	420.0	5.8%	24
Russia		300	428.0	4.2%	18	344	522.0	4.3%	22
Turkey		297	260.5	10.3%	27	283	187.7	9.9%	19
Belarus/White Russia		58	86.0	9.5%	8	55	60.0	9.0%	5
Switzerland		17	29.3	9.2%	3	16	17.7	8.2%	1
	Rest of Europe	1,052	1,183.8	6.7%	79	1,068	1,207.4	5.9%	71
	EUROPE	30,138	61,423.4	9.1%	5,614	31,541	59,562.0	8.5%	5,049
USA	Washington	15,153	29,686.2	10.5%	3,104	15,556	35,694.9	11.4%	4,075
	Oregon	3,143	5,622.1	8.5%	478	3,177	5,403.8	9.1%	492
	Idaho	2,286	4,217.4	10.0%	424	2,830	6,241.3	10.7%	669
	PNW-States	20,582	39,525.7	10.1%	4,006	21,564	47,340.0	11.1%	5,236
	Other States	988	680.4	7.1%	48	1,012	850.5	7.5%	64
	Total	21,570	40,206.1	10.1%	4,054	22,576	48,190.5	11.0%	5,300
Canada*		137	155.0	8.9%	14	172	155.0	9.6%	15
Argentina		167	232.4	8.3%	19	153	266.7	8.4%	22
	AMERICA	21,874	40,593.5	10.1%	4,087	22,901	48,612.2	11.0%	5,337
China	Xinjiang	1,647	4,752.0	6.0%	284	1,648	4,506.0	6.5%	293
	Gansu	992	2,349.4	7.5%	176	1,035	2,538.0	6.8%	172
	Total	2,639	7,101.4	6.5%	460	2,683	7,044.0	6.6%	465
Japan		133	244.6	6.9%	17	120	273.4	6.5%	18
	ASIA	2,772	7,346.0	6.5%	477	2,803	7,317.4	6.6%	483
South Africa		395	863.5	14.9%	129	421	710.6	12.9%	92
	AFRICA	395	863.5	14.9%	129	421	710.6	12.9%	92
Australia		546	1,104.8	13.1%	145	631	1,438.3	14.6%	211
New Zealand		412	794.0	10.2%	81	442	760.5	10.0%	76
	AUSTRALIA/OCEANIA	958	1,898.8	11.9%	226	1,073	2,198.8	13.1%	287
	WORLD	56,137	112,125.2	9.4%	10,533	58,739	118,401.0	9.5%	11,248

^o Spain: A hailstorm in August 2017 destroyed nearly half the crop volume

* estimate

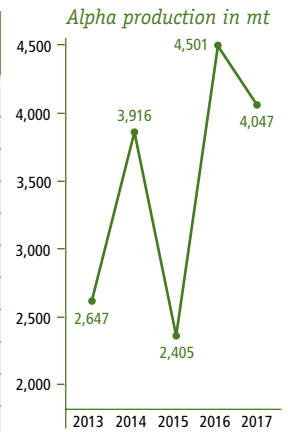
Italics: corrections of figures for 2016 as stated in last year's report.

Rounding differences of the acreage may cause differences in addition

GERMANY



Area	Variety	Development of acreage			Development of production				
		Acreage ha			Ø Yield mt/ha		Production mt		
		2016	+/-	2017	2016	2017	2016	2017	
Hallertau	Perle	2,780	-127	2,653	2.32	1.95	6,461.58	5,184.18	
	Hallertau Tradition	2,704	-112	2,592	2.31	1.93	6,234.23	5,009.90	
	Hersbruck Spaet	934	-24	910	2.05	1.98	1,913.98	1,806.16	
	Hallertau Mittelfrueh	553	-14	539	1.78	1.35	982.93	730.31	
	Spalt Select	440	-3	437	2.27	2.06	999.10	901.41	
	Saphir	400	16	416	2.19	1.92	876.57	798.27	
	Mandarina Bavaria	302	8	310	1.90	2.60	574.29	806.12	
	Amarillo	-	250	250	-	0.39	-	98.26	
	Northern Brewer	-	162	162	-	1.46	-	235.75	
	Hallertau Blanc	131	12	143	2.12	2.36	277.61	337.69	
	Opal	137	1	138	1.97	1.88	271.25	259.55	
	Huell Melon	111	17	128	2.24	2.29	248.40	292.68	
	Other Aroma	191	116	307	1.28	1.93	244.13	591.68	
	Total Aroma		8,683	303	8,986	2.20	1.90	19,084.07	17,051.96
	Herkules	4,540	866	5,406	2.87	2.63	13,019.27	14,243.57	
	Hallertau Magnum	1,526	-139	1,387	2.13	2.30	3,254.90	3,186.57	
	Hallertau Taurus	340	-70	270	2.22	2.03	753.62	547.97	
	Northern Brewer	156	-156	-	1.95	-	304.69	-	
	Nugget	128	-9	119	2.50	2.75	320.91	327.81	
	Other	136	6	142	1.59	1.28	216.05	182.31	
Total Bitter		6,827	497	7,324	2.62	2.52	17,869.44	18,488.23	
Total Hallertau		15,510	800	16,310	2.38	2.18	36,953.51	35,540.19	
Elbe-Saale	Perle	219	3	222	2.17	1.91	475.38	423.19	
	Northern Brewer	-	138	138	-	1.61	-	222.48	
	Saaz	106	23	129	1.00	1.22	105.65	157.62	
	Other Aroma	87	30	117	1.77	1.72	154.10	201.09	
	Total Aroma	412	195	607	1.78	1.65	735.13	1,004.38	
	Hallertau Magnum	663	-45	618	2.16	2.26	1,434.63	1,398.15	
	Herkules	135	6	141	2.39	2.62	322.33	368.78	
	Northern Brewer	109	-109	-	1.93	-	211.32	-	
	Other	89	11	100	1.60	1.67	142.00	167.46	
Total Bitter	997	-138	859	2.12	2.25	2,110.28	1,934.39		
Total Elbe-Saale	1,409	57	1,466	2.02	2.00	2,845.41	2,938.77		
Tettngang	Tettngang	732	15	747	1.41	1.31	1,032.26	976.89	
	Hallertau Mittelfrueh	142	5	147	1.87	1.53	264.50	224.25	
	Other Aroma	215	28	243	2.05	2.07	441.46	502.70	
	Total Aroma	1,089	48	1,137	1.60	1.50	1,738.22	1,703.84	
	Herkules	173	35	208	2.56	2.67	442.50	556.02	
	Other	20	-11	9	0.67	1.18	13.44	10.58	
Total Bitter	193	24	217	2.36	2.61	455.94	566.60		
Total Tettngang	1,282	71	1,353	1.71	1.68	2,194.16	2,270.44		
Spalt	Spalt	119	2	121	1.41	1.38	168.35	167.13	
	Other Aroma	217	8	225	2.12	2.14	459.06	482.59	
	Total Aroma	336	10	346	1.87	1.88	627.41	649.72	
	Bitter	40	5	45	2.57	2.50	102.62	112.44	
Total Spalt	376	15	391	1.94	1.95	730.03	762.16		
Rhen.-P./Bitburg	Aroma	14	1	15	2.04	1.81	29.91	27.19	
	Bitter	8	0	8	1.68	2.19	13.07	17.50	
	Total Rhen.-P./Bitburg	22	0	22	1.91	2.03	42.98	44.69	
Total Aroma	10,534	557	11,091	2.11	1.84	22,214.74	20,437.09		
Total Bitter	8,064	389	8,453	2.55	2.50	20,551.35	21,119.16		
GERMANY TOTAL		18,598	945	19,543	2.30	2.13	42,766.09	41,556.25	



Varieties with acreage of less than 100 ha are included in 'Other aroma' varieties or 'Other' varieties in 2017

The addition of rounded acreage figures may lead to differences in totals in some cases

GERMANY

Farm structure

In spite of an increase of five per cent in hop acreage, the number of hop farms in Germany continued to decline. In crop year 2017 the number of producers had fallen to 1,132 representing a year-on-year decline of 22 farms. The average planted area per farm rose from 16.1 ha to 17.3 ha.

Within the Hallertau production region there were 912 producers (-19) with an average acreage of 17.9 ha (+1.2 ha) per farm.

Acreage

Hop acreage in Germany increased by 945 ha. The total area thus returned to a level last seen in Germany

20 years ago. Taking into account the reclassification of individual hop varieties in accordance with the internationally applicable IHGC table, the area planted with aroma and bitter varieties grew by 557 ha (5.3%) and 389 ha (4.8%) respectively. While the acreage planted with the two most widely grown aroma varieties **Perle** and **Hallertau Tradition** declined by 127 ha and 123 ha respectively, the expansion of the acreage of the main bitter variety **Herkules** by 913 ha represented the greatest change. With a share of 30% of total acreage, **Herkules** is by far the most widely grown variety in German hop farming.

In the last five years hop acreage developed as follows:

Variety	2013 ha	2014 ha	2015 ha	2016 ha	2017 ha	Percentage of acreage 2017
Perle	3,048	3,154	3,187	3,093	2,966	15.2%
Hallertau Tradition	2,661	2,825	2,914	2,827	2,704	13.8%
Hersbruck Spaet	847	924	955	940	916	4.7%
Tettngang	787	762	744	732	747	3.8%
Hallertau Mittelfrueh	925	838	751	733	723	3.7%
Spalt Select	496	523	534	534	532	2.7%
Saphir	324	381	423	450	473	2.4%
Mandarina Bavaria	35	99	207	346	356	1.8%
Northern Brewer	-	-	-	-	300	1.5%
Amarillo	-	-	-	-	280	1.4%
Hallertau Blanc	12	48	109	154	170	0.9%
Huell Melon	14	56	101	134	157	0.8%
Opal	28	63	130	140	141	0.7%
Saaz	12	19	74	113	137	0.7%
Spalt	112	112	114	119	121	0.6%
Other Aroma	51	71	96	220	369 ¹⁾	1.9%
Total Aroma	9,352	9,876	10,340	10,534	11,091	56.7%
Herkules	3,086	3,622	4,152	4,884	5,797	29.7%
Hallertau Magnum	3,102	2,642	2,353	2,196	2,011	10.3%
Hallertau Taurus	709	594	465	357	284	1.5%
Polaris	43	53	60	106	174	0.9%
Nugget	184	173	162	152	131	0.7%
Northern Brewer	281	267	238	266	-	-
Other	92	80	85	104	55 ²⁾	0.3%
Total Bitter	7,497	7,431	7,515	8,064	8,453	43.3%
GERMANY TOTAL	16,849	17,308	17,855	18,598	19,543	100.0%

1) Other aroma varieties include: Ariana, Brewers Gold, Callista, Cascade, Comet, Hallertau Gold, Hersbruck Pure, Monroe, Relax, Smaragd, Target.

2) Others include: Hallertau Merkur, Record, others/selections.

There may be differences in the sum totals due to figures being rounded up or down after the decimal point

Crop volume

2017 began with a two-week period of cold wintery weather, bringing frosty conditions with double-digit minus temperatures. The severity of these permanent minus temperatures led to good frost action in the upper soil segment in particular. An unbroken snow cover prevented the frost from penetrating further, however. Towards the end of the winter in February conditions were comparatively mild and dry.

Spring got off to a spirited start, with the warmest conditions seen in March since regular weather records began. As in the previous year, the dry climate

offered ideal conditions for crown pruning. The low-precipitation weather continued into early April, allowing all the spring work to be completed in good time. The weather conditions changed in the second half of the month, with typical April weather bringing repeated falls of rain and cool to occasionally wintery temperatures. The hop plants stopped growing almost entirely and fell a good week behind the long-term average in terms of development. As a result, training did not start on many farms until the beginning of May. With temperatures rising again from mid-May,



plant development gathered pace and by early June the plants had almost completely made up for the earlier setback. By mid-June the hop plants were displaying normal vegetative growth of 70% to 80% of trellis height.

The weather in June was characterised by summery temperatures with precipitation at only about half of its usual level. As a result, many of the plants had an underdeveloped appearance with below-average lateral formation. The dry weather conditions continued into July while the hops were coming into burr, leading to a comparatively short flowering period and a lower number of flowers per vine. The only positive effect of this dry period was the low incidence of infestation with downy and powdery mildew.

Ideal growing conditions returned from the end of July, with plentiful rainfall ending the water shortage for the hop plants and encouraging good cone development and above-average cone size. This made up for the low number of flowers and, as a result, an average crop was harvested in the Hallertau region. The volume harvested was slightly above-average in the Elbe-Saale region and even above average in the Tettngang and Spalt regions. Due to the low level of disease and pest infestation, the visual quality of all varieties was generally very good.

The total crop volume in crop year 2017 of 41,556 mt was 6% higher than the volume estimated when picking began. Crop volume was down by roughly 1,200 mt or just below 3% year on year.

Alpha content*

The alpha acid content in all varieties in 2017 was significantly lower year on year. In most cases, however, the levels were in line with the average for the last five crop years. The only exception was the **Herkules** variety. This, the main variety, with a share of crop volume totalling 40% in the Hallertau region, was below the average. In spite of crop volume being only slightly lower nationally, the alpha yield of 4,047 mt was 10% down year on year.

Market situation

Spot market crop 2017

Growers received initial advance payment price offers for the 2017 crop relatively early, i.e. in the first ten days of September. This was part of an effort by the marketers to promote their pools and purchasing initiatives. Gradually the prices rose, reaching their peak in early October.

For example, the advance payment prices rose from 9.00 EUR/kg to 10.00 EUR/kg for the varieties **Perle** and **Spalt Select** and from 9.00 EUR/kg to 9.50 EUR/kg for **Hersbruck Spaet**. The price for **Hallertau Tradition** remained unchanged at 9.00 EUR/kg. In Tettngang an advance payment price of 13.00 EUR/kg was offered for **Tettngang** hops.

In the case of fixed price purchases, offers to growers peaked at 12.00 EUR/kg for **Perle**, 11.50 EUR/kg for **Spalt Select** and 11.00 EUR/kg for **Hersbruck Spaet** and **Hallertau Tradition**.

Lastly, an advance payment price of 65.00 EUR/kg alpha was offered for the bitter varieties **Herkules**, **Hallertau Taurus** and **Polaris**. Occasionally, fixed price purchases were made at up to 88.00 EUR/kg alpha.

By mid-October the farm-gate market could be considered cleared.

Contract market

According to the EU crop report, growers had sold forward approx. 90% of the total German crop produced in 2017 at an average price of 4.90 EUR/kg.

In October 2017 there were some price adjustments for certain varieties in the **Hallertau** region.

Activity in the contract market largely came to a halt in November/December 2017. One by one, the hop marketers withdrew their orders. There was no further activity until February/March 2018 when occasional contracts were signed for **Perle** and **Hallertau Tradition**, and then only for four years and mostly on the same terms as in October of the previous year.

The contract ratio for crop year 2018 is 95%.

**Alpha acid content overview for individual varieties, page 10*

Forward contract rates up to crop year 2021, page 13

Forward contract offers for the main varieties in the Hallertau region

Variety	Time	2018	2019	2020	2021	2022	2023	2024	2025	Price basis
PER	Sept. 2017	7.20	7.20	7.20	7.20	7.20	7.20	7.20	7.20	1
	Oct. 2017	8.00	8.00	7.50	7.50	7.50	7.50	7.50	7.50	1
HTR	Sept. 2017	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	1
HEB	Sept. 2017	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	1
	Nov. 2017	8.00	8.00	8.00	7.50	7.50	7.50	7.50	7.50	1
SSE+SIR	Sept. 2017	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	1
	Oct. 2017	7.50	7.50	7.00	7.00	7.00	7.00	7.00	7.00	1
HKS+PLA	Sept. 2017	55.00	45.00	35.00	32.00	32.00	32.00	--	--	2
	Oct. 2017	60.00	45.00	40.00	35.00	32.00	32.00	32.00	32.00	2
HMG	Sept. 2017	6.50	6.50	6.50	6.35	6.35	6.35	--	--	1
	Oct. 2017	8.20	6.90	6.70	6.50	6.35	6.35	6.35	6.35	1

Variety names:

PER – Perle

HTR – Hallertau Tradition

HEB – Hersbruck Spaet

SSE – Spalt Select

SIR – Saphir

HKS – Herkules

PLA – Polaris

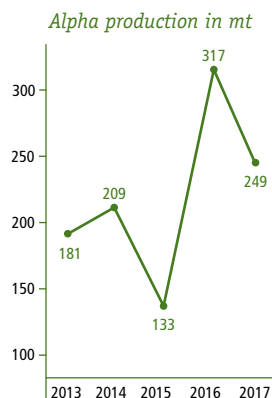
HMG – Hallertau Magnum

Price basis

1: EUR/kg

2: EUR/kg α

CZECH REPUBLIC



Variety	Development of acreage Acreage ha			Development of production Ø Yield mt/ha Production mt			
	2016	+/-	2017	2016	2017	2016	2017
Saaz	4,190	127	4,317	1.52	1.28	6,366.5	5,514.2
Sládek	267	28	295	2.39	2.08	639.4	613.9
Premiant	175	-10	165	2.42	2.07	423.9	342.3
Other Aroma	92	22	114	1.88	1.86	173.4	212.0
Total Aroma	4,724	167	4,891	1.61	1.37	7,603.2	6,682.4
Agnus	39	3	42	2.37	2.33	92.6	97.7
Other Bitter	12	0	12	1.32	1.39	15.8	16.7
Total Bitter	51	3	54	2.35	2.12	108.4	114.4
CZECH REPUBLIC TOTAL	4,775	170	4,945	1.61	1.37	7,711.6	6,796.8

Farm structure

The number of hop producers in the Czech Republic increased by six. No new producers entered the market, however. Instead, the younger generation within certain hop-farming families took over some areas of existing planted acreage. The average hop-growing area farmed by the now 117 growers fell to 42 ha per farm in crop year 2017 from 43 ha per farm the previous year.

Acreage/crop volume/alpha content

Hop acreage increased in all three production regions in the Czech Republic. In total, acreage grew by nearly 4% the bulk of which was planted with the main variety **Saaz**.

The weather conditions in the winter were normal. In March, on the other hand, it was warm with above-average temperatures which led to work beginning very early in the hop gardens. The early growth was stalled, however, by the cold and very rainy last three weeks in April. In fact, night frosts in early May caused plant development to fall behind the long-term average. The first dry period began in late May with summery temperatures. It was not until mid-July that the rainfall growers had been hoping for arrived, bringing much-needed relief. However, this was followed by another heatwave in early August. With the hops almost ready for harvesting, there was plentiful rainfall in mid-August accompanied by a sustained period of moderate summer temperatures. Harvesting began with **Saaz** hops on 18 August. The yield per hectare was roughly in line with the multi-year average.

Alpha content was down year on year. The difference was particularly noticeable in the Tirschitz and Auscha regions. The national average values were equal to those of the last five crop years. The alpha acid yield decreased by 22% year on year.

Market situation

The record production volume in crop year 2016 had met the high demand from brewers for **Saaz** hops and, in some cases, had even allowed them to stock up. Nevertheless, demand remained stable. The 2017 harvest allowed the growers to meet their contractual obligations in full at prices ranging from 175 to 270 CZK/kg (6.90 to 10.65 EUR/kg) for **Saaz** hops and from 100 to 170 CZK/kg (3.90 to 6.70 EUR/kg) for **Premiant** and **Sládek**. In addition, they were able to sell what non-contracted hops they could offer at prices ranging from 240 to 270 CZK/kg (9.50 to 10.65 EUR/kg) for **Saaz** hops. Prices for **Premiant** and **Sládek** hops also benefited from the high demand immediately after the harvest with growers receiving between 210 and 240 CZK/kg (8.30 to 9.50 EUR). The flavour variety **Kazbek** was the only one affected by the price pressure resulting from the surplus of European flavour hops.

Occasional offers of forward contracts were received for **Premiant** and **Sládek** hops in the late autumn, but no new contracts were offered for **Saaz** hops.

Acreage is expected to increase by approx. 80 ha in 2018 with almost half of the new plantings being devoted to the **Saaz** variety. Based on the assumption of an average yield, almost the entire crop volume expected for 2018 had already been contracted forward* by this spring.

Growers are investing in new production equipment in order to reduce production costs and align the quality of the hops harvested with the high standards demanded by their customers in the brewing industry.

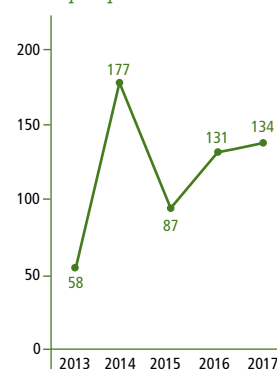
*Forward contract rates up to crop year 2021, page 13

Alpha acid table, page 10



Variety	Development of acreage Acreage ha			Development of production Ø Yield mt/ha Production mt			
	2016	+/-	2017	2016	2017	2016	2017
Celeia	573	22	595	1.76	1.94	1,006.2	1,153.4
Aurora	474	8	482	1.72	1.87	813.1	903.2
Savinjski Golding	168	10	178	1.26	1.13	211.3	201.6
Bobek	147	17	164	1.86	1.63	272.9	267.5
Styrian Gold	43	7	50	1.69	1.56	72.5	77.3
Other Aroma	42	24	66	0.98	1.25	41.3	82.7
Total Aroma	1,447	88	1,535	1.67	1.75	2,417.3	2,685.7
Total Bitter	37	19	56	1.57	1.43	58.2	80.8
SLOVENIA TOTAL	1,484	107	1,591	1.67	1.74	2,475.5	2,766.5

Alpha production in mt



Farm structure

In the Podgorje region of Slovenia, five farms went into hop production for the first time bringing the number of active hop producers to 116. As there was an increase in acreage in the same period, the average planted hop acreage per farm increased to 14 ha (2016: 13 ha).

Acreage/crop volume/alpha content

Total planted acreage grew by 7%. The expansion of acreage planted with **Celeia** hops slowed due to the prospect of market saturation. The downward trend affecting **Aurora** hops came to an end. In fact, acreage of this variety, which was once Slovenia's most important, rose again slightly for the first time since 2007. There was also an upsurge in planting of new flavour varieties.

The weather conditions during the winter months were mainly cold and dry whereas March, by contrast, was unusually warm and dry. The second half of April was marked by extensive rainfall and cold conditions including night frosts. In May the weather turned very warm. A severe hail shower in the region around the town of Petrovce in early June caused massive damage with crop losses ranging from 50% to 80%. An area of approx. 120 ha, mainly planted with **Aurora** and **Celeia** hops, was affected. The entire month of July was too dry with above-average temperatures. Some 80% of Slovenia's hop acreage is now equipped with irrigation systems, which benefited plant development in the respective hop gardens. Another heat wave followed in August. The remaining weeks before the harvest were characterised by average summer temperatures and sufficient rainfall. The yield per hectare was above the long-term average, although this was due mainly to the very good yields among the **Aurora** and **Celeia** varieties.

The alpha contents* in crop year 2017 were disappointing. Not only were they far below the very high levels of the previous year; they also failed to come anywhere close to the averages for the last five and ten crop years. However, the combination of larger acreage and higher yield per hectare resulted

in an alpha yield of 134 mt which was comparable with crop year 2016.

Market situation

International demand for Slovenian aroma hops can be described as sustainably stable. At the time of picking, approx. 80% of the crop volume had been contracted forward. Prices varied within a wide range and, depending on when the contracts were signed, they were between 4.20 and 7.00 EUR/kg for **Aurora** hops, between 6.50 and 9.50 EUR/kg for **Savinjski Golding**, between 4.20 and 7.50 EUR/kg for **Celeia** and between 5.00 and 6.50 EUR/kg for **Bobek**.

All the non-contracted hops available were purchased by marketers at rising prices. Prices ranged between 9.00 and 12.00 EUR/kg for **Aurora** hops, between 8.20 and 9.00 EUR/kg for **Savinjski Golding**, between 6.00 and 7.50 EUR/kg for **Celeia** and between 6.00 and 7.00 EUR/kg for **Bobek**. This was the first time that spot prices for **Aurora** hops were higher than for any other aroma varieties. There was a surplus of Slovenian flavour varieties which in some cases were traded at international alpha market prices and therefore failed to find their way to the craft brewers for whom they had originally been intended.

The new forward contracts offered to growers from autumn 2017 were solely for **Aurora** hops.

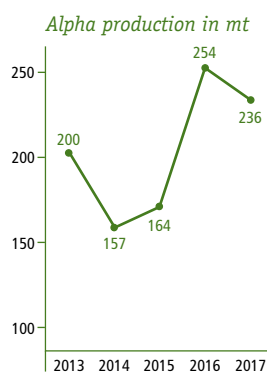
Acreage is expected to rise by approx. 60 ha in crop year 2018. Roughly 50 ha of this area is to be planted with **Aurora** hops.

In spring 2018, forward contracts accounted for approx. 85% of the coming crop. A relatively high proportion of the main Slovenian hop varieties has been contracted forward for the next few years. This contrasts with the other varieties, including flavour hops, which are covered by contract only to a minor extent, if at all. Slovenian hop growers are investing both in production equipment and in acreage expansion.

Forward contract rates up to crop year 2021, page 13

**Alpha acid table, page 10*

POLAND



The addition of rounded acreage figures may lead to differences in totals in some cases.

Variety	Development of acreage Acreage ha			Development of production Ø Yield mt/ha Production mt			
	2016	+/-	2017	2016	2017	2016	2017
Lubelski	415	4	419	1.66	1.52	688.7	639.3
Marynka	-	273	273	-	2.00	-	544.9
Sybillia	85	13	98	1.87	1.91	159.2	188.5
Hallertau Tradition	73	-3	70	2.12	1.89	154.8	132.8
Perle	49	0	49	2.00	2.05	98.2	100.0
Other Aroma	10	14	24	1.64	1.41	16.4	33.3
Total Aroma	632	302	934	1.77	1.76	1,117.3	1,638.8
Hallertau Magnum	494	26	520	2.41	2.15	1,191.9	1,117.5
Marynka	273	-273	-	2.10	-	572.6	-
Magnat	62	40	102	2.11	1.99	130.7	203.7
Other Bitter	14	6	20	2.22	1.66	31.1	33.3
Total Bitter	843	-201	642	2.29	2.11	1,926.3	1,354.4
POLAND TOTAL	1,475	101	1,576	2.06	1.90	3,043.6	2,993.2

Farm structure

In 2017 the number of hop farms rose by a further eight bringing the total number of producers to 625. As there was also an increase in total acreage, the average planted area per farm remained constant at 2 ha.

Acreage/crop volume/alpha content

As expected, the variety that saw the most significant increase in acreage (+65%) was the bitter hop **Magnat**. The acreage planted with **Hallertau Magnum** also increased by 5%. As a result of the reclassification of **Marynka** and **Chinook** hops as aroma varieties, there was a significant reduction in bitter hop acreage in favour of aroma hops. In total, hop-growing acreage in Poland increased by 7%.

Spring work began in mid-April. However, many plants were not pruned until early May. In April and May it was cold with severe frosts in places in early May. Precipitation levels were below average until early June, but unlike the previous year they were spread more evenly across the different growing regions. The hot, dry conditions in the first half of July were followed by a week of heavy rain. The plants showed good potential furthermore.

In the end, the yield per hectare was below the very good yield of the previous year, but was nevertheless above the multi-year average. Combined with the larger planted acreage, this resulted in a crop volume that was only slightly lower than in crop year 2016.

The alpha content of all the varieties was in line with the average for the last five years. Year on year, there was a 7% decline in alpha yield in 2017.

Market situation

When picking began, approximately 75 to 80% of the 2017 crop volume had already been contracted forward or was bound by supply commitments. **Lubelski** hops fetched the highest returns with contract prices of 15 to 27 PLN/kg (3.60 to 6.50 EUR/kg). The prices for the other varieties varied between 13 and 24 PLN/kg (3.10 and 5.75 EUR/kg). The spot market in Poland came to life relatively late compared with other European countries. In contrast to previous years, demand for **Lubelski** hops was significantly lower which can be attributed to the sufficient supply of Saaz hops from the Czech Republic. It was mid-October before growers began to receive offers. The prices were: **Lubelski** 20 PLN/kg (4.80 EUR/kg), **Hallertau Tradition**, **Hallertau Magnum** and **Magnat** 25 PLN/kg (6.00 EUR/kg), **Perle** and **Marynka** 26 PLN/kg (6.25 EUR/kg). By the end of the year the market had been cleared with prices remaining stable.

After harvest, only occasional forward contract offers were received and then only for **Marynka** hops and **bitter varieties** at prices of around 22 PLN/kg (5.30 EUR/kg).

In spring 2018, forward contracts* accounted for approx. 75% of the coming crop. For 2018, acreage is expected to grow by approx. 50 ha with the **Magnat** variety accounting for the predominant share of this expansion.

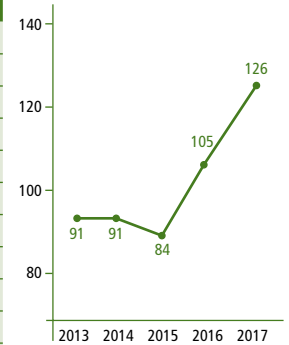
*Forward contract rates up to crop year 2021, page 13

Alpha acid table, page 10

ENGLAND

Variety	Development of acreage Acreage ha			Development of production Ø Yield mt/ha Production mt			
	2016	+/-	2017	2016	2017	2016	2017
Golding	133	8	141	1.91	1.98	254.0	279.5
EK Golding	94	4	98	1.74	2.48	163.2	244.2
First Gold	97	1	98	1.21	1.09	117.8	106.1
Fuggle	86	8	94	1.47	1.63	126.4	152.6
Progress	67	10	77	1.39	1.88	93.1	145.6
Pilgrim	72	-1	71	1.64	2.21	118.1	157.4
Target	76	-9	67	1.57	1.85	119.3	124.1
Challenger	53	6	59	1.74	2.32	92.3	137.7
Sovereign	57	-3	54	1.11	1.24	63.3	66.2
Other	185	23	208	1.49	1.76	276.4	367.3
ENGLAND TOTAL	920	47	967	1.55	1.84	1,423.9	1,780.6

Alpha production in mt



The addition of rounded crop volume figures may lead to differences in the total amount

Farm structure

The number of hop farmers increased in England, too. In 2017 there were 57 – two more than the year before. As there was also an increase in total acreage, the average hop acreage per farm remained unchanged at 17 ha.

Acreage/crop volume/alpha content

Acreage increased by 5% year-on-year in 2017, with the acreage of all the important varieties being adjusted up or down, according to demand.

The growing season began unusually early. In the end, the weather conditions proved ideal for hop growing. Never before had a yield of 1.85 mt per hectare been harvested in England. While the yields of **First Gold** hops were lower year on year, although still within the long-term average, the **East Kent Golding**, **Challenger** and **Pilgrim** varieties produced unprecedentedly high yields.

The alpha acid content of 7.1% was below the average of the previous crop year (2016: 7.4%). Nevertheless, due to the very good yields, alpha production was 20% higher.

Market situation

Farmers had signed forward contracts covering 80% of the expected 2017 crop volume for all varieties. The

level of forward contracting was somewhat lower for the alpha-rich varieties **Target** and **Pilgrim**. Depending on the variety and time of sale, producers received between 6.00 and 11.00 GBP/kg (6.90 to 12.55 EUR/kg) for their hops. The outstanding harvest volume produced considerable quantities of spot hops most of which were able to find buyers at high European market prices. Some varieties were purchased by marketers on the basis of alpha weight. There was no international demand for **East Kent Golding** and **Golding** spots. In the past, farmers supplied these varieties only to their traditional customers. There was therefore virtually no demand from the world market. It may be that unsold lots are being held by growers or growers' organisations.

According to reports, acreage is expected to increase by 3%. Assuming average yields, the existing acreage is sufficient to meet demand.

The forward contract rate for the coming harvest is estimated to be 85% on the basis of average yields.

There is a noticeable mood of optimism among the farmers. This is because of the growing tendency among farm successors to carry on the tradition of hop growing. Interest in modernising the outdated production and harvesting equipment is also rising.

Forward contract rates up to crop year 2021, page 13

FRANCE

Farm structure

As in the previous year, there were 51 active hop growers. In spite of the slight increase in total acreage, the average area cultivated with hops remained constant at around 9 ha per farm.

Acreage/crop volume/alpha content

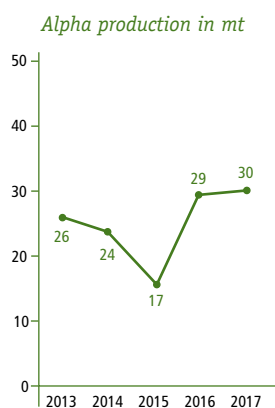
In the Alsace production region, the vast majority of new plantings are **Triskel** aroma hops. The reason for the decline in the acreage of the bitter varieties is the

reclassification of **Brewers Gold** which is now included among the aroma varieties.

The changes in acreage in Northern France are primarily due to the reclassification of hop varieties, affecting not only **Brewers Gold**, but also the varieties **Northern Brewer** and **Target** in this region.

The total acreage planted with hops in France rose by 5%.

FRANCE



The addition of rounded acreage figures may lead to differences in totals in some cases.

Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield mt/ha		Production mt	
		2016	+/-	2017	2016	2017	2016	2017
Alsace	Strisselspalt	186	-7	179	1.79	1.70	332.1	304.0
	Aramis	48	5	53	1.91	1.88	91.5	99.7
	Fuggle	44	5	49	1.45	1.19	63.6	58.1
	Savinjski Golding	42	3	45	1.45	1.33	60.9	60.0
	Triskel	22	17	39	1.44	0.82	31.7	32.0
	Hallertau Tradition	31	-3	28	2.04	1.75	63.1	49.1
	Other Aroma	36	17	53	1.09	1.73	39.3	91.5
	Total Aroma	410	36	446	1.66	1.56	682.2	694.3
	Bitter	22	-12	10	2.20	2.39	48.5	23.9
	Total Alsace	432	24	456	1.69	1.58	730.7	718.2
North	Aroma	11	7	18	1.59	2.03	17.5	36.6
	Bitter	16	-9	7	1.48	1.27	23.6	8.9
	Total Nord	27	-2	25	1.52	1.82	41.1	45.5
FRANCE TOTAL		459	22	481	1.68	1.59	771.8	763.7

*Forward contract rates up to crop year 2021, page 13

The hops in the Alsace region in particular were affected by the heatwave in late June and early July. The rainfalls at the end of July relieved the situation. In August it rained repeatedly which greatly helped the hops to ripen. The early varieties failed to reach their full potential in terms of yield and alpha. On the other hand, the results for the new Alsatian varieties **Aramis**, **Barbe Rouge** and **Mistral** were particularly gratifying. The total crop yield was slightly below the average of the last five years.

The alpha contents of all varieties nationwide were virtually unchanged year on year and thus in line with the long-term average. The alpha acid content of the **Strisselspalt** variety was good with an above-average 1.8%. The alpha yield was up slightly year on year.

Market situation

At the time of picking, approx. 95% of the 2017 crop volume was under contract. After the harvest, the spot market was very dynamic, but it has cooled considerably since the end of 2017. The total volume of hops of the varieties **Barbe Rouge**, **Savinjski Golding** and **Brewers Gold** remaining unsold in this spring was approx. 15 mt. An increase in acreage of approx. 15 ha is expected for 2018.

In spring, the forward contract rate* for this year's crop was 90%.

The French brewing industry is supporting numerous hop-planting projects in all parts of the country. This is mainly driven by craft breweries in search of locally produced raw materials.

USA

The summary below pertains to the traditional growing regions of Washington, Oregon, and Idaho which are also referred to as the Pacific Northwest (PNW) states. New developments outside the PNW states are reported in a separate section (page 26)

Farm structure

The US added two new growers in the Pacific Northwest (PNW) region for crop 2017 which brings the total to 69 hop growers. The average farm size continued its slight upward trend to 312 ha for crop 2017 compared with an average of 307 ha for the previous year. Within the PNW region, the average hop acreage cultivated by Washington growers was 432 ha, followed by Idaho and Oregon with 283 ha and 138 ha respectively. The number of states outside of the PNW growing hops is still thought to be 26, although industry data can only be estimated as these states do not report into the annual USDA grower survey. The average size of the

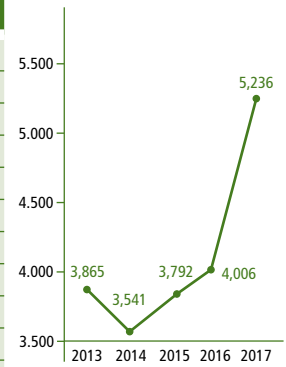
non-PNW hop farms is generally quite small and well below the average farm size in Germany, although a few large farms do exist which are close in size to some of the PNW farms.

The PNW growers continued to invest in land and harvest infrastructure to support the crop 2017 acreage expansion as well as the new acreage coming into full production maturity from the previous year. New harvest facilities and upgrades were installed to accommodate the increased production volumes and mix of aroma-heavy varieties, although the number of such projects has slowed from the previous two years.



Area	Variety	Development of acreage			Development of production				
		Acreage ha			Ø Yield mt/ha		Production mt		
		2016	+/-	2017	2016	2017	2016	2017	
Washington	Cascade	2,259	-278	1,981	1.94	2.38	4,372.7	4,717.0	
	Centennial	1,764	-22	1,742	1.52	1.91	2,679.1	3,325.5	
	Simcoe®	1,525	-6	1,519	1.88	2.01	2,860.1	3,050.6	
	Citra®	1,321	154	1,475	1.73	1.96	2,284.5	2,890.0	
	Amarillo®	757	46	803	1.52	1.89	1,151.0	1,518.2	
	Mosaic®	821	-61	760	2.61	2.73	2,140.7	2,076.5	
	Chinook	573	87	660	1.59	2.00	911.4	1,320.6	
	Ekuanot™	411	-51	360	2.40	3.07	987.6	1,106.1	
	Cluster	252	-1	251	1.91	2.17	480.4	545.6	
	Azacca®	205	29	234	2.09	2.76	429.2	645.7	
	Willamette	295	-64	231	1.43	1.62	421.7	374.5	
	Palisade®	235	-4	231	2.27	2.48	533.5	572.1	
	Other Aroma	1,383	219	1,602	1.79	1.94	2,476.5	3,112.1	
	Total Aroma		11,801	48	11,849	1.84	2.13	21,728.4	25,254.5
	CTZ	1,586	-19	1,567	2.56	3.25	4,068.0	5,092.9	
	Summit™	716	-62	654	1.85	2.32	1,322.4	1,516.1	
	Apollo™	297	-20	277	2.50	3.06	741.8	846.7	
	Bravo™	232	-35	197	2.99	3.33	694.2	655.4	
	Super Galena™	125	51	176	2.81	2.97	351.7	522.3	
	Other Bitter	396	440	836	1.97	2.16	779.7	1,807.0	
Total Bitter		3,352	355	3,707	2.37	2.82	7,957.8	10,440.4	
Total Washington		15,153	403	15,556	1.96	2.29	29,686.2	35,694.9	
Oregon	Cascade	490	-18	472	1.79	1.60	877.2	754.3	
	Willamette	337	0	337	1.76	1.48	594.3	499.7	
	Centennial	293	6	299	1.38	1.43	405.0	426.7	
	Citra®	265	25	290	1.17	1.65	310.6	479.0	
	Simcoe®	134	53	187	2.20	1.59	294.7	297.1	
	Crystal	171	-16	155	2.49	1.98	425.2	307.0	
	Mt. Hood	131	-2	129	1.64	1.61	215.0	207.6	
	Other Aroma	619	58	677	1.61	1.66	995.2	1,122.0	
	Total Aroma	2,440	106	2,546	1.69	1.61	4,117.2	4,093.4	
	Nugget	591	-38	553	2.16	2.04	1,274.8	1,128.5	
	Other Bitter	112	-34	78	2.05	2.33	230.1	181.9	
Total Bitter	703	-71	632	2.14	2.07	1,504.9	1,310.4		
Total Oregon	3,143	34	3,177	1.79	1.70	5,622.1	5,403.8		
Idaho	Amarillo®	270	128	398	1.34	1.76	362.4	699.6	
	Cascade	319	38	357	1.78	1.99	566.5	708.5	
	Citra®	233	74	307	1.36	1.86	316.9	570.5	
	Chinook	169	102	271	1.92	1.87	324.6	505.3	
	Mosaic®	201	1	202	2.47	2.89	495.9	585.4	
	Other Aroma	659	-3	656	1.48	2.04	972.8	1,339.0	
	Total Aroma	1,851	340	2,191	1.64	2.01	3,039.1	4,408.3	
	CTZ	235	174	409	3.09	3.09	726.4	1,263.8	
	Apollo™	95	-3	92	2.12	2.02	201.8	185.9	
	Other Bitter	105	33	138	2.38	2.78	250.1	383.3	
	Total Bitter	435	204	639	2.71	2.87	1,178.3	1,833.0	
Total Idaho	2,286	544	2,830	1.84	2.21	4,217.4	6,241.3		
Total Aroma	16,092	494	16,586	1.79	2.04	28,884.7	33,756.2		
Total Bitter	4,490	488	4,978	2.37	2.73	10,641.0	13,583.8		
USA Pacific Northwest	20,582	982	21,564	1.92	2.20	39,525.7	47,340.0		
Other States	988	24	1,012	0.69	0.84	680.4	850.5		
USA TOTAL	21,570	1,006	22,576	1.86	2.13	40,206.1	48,190.5		

Alpha production in mt



Due to the conversion of acres into ha and from lbs into mt, there may be minor statistical deviations and differences in the sum totals caused by figures being rounded up or down

Acreage and variety development

Hop acreage in the PNW region of the US expanded again in 2017 with an increase of 982 ha (4.8%) putting the total at 21,564 ha grown for the season. This represents the sixth consecutive acreage increase and also the third consecutive record for the largest acreage grown in the US. However, the crop 2017 acreage expansion was significantly smaller compared with the increases of 10 to 17% seen in three of the past four seasons. In addition to the PNW acreage, an estimated 1,012 ha were also grown in the 26 states outside of the PNW region.

Aroma varieties expanded by 494 ha (3.1%), while bitter varieties increased by a similar amount (488 ha), but a larger percentage (10.9%) ending a seven-year

decline for this category. The majority of the acreage changes within the aroma category came from five of the top seven most widely grown aroma varieties.

Industry-leading **Cascade** appears to have peaked in 2016 with a reduction of 257 ha (-8.4%) in 2017. With the exception of **Cascade**, most other leading aroma varieties continued to see acreage expansion including **Citra**[®] (253 ha, 13.9%), **Chinook** (196 ha, 25.0%), **Amarillo**[®] (182 ha, 17.6%), and **Simcoe**[®] (112 ha, 6.4%). Rounding out the top seven, only minor increases were seen with **Centennial** (37 ha, 1.8%) and **Mosaic**[®] (17 ha, 1.6%). Collectively, the top seven varieties accounted for 73.4% of the US aroma acreage for 2017 and remain very popular within the craft beer sector.

Acreage for the main varieties in the PNW has developed as follows over the past five years:

Variety	2013 ha	2014 ha	2015 ha	2016 ha	2017 ha	Percentage of acreage 2017
Cascade	2,140	2,679	2,748	3,068	2,811	13.0%
Centennial	880	1,357	1,807	2,095	2,132	9.9%
Citra [®]	533	727	1,211	1,819	2,072	9.6%
Simcoe [®]	527	763	1,338	1,753	1,865	8.6%
Amarillo [®]	558	582	683	1,035	1,217	5.6%
Mosaic [®]	155	272	728	1,081	1,098	5.1%
Chinook [*]	-	712	723	785	981	4.5%
Willamette	435	469	550	646	620	2.9%
Ekuanot [™]	-	-	182	438	398	1.8%
Crystal	169	191	246	298	278	1.3%
El Dorado [®]	39	59	181	252	276	1.3%
Cluster	325	299	274	259	258	1.2%
Azacca [®]	-	-	71	205	234	1.1%
Palisade [®]	57	90	184	237	233	1.1%
Mt. Hood	157	170	169	171	168	0.8%
Ahtanum [™]	85	79	59	63	150	0.7%
Calypso [™]	-	-	-	116	116	0.5%
Golding	121	133	118	106	105	0.5%
Sterling	-	-	85	144	102	0.5%
Other Aroma	881	1,226	1,471	1,521	1,471	6.8%
Total Aroma	7,062	9,808	12,828	16,092	16,586	76.9%
Columbus-Tomahawk-Zeus (CTZ)	2,493	2,337	2,154	1,820	1,977	9.2%
Summit [™]	1,151	1,021	656	716	654	3.0%
Nugget	834	659	682	666	604	2.8%
HBC 682	-	-	-	110	399	1.9%
Apollo [™]	404	399	402	395	371	1.7%
Bravo [™]	241	287	295	295	259	1.2%
Super Galena [™]	491	361	206	180	231	1.1%
Galena	210	124	136	122	169	0.8%
Eureka [™]	-	-	-	50	132	0.6%
Chinook [*]	722	-	-	-	-	-
Other Bitter	646	389	299	136	182	0.8%
Total Bitter	7,192	5,577	4,830	4,490	4,978	23.1%
USA TOTAL	14,254	15,385	17,658	20,582	21,564	100.0%

The addition of rounded acreage figures may lead to differences in totals in some cases



The increase in bitter acreage came primarily from three varieties led by **HBC 682** (289 ha, 263%), a new proprietary bitter variety from the Hop Breeding Company, followed by **CTZ** (+157 ha, 8.6%) and **Eureka™** (82 ha, 164%). **CTZ** remains the leading US bitter variety with a 40% share of the category, although for 2017 **CTZ** was overtaken by **Citra®** and drops from third to fourth on the overall acreage list. Acreage changes for the remainder of the bitter varieties consisted of a mixed bag of slight increases for **Galena** and **Super Galena™** as well as slight decreases for **Summit™**, **Nugget**, **Apollo™** and **Bravo™**.

Crop volume

The crop 2017 growing season in the PNW commenced after a rather cold and snowy winter followed by a wet and cool spring which presented challenges for the early season field work. However, in contrast to the previous two seasons, the cool spring allowed for a more gradual transition into the warmer summer months which was conducive to early-season growth of the hop plants. Although the summer months experienced above-normal temperatures, the winter snowpack provided ample irrigation water throughout the Yakima Valley. Idaho and Oregon also had no water issues throughout the growing season. Growing conditions throughout the season were generally quite favourable which was evident as the crop growth further developed over the summer months. A two-week heat spell of 38 °C and above was experienced in late July and into early August. The heat had a slight impact on the baby crop and brought on mite pressure, but was not detrimental to the crop in general. The incidence of powdery mildew throughout the season was light to moderate and successfully controlled. In early August the USDA pre-harvest grower survey estimated the crop at 44,225 mt for the PNW which was a further indication of a strong average crop in the

making. The positive crop outlook carried on into the harvest season which was accompanied by favourable weather conditions. The early-maturing aroma varieties produced average to above-average yields with several in the range of 20 to 25% above long-term averages including **Centennial**, **Citra®** and **Mosaic®**. **Centennial**, a variety that has been prone to low and inconsistent yields over the past four crops, did particularly well at roughly 26% above long-term average. Yields of other aroma varieties including **Cascade**, **Cluster**, **Amarillo®**, **Simcoe®** and **Willamette** were not quite as strong, but still 5 to 12% above average. Collectively, yields for the aroma category were up about 14% from long-term averages. The bitter varieties looked very good heading into harvest, particularly in Idaho. However, the alpha crop did not finish as strongly as expected, with **CTZ** coming in about 8% above average and the alpha category as a whole about 4% up. Nonetheless, alpha yields were much improved from the poor yields experienced in 2016. Furthermore, alpha content was up considerably across all varieties and for the alpha category in particular alpha content was up 5 to 10% depending on variety. As a result of the favourable growing conditions and harvest, the overall crop yield per hectare was about 10% above long-term averages and 14.5% above crop 2016 yields.

Total production for crop 2017 as reported by the USDA following harvest was 47,340 mt for the PNW region, up 20% (7,814 mt) over crop 2016 as a result of good yields and acreage expansion. Aroma production increased by 17% (4,871 mt), while bitter production was up 28% (2,943 mt) which reflects some shifting of acreage into bitter varieties. The quality of the crop was good/normal, as disease and pest pressure was relatively moderate and controlled throughout the season.

Alpha acid table

Variety	2013	2014	2015	2016	2017	Average
Nugget	14.4%	13.5%	13.6%	12.6%	12.5%	13.3%
Columbus-Tomahawk-Zeus (CTZ)	15.5%	14.5%	13.8%	15.0%	15.4%	14.8%
Bravo™	15.2%	14.6%	14.4%	15.5%	13.9%	14.7%
Summit™	16.7%	15.8%	15.9%	16.7%	15.9%	16.2%
Apollo™	17.9%	18.2%	17.5%	17.5%	16.0%	17.4%

Market situation

Contract market

As evidenced by the 2017 acreage expansion of a moderate 5% compared with the double-digit increases in recent years, forward grower contracting activity following the crop 2016 harvest slowed considerably. Furthermore, the activity that did occur shortly after harvest was no longer focused primarily on aroma varieties, but was more evenly distributed between

aroma and bitter hops. Contracts were written for a mix of new plantings and existing acreages coming open in crop 2017. For the latter, contract periods were much shorter than seen in recent years, with terms ranging from one to three years rather than four to five years when required to support land and infrastructure investments.

Within the aroma category, late in 2016 new contracts were written for several proprietary varieties including **Citra**[®], **Simcoe**[®], **Amarillo**[®] and **Mosaic**[®] at prices that would generally provide grower returns in the range of 28,500 to 31,000 USD/ha with some pricing slightly higher still depending on the variety. The contracts written at this time appear to have coincided with the peak of the current aroma bull market. Contracting activity for public aroma varieties never gained momentum following the crop 2016 harvest. In late winter/early spring of 2017 only sporadic purchases were made for some of the larger varieties including **Cascade**, **Centennial** and **Chinook** which were generally contracted for one or two years at prices bringing grower returns of 21,000 to 25,000 USD/ha. While **Centennial** acreage remained relatively flat from 2016 to 2017, US leader **Cascade** saw acreage drop by 8.4% (-257 ha).

Contracting of bitter varieties also occurred during the months following the crop 2016 harvest and continued at a moderate but somewhat steady pace relative to aroma activity. Contracts were written for bitter varieties including **CTZ**, **HBC 682** and **Eureka**[™] for one to three-year periods at prices generally in the range of 44.00 to 48.50 USD/kg alpha, with some pricing falling outside this range. By early summer almost all contracting activity had come to a standstill.

Spot market crop 2017

The above-average crop produced sizeable spot volumes of both aroma and bitter varieties. While large spot volumes existed for both **Cascade** and **Centennial**, interest in these spots was limited and generally centred on the alpha content to meet the generic alpha needs of the brewing and non-brewing markets at generic alpha prices. Given the relatively low levels of alpha in these varieties, spots sold in the range of 2.20 to 5.00 USD/kg with most volumes eventually sold. However, for other aroma varieties including **Chinook**, **Willamette**, **Mt. Hood** and **Cluster**, spots were generally sold at near to contract prices. Approximately 42% of the PNW production for crop 2017 consisted of proprietary varieties (20,000 mt) such as **Citra**[®], **Simcoe**[®], **Amarillo**[®], **Mosaic**[®] and others. While most of these varieties produced above-average yields, most are also contracted on a “full production” basis and, therefore, do not provide spot hops to be sold on the open market.

With bitter varieties, the spot market was fairly active and gained strength throughout the harvest as reports were received on the downgraded bitter yields from the German crop. The escalation of spot pricing in Germany spread to the US market and largely influenced the rise of spot pricing in the US. As a result, spot pricing in the US for **CTZ** ranged from 48.50 USD/kg alpha to a high of approximately 73.00 USD/kg alpha, with some spot volumes leveraged into forward contracts. **Nugget** spots were also picked up at prices that levelled off at around 53.00 USD/kg alpha. The alpha market activity continued for a few months following harvest but had simmered down by the holidays.

Outside the Pacific Northwest

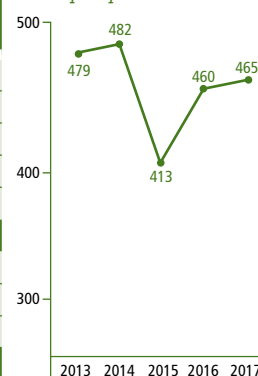
Based on industry estimates, the 26 states growing hops outside the PNW region harvested a crop of 850.5 mt off 1,012 ha in crop year 2017. The production volume amounts to about 2% of total US production, while the acreage accounts for 4% of the total US acreage base. Crop yields were reported to be average, although still below the yields seen in the PNW region. Growing conditions in some of the larger non-PNW states were challenging with cool, wet weather in the spring followed by above-normal temperatures in the summer months. Downy and powdery mildew pressure was also prevalent throughout the Midwest and East Coast regions.

Six states accounted for 80% of the acreage grown outside the PNW led by **Michigan** at 33% (328 ha), followed at a distance by **New York**, **Wisconsin**, **Colorado** and **Minnesota**. Similar to the PNW region, the 2017 acreage expansion in the non-PNW states slowed considerably from previous years as result of overall US supply catching up with demand. Several of the larger farm operations continued to invest in infrastructure to support yield and quality improvement. Most of the non-PNW farms are growing mainstream US public varieties such as **Cascade**, **Centennial**, **Chinook** and **Nugget**, although a multitude of other varieties is being grown on very small scales. Generally, the large US proprietary varieties are not seen outside of the PNW region due to concerns about terroir-related flavour influences.



Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield mt/ha		Production mt	
		2016	+/-	2017	2016	2017	2016	2017
Xinjiang	Tsingtao Flower	854	1	855	3.18	2.99	2,716.0	2,556.0
	SA-1	467	0	467	1.80	1.61	840.0	750.0
	Kirin Flower	193	0	193	3.61	3.63	696.0	700.0
	Marco Polo	133	0	133	3.76	3.76	500.0	500.0
	Total Xinjiang	1,647	1	1,648	2.89	2.73	4,752.0	4,506.0
Gansu	Tsingtao Flower	682	134	816	2.41	2.64	1,642.0	2,152.0
	Bitter	281	-104	177	2.40	1.94	675.0	344.0
	Aroma	29	13	42	1.12	1.00	32.4	42.0
	Total Gansu	992	43	1,035	2.37	2.45	2,349.4	2,538.0
	Total Aroma	496	13	509	1.76	1.56	872.4	792.0
	Total Bitter	2,143	31	2,174	2.92	2.88	6,229.0	6,252.0
	CHINA TOTAL	2,639	44	2,683	2.69	2.63	7,101.4	7,044.0

Alpha production in mt



General information

There are no reliable statistics on acreage and production volume in China. Due to the size of the Chinese hop-growing regions the figures presented here are often based on estimates and have been gathered using our own sources.

Farm structure

In the **Xinjiang** region with its 15 farms, both the number of hop producers and the average planted area of 110 ha remained unchanged. In the **Gansu** region, on the other hand, hop growing was discontinued on one state-run farm. The remaining nine farms grew hops on an average area of 115 ha per farm, up from 99 ha the previous year following an expansion in acreage. In total, there were 24 producers farming hops in China in crop year 2017 (2016: 25 producers). The average planted area rose from 106 ha to 112 ha per farm.

Acreage/crop volume/alpha content

The only changes in acreage were in the **Gansu** hop region. Acreage increased only moderately nationwide, with slightly more acreage being devoted to aroma varieties and slightly less to bitter varieties.

Weather conditions varied widely – not only between the two production regions which are approx. 1,200 km apart, but also within the regions. In **Xinjiang** both the average temperature and the average precipitation volume were higher than normal. Various meteorological catastrophes were reported. In the west of South Xinjiang, the level of rainfall in July and August was 90% higher than usual. This weather encouraged the incidence of downy mildew

with adverse effects on hop quality. In the north of Xinjiang, on the other hand, growing conditions were good. The production yield of 2.73 mt/ha slightly exceeded the long-term average.

In **Gansu** the temperatures in March and April were slightly lower than usual. Low temperatures in June slowed plant growth. Otherwise conditions were suitable for hop development – neither too hot, nor too cold. The absence of rain between 8 August and 8 September made picking easier. The adoption of picking machinery by most of the growers by now has led to a decline in quality and yield in **Tsingtao Flower** hops. The production yield of 2.45 mt/ha was slightly below the long-term average.

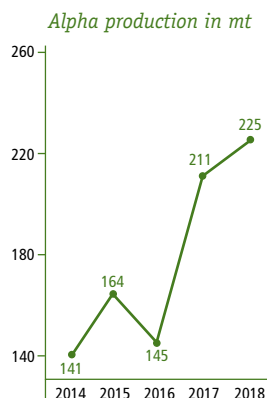
The alpha acid content of Chinese hops in crop year 2017 averaged 6.6% which was roughly on a par with the previous year. Likewise, both the production and alpha yields were around the same level as in the previous year.

Market situation

In China there is nothing comparable to the forward contract market in Europe or the USA. Instead, it is customary for farmers and buyers to conclude purchase agreements. These agreements only contain specifically defined quantities and qualities. The actual price is settled at a later date.

With the exception of a small residual quantity, the 2017 crop is sold out. The average price for bitter varieties was higher than that paid for the traditional variety **Tsingtao Flower**. Bitter hop acreage is likely to increase slightly in 2018.

CROP 2018: AUSTRALIA



The addition of rounded acreage figures may lead to differences in totals in some cases

Area	Variety	Development of acreage			Development of production			
		Acreage ha			Ø Yield mt/ha		Production mt	
		2017	+/-	2018	2017	2018	2017	2018
Tasmania	Galaxy™	104	8	112	2.56	2.85	265.8	319.2
	Super Pride	40	0	40	1.83	2.44	72.5	96.9
	Ella™	37	0	37	2.50	2.33	92.4	85.8
	Pride of Ringwood	13	0	13	3.33	3.79	43.0	49.0
	Other	82	-24	58	1.55	1.28	127.2	74.0
	Total Tasmania	276	-17	259	2.18	2.41	600.9	624.9
Victoria	Galaxy™	170	12	182	2.07	2.41	351.8	437.8
	Vic Secret™	51	24	75	2.90	2.70	149.0	203.2
	Super Pride	52	0	52	2.42	2.15	127.0	112.7
	Pride of Ringwood	47	0	47	2.02	2.02	95.0	95.0
	Topaz	22	1	23	3.33	2.97	72.6	69.2
	Ella™	13	0	13	3.26	3.06	42.0	39.5
	Total Victoria	355	38	393	2.36	2.44	837.4	957.4
AUSTRALIA TOTAL		631	21	652	2.28	2.43	1,438.3	1,582.3

Farm structure

As a result of the increase in total acreage, the average area farmed by the six producers rose from 105 ha to 109 ha per farm.

Acreage/crop volume/alpha content

Demand for the proprietary varieties **Galaxy™** and **Vic Secret™** was met thanks to new plantings of these two varieties. Production of varieties in low demand was further reduced. While hop growing declined in the production area of Tasmania, acreage increased in the Victoria region. In total, acreage in Australia increased by 3%.

In Tasmania, plant development began with strong growth in October and November. In December, the volume of rain that fell in just two days was equivalent to the average for an entire summer, and soil temperature dropped from 16 °C to 12 °C. As a consequence, the varieties **Cascade** and **Enigma™** came into burr early and failed to achieve the expected yields. The season also started well in the Victoria region. However, repeated periods of heavy rainfall and wind proved challenging. With a yield of 2.43 mt/ha, the 2018 Australian harvest was in line with the average for the last five years.

*Forward contract rates up to crop year 2021, page 13

Average alpha contents varied: some were below the previous year's values, some above. Results for the three main hop varieties compared with the previous year: **Galaxy™** 14.6% (2017: 15.4%), **Super Pride** 12.0% (2017: 14.6%), **Vic Secret™** 18.4% (2017: 18.1%). The higher crop volume resulted in an increase in alpha yield of 7%.

Market situation

The varieties **Cascade**, **Enigma™** and **Super Pride** failed to meet expectations. The volumes sold exceed the volumes produced. Shortly after harvest, around 200 mt of hops were destroyed by fire. Worst hit were the varieties **Pride of Ringwood** and **Super Pride**. Given the large forward-contract volume nationally, only limited quantities of hops harvested in 2018 will be available on the spot market.

The contract rate* for hops picked in crop year 2019 already stood at 85% in May 2018.

Hop Products Australia (HPA) is working intensively on releasing a number of new aroma varieties.

HOP PLANT DEVELOPMENT 2018

Germany (Hallertau)

2018 began with mild weather and plentiful precipitation in January, followed by the onset of winter in February with frosty temperatures falling to below -10 °C. This period of cold weather led to good frost action in the upper soil layer, leaving the soil in good condition by the end of the winter.

In contrast to previous years, temperatures in March were significantly cooler. The ground was even covered

with snow for a short period. In addition, due to repeated precipitation the soil was unable to dry out. Consequently, the hop gardens were unsuitable for vehicles which meant that spring work could not be started until towards the end of the month. Crown pruning was, therefore, delayed until the first third of April in many of the hop gardens.

In April the weather changed completely. From then on, warm and dry weather conditions accompanied by above-average sunshine predominated. Due to the warm temperatures the hop plants grew rapidly and quickly made up for the previous retardation in their development. Training began slightly earlier than usual and often had to be done under considerable time pressure as the hop shoots continued to develop at a very fast pace.

The warm temperatures, accompanied at times by plentiful rainfall continued in May providing ideal growing conditions. The hop plants developed rapidly and by the end of May they were 10 to 14 days ahead of the long-term average development stage.

USA (Pacific Northwest)

In the Pacific Northwest growing region, the temperatures in the late winter of 2017 and in January/February 2018 were above average, while precipitation was below the anticipated level. By late

February, however, temperatures had cooled and returned to normal, while the mountain snowpack exceeded normal levels as a result of heavier-than-usual late winter precipitation. Temperatures remained cool throughout the remainder of the winter and into early spring. With good water levels in the mountain reservoirs in PNW promising an adequate supply for the 2018 growing season, no water shortages are expected. The cool conditions in spring allowed the hop plants to develop within the usual time frame. The spring weather conditions were also favourable for digging up hop crowns and planting rhizomes for new acreage as well as for performing the early-season field work. Pruning and training were carried out at the usual time and by mid-May all the hop vines had been trained. Despite the high temperatures in early May, conditions have generally been favourable and normal at this early stage of the growing season in all growing areas of the Pacific Northwest.

OUTLOOK 2018

Germany

In 2018, hop acreage has risen for the fifth year in succession, this time by 601ha (3.1%), to reach 20,144 ha. It is 21 years since hop acreage in Germany was last as large as this. However, the number of hop producers has fallen by a further 11 to stand at 1,121 farms. The average hop acreage of 18 ha per farm is a new record for Germany.

Although the acreage planted with **aroma varieties** has risen by 95 ha (0.9%) to 11,185 ha, this variety group's share of total acreage has fallen from 56.7% to 55.5%. Acreage expansion among the aroma varieties was mainly confined to **Spalt Select** (45 ha), **Saphir** (42 ha), **Perle** (37 ha), **Amarillo** (20 ha) and **Saaz** (19 ha). The varieties cut back were primarily **Hallertau Mittelfrueh** (-35 ha), **Mandarina Bavaria** (-35 ha) and **Huell Melon** (-17 ha).

The area planted with **bitter varieties** has grown by 506 ha (6.0%) to 8,958 ha. Their share of total acreage has risen from 43.3% to 44.5%. While **Herkules** acreage has increased by 512 ha to 6,309 ha and **Polaris** acreage has risen by 51 ha to 225 ha, all the other bitter varieties have seen a decline in acreage.

Herkules has consolidated its position as Germany's most important hop variety and now accounts for 31.3% of total acreage.

The five aroma flavour varieties **Mandarina Bavaria**, **Hallertau Blanc**, **Huell Melon**, **Callista** and **Ariana** have seen their combined acreage decline by 47 ha to 769 ha which corresponds to an acreage share of slightly below 4%.

USA (PNW)

As reported by the US Department of Agriculture, a total of 22,395 ha has been strung for the crop 2018 season in the Pacific Northwest region – an increase of approximately 831 ha (4%) over crop 2017. The craft-fuelled acreage expansion continues in the US at a similar rate to last year (5% for crop 2017), but is much lower than the double-digit expansion rates seen over the past five years. Furthermore, many adjustments are occurring within the **aroma varietal mix**, as accompanied by a slight upward trend into **bitter varieties**.

Aroma acreage overall has remained virtually flat, with a slight decrease of 27 ha which compares to a modest 3% increase seen in the previous year. **Citra**® is the standout with the largest increase at +620 ha (30%), surpassing both **Centennial** and **Cascade** to become the number one variety grown in the US at 2,692 ha. Only moderate increases are seen for a few other varieties including **Chinook** at +168 ha (17%) and **Mosaic** +22 ha (2%), while many other aroma varieties including **Amarillo**®, **Willamette**, **Ekuanot**™, and **Golding** remain flat or have minor decreases for crop 2018. Several of the larger aroma varieties have decreased, led by **Cascade** at -379 ha (13%), **Simcoe**® -280 ha (15%), and **Centennial** -164 ha (8%).

The acreage of **bitter varieties** has increased by 858 ha (17%) for crop 2018 led by **CTZ** at +493 ha (25%), followed by **HBC 682** at +291 ha (73%) and **Eureka**™ at +88 ha (67%). Total bitter acreage stands at 5,836 ha, which puts the category at a 26% share of

total US acreage compared to 74% for aroma varieties, up from a 23% share a year ago.

Craft-dominant **Cascade** has been the leading US variety for four consecutive years, but with crop 2018 it falls to third place, its 10.9% share being surpassed by both **Citra**® (12%) and **CTZ** (11.0%), while **Centennial** has fallen from second to fourth position with a share of 8.8 %.

World

Hop acreage in 2018 has grown worldwide by approx. 1,670 ha and thus by 2.8% to roughly 60,400 ha. It is 21 years since world hop acreage last equalled this figure. The principal beneficiary of the increase is the bitter hop segment which has seen supply shortages in recent years. New plantings of alpha-rich bitter hop varieties in Germany and the USA, covering 500 ha and 860 ha respectively, account for more than 80% of world acreage expansion.

KEY DATA

Development of the key economic indicators for the world's four largest economies in the last three years

The figures for 2015 and 2016 have been revised according to the latest statistics and subsequent recalculation

*) Interest rate for 10-year bonds. China: Lending rate for long-term loans

		GDP growth (real)	Balance of payments in USD bn	Balance of trade in USD bn	Inflation rate Ø	Interest rate Ø*	Unemployment (as of 31.12.)
USA	2015	2.9%	-434.6	-761.9	0.1%	2.14%	5.3%
	2016	1.5%	-451.7	-752.5	1.3%	1.84%	4.9%
	2017	2.3%	-466.2	-811.2	2.1%	2.33%	4.4%
China	2015	6.9%	330.6	567.0	1.4%	5.46%	4.0%
	2016	6.7%	196.4	494.1	2.0%	4.90%	4.0%
	2017	6.8%	199.5	498.2	1.6%	4.90%	3.9%
Japan	2015	1.4%	134.0	-7.4	0.8%	0.35%	3.4%
	2016	0.9%	187.3	51.1	-0.1%	-0.07%	3.1%
	2017	1.7%	195.0	43.8	0.5%	0.05%	2.8%
Germany	2015	1.5%	289.8	289.6	0.2%	0.52%	6.4%
	2016	1.9%	286.6	297.2	0.5%	0.13%	6.1%
	2017	2.5%	287.2	307.5	1.7%	0.35%	5.7%

These exchange rates can only serve as an indication. They vary from bank to bank and are not binding

Currency exchange rates					
1 EUR equals (reference by ECB):					
	on 1 June 2017	on 1 June 2018		on 1 June 2017	on 1 June 2018
Australia	1.5182 AUD	1.5494 AUD	Poland	4.1830 PLN	4.3162 PLN
China	7.6389 CNY	7.4883 CNY	Russia	63.5329 RUB	72.5972 RUB
United Kingdom	0.8723 GBP	0.8768 GBP	Switzerland	1.0883 CHF	1.1531 CHF
Japan	124.5300 JPY	127.7400 JPY	Czech Republic	26.3970 CZK	25.8270 CZK
Canada	1.5155 CAD	1.5142 CAD	USA	1.1219 USD	1.1669 USD

Conversion table weights and measures					
Area:			Weight:		
1 hectare (ha)	= 10,000 m ²	= 2.471 acres	1 metr. ton (mt)	= 1,000 kg	= 20 Ztr. (DE) = 2,204.6 lbs
1 acre		= 0.4047 ha	1 Zentner Ztr. (DE)	= 50 kg	= 110.23 lbs = 1.102 cwt (US)
					= 110.23 lbs = 0.984 cwt (GB)
			1 hundredweight (cwt/USA)		= 100 lbs = 45.36 kg
					= 0.9072 Ztr.
			1 hundredweight (cwt/GB)		= 112 lbs = 50.800 kg
					= 1.0160 Ztr.
Volume:			1 centner (GB)		= 100 lbs = 45.36 kg
1 hl = 100 l		= 26.42 gall = 0.8523 bbl (US)			= 0.9072 Ztr.
1 hl = 100 l		= 22.01 gall = 0.6114 bbl (GB)	1 kg		= 2.20462 lbs
1 barrel (bbl/USA)		= 31 gall = 1.1734 hl	1 lb		= 0.45359 kg
1 barrel (bbl/GB)		= 36 gall = 1.6365 hl			

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HOP FLAVOURIST COURSES

“I smell Hallertau Tradition, crop year 2016 – harvested a little too early for my liking ...”

This, or something like it, could be your assessment of a hop aroma once you have successfully completed levels 1 to 5 of our Hop Flavourist course. In these course modules you will learn everything about hop aroma and hop flavour. Hops give the beer its soul, and there are now roughly 300 different hop varieties worldwide – each of them with its own unique aromas. In recent years, hop breeding institutes and also private hop breeding companies have been releasing new varieties with new and exciting aromas virtually on an annual basis.

Our course content is designed to teach you the language of hops and how to describe the different hop aromas. Our goal is to expand your sensory memory and train it with everything there is to learn about hop aromas. People find it difficult to describe in words the aromas that they perceive because this skill was never required for survival. The only important thing was to be able to immediately

identify the hop aromas of certain hop varieties. The course objective is to be able to identify hops according to variety, production region and time of harvest.

The theoretical parts of the course also include basic hop knowledge as standard. All the important facts about hop growing and harvesting and the hop market are taught. The subject of hop aroma in beer is also covered in detail and the necessary background knowledge regarding the brewing process and hopping techniques is addressed in depth. Each course module includes a craft beer tasting (initially guided) to present the range of hop aromas in beer.

A brewing or food technology background is an advantage, but not a prerequisite for course participants. An additional advantage is a passion for cooking or brewing because in that case a great deal of basic knowledge of aroma and flavour description is

Level 1 Connoisseur – Basic sensory training with natural substances (fruits, spices, etc.). Basic sensory training with very different and well-known hop varieties.

Level 2 Sommelier – Advanced sensory training with selected natural substances. Subsequent sensory training with several hop varieties.

Level 3 Sniffer – Sensory training with a focus on certain categories. Sensory training with hop varieties, with a focus on distinguishing between similar hop varieties.



Level 4 Clairvoyant – Sensory training with a focus on certain categories. Sensory training with hop varieties, with a focus on identifying similar hop varieties.

Level 5 Master – Sensory training refresher. Focus on sensory work with hop varieties. Classification and identification of certain varieties with regard to production area and time of harvest.

distinguish between good aromas (a signal for important nutrients) and bad aromas (a signal for potential poisons). This did not require any words. Therefore, the connection in the human brain between the language centre and aroma perception is poorly developed, but that is something we will be working on. By dividing the course into five levels, we allow you to decide how deeply you want to immerse yourself in the sensory world of hop aromas. Each level consists of two days offering a total of 14 hours of knowledge building about the subject of hops with a focus on sensory training. As you progress up through the levels, we will expand your sensory capabilities so that you are able to classify and even

already established. A good memory is useful for storing away the aromas taught in the course modules for later recall. Creativity is also a good prerequisite for our courses because we will try to create and deconstruct hop aromas as an artist does with his colours. And if you now think this is not for you because you're not a good taster, you can take from us: there is no such thing as a bad taster – it is only a question of training your receptors and your brain accordingly and regularly.

Our Hop Flavourist courses kick off in September 2018 on the Barth-Haas Campus in Nuremberg. For current course dates please visit: www.hopsacademy.com

Our thanks go to all those bodies and individuals who provide us with information and thus contribute to the success of the Barth-Report.

